

PRIVATE SECTOR INVOLVEMENT IN SOLID WASTE MANAGEMENT IN THE
KUMASI METROPOLITAN ASSEMBLY

BY

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DECLARATION

I hereby declare that this submission is my own work towards the M.PHIL and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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DEDICATION

This thesis is dedicated to my lovely daughter, Nana Ayiwah Agyemang Pearl and all who contributed in diverse ways to its success. May God richly bless you all.



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I am most thankful to God for his protection and for seeing me through the successful completion of this study and the master's programme.

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ABSTRACT

This study examined the involvement of the private sector in the management of solid waste in the Kumasi metropolis. The main tools used in the collection of the data were household survey, key informants interviews, structured interviews and focus group discussions. Quantitative data were displayed using tables, graphs and charts while qualitative data were used through the use of direct quotations from respondents. The study reveals that solid waste collection and disposal have improved significantly since the involvement of the private sector in solid waste management in the KMA. The study also found that the level of performance in terms of efficiency and service quality of the private companies were higher than the KMA/WMD after the involvement of the private sector in solid waste management. The study further observed that the capacity of the private companies in terms of equipment holdings and operational qualities of the waste companies accounted for the higher level of performance of the companies. In spite of all these efforts by the private waste companies the metropolis is still challenged with poor solid waste management situations. Waste collection in the various communities has not been regular especially at the low income and middle income communities resulting in heap of refuse and overflow of waste from bins and skips at the communal collection sites. Government through the KMA has not been responsible enough to make prompt payments to private waste companies rendering them ineffective in their operations.

In the light of these problems, the study recommended adequate supply of waste bins, skips and regular collection of waste by the waste companies. It is also recommended that, the Government/KMA should see to the prompt payment of the monies meant for the companies and also intensify their monitoring system to avoid shoddy work. In-service training should be organized for the companies by the KMA on a quarterly basis to help them update their activities.

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LIST OF ABBREVIATIONS

ACC.....	Accra City Council
CBD.....	Central Business District
DELM.....	Department of Environment and Land Management
EPA.....	Environmental Protection Agency
FDI.....	Foreign Direct Investment
ISWM.....	Integrated Solid Waste Management
KMA.....	Kumasi Metropolitan Area
KMA.....	Kumasi Metropolitan Assembly



KMAWMD.....	Kumasi Metropolitan Assembly Waste Management Department	
KWMD.....	Kumasi Waste Management Department	
KWML.....	Kumasi Waste Management Limited	
LMIC.....	Low and Middle Income Countries	
MERC.....	Micro Enterprise Refuse Collection	
MLGRD.....	Ministry of Local Government and Rural Development	
MMDAs.....	Metropolitan, Municipal and District Assemblies	
MSW.....	Municipal Solid Waste	
MSWM.....	Municipal Solid Waste Management	
NEPAD.....	New Partnership for African Development	
PAYD.....	Pay-As-You Dump	
PPPs.....	Public-Private Partnerships	
PPP.....	Polluter Pays Principle	
PSE.....	Private Sector Enterprise	
PSP.....	Private Sector Participation	
PSI.....	Private Sector Involvement	
RCRA.....	Resource Conservation and Recovery Act	
SWM.....	Solid Waste Management	
SWM.....	Sustainable Waste Management	
UESP.....	Urban Environmental and Sanitation Project	
UK.....	United Kingdom	
UNDP.....	United Nations Development Project	

USEPA..... United States Environmental Protection Agency

WMD..... Waste Management Department

WCED..... World Commission on Environment and Development



CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background

The widely held view that the world is experiencing the most spectacular change in its history as countries are urbanizing at an unprecedented rate with more than 50% of the current population living in cities is without doubt (UN-Habitat, 2010; Ahmed and Dinye, 2011; Oteng-Ababio, 2014). Statistics from the UN Habitat, 2010 further indicates that the world's population increased from three billion in October 1950 to seven billion in October 2011. Projections are that by 2050, seven out of ten of the global population will live in urban centres (Montgomery, 2009). The greatest impact of the urban revolution will be felt in sub-Sahara Africa than the rest of the world. This is evidenced from a UN report which suggests that as at the end of 2011, 414 million Africans lived in cities, and this figure is expected to rise to 662 million by 2050 (UN- Habitat, 2010). It is however important to state that this projection will materialised on the assumption that the current urban revolution will continue.

The high concentration of people in the emerging cities in sub-Sahara Africa has implications for solid waste generation whose management endures as an increasingly arduous challenge for residents and governments (Oteng-Ababio, 2014), even though researchers (Annez et al., 2010; Owusu-Sekyere, 2014; Oteng-Ababio, 2014) have made a strong case that when properly handled, solid waste may become valuable resources. For instance, in Accra and Kumasi, the two largest cities in Ghana and in many other cities and towns, scavengers and waste pickers are increasingly seen scavenging for some waste (plastics, scrap metals and e-waste) as a 'new' source of raw material for the plastic and steel industries.

Municipal solid waste management (MSWM) has long been a considerable and unrelenting challenge for municipal leaders and waste management departments in cities of low-middle income countries (LMICs), particularly in Sub-Saharan Africa. The attendant forces behind these conditions range from weak municipal organizational capacity and internally generated revenues Wilson et al, (2006); over-simplified expectations on public-private partnerships to achieve “overnight” sustainability of service provision Ali (2010); and lack of community participation in strategic plans and projects; to poorly designed collection, transport and disposal systems (UN-HABITAT, 2010).

In a number of these cities there is such pressure to attenuate the uncontrolled dumping of waste and associated disease outbreaks such as cholera and malaria in part due to mosquito breeding in choked primary and secondary drainage networks that a tendency arises for city managers to seek technological “solutions” often originating from Western countries that perceive to yield exponential results in short time (UN-HABITAT 2010). Leaders from cities in LMICs participate in “peer to peer exchanges”, visiting “sister” cities in Northern and Western Europe and North America, returning home with the notion that those same technologies can effectively be superimposed onto their city’s environmental, social and political contexts. On the other side of the equation, companies specializing in these technologies purport to have the capacity to import these systems at little (often in exchange for a waste quota and/or land tax holidays) or zero cost to the local government (Ali, 2010).

The outcome more often than not is a circumventing of the characteristics of local waste streams and the in-situ innovations for treating them, and a subsequent realization on the part of the

company after conducting local waste stream analyses that their technology would fail to recover long-run costs. Worst yet, the capital-intensive system incurs a near or total breakdown as a result of incompatibility with the realities of the institutional and waste stream-specific makeup of its surrounding socio-economic and environmental system. Such realities include little to no source separation initiatives at community scale and the parallel community sensitization to make it work, ill-conceived by-laws intending “overnight” transition from one collection mode to another, and insufficient data on the physical/chemical properties of waste streams, including its combustibility and moisture content. What remains is further frustration on the part of city managers, and their constituents, who continue to bear the brunt of what seems to be heaps of time being added to surging mounds of decomposing waste.

The demand for proper solid waste management infrastructure continues to grow dramatically while governments at all levels struggle to balance their budgets. As a result, state and local governments are looking more and more to nontraditional sources of financing for their solid waste management infrastructure and operating needs. As noted by Awortwe (2004), the need to secure a more non-conventional source of funding is the results of the disintegration of political and economic structures during the 1980s in sub-Saharan Africa (SSA), which brought a sharp decline in the provision of basic services. During this period, the delivery and management of sanitation services were still poor and large segments of the population were left out (Karanja, 2003; Awortwe, 2004). Many cities in particular were described as being „in crisis“ following governments’ failure to maintain existing services, let alone provide new ones. Cities in the subregion were characterized by piles of garbage at public places while drains were choked resulting in floods and occasional outbreaks of epidemics whose impact extended beyond the geographical boundary of any particular city (Kaseva & Mbuligwe 2005).

In Ghana and like in many sub-Saharan Africa countries, available records suggest a waste generation rate of approximately 0.5kg per person per day (see Oteng-Ababio 2014), and in some cases reaching as high as 0.8kg per person per day and most of the waste remains uncollected (Owusu-Sekyere, 2012). This tendency presents a worrying situation since according to OwusuSekyere (2012), in the next 25 years, both low and middle-income countries will experience about a three-fold increase in their overall waste quantities and volumes, while most developed countries will stay relatively constant. As a response strategy, Oteng-Ababio (2012) observes that city managers in sub-Saharan African (SSA) have embraced public-private partnership (PPP) approach as a sustainable means of solid waste management. As observed by Hardoy *et al.* (2001), in most cases, governments and waste managers talk about PPP in public sector enterprise only in terms of „formal sector“ companies but do not recognize the role played by some informal workers and other community based and non-governmental organizations (CBOs and NGOs). This lack of recognition for the informal sector often results in preference for largescale, technocratic solutions to problems due to the perceived „prestige“ and some financial gains to some officials (Baud *et al.* 2001, Post 2002). The obstacles that affect PPP include unequal power relations between external partners and project beneficiaries, and the costs involved in dealing with a variety of partners (Baud 2000). Generally, PPP is an expression of peoples“ practices that evolve, adapt and dissolve in response to changing circumstances (Baud & Post 2002).

1.2 Problem Statement

The Kumasi Metropolitan Area (KMA) is increasingly experiencing rapid rate of high population growth. It is estimated that over 2,022,919 million people live in the metropolitan area with a growth rate of 5.4 per cent annually (KMA, 2010). Despite numerous benefits of urbanization, the metropolitan area remains largely hostage to poor and dysfunctional safe disposal of solid waste

within its jurisdiction, generated from the production and consumption activities. As a result, the KMA is saddled with a worsening waste situation which is proving to be intractable and threatening public health and the environment. In 1995, the rate of domestic waste generation in Kumasi was estimated at 600 tons per day. By 2005, 1,000 tons of solid waste was generated each day in the city; three years later, the KMA was generating 1,200 tons a day, and a 2010 KMA document shows that 1,500 metric tons of waste is now generated in Kumasi each day (KMA, 2010). More than 90% of solid waste generated is deposited at one of the several open dumpsites dotted in the metropolis without any attempt to segregate. These dumpsites are often located in ecological or hydrological sensitive areas and these are primarily abandoned valleys without proper leachate or gas recovery systems. This makes it difficult for the maintenance of the facilities to meet the standards required for safeguarding public health and environmental quality.

As a response strategy, Owusu-Sekyere (2014) observes that city managers have embraced public–private partnership (PPP) approach as a sustainable means of solid waste management. Public–private partnerships (PPPs) are financing strategies that are widely used around the world including Accra (Post 1999, Oteng-Ababio, 2010). Under this agreement, state and local governments maintain ownership and control of the assets but receive financial compensation to contract with a private operators who provides operating, maintenance and/or construction expertise for the solid waste management infrastructure. The thinking is that PPP can help mobilize resources, reduce risks, contribute to economies of scale and enhance service delivery (Baud 2001, Helmsing 2000). Again, it can help save cost through commitment of civil society partners as well as the synergy resulting from combining skills and resources of various players (Johnson 1998). The private sector participation policy came into effect in 1999 in Kumasi which was one of five major cities in the country that benefited from its implementation and has continued to date with increased

coverage. In 2000, four sub-metropolitan districts in Kumasi were zoned into seven solid waste collection zones by the Waste Management Department (WMD). The zoning was intended to bring in more private sector companies and to enhance competition for the market. In 2007, the government re-categorized the four sub-metros into 10 by legislative instrument due to the increasing population especially in the peri-urban areas of the city. The approach of the zoning sub-metros in Kumasi was similar to that of Accra

This shift has created a completely new set of roles and responsibilities for the various stakeholders involved in solid waste management. It is expected that after the involvement of the private sector, the solid waste management situation in the Metropolis would witness marked improvement. However, the problem still persists, even though some residents have benefited from private sector participation in terms of coverage and reliable service compared to when the services were delivered by the local governments alone (Obiri-Opareh, 2002), there are still issues of inefficiency of private sector delivery and service quality problems.

The purpose of this research is to assess the contribution of the private sector in the management of solid waste in the KMA. The study seeks to address the following questions:

- a. What are the historical antecedents of solid waste management in Kumasi
- b. What are the types and components of solid waste generated in the KMA?
- c. What is the level of performance of private companies in terms of efficiency and service quality?
- d. What have been the roles and responsibilities of the various actors in solid waste management in the metropolis?
- e. What challenges do the private waste management companies face in their operations?

Looking for answers to the above questions is the focus of the research.

1.3 Objectives of the study

The general objective of this study is to examine the contribution of the private sector in solid waste management in the KMA.

In line with this, the specific objectives that guide the study are:

- a. Examine the evolution of solid waste management services in Kumasi
- b. Identify the types and the components of solid waste generated in the Kumasi Metropolitan Area.
- c. Examine the efficiency and quality of service delivery of the private waste companies in the metropolis.
- d. Identify the challenges faced by the private waste companies in managing solid waste in the KMA.
- e. Identify the roles and responsibilities of the various actors in solid waste management in the Kumasi Metropolitan Area.

1.4 Propositions

The study is guided by following propositions:

- a. The private solid waste companies have brought improvements in solid waste management in the KMA.
- b. The capacity of the companies in terms of equipment holdings has increased the efficiency and service quality of the companies.

1.5 Justification of the study

The study involving private sector performance, capacity and regulation in solid waste management in developing countries is least explored. In Ghana studies on solid waste management have not adequately explored the influence of private sector capacity and local government regulation on private sector performance. This study will therefore bring to the fore the performances of the private waste companies in the management of solid waste in the Ghanaian cities in general and the Kumasi Metropolitan Area in particular. This will be very significant at policy level.

In 1999, the Ministry of Local Government and Rural Development produced an Environmental Sanitation Policy document which sought to reform the solid waste management sector and allowed private sector participation in solid waste collection, transport and disposal in the major cities. After 10 years of implementation, the flaws in the policy became evident. It was therefore reviewed in 2010 so that the policy-makers could adapt to changing conditions to prevent failure of their policies (ISSER, 2012). The revised policy reflected the changing context of national and international development priorities (the Ghana Poverty Reduction Strategy, the Millennium Development Goals, and the New Partnership for African Development –NEPAD).

This new policy reforms did not come with adequate efficiency. The study will help operating companies to assess their operations so as to identify their strengths, achievements as well as constraints pertaining to their operations. The study will stimulate further research in this area.

Besides the relevance of assessing performance of private operators involved in solid waste management in Ghana is an emerging issue. There are no standards or well defined performance targets for assessing performance of urban solid waste providers, and therefore different approaches are used by researchers. The performance data in terms of capacity and service quality

of the companies from this study could provide the basis for future performance monitoring of the private sector companies.

The output from this study will be useful for improving solid waste management service delivery. Specifically, the output will be useful for environmental sanitation policy formulation, performance monitoring, and future benchmarking to enhance efficient and effective service delivery.

1.6 Scope of the study

Generally, the study categorized waste into two namely liquid and solid. This study particularly focused on solid waste management. There are other private companies operating in the metropolis, but this research concentrated on the companies that have been contracted by the KMA to manage solid waste in the metropolis.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section consists of review of related literature and the conceptual framing of the study. The literature review is presented in three parts. The first section discusses some basic concepts related to waste management, and the historical antecedent of solid waste management in Ghana while the second part focuses on the private sector involvement in managing urban solid waste. The origin of the private sector and its relevance on solid waste management as well as the challenges confronting the efficient and effective operations of the private sector were reviewed. The third part consists of the institutional, regulatory and legal framework guiding solid waste management in Ghana.

2.2 Definition of Solid Waste Management

Solid Waste Management (SWM) is defined as managing the processes involving solid waste collection, treatment and disposal of waste generated in households, commercial and business establishments, institutions, and non-hazardous industrial process waste (Tchobanoglous et al., 1993). Tchobanoglous et al. (1993) grouped the direct activities of solid waste management into six functional elements: (a) waste generation and characterization, (b) on-site storage and handling, (c) collection, (d) transfer and transport, (e) separation processing, treatment and resource recovery, and (f) final disposal. These functional elements require planning and management in order to achieve high quality of service. Schubeler et al. (1996) reported that agencies responsible for SWM often pay too little attention to integrated management approaches based on adequate information systems, management approaches, methods, and techniques. The procedures and methods developed for management (planning, operations, monitoring) may be different in the various organizations, and managers responsible for solid waste management take control of all the necessary management functions and are responsible and accountable for discharging the roles of the organization in a cost effective manner.

2.3 The classification of waste

Wastes can be classified into types including their sources, physical state, material composition and the level of risk associated with waste substances (Table 2.1) (World Bank, 1999). Such classification of waste provides a basis for the development of appropriate waste management practice.

Table 2.1: Classification of waste

Criteria for classification	Examples of waste types
-----------------------------	-------------------------

Sources or premise of generation	Residential, commercial, industrial, agricultural, municipal, services etc.
Physical state of waste material	Liquid, solid, gaseous, radioactive
Material composition of waste	Organic food, paper, plastic, glass, metal, textile waste
Level of risk	Hazardous , non-hazardous

Source: World Bank (1999).

Similarly, waste can be classified based on the source-classification, which is based on the fact that waste emanates from different sectors of society such as residential, commercial and industrial sources. A good example of the source classification was provided by the World Bank (1999) in a study in Asia which identified the sources of waste as residential, commercial, industrial, municipal services, construction and demolition, processing and agricultural sources (Table 2.2). Waste can also be classified based on their physical state which include liquid, solid, gaseous and radioactive waste. Waste can also be classified based on the level of risk, which is hazardous or non-hazardous.

Table 2.2: Sources and types of municipal solid waste

Sources	Typical waste generator	Types of solid waste
Residential	Single and multiple family dwellings	Food waste, papers, cardboard, plastic, textiles, glass, metals ashes, social waste (bulky items, consumer electronics, household hazardous waste etc.
Commercial	Stores, hotels, restaurants, markets, offices.	Food waste, papers, cardboard, plastic, glass, metals ashes, social waste (bulky items, consumer electronics), office hazardous waste etc.
Institutional	Schools, government centers, hospitals, prisons etc.	Papers, cardboard, plastic, glass, metals, ashes, special waste (bulky items, consumer electronics, office hazardous waste etc.).

Municipal sources	Street cleanings, landscaping, parks, beaches, recreational centers.	Street sweepings, landscape and tree trimmings, general waste from parks, beaches and other recreational centers
Construction and demolition	New construction sites, road repair, renovation sites, demolition of buildings	Wood, steel, concrete dirt.
Process (manufacturing)	Heavy and light manufacturing, refinery, chemical plants, power plant, mineral extraction and processing.	Industrial process water, scrap materials, clay, tailings
Agriculture	Crops, orchards, vineyards, diaries, feedlots, farms.	Spoilt food waste, agricultural waste, hazardous waste

Source: World Bank/IBRD, 1999.

The UK Environment Council (2000) also employed source classification to identify the major sources of waste as municipal sources, commerce and industry, agricultural sources, demolition and construction activities, dredged spoils, sewage sludge and mining and quarrying operations. Classifying wastes by their sources is a useful way of determining the relative contributions of the different sectors of society to the waste stream and how to plan for their collection and disposal. Very often, the composition of the waste stream is also used to classify wastes into such types as organic waste, paper and cardboard, plastic, glass, ceramics, textiles metal and inert waste (Table 2.3). This type of waste classification based on material composition was conducted by the World Bank in 2002. An analysis of household waste streams in the county identified nine main types of materials: paper/card, plastic film, dense plastic, textiles, miscellaneous combustibles, glass, ferrous metal, garden waste and food waste.

Table 2.3: Examples of Material classification of waste type

Waste type	Example
Paper	Newspaper, Cardboards, Office waste paper, Magazine, Glossy
Plastics	Bottles, Expanded polystyrene, Film plastic, Other rigid plastics
Glass	Clear glass, Green glass, Amber glass, Non-recyclable glass

Metals	Steel cans, Aluminum can, Other Ferrous, Other aluminum
Organics	Yard waste-grass, Yard waste-other, wood, textiles, diapers, other organics
Inorganic	Electronics, carpets, drywall, other construction and demolition, other inorganic

Source: World Bank, 2002

Using the physical state of waste substances, the materials in the waste stream can also be categorized into liquid, solid, gaseous and radioactive wastes. Examples of these types are shown in Table 2.4. The liquid waste include sewage sludge and waste water from bath house and kitchen while solid waste include food waste, paper, plastics, bottles, metals and debris. Waste could also be classified as gaseous which include smoke from factories, exhaust fumes and fumes from burning waste gas. Radioactive waste also includes uranium, radiation and plutonium.

Table 2.4 Classification of waste based on physical state of waste substances

Waste type	Examples
Liquid Waste	Sewage sludge, Waste water from bath house and kitchens
Solid Waste	Food waste paper, plastic, metal, debris
Gaseous Waste	Factory smoke, vehicle exhaust, smoke, fumes from burning waste gas,
Radioactive Waste	Radiation, uranium, plutonium, excess energy

Source: US EPA, (2008).

Furthermore, the potential health or pollution risk of waste materials is also used to classify wastes into hazardous or non-hazardous waste (US EPA, 2008). On the one hand, hazardous waste refers to wastes with properties that make them potentially harmful to human health or the environment (US EPA, 2008). According to the US EPA (2008), hazardous wastes can be liquids, solids, contained gases, or sludge and can be the by-products of manufacturing processes or simply discarded commercial products like cleaning fluids or pesticides. Because of their potential

pollution danger, hazardous waste materials require rigorous and cautions means of disposal (DELM, 2003). In the EPA's Hazardous Waste Listings (2008) the categories of hazardous wastes include ignitable waste, corrosive waste, reactive waste, toxicity characteristic waste, acute hazardous waste and toxic waste. Special waste is one type of hazardous waste which is usually so dangerous to treat, keep or dispose of that it requires special disposal arrangements (US EPA, 2008). Examples include hard clinical waste such as human parts, contaminated swabs and sharps. On the other hand, non-hazardous waste does not pose a danger and can be dealt with easily, examples being inert materials such as uncontaminated earth and excavated waste such as bricks, sand, gravel and concrete slates (Environment Council, 2000). However, the broad classification solid waste into various types as is given by the developed countries' institutions neglects the obvious practicalities and limitations in developing economies where even those living getting the right data on waste types is a challenge. Such a position appears rather simplistic, artificial and provides little realistic guidance for environmental policy makers in developing countries.

2.4 Solid Waste Management in Ghana: Some Historical Milestones

Historically, the impression that the responsibility of proper waste management services (considered as a public good) is the duty of a public institution (i.e. MMDAs) has its antecedents in how local governance of our towns and cities has evolved (Oteng Ababio, 2011). While the Municipal Ordinance of 1859 established municipalities in the coastal towns of the Gold Coast, the „new“ Ordinance established in 1943 elected town councils beyond the coastal towns to include Accra, Kumasi, Sekondi-Takoradi and Cape Coast. The „new“ Municipal Ordinance of 1943 established municipalities as Public Health Boards with the establishment of the first one in Cape Coast, followed by Accra and then Kumasi. The mandates of the Public Health Boards were mainly to ensure hygienic living conditions within settlements. The main operational tool was enforcement management with diligent premises inspections and sanctions (Acquah, 1958).

There was however, a paradigm shift after independence with the passage of the Local Government Act 54 of 1961. The Act empowered the State to provide all public services for the benefit of all citizens (World Bank, 1999). These included education, health, water, environmental sanitation, energy, telecommunication, roads, transport, railways, markets, lorry parks, public toilets and bathhouses, stadia and other recreational infrastructure managed by one entity – the Public Works Department. Though the Act expanded the powers of the central government, the local government bodies were still responsible for the provision of municipal services and amenities in their localities without regard to whether or not they had the personnel with the requisite skills and professional expertise to deliver (Oteng Ababio, 2011). The reasons were that the provision of those basic services had elements of externality, excludability and non-rivalry problems (public good characteristics) and thus should be the responsibility of the state to ensure the welfare of its citizens (Awortwi, 2003).

The role of the central government in the provision of basic services including solid waste management continued till the 1970s when the general economic downturn began. From the mid-seventies, Ghana's economic fortunes started declining; the economy started stagnating, general tax revenue dwindled and therefore, the policy of tax-based sanitation services could not be supported. The economic downturn led to general decline in agricultural productivity as well as exports. There were also increased inflationary pressures and a gradual buildup of unemployment. With the economy literally on the verge of bankruptcy, environmental sanitation services collapsed with the local government agencies suffering from lack of central-government transfer of funds and provision of machinery and equipment (ISSER, 2012).

The period of general economic decline also coincided with a period of rapid urbanization, with the rate of urbanization increasing from 23.1 percent in the 1960s to 32.0 percent by 1984 (Owusu and Oteng-Ababio, 2014), a situation which was partly blamed on the large scale deportation of Ghanaian migrants from Nigeria and the rate of natural increase in the population. The high rate of urbanization had two implications; there was a massive increase in solid waste generation and free land for waste disposal became less available. As a result, existing waste disposal sites (including communal containers at sanitary sites) became engulfed with refuse.

Incinerators (masonry brick-furnaces for burning refuse) which were introduced in 1929 (see Oteng-Ababio, 2013) also broke down in the 1970s due to the increasing quantity of waste leading to crude dumping into quarry pits. By the 1980s, the state of environmental sanitation services had dipped to a point that it needed radical reforms to put it back on track.

The first major radical reforms towards improved sanitation service in Ghana started with the implementation of the Accra Waste Management Project from 1985 to 1994 with support from the German Technical Cooperation, GTZ. This project saw the re-tooling of the waste management department with the introduction of compaction trucks to replace side-loading trucks (side-loader) that was being used by the environmental health units of the various municipalities. As part of the GTZ support, the first Waste Management Department (WMD) was established in Accra. This era also saw the coming into being of the informal sector in the form of micro and small-scale enterprises whose main area of concentration was the inaccessible communities that were difficult to reach by the waste trucks (MLGRD, 2001). These informal waste collectors mainly relied on carts drawn by horses, donkeys, bicycles, or tri-motors (Katusiimeh, and Oteng-Ababio, 2013).

In the early 1990s, there was a policy shift towards private sector-led involvement in solid waste management as part of the extension of the market mechanisms of the New Public Management (NPM) and decentralization of local service delivery to the local governments (Awortwi, 2004).

As observed by Oduro-Kwarteng and van Dijk (2013), the private sector involvement in public service provision was intentioned to tackle market and government failures. With this arrangement, the public sector (government) plays a leading role of purchaser (buyer) on behalf of citizens through subsidies and/or user charges, while the private sector plays the role as provider (seller) of public services, who is being regulated by the public sector to correct the abuse and exploitation that may be associated with the public good nature of solid waste service. In this case, the government plays dual roles-as a purchaser and as a regulator. It is believed that private sector involvement is a way to maintain market discipline and to bring management and technical expertise and private finance into public service to achieve cost efficiency and better service provision (improve service quality) (Cointreau, 1994; van Dijk, 2010). At present, the environmental sanitation policy, which was revised in 2010 is the major document guiding solid waste management in Ghana. The policy is focused on seven key areas: Capacity development; Information, Education and Communication; Legislation and regulation; Levels of Service; Monitoring and Evaluation; Policy on Financing and Cost Recovery. The Policy outlines the following four distinct functions to be carried out by the Assemblies with regard to environmental sanitation. These functions are the provision of waste management services, public health management services, environmental monitoring services as well as planning, monitoring and public relations. The policy tends to reflect the current thinking of solid waste management and provide a general assessment of the prevailing situation and strategies in the country.

2.5 Sustainable Waste Management

An important concept of waste management is sustainable waste management which is an integral part of sustainable development (WCED, 1987). Thus, in keeping with the objectives of sustainable development, sustainable waste management can be regarded as an approach to waste management that, in addition to protecting human health and the environment, ensures that the scarce resources of the earth are conserved

for both present and future generations of humanity. It therefore becomes important to minimize natural resource extraction and consumption by recycling waste materials, and conduct waste management efficiently to curtail the environmental impacts of waste disposal and protect ecosystem services for both current and future generations (Millennium Assessment Report, 2005). In line with the waste hierarchy, the best way to achieve sustainable waste management is to reduce the amounts of waste we produce (Girling, 2005). Where waste is unavoidable a sustainable approach is to encourage re-use and recycling of products to prevent them from getting into the waste stream. Finally, where waste prevention/reduction, re-use and recycling are economically impossible, waste is processed to recover their intrinsic values such as energy. Sustainable waste management also seeks to increase co-ordination between the producers of goods, retailers, manufacturers, the public, local authorities and all concerned with the management of waste and reusable materials and equipment (London Waste Action, 2007).

2.6 The goals of waste management

In 1976, the United States Congress enacted the Resource Conservation and Recovery Act (RCRA) which authorized the Environmental Protection Agency (EPA) to regulate waste management and disposal practices. The goals of waste management that were set by the RCRA included: the protection of human health and the environment from the hazards posed by waste disposal, the conservation of energy and natural resources through waste recycling and recovery, reducing or eliminating the amount of waste generated, and ensuring that wastes are managed in an environmentally-safe manner (RCRA,1976)

Other writers agree with these objectives of waste management. For example, Schubeller *et al.* (1996) have stated the goals of municipal solid waste management as protecting environmental health, protecting the quality of the environment, supporting the efficiency and productivity of the

economy and the generation of employment and income for people. On her part, Cointreau (2001) argued that “the overall goal of urban solid waste management is to collect, treat and dispose of solid waste generated by all urban population groups in an environmentally and socially satisfactory manner, using the most economical means available”. Similarly, the Ghana Environmental Protection Agency has noted that waste management is essential in the present day context for the following reasons: To protect human health against waste-related hazards and risks, to prevent pollution of the environment and its natural resources like air, water and land, to produce energy which could be an alternative for the fast depleting fossil fuels and other conventional sources of energy, to make optimum use of the waste generated, for a better and sustainable future and (Ghana EPA, 2002). It can be concluded from the above that the main objective of waste management is to protect public health against waste-related hazards and risks, and to maintain ecosystem services by preventing the pollution of the natural environment and its resources such as land, water and air as well as the aesthetic quality of the environment.

2.7 The principles of waste management

The principles of waste management, as identified by Schubeller *et al.* (1996:19), are “to minimize waste generation, maximize waste recycling and reuse, and ensure the safe and environmentally sound disposal of waste”. This means that waste management should be approached from the perspective of the entire cycle of material use which includes production, distribution and consumption as well as waste collection and disposal. While immediate priority must be given to effective collection and disposal, waste reduction and recycling should be pursued as equally important longer-term objectives (Schubeller *et al.*, 1996).

Cointreau (2001) has also identified ten principles that should guide a sustainable and integrated solid waste management programme. According to her scheme, such a programme should: Be

supportive of good governance, provide economic service delivery, establish cost recovery mechanisms for long-term financial sustainability, and conserve natural resources embrace public participation, foster environmentally appropriate technologies and sites, seek appropriate levels of source segregation, recycling and resource recovery, conduct strategic facility planning and development, build institutional capacity and invite private sector involvement.

In line with Gilpin's (1996) notion of waste management, this means that waste management involves much more than the practical organization of waste collection, transportation, treatment and disposal. While these are important aspects of waste management, several other issues are equally important including good governance, public and private sector participation (Cointreau, 2001). The waste management situations in most developing countries show that the goals and principles of waste management are far from being achieved (Schubeller *et al.*, 1996; Hardoy *et al.*, 2001; Pacione, 2005).

2.8 Origin of Private Sector

Privatization is a policy that has been implemented all over the world in recent decades. In regions such as Europe and Latin America privatization has been characterized primarily by the sale to the private sector of government-owned firms and assets. In other regions where public ownership of firms was not as common, such as North America, privatization has mainly taken the form of contracting out services previously delivered by the government to the private sector.

Most Economics and Public Policy scholars consider the privatizations in Chile (1970s- early 1980s) and the United Kingdom (1980s-early 1990s) as the first privatization policies in modern history. Others argue that the first privatization operation was the denationalization of steel in the UK in 1953, and a few scholars identify the partial sales of state-owned enterprises in Germany under Adenauer's government (late 1950s-early 1960s) as the first large-scale privatization

program. However, recently published works document and analyze a large-scale privatization policy in 1930s Germany, under Hitler's government. Indeed, between 1934 and 1937, the Nazi regime privatized almost all the firms that had been taken over by the Weimar government in the early 1930s during the Great Depression.

The formal private sector is here understood to refer to private sector corporations, institutions, firms and individuals, operating registered and/or incorporated businesses with official business licenses, an organized labour force governed by labour laws, some degree of capital investment, and generally modern technology (Furedy, 1991). In general, the defining characteristic of the formal private sector is that its main objective is to generate a profit on investments.

2.9 Why Private Sector Involvement in Municipal Solid Waste Management

Private agencies engaged in waste management have higher operating efficiency because, firstly they are free from bureaucratic hurdles and the upkeep of their equipment is excellent. Good condition of vehicles and equipment ensure not only trouble-free operation but also result in higher output and profitability. According to Boorsman (1994), private sector is endowed with qualities such as political independence, economic rationality, efficiency, dynamism and innovation; qualities which make it measure up favourably to public sector enterprise. The motives of privatization have primarily been that the private sector works more efficiently than the public sector; it is hence concluded that economic benefits will arise from privatizing public sectors where there is no natural monopoly (Prasad, 1998).

Another important aspect of the involvement of the private sector in Low and Middle Income

Countries (LMIC) is the debt issue. Most LMIC public budgets depend on external financial aid. Many international credit organizations impose the concept of privatization to obtain less demand for loans. The World Bank Group is the leading institution in the preparation and support of privatization programmes, providing advice and loans to cover costs associated with privatization, and also providing investment loans to cover costs associated with privatization as well as ones to help restructure private enterprises. Privatization is consequently assimilated into the “corpus conditionality” of the donor community (Grimshaw and Willmott, 2002). Taking into consideration that 90% of municipal investments in LMIC today come from external aid (World Bank, 1997), the issue of privatization is becoming inevitable for LMIC. In reality, the donor community imposes the principles of privatization. It is a „*conditio sine qua non*” for the continuation of external aid flows. Simply put, efficient SWM and privatization are linked to LMIC.

2.10 Private Sector Involvement in Solid Waste Market

The delivery of public services has traditionally been carried out by the public sector. The increasing financial burden on the local governments and the inefficiency of the public sector (government failure) in developing countries necessitate the use of markets for public service delivery. However, markets where there is perfect competition with willing buyers and sellers do not work for public services that have externalities and information asymmetry. Solid waste collection service as a public good has externalities (negative environmental impacts) if people are excluded from the service. Solid waste collection cannot be provided through the market without regulation (legislation and incentives). The private sector is involved in solid waste collection due to market and government failures. There is also non-governmental organization failure, due to the

over reliance on donor support to cover investment, operation, and maintenance costs. This means that the private sector failure (inefficiency) – under performance and inability to deliver the expected service quality – could occur if the needed policies, legislation, incentives, and government support are not given to it.

The extension of the market mechanisms of the New Public Management (NPM) to private sector involvement in solid waste collection services is still an emerging issue, especially in developing countries. Contracting out solid waste services to the private sector and charging for services rendered by the private sector are still faced with difficulties. Public services delivery such as water supply, sanitation and solid waste services have been failing in developing countries for a long time despite the NPM and decentralization of local service delivery to the local governments. The expected improvements in service delivery have often not been achieved (van Dijk, 2006). Obviously, decentralization alone was not enough to bring about improvements in service delivery, and therefore private sector involvement in public service delivery was introduced. The paradigm shift from public sector delivery of public services (solid waste service delivery) in developing countries to private sector provision began in the past two decades. Governments vigorously began to promote the private sector as a provider of services to improve service efficiency¹ and effectiveness² (Roth, 1987; Cointreau-Levine and Coad, 2000; Batley and Larbi, 2004), but the needed private finance and expertise to bring about the improvement are still issues, especially in developing countries.

In developing countries, different forms of Private Sector Involvement (PSI) have been suggested for achieving greater efficiency and effectiveness, to overcome the government failures in public direct service delivery – too many workers, not enough supervisors, few incentives for better

performance and limited finance (Cointreau-Levine, 1994; Cointreau-Levine and Coad, 2000; Post et al., 2003). Private Sector Involvement (PSI) in solid waste collection in developed countries emerged in the 1970s, and since then there has been increasing private sector involvement in solid waste collection service in many parts of the world (Eggerth, 2005). By 1994, there were more than 10,000 private firms engaged in urban solid waste collection service in the United States, where more than 80 percent of solid waste was collected by the private firms (Cointreau, 1994). There is now PSI in all the elements of integrated solid waste management from collection, sanitary landfilling, recycling to resource recovery in the developed countries.

Private Sector Involvement in all sectors in developing countries has been slow especially in the Sub-Saharan Africa countries, although there is increasing private sector involvement (PSI) uptake in French-Speaking Africa (Li and Akintoye, 2003). By 1989, there was private sector involvement in solid waste collection in Latin American cities (Santiago, Buenos Aires, Sao Paulo and Caracas) with populations of 3.6 to 12 million (Bar-tone, 1991). The companies in these cities operated under service contract arrangements with the municipalities. The involvement of private sector in solid waste collection in most developing countries started gaining momentum in the 1990s. The World Bank advocated Private Sector Involvement in the 1994 World Development Report. Since then, the development partners have supported the drive for PSI in solid waste collection and management through capacity building and loans for provision of equipment. The number of private companies involved in solid waste collection keeps on increasing in developing countries, as in the case of Ghana and there is growing interest of the private sector in many developing countries. However, the presence of PSI in urban solid waste collection in developing countries has not been felt in terms of better service quality and total service coverage, and this may be due to a number of issues such as policy, capacity, regulation, legislation, and investment risk.

2.11 Does Private Sector Deliver Efficient and Quality Solid Waste Service?

The rationale for the Private Sector Involvement (PSI) in solid waste collection is to improve efficiency (reduce cost) and effectiveness of service delivery (service quality) through competition for the market – where private sector providers compete for a zonal monopoly to render service over a period of time – and to ensure that the environmental aspect of sustainable development is integrated into solid waste management. However, recent case studies of PSI in solid waste management in some developing countries – for example, in Kenya (Karanja, 2002; Mwangi, 2003), in Ghana (Obiri-Opareh, 2002; Awortwi, 2003), in Tanzania (Mbuligwe, 2004; Kassim, 2006) and in India (Post et al., 2003) – showed that there has been an increased coverage in some of the countries, but the service quality, efficiency and sustainability of private sector service delivery are still issues that require further studies to identify drivers for performance. The private sector still faces challenging issues of inefficiency and low service quality due to some factors of the enabling environment, inter organizational arrangements, and how companies are run; and this is what this study seeks to identify.

Studies on performance of service providers often arrive at the conclusion that services delivery by private sector is associated with gains in effectiveness and service efficiency more than by municipal departments (Cointreau-Levine, 1994; Cointreau-Levine and Coad, 2000; Post et al., 2003). Other authors argue that the results of private sector performance (efficiency gains) over public sector delivery showed that efficiency gains are mixed and that the debate on private sector efficiency gain over public sector is inconclusive (Donahue, 1989; Bel and Warner, 2008). The results from these studies showed that their explanatory factors are inconclusive, and therefore require further studies into other approaches

Private sector inefficiency in developing countries may be due to a number of factors, and one of them is operational inefficiency due to weak capacity. Zurbrugg (1999) argues that the operational inefficiency of solid waste collection service delivered in developing countries are due to weaknesses in institutional arrangements (policies, legal, and regulations), deficient capacity of the public and private sector institutions involved, and the use of inappropriate technologies. It follows from this that operational efficiency of the service agent among other factors are necessary for private sector efficiency gains and improved performance. There has been increased involvement of the private sector in solid waste management in many cities in developing countries (Post et al., 2003; Cointreau-Levine and Coad, 2000). However, despite the increasing interest in public-private-community partnerships, there is evidence that coverage and the needed improvements in environmental sanitation have not been achieved (Onibokun and Kumuyi, 1999; Oduro-Kwarteng et al., 2006). The solid waste collection coverage has not improved to the desired level in the developing countries, despite the paradigm shift from public delivery of solid waste services to private sector participation.

There is an argument that the private sector does not, in some cases, guarantee higher effectiveness and efficiency gains or reduce cost. Some studies suggest that the efficiency of private sector depends on the capacity of local government institutions to regulate and monitor performance of the private sector⁴, and to recover cost (Obirih-Opareh and Post, 2002; Awortwi, 2003; Obirih-Opareh et al., 2004; Oduro-Kwarteng et al., 2006). Apart from regulation and performance monitoring by the public sector, which are external to private sector organization, there are other internal factors which affect private sector performance. The effectiveness and efficiency of

service delivery by private sector depends on a number of factors, which may be internal or external to private sector organization.

The performance improvement of solid waste services in developing countries is daunting and one would wonder where things went wrong in the management and provision of the services.

Although literature on technical, policy frameworks, implementation strategies, urban governance and institutional dimensions of waste management is large and growing, detailed analysis of internal and external factors to private sector organization is needed to be able to apply measures that will increase efficiency and effectiveness in solid waste service provision in developing countries. The theoretical framework for this study is based on theories of markets and regulation of public services. Market as a process involves market actors (buyers and sellers), exchange mechanisms (transactions), object of ex-change (services), industry demand and supply, and regulators. The market and how it is regulated determines the service coverage, efficiency, and quality.

2.12 Advantages of Privatization

One of the most frequently cited advantages of the private sector over government is its management flexibility (Savas, 2000). Private sector management has greater ease in firing personnel for non-performance and in providing upward mobility for workers with good performance. Regarding LMIC, Private Sector Participation (PSP) advocates argue that, privatization results in more competition, better service, economic growth, reduction of national debt, and benefiting from more Foreign Direct Investment (FDI) (Savas, 2000). Privatization

means less pressure on municipal budgets, and therefore provides more flexibility. It is also perceived as a way of reducing overall public deficits by increasing short-run revenues.

Cointreau-Levine also observes that the main reasons for this enhancement are that private sector service providers are accountable to their customers and are obliged to react to customer dissatisfaction. Competition between the private and public sectors is effective in improving cost-effectiveness. If thresholds are specified in the contractual agreement, and the private sector operator is monitored effectively, good standards of operation can be achieved (CointreauLevine, 2000).

She also argued that, the Private sector management has more flexibility to hire qualified staff, to pay staff according to their performance, to terminate the employment of unsatisfactory workers, and to adjust working hours according to service demand. The private sector can optimize the size of the work force and the ratio of professional to operational staff, and to concentrate its resources on the service for which they are intended, without staff or equipment being requisitioned for other purposes (Cointreau-Levine, 2000). In her opinion, private sector companies are both less restricted by bureaucratic procedures and more able to concentrate resources where they are needed.

According to Cointreau-Levine (2000), some reasons for this increasing focus by municipalities on alternative arrangements include: Many requirements of the MSW rules have not been fulfilled by municipalities in the past – such as primary door-to-door collection or sanitary land filling – and therefore, there are very limited skills and knowledge within municipalities to handle these activities; Most municipalities lack the finance to expand operations into new geographic areas or

into new activities; The increased need to focus on efficiency improvements to reduce cost and reallocate expenses within the waste management chain to activities like treatment and disposal.

2.13 Limitations of Privatization

Kessides (2005), and others argue that privatization is oversimplified, oversold, and ultimately somewhat disappointing. Kessides (2005) remarks that privatization has proved to be more difficult to implement effectively; it is also less magical in its accomplishments than what was believed or promised beforehand. Privatization, although useful, is easily overworked. It is not an uncontroversial solution to the problem of providing public goods when both costs and benefits are hard to measure. Without sound public management, PSP does little to enhance public value (Kessides, 2005).

On balance, the privatization policy debate has largely amounted to little more than competing anecdotal evidence. Those favouring privatization tell their favourite stories, and those opposed peddle theirs. Hence, the question is not whether privatization and private sector development should occur, but about how it can be done in an optimal way, that is, how to reach social goals through enterprise growth, how to avoid market distortions by supporting enterprises, and how to regulate and enter into dialogue with the business sector.

The decision to privatize a public service should not be based on ideological considerations but rather on economic merits. In Africa as well as Ghana, the main reason why we privatize our solid waste management is economic reasons. The governments of most Africa countries have a lot of pressure on their budgets and as such do not have the commitment in funding solid waste management effectively and as such the management of solid waste by the municipalities has not

yielded any fruits and so the only way out is to privatize, couple with the advantages that go with private companies. One of the most fundamental determinants of the efficiency and effectiveness of any PSP arrangement is competition. That is, the degree of competition that an arrangement permits will, to a major extent, determine how efficiently that arrangement will supply a service.

2.14 Forms of Privatization in Municipal Solid Waste Management

Generally there are four forms of privatization in MSWM which are contracting out, franchise, leasing or concession and open competition.

2.14.1 Contracting Out

According Cointreau-Levine (2000) contracting out is the process whereby the government awards a finite-term contract to a private firm for the delivery of solid waste collection service, street sweeping service, the collection of recyclables, transfer station operation, disposal site operation, or fleet maintenance. The contract award is made after a competitive procurement process. The private firm is paid for service delivery by the government under the terms of the contract. The service involves low economies of scale, technological simplicity, and moderate investment costs (Dillinger 1994). With contracting it is feasible for local firms with modest financial resources to enter into business of solid waste collection. Study of private sector participation in Latin America showed that most of the firms were small-to-medium-sized, indicating that there were virtually no barrier to entry (Bartone 1991).

In terms of cost, contracting out is less costly. The two principal studies on costs in the United States (one covering 1378, and the other, 340) showed contracting was 10 percent to 30 percent less costly as compared with those for a public monopoly (Dillinger 1994). These studies included government's cost to monitor contractors, estimated to average roughly 25 percent of overall costs (government plus contractors) (Dillinger 1994).

2.14.2 Open Competition

This occurs when the government freely allows qualified private firms to compete for refuse collection, recycling, or disposal services. In open competition, individual households and establishments make private arrangements with individual firms for refuse collection and or recycling. No firm holds a zonal monopoly, and any number of firms may compete within the same zone (Cointreau-Levine 2000).

2.14.3 Franchise

Cointreau-Levine (2000) defines franchise as the situation whereby the government awards a finite-term zonal monopoly (franchise) to a private firm for the delivery of solid waste collection service. The franchise award is made after a competitive qualification process. The private firm deposits a performance bond with the government and pays a license fee to cover the government's costs of monitoring. The private firm recovers its cost and profit through direct charges to the households and establishments that are served. Government provides control over the tariff charged to the consumer through: a) development of adequate competition and control of price collusion, or b) price regulation (Cointreau-Levine 2000).

Franchise is applicable to solid waste systems because economies of services are attainable only when waste is collected along a contiguous route or within an exclusive zone (Dillinger 1990).

Private firms must individually bear the cost of billing and collecting user charges. The cost of billing is estimated to amount to 10 percent of the total cost to the consumer of service. It is one of the reasons why franchise does not usually result in the same low cost as contracting (Dillinger 1990).

2.14.4 Concession/Leasing

Cointreau-Levine (2000) explains concession as the process whereby the government awards a concession to a private firm to set up a facility that utilizes the government-owned resource refuse. The concession may enable the private firm to recycle materials from refuse; to recover resources from refuse; or to transfer or dispose of refuse. The concession is in the form of a long-term contractual agreement, whereby the private firm builds the facility. In some cases, the private firm may maintain indefinitely the ownership of the facility to the government after a specified period of private ownership and operation (Cointreau-Levine 2000).

Under concession, government allows the private sector to utilize one of its resources, in this case solid waste, for profit-making purposes. Concessions typically involve construction of major long-term facilities to sort, treat transfer, or dispose of solid waste. Government may pay a tipping fee or service charge to defray part of the costs of processing the solid waste, but sale of the concession, product (such as compost), or service fees paid by non-government customers typically cover the remaining costs. Government provides a guarantee of flow control, so that amounts of wastes received closely match facility design capacity. Most concessions are operated

on a take or pay basis, where tipping fees are paid even if the guaranteed daily quantity of waste is not provided (Li and Akintoye, 2003). Among the four forms of privatization, it is normally difficult to say that, this particular one is better than the other. What might work for a particular country, might not work for another country. In each of them, it depends on the nature of the agreement and the monitoring system to monitor the private companies.

2.15 Waste Management Policy and Legal Framework in Ghana

The key elements of any functional waste management system require a clear determination of the types and sources of waste, the most appropriate collection and transportation system and the most cost effective treatment and disposal mechanism. Such a system demands effective policy formulation and implementation (Obirih-Opareh and Post, 2002; Oteng-Ababio, 2010). Yet the greatest challenge for most local authorities is that of striking a balance among policy, governance, institutional mechanisms, resource provision and allocation.

The local context of legal, regulatory and policy frameworks is believed to have significant influence on solid waste management in developing countries to some extent. This section explains the situation in Ghana. Until the establishment of a waste management policy, the Criminal Code on public nuisance was the only national legislative instrument on environmental sanitation prior to 1992 and it particularly sought to address indiscriminate disposal of waste at public places and prosecution of offenders. The Criminal Code of Ghana, by-laws of the local authority (Assembly) and national legal regulatory instruments have been promulgated and enacted into law and enforceable in a law court. The Criminal Code of Ghana, 1960 (Act 29) provides that whoever places or permits to be placed, any refuse, or rubbish, or any offensive or otherwise unwholesome matter, on any street, yard, enclosure, or open space, except at such places as may be set apart by

the local authority or health officer for that purpose commits a punishable offence. The law seeks to ensure that residents take responsibility for the streets in front of them as well as their premises.

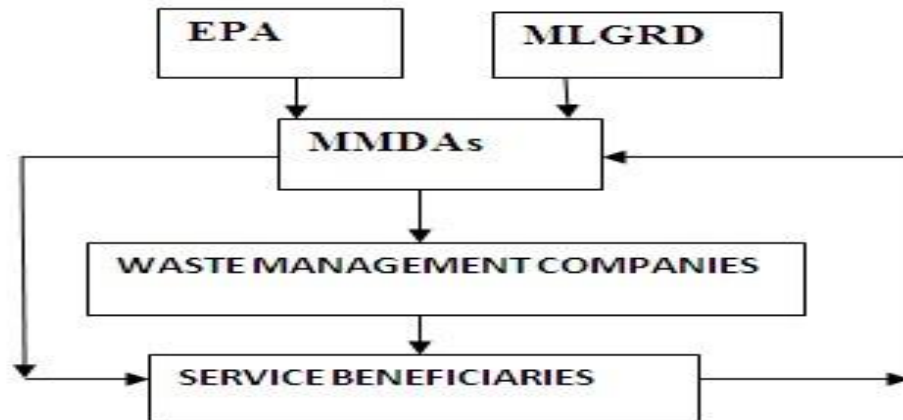
The policies and legal framework guiding solid waste management in Ghana is embodied in the Local Government Act (1994), Act 462 and the Environmental Sanitation Policy (ESP) of 1999. After 10 years of implementation, the flaws in the ESP became evident; hence its review in 2010 provided the advice that policy-makers adapt to changing conditions to prevent failure of their policies. The revised policy reflected the changing context of national and international development priorities (the Ghana Poverty Reduction Strategy, the Millennium Development Goals, and the New Partnership for African Development –NEPAD).

Ghana established an Environmental Protection Agency (EPA) in 1994 under the auspices of the Ministry of Environment and Science and has developed some environmental legislation, principally the Environmental Protection Agency Act 490 and Environmental Assessment Regulation LI 1652. The main tool of control is the environmental assessment procedure. The policy stipulates, among other things, that the disposal of solid wastes must be in accordance with the standards and procedures prescribed by the EPA and any other regulatory agencies.

While regulatory authority is vested in the EPA, general solid waste (domestic waste) management in Ghana is the responsibility of the Ministry of Local Government and Rural Development, which supervises the decentralized Metropolitan, Municipal and District Assemblies (MMDAs). The MMDAs are responsible for the collection and final disposal of solid waste through their Waste Management Departments (WMDs) and their Environmental Health and Sanitation Departments,

figure 2.1

Figure 2.1 Institutional Arrangements for Solid Waste Management in Ghana



Source: MLGRD, 2001

The EPA Act 490 is the enabling legislation and with regard to solid waste management, it enables the Minister to make regulations concerning the type, quality or conditions or concentration of substances that may be released into the environment and the collection, storage, recovery, recycling or disposal of substances which may be hazardous to the environment. The research reveals that to date, three relevant guideline documents have been developed: the Ghana Landfill Guidelines, May 2002; Guidelines for the Management of Healthcare and Veterinary Waste in Ghana, 2002; and Manual for the Preparation of District Waste Management Plans in Ghana, July 2002. The policies guiding solid waste management are inadequate or out-dated cookie-cutter plans that become even more out-dated every year. It is important to recognize that obsolete solid waste management plans are dangerous because it may fool people into believing that it is protecting them when in effect, it may rather be exposing them.

The Ghana Landfill Guidelines published by the EPA is an attempt to promote and help upgrade landfills, initially by improving site selection, waste compaction and drainage resulting in „High Density Aerobic Landfills and culminating in achieving operation of „Sanitary Landfills“ by 2020. However slow this process might be, there is evidence to show that progress is being made to achieve these targets (MLGRD, 2008).

The environmental sanitation policy, as a major document for improving health and standard of living in Ghana, is focused on seven key areas and these are capacity development; information, education and communication; legislation and regulation; levels of service; monitoring and evaluation; policy on financing and cost recovery. The Policy outlines the following four distinct functions to be carried out by the Assemblies with regard to environmental sanitation. These functions are the provision of waste management services, public health management services, environmental monitoring services as well as planning, monitoring and public relations. The policies tend to reflect the current thinking of solid waste management and provide a general assessment of the prevailing situation in the country and strategies (Table 2.5).

Table 2.2 Solid Waste Aspects of Environmental Sanitation Policy (2010)

Particular areas of Policy	Policy directives and decision making
Solid waste management by Waste Management Department (WMD)	○ All solid wastes generated in urban areas are regularly collected and disposed of in adequately controlled landfills or by other environmentally acceptable means Waste Management Department (WMD) ○ At least 20% of the solid waste collection service is done by individual Assembly and 80% provided by the private sector.

Private sector involvement in SWC	○ Involve the private sector in the provision of waste collection services, and supervision of the private sector by the WMD ○ City is to be zoned into service areas, private companies to be given monopoly in a zone with population less than 15000. ○ Private sector shall operate within the policies, regulations, supervisory and licensing arrangements set up by the public sector. ○ Full cost recovery where possible.
Environmental monitoring and public health education	○ Monitoring environmental health standards and sanitary regulations ○ Educate the people on public, environmental, sanitation issues
Legislation by laws enforcement and regulation	○ Promulgate and enforcement of the by-laws on sanitation together with national laws. ○ Strictly observing and enforcing environmental health standards and sanitary regulations. ○ By-laws are to be enforced by the Environmental Health and Management Department of the Assembly.

Source: MLGRD, 2010

2.15.1 Waste Management and International Conventions

In addition to the national and local legislations, Ghana has signed a lot of international agreements and conventions. Ghana is a signatory to the MARPOL Convention (Marine Pollution Convention), although not all parts are ratified yet, and as such is expected to have facilities for the reception of „MARPOL wastes“ which include oily wastes and refuse (and sewage when this part is ratified). Ghana currently has limited facilities capable of managing MARPOL wastes although Takoradi port has access to a good standard facility for oily wastes.

Ghana has also acceded to the Basel Convention on trans-boundary movement of hazardous waste, which implements controls on the movement of hazardous (and certain other) wastes into or between signatory countries. Under the Basel Convention, trans-boundary movements of hazardous wastes or other prescribed wastes can take place only upon prior written notification by the state of export to the competent authorities of the states of import and each state of transit. Each shipment of hazardous or other prescribed waste must be accompanied by a movement document from the point at which a trans-boundary movement begins to the point of disposal. Ghana acceded to the Basel Convention on 30th May 2003 (accession has the same legal effect as ratification) which means that it must comply with all the requirements of the Convention. Therefore, certain wastes generated in Ghana, or within its territorial waters, that are exported to another country, will be subject to the provisions of the Basel Convention.

Finally, Ghana is a signatory to the 1991 Bamako Convention on the ban of the import into Africa and the control of trans-boundary movement of hazardous wastes within Africa. This convention is supplementary to the Basel Convention and covers movement of hazardous waste into or between signatory African countries. The Convention has many provisions virtually identical or analogous to the Basel Convention provisions.

2.15.2 Evolution of Solid Waste Management Services in Ghana

In Ghana, city authorities have historically been responsible for providing sanitation services to residents. The Accra City Council (ACC) for instance, was established in 1898 under the provisions of the Town Council Ordinance of 1894 and charged with the responsibility of refuse and sanitation management (Acquah 1958). This, the council was able to do with the assistance of

few community sanitary inspectors. Systematic waste collection and disposal services commenced during the period and by 1925, public dustbins, emptied by two pushcarts and later, replaced with large carts drawn by mules, were introduced. Incinerators were also introduced in 1929 (Oteng-Ababio, 2013). However, increasing quantity of waste due to increases in population led to their breakdown by 1970, leading to crude dumping into quarry pits at Aborfu, Achimota and Abeka.

However, in the early 1990's, there was a policy shift towards private sector-led involvement. The World Bank in collaboration with the Ghana Government established the Urban Environmental and Sanitation Project (UESP) in 1999 to be implemented in five major cities in the country (World Bank, 1999). Under the project, the World Bank provided the funds as well as technical assistance for the privatization of refuse collection, (MLGRD, 2001). This was against the backdrop of the increasing financial burden on the local governments and the inefficiency of the public sector. The private sector was to overcome the government failures in public direct service delivery – too many workers, not enough supervisors, few incentives for better performance and limited finance (Cointreau-Levine, 1994; Cointreau-Levine and Coad, 2000; Post et al., 2003).

2.16 Conceptual Framework

The conceptual Framework developed by Schubeler (1996) identifies the goals and principles that normally guide Municipal Solid Waste Management (MSWM). It also discusses key objectives and issues which should be addressed by MSWM strategies with regard to political, institutional, social, financial, economic and technical aspects. It also discusses the actors involve in MSWM in a political, socio-cultural, environmental as well as economic context. This is demonstrated figure 2.2.

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Figure 2.2: Structure of the Conceptual Framework



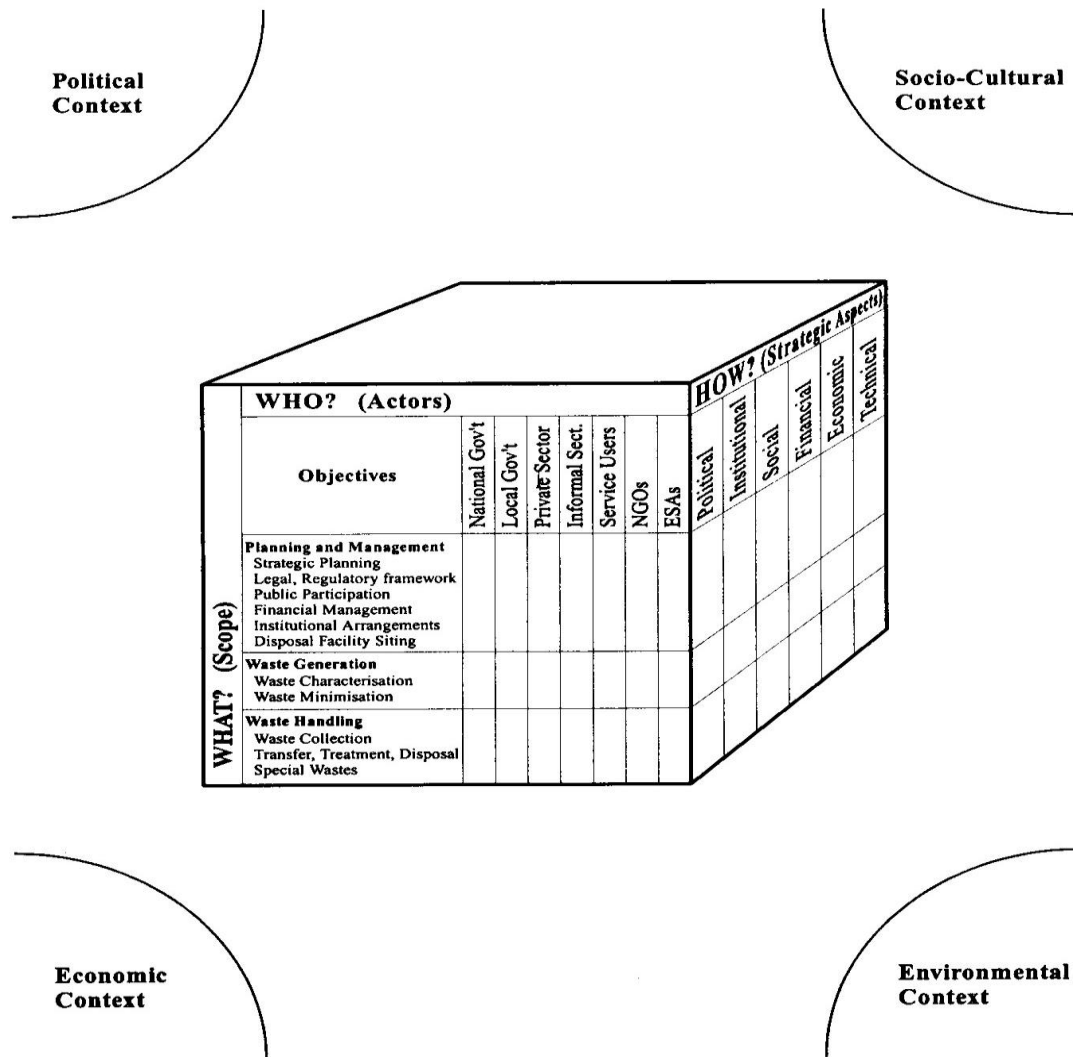


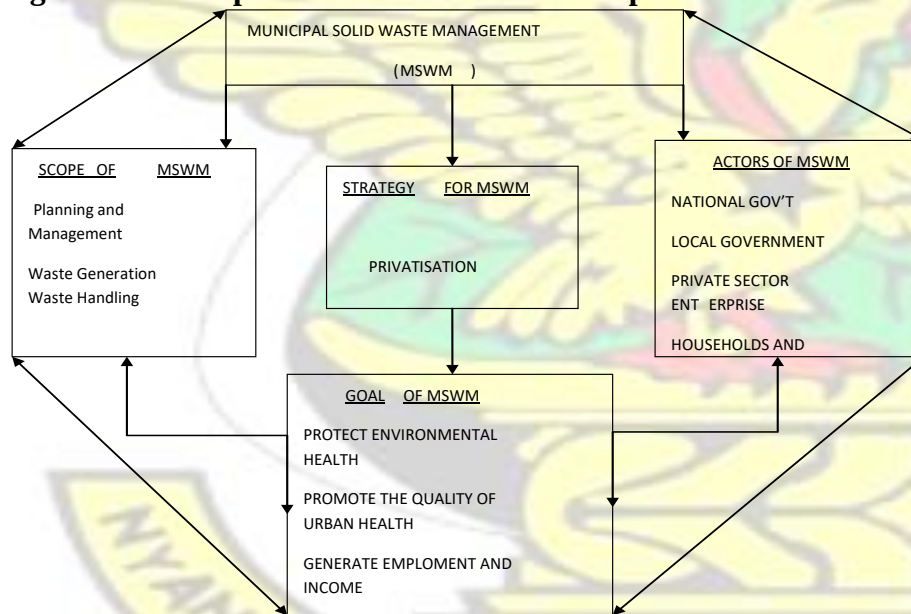
Figure 2.2 Conceptual Framework for Municipal Solid Waste Management

Source: Peter Schubeler's model, 1996

Peter Schubeler's model has been modified to give a theoretical explanation on the impact of private sector involvement in solid waste management in the KMA. This is explained using casual relationships. The framework shows the linkages of the various components with one another and identifies the goals and principles that Municipal Solid Waste Management (MSWM). Privatization has become a global tool or strategy adopted by most governments in the

accomplishment of economic, social, and technical that the government institutions find difficult to manage or achieve. This is because privatization has been tried to be very productive and cost effective. Based on the success story of privatization, the KMA in conjunction with the Ghana government have adopted privatization as a strategy to solve the mounting solid waste management problem in the metropolis. After the involvement of the private sector in solid waste management, the contracted companies are expected to collect solid waste regularly and also to government expenditure on waste in the metropolis. The KMA/WMD now regulates the activities of the private companies. It also looks at the key objective and issues which should be addressed by MSWM strategies. I equally discuss the actors involved in MSWM which are the national government, local government, private sector and the communities who are basically the beneficiaries. This has been explained diagrammatically in figure 2.2.

Figure 2.3 Conceptual Framework for Municipal Solid Waste Management



Source: Adapted and modified from Peter Schubeler's model, 1996

Figure 2.3 is a schematic model developed from Peter Schubeler's model to serve as the basis of the study. It looks at the main goals of MSWM, how to achieve these goals which is the strategy

and the actors as well as the scope of in MSWM. The first and ultimate goal of MSWM is to protect the health of the population in the metropolis. It has other goals such as the promotion of environmental quality and sustainability, support of economic productivity and employment generation. To achieve these goals, the strategy must be adopted is privatization. There is a linear relationship between MSWM and the goals of MSWM as well as privatization. The model also talks about the actors of MSWM who are the National Government, Local Government (KMA), Private Sector Enterprise (PSE) (Companies) as well as the Household, Communities, and Service users. There is a linear relationship between the actors as well as the scope of MSWM. The scope of Planning and Management is connected to National and Local Government, Waste Generation is also linked to the Users, communities and the Households, who do the generation, the Private Sector Enterprise is also connected to the Handling of the waste. After several efforts to manage solid waste in the metropolis by the government through the KMA which has been futile, the government through the KMA has adopted a different strategy which is the involvement of the private sector in the management of solid waste. The question therefore is to what extent has this new strategy help to address the solid waste management problems in the metropolis? This is what the model seeks to look at.

2.17 Conclusion

This chapter reviewed literature on solid waste management and discussed some basic concepts related to urban waste management in the world with special emphasis on Ghana. The historical antecedent of solid waste management in Ghana was reviewed. The chapter also discussed private sector involvement in managing urban solid waste as strategy to address poor solid waste management situation in the developing world. The origin of the private sector and its relevance on solid waste management as well as the challenges confronting the efficient and effective

operations of the private sector were reviewed. The institutional, regulatory and legal framework guiding solid waste management in Ghana was reviewed. The conceptual framework guiding the study was adopted from Peter Schubeler's model (1996).



CHAPTER THREE

STUDY AREA AND METHODOLOGY

3.1 Introduction

This chapter is presented in two parts; the first part presents a profile of the study area. The profile gives a summary of characteristics such as location, size, population size and growth rates, conditions of the built environment as well as solid and liquid waste management situation in the

study area. The second part consists of the methodology of the study and describes and analyses specific research methods and techniques used for the study. It also looks at the appropriate data collection procedures and the tools used for the data analysis. Multi-stage techniques which include purposive, simple random and systematic sampling were employed. Questionnaire survey was carried out in all the selected communities and a total of 156 households were interviewed. In addition separate key informant interviews were carried out.

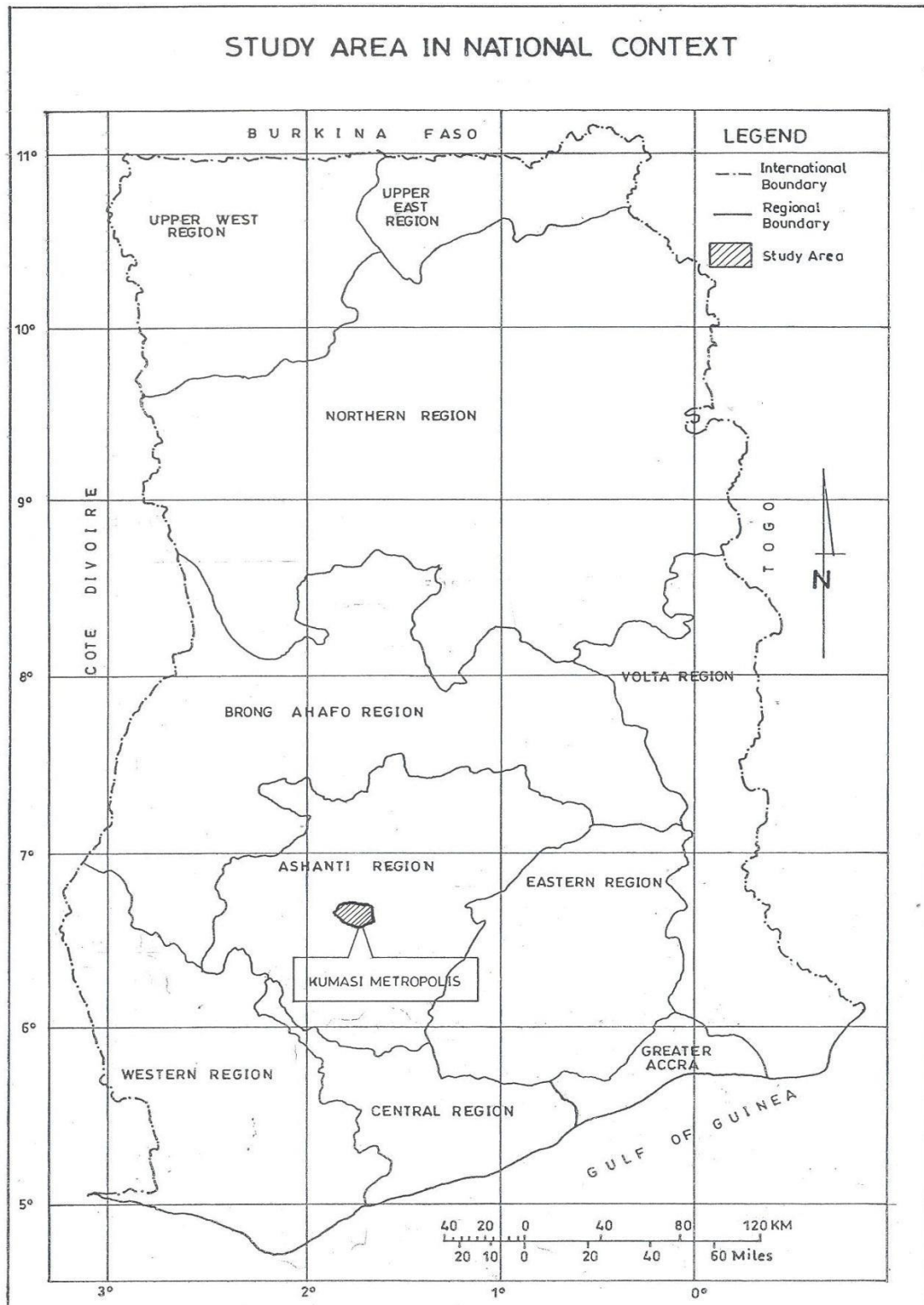
3.2 Study Area

The city of Kumasi was founded in the 1680s by King Osei Tutu I to serve as the capital of the Asante State (Gyasi, 1995). Given its strategic location and political dominance, Kumasi developed into a major commercial centre with most major trade routes in Ghana converging on it. However, it came under the influence of the British rule in 1890 (Adu Boahen, 1975). With time, the city began to expand and grow thereby making it second only to Accra in terms of land area, population size, social life and economic activity (Dickson, 1998). Its beautiful layout and greenery accorded it the accolade of being the “Garden City of West Africa”. From the three communities of Adum, Krobo and Bompata, it has grown in a concentric form to cover an area of approximately ten (10) kilometers in radius. The direction of growth was originally along the arterial roads due to the accessibility they offered resulting in a radial pattern of development. It encompasses about 90 suburbs, many of which were absorbed into it as a result of the process of growth and physical expansion. The metropolis has further been sub divided into ten sub-metros for administrative purposes.

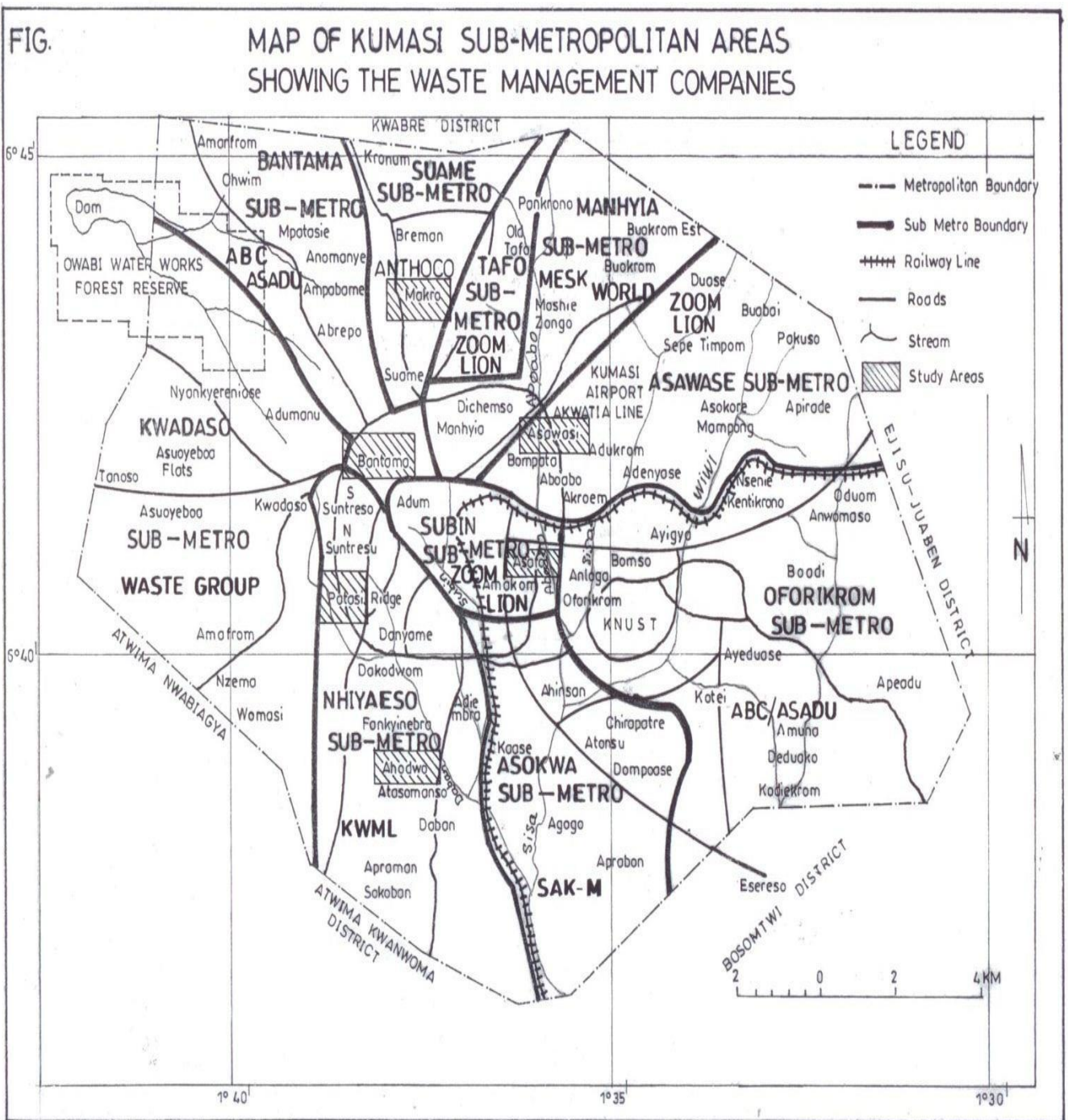
3.2.1 Location and Size

Kumasi is located in the transitional forest zone and is about 270km north of the national capital, Accra. It is between latitude 6.35° - 6.40° and longitude 1.30° - 1.350° , an elevation which ranges between 250-300 metres above sea level is located on ($6^{\circ}35'' - 6^{\circ}40''N$) $30''$ W and longitude $1^{\circ}30''$ $135''$ W $6^{\circ}40''$ N (Gyasi, 1995). The unique centrality of the city as a traversing point from all parts of the country makes it a special place for many to migrate to. Figure 3.1 shows Kumasi (study area) in a national context. Fig 3.2 shows the six communities under study as well as the private waste managing solid waste in the area.

Figure 3.1 : Map of Ghana showing location of the study area – Kumasi.



Source: Survey Department Accra Ghana
Figure 3.2: Map of Kumasi Metropolitan Assembly.



Source: Kumasi Metropolitan Assembly, 2010.

3.2.2 Population Size and Growth Rates

Kumasi is the second populous district in Ghana after the capital, Accra. The metropolis has witnessed a rapid increase in population growth over the last three decade. In 1948, the population

was over 80,000 and increased to about 1,170,270 during the 2000 Population Census. It has been projected to have a population of 2,022,919, by the end of 2010, based on a growth rate of 5.47 per cent per annum. Kumasi has attracted such a large population partly because it is the regional capital, and also the most commercialized centre in the region. Other reasons include the centrality of Kumasi as a nodal city with major arterial routes linking it to other parts of the country and also the fact that it is an educational centre with two state universities, private universities, a polytechnic, two teacher training colleges, senior high schools and a host of basic schools. A high population growth has serious environmental consequences if it is not accompanied by good and technology oriented infrastructure and service provision. Rapid population growth means high rate of waste generation, overcrowding and pressure on existing environmental sanitation infrastructure and sanitation service. When such a high population is anticipated there is the need for planning for new infrastructure and maintenance of existing ones to prevent them from running down as a result of excessive pressure.

3.2.3 Conditions of the Built Environment

Kumasi falls within the moist semi-deciduous section of the South East Ecological Zone. It is drained by a number of rivers and streams. However, as a result of the effects of the urban sprawl and population growth, the natural environment has been altered. Estate developers have encroached upon the green reserves. In addition to this, the water bodies have been greatly polluted from human activity to the extent that some are near extinction (KMA, 2006). Even the few patches of greens along the waterways have been cleared for agricultural purposes leading to siltation. Some developers have also built along and across watercourses resulting in occasional flooding in some areas in Kumasi. Industrial and vehicular emissions have also affected the quality of air in the city.

3.2.4 Solid and Liquid Waste Management

The city is estimated to generate about 1500 tonnes of solid waste daily based on the current projected population of 2,110,867 (KMA, 2012). It is expected to go up by 15% by the year 2020. The Waste Management Department of KMA appears to be overwhelmed by the task of hauling all the solid waste produced in the city. The task is so daunting that the KMA has become synonymous with Waste Management. The use of plastic bags as packages for drinking water and other wares and the proliferation of fast foods which package cooked food in Styrofoam, and the indiscriminate disposal of these materials in the environment is an eye sore in the metropolis. These waste materials are bio non - degradable. In terms of liquid waste management in the metropolis, some achievements have been made, but much still remains to be done.

3.3 Study Methodology

3.3.1 Research Design

The case study design was adopted for this study. It is an empirical enquiry that allowed the researcher to investigate and understand the private sector involvement in solid waste management in Kumasi. This approach was preferred because it provides a systematic way of looking at events, collecting data, analyzing information and reporting results. It is used to narrow down a very broad field of research into one easily researchable topic. The varied nature of the data required and the different sources from which they had to be gathered made the mixed methods approach appropriate. In line with this methodological approach, research tools associated with both the quantitative and qualitative approaches were combined to collect the data. The process included questionnaires, in-depth interviews, focus group discussions (FGDs), direct observation and

documentary analysis. The choice of the mixed methods approach was informed by a number of reasons. First, it was meant to achieve the logic of triangulation since no single method (such as questionnaire, interviewing of documentary analysis) could completely capture all the relevant features of any study Denzin (1989). Furthermore, the combination of qualitative and quantitative methods enabled the researcher to crosscheck the data gathered by different methods, thereby, making the results of the study valid and credible. The decision to combine quantitative and qualitative methods in this study could also be justified on the grounds that it made it possible for the researcher and his assistance to explore the research questions from different perspectives which lead to broader understanding of the issues connected with solid waste management in Ghanaian cities.

3.3.2 Sources of Data

3.3.2.1 Secondary Data

The analysis of secondary data is one important source of data for social science research. Secondary data were obtained from journals, books, newsletters, magazines, published and unpublished materials. The researcher also obtained data from existing documents of related institutions and departments, some national and international records and experiences on solid waste management to ensure that the research outcomes and experiences on private sector involvement in solid waste management are logically explained. Information was gathered from the records of the Kumasi Waste Management Department and Private Solid Waste Management Companies in the Metropolis.

3.3.2.2 Primary Data

Primary data were gathered from a comprehensive field survey, using both quantitative and qualitative research methods. The study employed interviews, questionnaires survey, focus group discussions and field observation drawing upon the strengths of these different methods to improve the quality or validity of the data.

3.3.3 Sampling Design

The Kumasi Metropolis is estimated to have a population of about 2,035,064 people (Ghana Statistical Service, 2012). For the purpose of time and limited logistics at the disposal of the researcher, six communities were purposively selected to reflect the socio-economic classifications of the city as developed by the Kumasi metropolitan Assembly. Kumasi has been stratified into socio-economic classes (GSS, 2010) using wealth, population density, housing quality and some economic parameters, a method in consonance with works of Songsore et al, (2005). The socio-economic classification can be grouped into high income, middle income, and low income residential sectors. After selecting the six communities, two communities each were to represent the three wealth classifications. They include Patasi and Ahodwo representing the high class sector, Bantama and Asafo representing the middle class sector, Maakro and AsawaseZongo representing the low class sector, (see Table 3.1). It is important to note that Asawase was selected as one of the study areas because at the time of the data collection Asawase sub-metro was part of KMA but now part of the Asokore-Mampong Municipality. The high income sector comprises single-family high income housing, blocks of flats, privately built estates and government-built high income estates. These suburbs are not served by communal waste disposal sites. They are usually served by door-to-door or house-to-house waste collection service. The middle income sector includes the multi-storey compound houses and private middle income housing. This sector

is usually served by either house-to-house waste collection service or sometimes central container at a designated point. The low income sector includes the traditional houses such as compound houses. These are usually single storey with rectangular courtyard (Adarkwa and Post, 2001). These suburbs are usually served by communal dump sites or central container placed at a designated point.

After selecting the study communities systematic sampling was used to select the houses for the household interviews. In Bantama community, 40th house was systematically selected after selecting the first house, until all the 28 houses were obtained. This was obtained by dividing the total number of houses in Bantama by the sample size (28). In Asafo the 42nd house was systematically selected to obtain 14 houses for the study. The same process was used to select the houses of the rest of the communities. (see Table 3.2)

Table 3.1: Residential Categories

Category Sub-metro	Communities	No. of Houses
High Class Residential Areas	Patasi	721
	Ahodwo	270
Middle Class Residential Areas	Bantama	1106
	Asafo	587
Low Class Residential Areas	Maakro	1048
	Asawase-Zongo	2525

Total		6257
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Source: KMA, 2010

The sample was apportioned across the residential categories according to the relative share of households residing in each stratum. The apportioning was based on the results of the 2000 Population and Housing Census. The 2000 Population and Housing Census were readily available. The resulting sample size in each stratum is given in Table 3.2, with some rounding up. The sampling frame was 6257 houses. The total number of houses sampled was determined with the formula: $n = \frac{N}{1 + N(e)^2}$ (Gomez and Jones, 2010). Where n is the sample size, N is the total number of houses (households) in the six selected communities and e is the margin of error. With 8 percent margin of error representing 92 percent confidence level (see Appendix F). Using a simple proportion method, 28, 14, 19, 6, 27 and 62 houses were sampled from Bantama, Asafo, Patasi, Ahodwo, Maakro and Asawase-Zongo respectively (see Table 3.2). This was derived by the computation of a percentage for each community based on the total number of houses in the six communities and the number of households in each community. Hence, the number of houses selected in each community is proportional to the total number of houses in that community in relation to the final sample size. The six communities for the study were chosen and the total number of households for the sample calculated as shown in Table 3.2. The total number of houses that were selected for the study area was 156 houses (See Appendix E). From each house, one elderly female was interviewed. This is because in the culture of the study population, females are more responsible for managing solid waste in the home and as such could offer more precise information on the subject. In the case of a house where an elderly female was not available, anybody who was responsible for managing solid waste in that house was interviewed irrespective of the sex.

Table 3.2: Determination of Sample Size for the Study Areas

Suburb	Number of Houses	Percentage Share	Sample Size
Bantama	1106	18	28
Asafo	587	9	14
Patasi	721	12	19
Ahodwo	270	4	6
Maakro	1048	17	27
Asawase-Zongo	2525	40	62
Total	6257	100	156

Source: KMA, 2010

3.3.3.1 Methods of Data Collection

3.3.3.1.1 Questionnaire Survey

Questionnaire survey was carried out in all the selected localities. The questionnaire was precoded with a few open-ended questions that required information on perceptions and attitudes. Local community members who were trained by the researcher undertook the questionnaire survey. The questionnaires were administered to the principal homemaker of each household (generally a woman). Questionnaire is one of the most widely used instruments for collecting data in survey research. The questionnaire for the household survey was developed to cover an aspect of the

objectives of the study which was to investigate issues concerning the role of the private sector in managing solid waste. The instrument was divided into appropriate sections to allow for the systematic collection of data from households in different socio-economic areas in the study areas. The issues covered in the survey include: the socio-economic profile of households; efficiency and affordability of the solid waste management services they receive and recommendation for improvement.

3.3.3.1.2 Expert Interviews

In addition to the 156 households sampled, detailed expert interviews were held with two staff from KMA/WMD, four refuse attendants at the central container points at Tarkwa-Maakro, Bantama-Adumanu, Abrepo-Asubonten and Asafo “moonlight” and three directors in-charge of operations from the private waste companies. Each key informant gave their perspective, understanding and knowledge about the current solid waste management situation in the metropolis. Their responses were aptly captured in the form of narratives in chapter five of this research. Their responses provided an overview of the current solid waste management situation in Kumasi, the contributions of private sector involvement in solid waste management, the solid waste management challenges as well as strategies to manage solid waste in the metropolis. More importantly, they helped explain the socio-cultural and political issues affecting the solid waste management strategies.

3.3.3.2 Pre-tests

Research instruments were pre-tested at Bohyen (a suburb of Kumasi) to fine tune and determine the feasibility of the structured questionnaire. Bohyen was chosen for the pre-test because environmental conditions there are very similar to those of the selected communities.

3.3.3.3 Limitations of the Study

A number of challenges were encountered in the course of writing this thesis, the absence of a detailed comprehensive land use map of the study area made it difficult to clearly distinguish between localities. The study therefore had to depend on a crude description given by the metropolitan planning authorities. Again there was a difficulty in assessing the quantity of solid waste brought by the households at the various communal dumping sites since there was no standard scale to check the quantity. The situation made it difficult for the refuse attendants to charge appropriate fees for the refuse brought by the households. Attendants therefore had no option than to use their discretion. In the house-to-house collection mode, similar problems occurred as refuse could not be easily quantified in monetary terms since refuse were often put in polythene bags due to inadequate waste bins. Another limitation is the fact that the final disposal site at Dompouse had no mechanism to check the number of trips of solid waste made by the companies. This made it difficult to check the quantity of solid waste collected in a day by the companies. The researcher therefore had to rely on the information given by the companies, which could be compromised.

The logo of Kwame Nkrumah University of Science and Technology (KNUST) is centered in the background. It features a yellow eagle with spread wings, a red and black shield on its chest, and a red flame above its head. A yellow banner at the bottom contains the text 'WINSIP3 W. 2. NO. BADWENMA'.

CHAPTER FOUR THE PRIVATE SECTOR INVOLVEMENT IN SOLID WASTE MANAGEMENT IN THE KMA

4.1 Introduction

This chapter is divided into main components. The first section examines the evolution of solid waste management services in Kumasi and the involvement of the private sector in managing solid waste in the KMA. The second section gives an analysis of solid waste generation, collection and disposal before and after the private sector participation in solid waste management as well as challenges facing private waste companies.

4.2 Evolution of Solid Waste Management Services in Kumasi

This section answers research question one and objective one which seeks to examine the evolution of solid waste management services in Kumasi. Historically, the impression that the responsibility

of proper waste management services (considered as a public good) is the duty of a public institution (i.e. MMDAs) has its antecedents in how local governance of our towns and cities has evolved (Oteng Ababio, 2011). While the Municipal Ordinance of 1859 established municipalities in the coastal towns of the Gold Coast, the „new“ Ordinance established in 1943 elected town councils beyond the coastal towns to include Kumasi. The „new“ Municipal Ordinance of 1943 established municipalities as Public Health Boards in Kumasi among other places. The mandates of the Public Health Boards were mainly to ensure hygienic living conditions within settlements. The main operational tool was enforcement management with diligent premises inspections and sanctions (Acquah, 1958).

There was however, a paradigm shift after independence with the passage of the Local Government Act 54 of 1961. The Act empowered the State to provide all public services for the benefit of all citizens (World Bank, 1999). These included education, health, water, environmental sanitation, energy, telecommunication, roads, transport, railways, markets, lorry parks, public toilets and bathhouses, stadia and other recreational infrastructure managed by one entity – the Public Works Department. Though the Act expanded the powers of the central government, the local government bodies were still responsible for the provision of municipal services and amenities in their localities without regard to whether or not they had the personnel with the requisite skills and professional expertise to deliver (Oteng Ababio, 2011). The reasons were that the provision of those basic services had elements of externality, excludability and non-rivalry problems (public good characteristics) and thus should be the responsibility of the state to ensure the welfare of its citizens (Awortwi, 2003).

The role of the central government in the provision of basic services including solid waste management continued till the 1970s when the general economic downturn began. From the mid-

seventies, Ghana's economic fortunes started declining; the economy started stagnating, general tax revenue dwindled and therefore, the policy of tax-based sanitation services could not be supported. The economic downturn led to general decline in agricultural productivity as well as exports. There were also increased inflationary pressures, and a gradual buildup of unemployment. With the economy literally on the verge of bankruptcy, environmental sanitation services collapsed with the local government agencies suffering from lack of central-government transfer of funds and provision of machinery and equipment (ISSER, 2012).

The period of general economic decline also coincided with a period of rapid urbanization, with the rate of urbanization increasing from 23.1 percent in the 1960s to 32.0 percent by 1984 (Owusu and Oteng-Ababio, 2014), a situation which was partly blamed on the large scale deportation of Ghanaian migrants from Nigeria and the rate of natural increase in the population. The high rate of urbanization had two implications; there was a massive increase in solid waste generation and free land for waste disposal became less available. As a result, existing waste disposal sites (including communal containers at sanitary sites) became engulfed with refuse. Incinerators (masonry brick-furnaces for burning refuse) which were introduced in 1929 (see Oteng-Ababio, 2013) also broke down in the 1970s due to the increasing quantity of waste leading to crude dumping into quarry pits. By the 1980s, the state of environmental sanitation services had dipped to a point that it needed radical reforms to put it back on track.

In the early 1990's, there was a policy shift towards private sector-led involvement. The World Bank in collaboration with the Ghana Government established the Urban Environmental and Sanitation Project (UESP) in 1999 to be implemented in five major cities in the country (World Bank, 1999). Under the project, the World Bank provided the funds as well as technical assistance

for the privatization of refuse collection, (MLGRD, 2001). This was against the backdrop of the increasing financial burden on the local governments and the inefficiency of the public sector. The private sector was to overcome the government failures in public direct service delivery – too many workers, not enough supervisors, few incentives for better performance and limited finance (Cointreau-Levine, 1994; Cointreau-Levine and Coad, 2000; Post et al., 2003).

Like most cities in Ghana, the waste management department in Kumasi was also established 1985. It was founded by the UNDP and German Agency for Technical Cooperation (GTZ) with the sole responsibility of managing solid waste in the metropolis. However, in the early 1990's, there was a policy shift towards private sector-led involvement. The micro-enterprise refuse collection (MERC) scheme begun in the year 1998 with House-to-house collection of solid waste in the Atonsu area. In the year 2000, Aryithey and Brothers Company (ABC) joined the house-to-house collection of solid waste in some high class residential communities. Between 2000 and 2001 came the first formal contracted company to collect solid waste in the metropolis which was Kumasi Waste Management Limited (KWML), which is now in charge of the Nhyiaeso Sub-Metro. After the KWML came Meskworl Company Limited; Waste Group Company Limited, Zoomlion Ghana Ltd; Anthoco Company Limited; Sak-M Waste Company Ltd; and Osbon Company Ltd in that order.

Apart from KWML all the other companies were working without any formal contract with the KMA until January 2008 when the city authority decided to give all the companies a formal contract for the collection of solid waste. This led to contracting out and franchising the solid waste collection services to the private sector in the Kumasi Metropolis. This policy of private sector involvement in solid waste management is part of the extension of the market mechanisms of the New Public Management (NPM) and decentralization of local service delivery to the local

governments. It has continued to date, (KMA, 2011). The rationale for the Private Sector Involvement (PSI) in solid waste collection, which is a World Bank policy initiative is to improve efficiency (reduce cost) and effectiveness of service delivery (service quality) through competition in the market where private sector providers compete for a zonal monopoly to render service over a period of time and to ensure that the environmental aspect of sustainable development is integrated into solid waste management.

With this form of privatization, the companies were given a particular zone to manage. The total cost is not pushed to the beneficiaries, but rather the government subsidizes the cost, and allows the beneficiaries to pay some percentage of the total cost. The consumers pay between 10 and 20 percent of the total cost. The private companies individually bear the cost of billing and collecting user charges. The choice of this form of privatization was based on the fact that, generators of waste should take part in the costs of its management (limited polluter pay principle). This, according to the KMA will caution people to try as such much as possible to reduce the volume of solid waste that they generate. It is also to help the government reduce the colossal amount of money that is expended on the management of solid waste in the metropolis. This re-shuffling of waste management operations, while necessary, has not yielded the expected encompassing benefits, with only 60-70 percent of waste generated in the city being collected (Oteng-Ababio, 2012). This has always questioned the competency of the private sector involvement in providing MSWM services.

4.3 Waste Generation in Kumasi

This section covers research question two and objective two of the study which seeks to identify the types and the components of solid waste generated in the KMA. Historical data on the quantity

of solid waste generation and collection provides the basis for city authorities to strategically formulate effective management tools for handling the solid waste.

Table 4.1 illustrates the total solid waste generation and collection in the study area over a three year period. The table shows that solid waste generation has been increasing from year to year. Over the three year period, yearly average quantity of solid waste generation has more than doubled. Data from the KMA further shows that of the total waste generated, 75 percent is collected whereas 25 percent is left in choked drains or at the point of production. The forgoing analysis indicates that the KMA is still far from meeting their solid waste management targets of 90 percent collection. The uncollected waste thus leads to the pollution of air, water bodies and soil environment and ultimately affects the health status of the general population. In the low income communities, the uncollected wastes accumulate on roadsides, are burned by residents, or are disposed of in illegal dumps, which blight neighborhoods and harm the public.

Table 4.1 Solid Waste Generated in the KMA

WASTE COLLECTION KMA			
MONTH	YEAR		
	2010	2011	2012

JANUARY	15,803.40	20,620.50	30,601.26
FEBRUARY	19,353.10	17,909.90	31,928.78
MARCH	16,225.90	16,832.80	33,520.46
APRIL	20,482.79	16,832.50	32,260.97
MAY	20,844.40	16,445.90	37,126.86
JUNE	20,352.84	17,897.10	31,112.40
JULY	21,644.59	21,547.24	35,238.20
AUGUST	32,336.49	29,726.16	33,835.60
SEPTEMBER	19,427.81	29,003.59	31,260.50
OCTOBER	14,556.52	33,277.62	33,360.74
NOVEMBER	23,456.43	32,117.74	33,449.75
DECEMBER	26,370.00	34,564.14	45,043.36
NB: ALL FIGURES IN TONNES			
WASTE GENERATION KMA= 0.6KG PER PERSON PER DAY			

Source: Waste Management Department, KMA 2012

In communal waste dump neighbourhood like Tarkwa Maakro, Asafo, Bantama Adumanu roadside accumulation “has reached levels resembling those that spawned epidemics in European cities 500 years ago” (Oteng Ababio, 2013), with its impacts not routinely monitored or virtually ignored. On few occasions where attempts have been made by the city authorities to improve the dumpsites management, these often tend to be in reaction to threats of their imminent closure by nearby communities. Unless more effective urban SWM programs and public water supply systems are put in place, outbreaks of cholera, typhoid and plague may become increasingly common.

4.4 Types and Components of Solid Waste Generated in the KMA

Knowledge of the types and components of solid waste generated will inform management to use the appropriate method to effectively deal with the various components in solid waste. Methods such as source separation, recycling, composting can be used depending on the components of waste generated. According to the Waste Management Department, the commonest types of waste generated in the area are greens, rubber, plastic, food waste and ashes. These components are shown in Table 4.2

Table 4.2 Major Components of Waste Generated

Component	Percentage generated (%)
Greens/vegetables/fruits	44
Plastics	3.5
Fabrics/textiles	3.2
Paper/cardboard	3.1
Bottles	0.6
Metal	0.6
Rubber	0.3
Miscellaneous (ash, food, faeces)	44.6

Source: Waste Management Department, KMA (2010)

Table 4.2 shows that, organic waste constitutes the largest waste component in the waste stream generated in the KMA, it is made up of 44 percent (greens/vegetables/fruits) and 44.6 percent of

(ash, food, faeces). Together they contribute 88.6 percent of solid waste generated in the KMA. The other 11.4 percent are (paper/cardboard, rubber, metals, etc. could be recycled). This implies also that, the organic can be composted to produce fertilizer for agricultural purposes. The high composition of organic waste implies a high rate of putrefaction and hence a potential odour nuisance. As part of the efforts to address solid waste collection challenges, the city has introduced a house-to-house refuse collection scheme as well as communal collection schemes in the middle and low income class communities.

4.5 Solid Waste Management Strategies in the Metropolis

Currently, two modes of waste collection- House to House (HH) Collection Mode and the Communal Container Collection (CCC) Mode are being practiced in Kumasi.

4.5.1 House to House (HH) Collection Mode

The house to house (HH) collection is commonly practiced in higher income and some middle income communities as well as some public institutions. Under the HH system, each house owner and/or landlord, office building, business, and street-vending kiosk are required to register with a contractor and pay a fee, which is tiered according to income status. Upon registration, the dwelling is entitled to a free refuse bin which is provided by the municipality or the contractor. The contractors collect the solid waste weekly at a fee between GH¢ 12.00 and GH¢ 15.00 per month

Figure 4.1 Waste Bins of Varying Sizes at Patasi Estate



Source: Author's Fieldwork 2012

This mode has its own challenges. Respondents complained about the comparatively exorbitant fees that did not commensurate with the services they receive. The researcher's observations revealed that the containers were not collected regularly as agreed upon in the performance contract. The containers very often become the feasting grounds for domestic animals and create unsightly scenes. The mess, the nauseating stench and the flies hovering over the heaps was a grave source of worry to residents. For these reasons, tension and conflicts between the beneficiaries and service providers were a common occurrence. For instance, expressing outrage at the situation, an attendant at Bantam-Adumanu central container dump site indicated:

“my container was lifted sometimes just once in two weeks. This is not acceptable because the contractor promised to lift the container at least once a week,” she stated.

She continued that the situation had changed from bad to worse and it was no longer possible to determine when her filled-up litter bin would be lifted. Similarly, another attendant Asafo “moon light” expressed similar sentiments and suggested that it was time the government prioritized sanitation management, as it was the most basic service to residents.

While city authorities constantly blame solid waste contractors for not leaving up to the terms and conditions agreed upon, the waste contractors also put the blame at the doorstep of the government. For instance, in an interview with a director of Asadu Royal Waste Limited, he opined:

“How do you expect us to deliver when our capital is locked up? They owe us over GH¢4.315 million at January. He continued; “some of my colleagues (contractors) are currently not operating at their peak, as some of their trucks had broken down”, adding that “without adequate funds to repair them, some have remained in the shops for months”.

These concerns raised by the contractors were confirmed by a director of KMA/WMD but he explained further;

“According to the contractual agreement, they work of credit basis and therefore it was a „normal“ practice”, he concluded.

The research further revealed that the delay in funds released by the government was due to excessive bureaucracy and limited budgetary allocation. In a situation where solid waste management is regarded as a public good, it is important that the government always acts with dispatch in order to forestall any disaster that may arise from such (in) actions.

One other challenge, though less apparent, was the frequent container theft. It strains credulity that waste containers are regularly stolen by unscrupulous individuals for their personal gains.

Not even the company identification marks are able to deter such nation wreckers from engaging in this dastardly act.

4.5.2 Communal Container Collection (CCC) Mode

The CCC mode is of two forms; the pay as you dump, which is common in the low income, high density populated communities and the free dumping mode, which has been fashioned for public places such as markets, educational institutions and public hospitals among others. In Kumasi for example, there are over 150 communal collection centers where households discharge their waste. With the pay-as-you dump, households discharge their waste into Skips at transfer stations or designated locations and collection vehicles pick the solid waste at frequent intervals. This policy, also called the city wide waste levy was introduced as a result of high indebtedness by the government to private solid waste companies that were contracted to manage solid waste in the metropolis. As of the time of the study, an amount of GH¢ 1.00 was charged for a bucketfull of solid waste. The rate is not fixed. The more you dump, the more you pay.

There are major problems with the communal collection system as well. The first major difficulty is that the containers are often too high for the public to accurately dump the waste and therefore in the event, the waste is dropped on the immediate surroundings. Another problem with the communal container system is that sometimes, it takes the operators many days before emptying is done. This creates unsightly scenes with bad odour (see figure 4. 2).

Figure 4.2 Overflowing Communal Container at Bantama



Source: Fieldwork, 2012.

A third major problem relates to the distances residents have to travel to access the communal container sites. Literature on distance decay theory have established that there are maximum travel thresholds within which households will voluntarily access the central containers and once this is exceeded, utilization tends to fall off considerably. Indeed, leading scholars on distance studies (Oteng-Ababio 2010; Wilson, 2007& Ali, 2010) had established that the longest distance residents have to travel to access a container should not exceed 200m and that distance beyond 200m in most cases, serves as a deterrent for households to look for alternative dumping sites, which invariably are very close to their living places.

4.5.3 Final Disposal

Analysis of secondary documents from the MLGRD shows that Kumasi follows the “end-of-pipe approach” to SWM where generated solid waste is collected and disposed of in open dumpsites, which by far, remains one of the most reliable and economically viable methods of managing MSW (Seadon, 2010).

Poor solid waste management has not just become a local public health issue; it has been recognized as a global environmental problem, because of the significant contribution of waste-related emissions to climate change (Oteng Ababio, 2011). Indeed, waste-related greenhouse gas (GHG) emissions are estimated to be 5% of the total GHG emissions and are expected to increase to 9% in 2020 with business as usual (Owusu-Sekyere, 2014). Awareness is therefore growing, resulting in pressure on national governments to adopt an environmentally sound approach to SWM that must go beyond the technical guidance on the development, operation and monitoring of solid waste disposal sites as provided through the Government's Minimum Requirements (Oteng-Ababio, 2012).

The final disposal sites in Kumasi are often located in ecological and/or hydrological sensitive and challenging neighbourhoods including abandoned valleys (as is the case at Owchim) without proper leachate or gas recovery systems. Their maintenance therefore falls short of the legally set standards required for safeguarding public health and environmental quality. These sites tend to be disturbingly degraded but typically, „environmental pollution“ becomes a veritable buzzword, adapted inadequately, or adopted uncritically to mask actions or inactions of the city authorities who ought to have done better. Such a situation risks embedding unsustainable structures, processes and outcomes and therefore, there is the need to shift emphasis towards understanding these socio-ecological transformations and dynamics within the fundamental Ghanaian context.

Residents living in the environs of the dumpsites, have on countless occasions threatened to forcefully close down the facilities because of the overpowering stench, mosquitoes and insects emanating from the dumpsites. This has created a situation where public acceptance of such noxious facilities is fast diminishing, with some adopting a „build absolutely nothing anywhere near anything“ attitude. As of the time of

conducting this research, the Kumasi Metropolis had 15 open dumpsites and one landfill where all the waste collected in the metropolis is disposed. The landfill is located at Dompoease, 13 km south-west from the Kumasi city centre. It covers an area of 100 hectares of prime farmland. It is an open landfill, where the waste is deposited, spread out, levelled by a bulldozer, and then compacted by a steel studded wheeled compactor to reduce the volume (Kuma 2007). The landfill is expected to be operational till 2018. According to city authorities, the landfill was constructed at Dompoease because of hauling distance and availability of land. There were no evaluations of the underling soil structure, topography, climate, surface water, and the hydro-geological conditions of the area, (Kuma 2007). Both domestic and industrial waste are dumped at the site without any form of special treatment, and personal observations revealed that the waste is not regularly covered with soil to prevent the harbouring of disease vectors, odours, air pollution, and other hazards. The leachate collection system often breaks down and the site is not enclosed from the surrounding environment. In addition, no gas ventilation has been established to prevent fires. As a result, the nearby surface and groundwater is vulnerable to contamination by leachate which may contain high amounts of chloride, organics, metals, hydrates and other contaminants.

There is no doubt that the waste dumpsite is improperly managed. It attracts all types of diseasespreading insects. The stench can be smelt several kilometers away from the site. When the site was chosen, it was located at a safe distance from settlements, but today the site is no longer at the periphery of the city. The city has gradually extended towards the site and many residential neighbourhoods now surround the waste dump. Apart from the Dompoease landfill, the several unregulated open dumpsites in the Metropolis are located in valleys, old quarry site or transfer stations that have not seen collection for months. The fifteen open dumpsites dotted in the KMA are not managed according to standards set by the EPA in the Ghana Landfill Guidelines of May

2002. According to the guidelines certain controls must be observed in the operation of open dumpsites. These are: Control over waste, Control over gas and water and Control over access.

Control over waste could be done by establishing a physical boundary just like a rubbish bin. The waste should be safely contained in an orderly fashion. Deposited waste should be covered with soil or other suitable materials to eliminate fly breeding and odour emissions from the waste. The first important thing that needs to be done is to take control of rubbish and not the other way around.

Gases are generated as by-products of the natural decomposition process occurring at a landfill. Such gases include methane (CH_4), carbon dioxide (CO_2), nitrogen (N_2), hydrogen sulphide (H_2S), ammonia (NH_3) etc. Methane and carbon dioxide are the two principal gases generated from the anaerobic decomposition of biodegradable organic waste. Some of these gases may cause fires and/or explosions at landfills. Landfill gases need to be controlled to prevent unwanted movement into the atmosphere so that any accidents can be avoided. Water control has two targets, one for surface water and the other for leachate. The control of surface and storm water can prevent water from entering the landfill and as a result it contributes to reducing the amount of leachate. The control of leachate is essential for preventing pollution and protecting groundwater quality since leachate may percolate through the underlying soil. The idea of control over leachate is to collect and drain leachate as quickly as possible from the disposal area and keep it in a retention pond. It is much easier to control leachate when it is confined to one location. Lastly, control of access means the securing and proper maintenance of an access road and the restriction of unauthorized entry to a landfill.

The access road needs to be constructed and maintained to allow all-weather tipping. This means that the road leading up to the dumping area can be driven on even during a heavy wet season. Unauthorized entry of vehicles and people may lead to illegal waste dumping, fires and vandalism of landfill facilities. It also allows uncontrolled scavenging at the tipping area. In order to take control of site access, the perimeter of the landfill needs to be fenced or ditched and the gates should be locked after operating hours. The KMA is unable to comply with the above controls in the management of the solid waste dumpsites and this therefore causes a lot of health and environmental problems to the communities they are located. The increasing rate of urbanization coupled with competing demands for poverty alleviation, means much more focus has had to be placed on appropriate but cost-effective methods of managing household waste, which is growing at an average rate of 3% annually (GSS, 2012). The magnitude of the problem manifests more clearly when viewed against the Ghana's land area of 238,000 km², with 24 million people and 47,800 settlements, including 6 metropolitan, 49 municipal, and 161 district capitals (Owusu & Oteng-Ababio, 2014). This situation, by implication means that open spaces are becoming less available, thus making the practice of open disposal unsustainable.

4.6 Quantity of Solid Waste Generated in the selected Communities

Historical data on quantity of solid waste generation provides the basis for city authorities to strategically formulate effective management tools for handling the solid waste. Table 4.3 illustrates the solid waste generation in six selected communities in the KMA in 2010.

Table 4.3 Solid waste generated in six selected communities in the KMA

Suburb	Sub-metro& estimated pop (2010)	Suburbs'' estimated pop (2010)	Waste generation (KG)	Daily solid waste generation in the submetro (Tonnes)	Daily solid waste generation within the suburbs (Tonnes)
Bantama	Bantama (270,430)	28,093	0.6	160 (24%)	17 (13%)
Asafo	Subin (121770)	17,459	0.6	80 (12%)	12 (10%)
Maakro	Suame (346297)	99773	0.6	182 (29%)	52 (42%)
Asawase/Zongo	Asawase (209589)	53678	0.6	119 (18%)	31 (25%)
Ahodwo	Nhyiaeso (262006)	5660	0.6	113 (17%)	2 (2%)
Patasi	Nhyiaeso (262006)	22913	0.6		10 (8%)
Total		227576		654 (100%)	124 (100%)

Source: KMA, 2010

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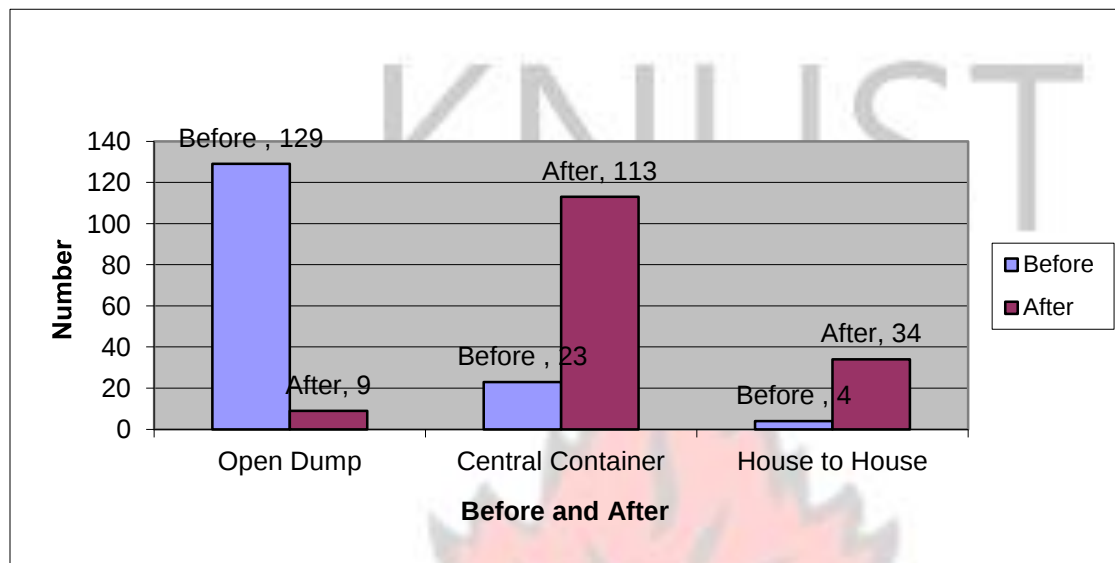


From table 4.3, it is estimated that total solid waste generated in the five sub-metros in a day for the year 2010 was 654 metric tonnes. Out of this the six selected communities from these submetros generated 124 metric tonnes. It is evident from the table that, population actually has a bearing on waste generation. Maakro from the Suame sub-metro which has the highest population of 99773 generated the highest percentage of 42 percent of the total solid waste generated among the selected communities in a day. Ahodwo from the Nhyiaeso sub-metro which has the least population among the communities generated the least solid waste which is only 2 percent of the total solid waste generated within the communities in a day. This supports the study of Kassim in 2008, that the rapid increase of population in the city coupled with the increasing growth of commerce and trade has increased solid waste generation at a rapid rate (Kassim, 2008).

4.7 Solid Waste Disposal Methods

When the respondents were asked how they disposed of their solid waste before privatization 3 percent said they were engaged in house-to-house collection service, 15 percent dumped their refuse in a central container provided by the KMA and a fee is charged at the end of every month. Majority of households about 82 percent said they used to dispose of their solid waste at the refuse dump site since that was the only means available to them. After privatization, however, statistics from Figure 4.3 indicate that, out of the 156 respondents, 22 percent dispose of their solid waste through the house-to-house collection while 72 percent dispose of their refuse through the central container and the remaining 6 percent still dispose of their waste through the refuse dump.

Figure 4.3: Solid waste disposal before and after privatization



Source: Author's Fieldwork, February 2012

From the survey it is clear that, most of the refuse dump sites have been converted to central container dumps by placing containers on the dump sites, with an increase in the house-to-house containers. On every refuse dump, a container is placed at the site for people to put in solid waste. If the container becomes full, anybody who comes with his or her solid waste is asked to go home and return when the container is back. The containers make it very easy for collection and disposal at the dump site as compared to the situation where the refuse was thrown on the ground for it to be collected.

There has been an increase in house-to-house collection as a way of disposing of waste. Before privatization, only 4 of the respondents representing 3 percent were engaged in the house-to-house collection mode, but after privatization, the percentage has increased to 22 percent which is quite significant, over the eleven year period. According to the respondents, there has been an increase in the house-to-house collection services because, most of the households are public servants who leave home early in the morning and come late in the evening and therefore resorted to sitting in

their houses and disposing of waste comfortably rather than carrying them to refuse dump site. Also, more containers have been provided by the companies to interested households for a fee to be paid by installment.

4.7.1 Pay- as -You -Dump

The study explored the issue of paying a fee for dumping of solid waste, before and after privatization. The interview with the respondents indicated that, before privatization, there was no fee paid for dumping of solid waste at the refuse dump site, but that of the house-to-house collection, there was some form of payment even before privatization. But after privatization, there is now the policy of pay as you dump, which affects the dumping of solid waste at the refuse dump site or the central container point as well as the house-to-house collection. This is to ensure that the private waste companies recover their cost and also to help them render good services to the households.

4.7.2 House-To-House Collection

The study also sought to identify the class of people who patronise the house-to-house as a form of solid waste disposal. The study revealed that, there has been an increase in the house-to-house as a form of solid waste disposal by the households in the Metropolis. Currently, 34 respondents representing 22 percent have taken to the house-to-house collection service. The study revealed that the house-to-house collection service is usually patronized by the households from middle and high income residential areas while most of the households from the low income residential areas engage in communal collection. This is because the refuse dump sites at the middle income and high income residential areas are usually sited far away from the residential area. For instance, Ahodwo and Patasi Estate which are typically high income residential areas have no other means of disposing their waste except the house-to-house collection mode.

4.8 Means of Disposal in the three Residential Class Areas

Before the involvement of Private sector in solid waste management in KMA, residents had various means by which they dispose of their refuse. The mode of disposal usually differs from one residential class to another.

Table 4.4: Means of Disposal at the Low Income Residential Area

Means of Disposal	Frequency	
	Before	After
Open Dump	82 (92%)	8 (9%)
Central Container	7 (8%)	80 (90%)
House to house Collection	0 (0%)	1 (1%)
Total	89 (100%)	89 (100%)

Source: Author's Fieldwork 2012

Statistics from Table 4.4 indicate the means of refuse collection and disposal at the low income residential area. Out of the 89 respondents sampled in the low income residential area greater number of residents (92 percent) dumped their refuse through the open dump or the traditional refuse dump where dumping of refuse was free. Households who dumped their refuse through the central container constituted 8 percent. No household used the house to house collection mode.

When the private sector was contracted to manage solid waste in the KMA, almost all the traditional refuse dumps in the metropolis were converted to central containers. The conversion came along with the pay-as-you-dump policy. Even though the affected households were not adequately informed before the conversion, they had no option than to comply. Table 4.4 further indicates that after privatization, about 90 percent of the respondents accepted the change, and dumped their refuse through the central container. Households who were still using the traditional

refuse dump constituted 9 percent. Only 1 percent of the residents confirmed that they relied on the house-to house-collection mode.

4.8.1 Means of Disposal at the Middle and High Income Class Residential Areas

Before the private sector involvement in solid waste management in the metropolis, some of the households in the middle income class residential area paid some fee before disposing of their refuse. The study found that households in the high income class residential area were always in readiness to pay for the waste that they generate.

Table 4.5: Means of Disposal at the Middle Class Residential Area

Means of Disposal	Frequency	
	Before	After
Open Dump	22 (52%)	1 (2%)
Central Container	16 (38%)	28 (67%)
House to house Collection	4 (10%)	13 (31%)
Total	42 (100%)	42 (100%)

Source: Author's Fieldwork 2012

It is evident from Table 4.5 that before the private sector involvement in solid waste management in the metropolis, about 52 percent of the households were engaged in open dumping in the middle class residential area. Households who dumped their refuse through the central container were 38 percent and 10 percent were involved in the house-to-house collection mode. After privatization, 67 percent of the households use the central container. Households engaged in the house-to-house collection service constituted 31 percent and only one of the respondents (2 percent) confirmed that she still uses the open dump.

Table 4.6: Means of Disposal at the High Income Class Residential Area

Means of Disposal	Frequency	
	Before	After
Open Dump	02 (8%)	0 (0%)
Central Container	15 (60%)	5 (20%)
House to house Collection	08 (32%)	20 (80%)
Total	25 (100%)	25 (100%)

Source: Author's Fieldwork 2012

From Table 4.6, when the respondents in the high income residential area were asked how they disposed of their refuse before privatization, 60 percent and 32 percent of the households confirmed that they paid for dumping at the central container and house to house collection mode respectively even before privatization. Only a few, about 8 percent of the households confirmed that they used the open dump. After privatization households' patronage in the house to house collection increased to about 80 percent and reduced to 20 percent at the central container. It was revealed that no household was engaged in open dumping. This confirmed the earlier notion that majority of households at the high income class residential area are always willing to pay for the waste that they generate, since most of them are working class and could afford to pay services rendered to them.

4.8.2 Quantities of Solid Waste collected by the Private Companies in a day.

An interview with the Waste Management Companies as well as KMA produced the statistics in the Table 4.7 as the quantities of solid waste collected by seven companies in a day. Four of these companies have been assigned to the six selected communities. They include KWML which manage Ahodwo and Patasi, Zoom Lion for Asafo and Asawase/Zongo, ASADU Royal Waste for Bantama and Anthoco for Maakro.

Table 4.7 presents the total quantities of solid waste collected in a day by all waste companies in the KMA. This was compared with the time KMA/WMD was in charge of managing solid waste in the KMA.

Table 4.7 Quantities of Solid Waste collected by the Companies

Name of company	Daily solid waste collection in metric tonnes	Percentage of total waste collected in a day(1470)
KWML	75	5%
VE Mark	65	4%
Meskworl	220	15%
ASADU	342	23%
Zoomlion	600	41%
Anthoco	92	6%
SAK-M	76	5%
Total	1470	100%

Source: Author's Fieldwork, 2012

From Table 4.7, in a day, all the seven companies collected a quantity of 1470 metric tonnes of solid waste which is approximately 86.5 percent of the total solid waste generated in a day which is about 1,700 metric tonnes (Owusu Sekyere, 2012), with 13.5% of the total waste generated remaining uncollected. Out of total solid waste collected, Kumasi Waste Management Limited (KWML) collected 5 percent, VE Mark collected 4 percent, Meskworl collected 15 percent, ASADU collected 23 percent, Zoomlion collected 41 percent, and Anthoco collected 6 percent, and Sak-M collected 5 percent of the total solid waste generated in the Metropolis in a day. Out of the total 1,700 metric tonnes of solid waste that was generated in the Metropolis in a day (Owusu-

Sekyere, 2012). The four companies assigned to the study areas together collected a total of 1109 metric tonnes representing 65 percent of the total solid waste generated in a day.

According to Post, the Kumasi Waste Management Department (KWMD) collected 344.4 metric tonnes of solid waste of the total 861 metric tons which represents 40 percent of the household waste generated daily (Post, 1999). This is in agreement with Lee (1999), in his study of nine contractors providing solid waste management service to 10,000 houses each in Kuala Lumpur found out that private companies made more trips per day by each vehicle and collected more waste on each trip than the city council. The private company collected 8.7 tonnes of waste per day; whereas the public sector collected only 5.7 tonnes per vehicle per day (Lee, 1999). In effect, the four companies together are doing better than the KMA/WMD used to do when they were in operation, even though much needs to be done. This confirms the proposition that the private waste companies have brought improvements in the solid waste management in the KMA.

4.8.3 Frequency of solid waste collection before and after privatization

With the issue of frequent solid waste collection before and after privatization, 29 percent of the respondents said before the takeover of the companies as well as the pay as you dump policy, the refuse at the dump site was collected daily. Meanwhile 45 percent of the respondents said the refuse was collected weekly and 26 percent indicated that, their waste was collected monthly. On the other hand, after the city wide waste levy scheme, coupled with the privatization, the frequency of solid waste collection has changed.

Table 4.8: Frequency of Solid Waste Collection Before and After Privatization

Waste collecting time(s)	Frequency	
	Before	After
Daily	46 (29%)	76 (49%)
Weekly	70 (45%)	80 (51%)
Monthly	40 (26%)	00 (0%)
Total	156 (100%)	156 (100%)

Source: Author's Fieldwork 2012

From Table 4.8 it is clear that, daily collection has improved significantly with monthly collection no more after privatization. According to the respondents, there has been an improvement because of the introduction of the central containers which makes it very easy for the companies to convey. They also said that, the money they pay helps in the frequent collection of their solid waste which was not the case before privatization. It was observed during the field survey that, when KMA was in operation, heaps of refuse dumps were very common in most of the sub-metropolis, indicating that, the refuse was not collected frequently. But since the takeover of the companies, frequency of collection at various dump sites has improved tremendously.

This confirms the frequent collection of solid waste by the companies, and an improvement in the solid waste management in the metropolis.

4.8.4 Payment for Solid Waste Disposal before and after Privatization

The amount of money paid for solid waste management services is dependent on the mode of disposal as well as the type of residential class the individual belongs to. Table 4.9 presents households responses to whether they used to pay for dumping before and after privatization.

Table 4.9: Payment for Dumping before and after Privatization

Response	Frequency	
	Before	After
Yes	12 (7.7%)	154 (98.7)
No	142 (92.3)	2 (1.3)
Total	156 (100%)	156 (100%)

Source: Fieldwork, 2012

The results from Table 4.9 indicate that, before privatization, waste disposal by the generators was almost free. Out of the 156 respondents, 92.3 percent indicated that, before privatization, they used to dump at refuse dump site without paying any money, while the remaining 7.7 percent said they used to pay some money for disposing of their solid waste, but it was through the house-to-house collection. After private sector involvement in solid waste collection, 98.7 percent of the respondents indicated that, now they do pay money any time they go to dump solid waste at the refuse dump site or the communal container and pay for house-to-house collection. Only two persons representing 1.3 percent do not pay any money for dumping of solid waste at the central container.

The form of privatization that is implemented in the metropolis is franchise, which involves the payment of some fee by the households, which has been subsidized by the government. This is perhaps the reason why after privatization of solid waste management, open dumps were replaced by central containers and households were made to pay some fee before dumping their refuse.

Table 4.10 presents the amount of paid for dumping at the communal dumping site. Majority of households at middle income and low income communities usually access this facility. Out of the 156 respondents sampled, 113 respondents are engaged in communal dumping.

Table 4.10: Payment for Dumping at the Central Container

Amount paid for dumping	Frequency	Percentage
10 pesewas	1	0.9
20 pesewas	57	50.4
40 pesewas	49	43.4
50 pesewas	6	5.3
Total	113	100

Source: Author's Fieldwork 2012

To identify the amount charged for dumping, respondents were asked how much they pay for dumping their refuse at the central container. Table 4.10 shows that 50.4 percent of the respondents responded that, they pay an amount of 20 pesewas each time they go to dump at the central container while 43.4 percent pay an amount of 40 pesewas, with six people representing 5.3 percent paying an amount of 50 pesewas for dumping. Only one person representing 0.9 percent pays 10 pesewas for dumping. The question is why the differences in the fee paid for dumping? An interview with the KMA/WMD indicates that, the basic rate for dumping at the refuse dump is 20 pesewas, but the fee can be more than the basic rate but should not be less. It becomes more than the basic rate if the person in-charge thinks that, the quantity of waste brought by an individual is more than the normal quantity that attracts the basic rate. The person in-charge then decides how much one should pay for that quantity of waste that one has brought to dump. Normally this ranges from 20 to 50 pesewas. Ideally, on no occasion should the rate be lesser than the basic rate. The 57 people representing 50.4 percent who responded they pay an amount of 20 pesewas for dumping confirms the KMA's basic rate for dumping at the central container.

4.8.5 Amount of Money Paid for a House-to-House Collection Service

The House-to-house solid waste collection is practiced at the middle and high income class residential areas in the metropolis. Unlike the central container where amount of money paid for

dumping is done on daily basis, with the house-to- house collection, households are made to pay for a service delivery at the end of the month. The amount charged depends on the quantity of solid waste generated by the households. The refuse generated by the households are put in waste bins of varying sizes provided by the KMA and the Waste Companies. Table 4.11 presents the fees paid to access house-to-house collection service. Out of the 156 respondents sampled, 34 of them access house-to-house collection service.

Table 4.11 Payment for House-to-House Collection Service

Volume of Bin	Amount Paid	Frequency	Percentage
250 Litre	15 cedis	18	53
120 Litre	10 cedis	12	35
Below 120 Litre	5 cedis	4	12
Total		34	100

Source: Author's Fieldwork, 2012

Table 4.11 presents the amount of money paid by the households that access the house to house waste collection service per bin per month. Out of the 34 respondents who access the house to house collection service, 53 percent paid for 250 Litre bin of solid waste per month. Respondents who paid for 120 Litre bin of solid waste per month constituted 35 percent and 12 percent of the respondents confirmed that they usually put additional refuse in polythene bags when the waste bins are full and pay for them at the end of the month and this is classified below 120 Litre bin. Figure 4.4 shows solid wastes that have been wrapped in polythene bags awaiting collection.

Figure 4.4: Refuse Wrapped in Polythene Bags in Patasi



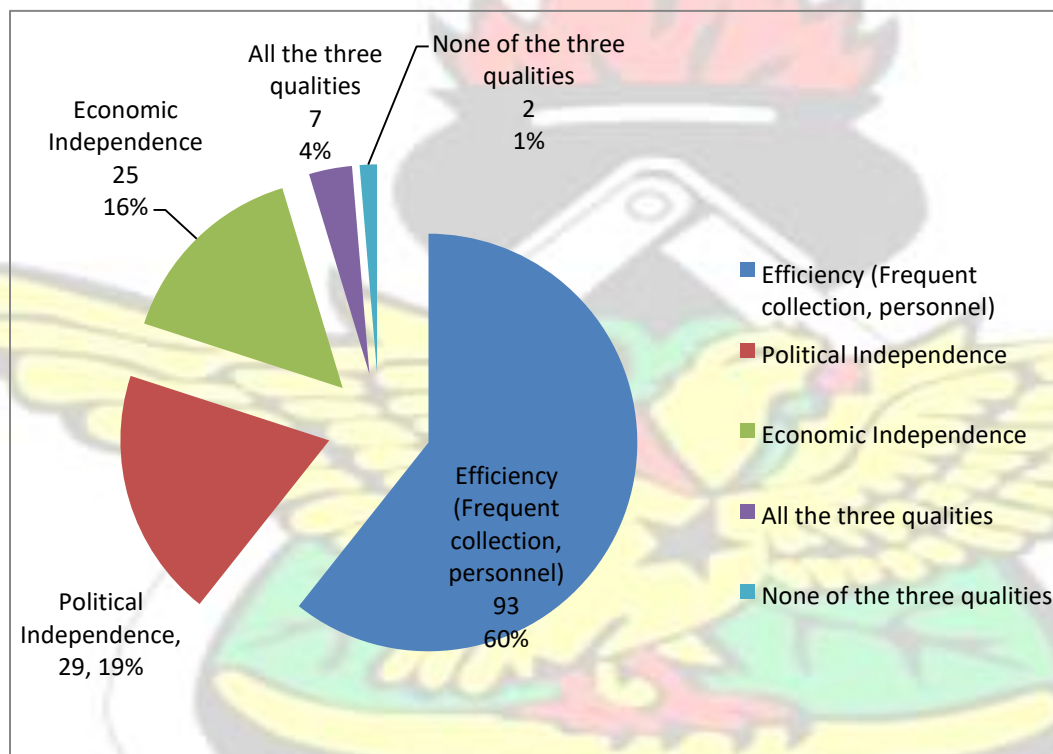
Source: Author's Fieldwork 2012

4.9 The Level of Performance and Service Quality of the Private Companies

4.9.1 Qualities of the Companies

During the field survey, it was observed that there have been tremendous improvements in the performance and service quality of the private companies assigned to the study areas due to a number of factors. When respondents were asked to identify some of the factors responsible for the improvements in the performance of the waste companies, it was evident from Figure 4.5 that out of the 156 respondents interviewed, 60 percent said the companies are very efficient (frequent collection and dedicated personnel) when it comes to solid waste collection. 19 percent also identified political independence as one of the qualities the companies have, whilst 16 percent identified economic independence as another quality of the companies. Meanwhile 4 percent of the respondents identified all the three qualities in the companies. On the other hand, 1 percent of the respondents did not identify any of the three qualities in the companies. Figure 4.5 presents the qualities possessed by private waste companies.

Figure 4.5: Qualities of the Private Waste Companies



Source: Authors Fieldwork 2012

These qualities of the companies that have been identified by the respondents go to confirm the study of Boorsman in 1994, who said that, the private sector is endowed with qualities such as political independence, economic rationality, efficiency, dynamism and innovation; qualities which make it measure up favourably if not better than public sector enterprise.

4.9.2 Equipment Holdings of the Private Companies

The equipment base of the private companies has significant bearing on the effective management of solid waste in the Metropolis. In an interview with the Research Coordinator of KMA/WMD, it was realized that the inadequate waste management equipment such as skips, compactor trucks and tipper trucks and frequent breakdown of these vehicles actually worsened the solid waste management situation in the Metropolis. Before privatization, statistics from the Transport office of the KMA/WMD indicate that, the WMD which was in charge of managing solid waste in the whole Metropolis could boast of only seventeen (17) tipper trucks and only two (2) pay loaders with no compactor trucks in the collection of solid waste in the Metropolis. This actually had a negative influence on the performance of the KMA/WMD in solid waste collection and disposal. With the involvement of the private sector in the management of solid waste in Kumasi, the solid waste management situation has improved because of adequate equipment used by the private companies in solid waste collection and disposal. One key requirement for solid waste collection is vehicles. There are different types of vehicles used by the companies in their operations. Some of the vehicles used include the compactor trucks, skip trucks, the roll on and off container truck, pickups, saloon cars, etc. The study however focuses on the compactor truck, skip truck and the roll on and off truck. An interview with the companies reveals that, almost all the companies have a number of vehicles in their operations. Table 4.12 shows the types and number of vehicles of the companies.

Table 4.12: Types and Number of Vehicles

Company	No. of compactors	No. of skip vehicles	No. of roll off and on	Total no. of vehicles	Percentage
KWML	05	08	08	21	32%
Ve Mark	07	04	-	11	17%
Meskworl	02	05	01	08	12%
ASADU	02	02	01	05	08%
Zoomlion	04	05	02	11	17%
Anthoco	03	0	02	05	08%
SAK-M	02	02	01	05	08%
TOTAL	25	28	15	66	100%

Source: Author's Fieldwork 2012

All the companies have a total of 66 vehicles, out of this; the four companies (Zoom Lion, ASADU, KWML and Anthoco) assigned to the selected communities alone have 42 vehicles. The skip is the most dominant among the vehicles, representing 40 percent of the total vehicles, even though not all the companies have some. The Anthoco Company operates and collects the waste without the skip truck, even though plans have been put in place to acquire one. There are 25 compactors, and almost all the companies have at least a compactor. The companies said, without the compactor, it is very difficult to carry out the house-to-house collection. This is because the compactor can collect enough solid waste at a time without dropping the waste as it transports it to the final disposal site. The skip and the roll off and on are 26 and 15 in number respectively and are used for the central container/refuse dump collection. Comparatively, there have been more vehicles after privatization than it was before privatization. In terms of vehicles, the four companies are better equipped than the KMA and this can be cited as one of the reasons why the companies are performing better than the WMD used to do, even though it might not be the only reason why the companies are doing better than the KMA/WMD. According to Oteng Ababio

(2010), more and good condition of vehicles and equipment ensures not only trouble-free operation but also results in higher output and profitability in waste management. This therefore supports the proposition that the capacity of the companies in terms of equipment holdings has increased efficiency and service quality of the companies.

4.9.3 Service Quality of the Private Companies

In assessing the quality of solid waste collection service, the residents were asked to rate companies (on a five-point scale from very poor to Excellent) in terms of two service quality attributes (reliability of collection and waste overflow and sanitary conditions at bin/container location). The reliability of solid waste collection has already been discussed in Table 4.8.

Table 4.13: Waste overflow and Sanitary Conditions at the Central Container

Remarks	Scores	Frequency	Percentage
Excellent	80-100	24	21.2
Very Good	60-79	28	24.8
Good	40-59	35	31.0
Poor	20-39	14	12.4
Very Poor	0-19	12	10.6
Total	100	113	100

Source: Author's Fieldwork 2012

From Table 4.13, a service quality aggregate score of between 80-100 representing 21.2 percent indicates that the company service quality is excellent while aggregate score between 0-19 representing 10.6 percent indicates that the service quality of the company is very poor. Out of the 156 respondents that were interviewed, majority of them representing 31percent indicated that the sanitary conditions and spillover of waste at bin/container was good. Respondents constituting

24.8 percent scored between 60-79 with 12.4 percent scoring between 20-39. Reliability of collection and waste overflow are related to some extent. Waste spill over from bins occurs as a result of unplanned waste collection or changes in waste pick-up scheduling and irregular pick-ups. Spill over of waste from bins in front of houses (house-to-house collection) and at container locations (communal collection) contributes to the poor aesthetic conditions and nuisance in communities even though companies may be operating in those communities.

Table 4.14 Waste overflow and Sanitary Conditions at the House-to-House Containers

Remarks	Scores	Frequency	Percentage
Excellent	80-100	6	18
Very Good	60-79	8	23
Good	40-59	12	35
Poor	20-39	5	15
Very Poor	0-19	3	9
Total	100	34	100

Source: Author's Fieldwork 2012

From Table 4.14 the waste companies engaged in the house-to-house collection seem to be doing better than those involved in the communal collection. This can be attributed to the fact that waste collection at the house-to-house is more regular and reliable resulting in a reduction of waste overflow from waste bins and ensuring good sanitary conditions. It is evident from Table 4.14 that greater number of the respondents representing 35 percent scored between 40-59, indicating that sanitary conditions at bins/container was good. 23 percent scored between 60-79 and 18 percent of the respondents obtained the highest score of marks between 80-100. 9 percent and 15 percent of them scored between 0-19 and 20-39 respectively. Table 4.14 indicates that service quality has

improved but much needs to be done to ensure an excellent service delivery at the house-to-house collection.

4.9.4 Households' Views on Cost Recovery

Households' views and opinions on who should pay for solid waste generation in their communities were sampled.

Table 4.15: Opinion on who should pay for Waste Collection Services

Cost recovery options	Frequency	Percentage
Generators only	18	12
Generators, Assembly/Government	120	77
Government and Assembly	16	10
No response/ cannot tell	2	1
Total	156	100

Source: Author's Fieldwork 2012

Table 4.14 presents the households' views on options for cost recovery (opinion on who should pay for the waste collection) across the communities in the Metropolis. Most of the respondents were aware of their role to pay towards the solid waste collection to improve the service quality. The survey showed that 77 percent of the respondents across the communities were of the view that the generators, assembly and the government should contribute towards recovery of the cost incurred in waste collection and disposal, whereas 12 percent said only generators should pay for waste collection service, and 10 percent said the assembly and government should pay for waste collection service. Only two persons representing 1 percent could not tell who should pay for the waste collection services.

This presupposes that more effort has to be put into household involvement and the companies made to be accountable for results and be more responsive to the user. This will make the households aware of the financial burden on the assembly and the need to pay for service improvement. The Assembly over the years have offered the communal collection service free of charge, and therefore faced financial constraints which affected the level of efficiency of waste collection as well as service quality. There is the need to improve the process by involving the households to pay for the service and to increase the level of awareness, and make the private sector more responsive to the costumers to realize the policy on full cost recovery. Table 4.16 and Table 4.17 present the willingness of the households to pay for waste collection services at both communal collection and house-to-house collection.

4.9.5 Households' Willingness to pay

Table 4.16 Respondents Willingness to pay user charges (House to house collection)

Households willingness to pay	Frequency	Percentage
Does not pay user charge	0	0
Willing to pay current user charge	14	41
Willingness to pay more	12	35
Willingness to pay less	8	24
Total	34	100

Source: Author's Fieldwork 2012

Table 4.17 Respondents Willingness to pay user charges (Communal collection)

Households willingness to pay	Frequency	Percentage
-------------------------------	-----------	------------

Does not pay user charge	12	11
Willing to pay current user charge	65	57
Willingness to pay more	28	25
Willingness to pay less	8	7
Total	113	100

Source: Author's Fieldwork 2012

Besides the analysis of households' views on options for cost recovery, their willingness to pay for user charges was assessed. The results of willingness-to-pay for house-to-house service show that majority (41 percent) of respondents were satisfied with the current services and were therefore willing to pay current charges for the services, while 35 percent were willing to pay more than the current charges provided there will be improvement in the service. Besides, some respondents (24 percent) were willing to pay less since they were not satisfied with the service quality. The households were willing to pay appreciable money for the service if the service is improved in terms of regular collection and twice a week collection frequency. They said the user charges should be based on collection frequency (twice collection), waste volume, and for regular collection instead of the monthly fixed fees, this will help the companies to recover cost and ensure waste minimization. Those willing to pay more were of the view that there is still room for service improvement. The willingness to pay more was high in the high income class areas compared to the middle income areas. This means that customer orientation and accountability for results and better service quality are necessary for increasing service charges. The private sector needs to be responsive to the customers and to provide better service quality, and this need is affirmed by some authors (World Bank, 2002 and Gidman et al., 1999).

The results of willingness-to-pay for communal collection service show that 11 percent of the respondents across the study areas at the time of survey do not pay and 57 percent of respondents

were willing to pay for the current user service. Respondents who were willing to pay more provided service quality at the central container site will be improved constituted 25 percent. Few people constituting 7 percent were willing to pay less than the current user charge. The gradual growth of house-to-house collection services directly implies gradual growth of cost recovery. It is in the interest of the Assembly to support the growth of the house to house service in all middle income communities since increasing the house to house coverage directly relates to a decrease in the communal collection which should be limited to the low income communities. The sustainable solid waste management can only be realized if cost recovery policy is pursued. The charging of user fees from users to increase cost recovery through pay-asyou-dump to overcome the financial burden of solid collection is necessary.

4.9.6 The Role of KMA/WMD in Solid Waste Management

Before privatization, it was the sole responsibility of the KMA/WMD to collect/manage every solid waste in the Metropolis. After privatization, what the KMA/WMD does now is to make sure that the companies that have been contracted to collect the solid waste live up to expectation. This is done through monitoring and evaluation. Based on this monitoring and evaluation, any company that does not perform up to expectation, has its contract terminated and those that live up to expectation have their contracts renewed. An inspectorate team has been set up, and the team undertakes the monitoring and evaluation task. The team goes round each zone to assess the sanitation conditions there and award marks based on their indicators and then rank the companies from first to the last company. They basically look at the conditions prevailing around the refuse dump site. Below is a sample of the grading system and how it works. The system has been divided into three categories; A and B Category. A category talks about the husbandry-nature of the site.

The A category specifically looks at how clean the site is. A very neat, clean and well-kept site is ranked excellent. A clean dumpsite is scored 80 and ranked good. Littered and unkempt site is ranked poor and scored 20. Finally an uncontrolled heap spread all over the site is ranked very poor and scored -10. The B category which deals with how the waste collected is transported to the dumpsite and others. Each vehicle reported transporting solid waste uncovered is scored -5 and also each occasion a contractor fails to report for inspection, the company is scored -20.

GRADING SYSTEM

Table 4.18 (Category A) Site Husbandry (Weight - 20%)

ITEM	DESCRIPTION	RANKING	SCORE	
1	Very Neat, Clean and Well Kept Site	Excellent	100	100
2	Clean Site	Good	less 20	80
3	Fairly Clean Site	Average	less 40	60
4	Filthy Site	Fair	less 60	40
5	Littered and Unkempt Site	Poor	less 80	20
6	Uncontrolled Heaps Spread all over the Site	V. Poor	-10	-10

Table 4.19 (Category B) Covering with Nets or Tarpaulin and Others (Weight - 20%)

ITEM	DESCRIPTION	SCORE
1	Each Vehicle Reported Transporting Solid Waste Uncovered	-5
2	Each Occasion Contractor Fails to Report for Inspection	-20

Source: Database from KMA 2012

Based on the grading system, the inspectorate team ranked the companies for the month of January 2010. In an interview with the leader of the inspectorate team, the leader indicated that Zoom Lion Company did not perform well at Asawase/Zongo community scoring 40 percent for the A category but the same company did well at the Asafo community scoring 80 percent for A category.

ASADU Royal Waste performed creditably well at the Bantama community scoring 100 percent for the A category but also scored zero for the B category. In effect, all the companies involved with communal collection are doing well but have problems with how their wastes are transported to the final disposal site. The leader of the inspectorate team further indicated that they have no problem with the house-to-house collection and KWML performed very well scoring 100 percent for the A and B categories at Nhyiaeso and Patasi which are high income class residential areas.

4.9.7 Government budget for solid waste management 2003-2011

As the name implies, municipal solid waste management is within the domain of the municipality, which is under the control of the government. The KMA on behalf of the government finances the management of solid waste in the metropolis. This study is designed to find out how much the government spends on the management of solid waste before and after privatization. Table 4.20 depicts the income and expenditure on waste (solid and liquid) management in the metropolis.

Table 4.20 Government expenditure on waste management 2003 – 2011

Item Year	Total Revenue Gh¢	Expenditure on liquid and solid waste Gh¢	Expenditure as a percentage of total revenue (%)
2003	4,735,500,000	997,300,000	21
2004	6,250,900,000	1,348,200,000	22
2005	8,170,600,000	1,392,800,000	17
2006	7,192,100,000	1,368,500,000	19
2007	7,630,400,000	2,493,600,000	33
2008	4,312,720,500	431,272,005	10
2009	13,189,634,000	1,318,963,040	10
2010	-	5,211,500,023	-
2011	-	600,000	-

Source: KMA Budget Office

It is clear from Table 4.20 that, the KMA spends huge sums of money on waste - solid and liquid management. These huge expenditures affect the operations of the KMA, because, ideally, the appropriate budget for waste management in the metropolis should be more than ten percent (10%) of the total revenue received from the central government (common fund). But on no occasion, as it is demonstrated in table 4.20 did the budget fall below 10%. For the year 2007, the budget even went as high as 33%, which was very high. This high expenditure on waste by the assembly confirms the studies of Cointreau, Douglas and Schubeler (1996) that, waste collection and disposal in developing countries typically consumes between 20 and 50% of municipal budgets (Cointreau-Levine 1994; Douglass & Lee 1996; Schubeler, 1996).

After privatization starting from 2008, the amount as well as the percentage meant for waste management in table 4.20 has reduced. In the years 2008 and 2009 the KMA spent 10% of its total revenue on waste management. This agrees with Walker et al (1992) who carried out a study and came out with the findings that, government in Jakarta saved hundred thousand US dollars in 1988

from privatized refuse collection in 10 percent of the city of 261 sub- districts. In the case of Kumasi, the figure has reduced not necessarily because of the privatization, but because of the pay-as-you-dump policy that was initiated by the assembly which helps in raising some amount of money from the households. From Table 4.20, the total revenue for 2010 and 2011 is nil because, after the new contract was signed with the companies, the government separated the revenue for the waste management from the total revenue for the KMA. However, the KMA/WMD received a separate amount from government to be expended on waste. In 2011, as at the time of the survey, KMA had only received part payment of this amount. This attests to the fact that, the money for the waste management in the metropolis always comes in late from government, which sometimes affects the operations of the companies. The companies usually look for their own source of income, in addition to the money realized from the pay-as-you-dump initiative, to keep them in operations and not to wait till the government brings money.

4.10 The Challenges faced by the Private Waste Companies

Solid waste management is faced with a lot of challenges in nations of the developing world. The challenges somehow have rendered KMA/WMD inefficient in providing waste management services to the residents in the metropolis. The poor solid waste management situation in the metropolis triggered the involvement of the private sector in the management of solid waste in the metropolis. However, the operations of these private waste management companies are saddled with common challenges affecting effective and efficient delivery of solid waste collection and disposal services to the residents in Kumasi. These problems are discussed below:

a) Poor attitude of the people

The study revealed that, one major problem waste management companies face is the poor attitude of the people towards sanitation. People seem not to bother living with litter all around them. They believe if they litter the streets, gutters or public places, it would be swept in the evening by the waste companies. They therefore do not make the least effort to put litter in a waste bin even when the bins are closed by, but rather dump it wherever they stand. This makes the city always dirty because, a few hours after streets have been swept, people start throwing litter around. In places such as Suame magazine, the situation is an eyesore as the people who stay and work there start throwing litter even when sanitation workers are still sweeping. This usually causes confrontation between their staff and the public. Sometimes when it rains in the afternoons, all the litter are washed into sewers which clogs gutters and sometimes causes flooding. Usually, in communities with communal containers, some people are reluctant to pay a pesewas for dumping which sometimes results in confrontations between clients and their staff over pay as you dump. During the field survey an attendant at Tarkwa Maakro central container had this to say *[I don't understand why a woman will have to call her husband to fight me over just 20 peswas. My brother situation like this makes this work very difficult for me]*. Some wait until midnight to throw garbage in the skip container in an attempt to avoid paying the just 20 pesewas fee. This results in revenue loss to the companies. Others dump their garbage in storm water when it rains and this goes to choke gutters and causes streets to be littered with waste after heavy rains.

Sanitation workers are also sometimes not treated with respect in society. This sometimes undermines the morale of the workers and has serious negative effects on their work.

b) Lack of Political Will

Governments do not seem to prioritize solid waste management and thus do not commit enough funds to provide facilities to ensure proper solid waste management. They usually believe in

outcome instead of impact. They would rather spend huge sums of money on subsidizing the cost of mosquito nets and anti-malarial drugs and other health costs instead of investing in sanitation to prevent disease vectors and to break the cycle of disease. Usually when there is a change of government, the new administration asks for some time to review old contracts before paying for waste management services that have been rendered. This leads to delays in payments for sometimes more than eight months. When this happens, the waste management companies are unable to pay their workers and this affects service delivery. Agitation by youth from some political parties sometimes causes distractions in the activities of waste management companies. Some youth have the notion that there is so much profit in waste or garbage collection and sanitation business. They demand for communal central containers in order to collect the fee for garbage collection at locations which are not feasible for garbage collection.

c) Financial Problem

The scarcity of financial resources seriously affects the abilities of municipal authorities to undertake effective waste management. This became evident in in-depth interviews conducted with stakeholders in the metropolis. At the KMA/WMD, the director of operations noted that *[Waste management consumes a lot of resources; and because we don't have enough funds, it is difficult to cover the whole of the metropolis. ... If we have enough money we can improve the service]*. I further asked the director how the shortage of funds affected solid waste management operations in the city. His response was: *[it really affects our operations. ... Because of the shortage, we are not able to pay our contractors and maintain equipment for full coverage ...]* On how the problem of inadequate funds could be solved, the director was of the view that: *[the polluter-pays principle is the best solution to the problem. Everyone who generates waste must*

also pay for waste disposal We don't have the funds to provide free service"... and that is why we are pushing for the 3Ps [polluter-pay principle] ... and if the government allows us to implement it fully, we will have no problem with waste at all. So those of you who understand the problem should also join the crusade].

On how the shortage of funds affected waste management operations in the city, the director was of the view that *[it affects everything; it affects collection, it affects equipment and also maintenance of the dump site. That is why we cannot collect all the waste from the city ...]* It is evident from the views expressed by the city authorities that the shortage of funds greatly affects the quality of the waste management service delivered. The shortage of funds also affects the performance of the contractors who operate solid waste collection contracts in the city. A summary of views from the contractors interviewed shows that they need funds to acquire new equipment and maintain old machines, pay salaries and settle debts owed to banks, spare parts dealers, garages and fuel companies. A common complaint among the contractors was that they are paid very low rates (and irregularly) which makes it difficult to meet the operational costs of waste collection in their contract areas. The deputy director of operations at ASADU Royal Waste Management Company for instance reported that: *[As I speak, we are unable to operate effectively because of high operational cost resulting from the KMA's inability to pay us and because they are not paying us, we are all indebted to our business partners. As I speak, we owe the fuel companies, spare parts dealers, and our bankers and they are getting impatient with us]* The deputy director wondered why the government would not allow the contractors to take full responsibility of the pay-as-you-dump system of charges to solve the problem of finance. When asked how the problem

of finance affected his performance as a waste contractor, the manager of Anthoco Waste Ltd said that: *[As for waste business you can't do it without money.*

In this job money is everything. So if they pay us and we have the money, we can work well. But without the money we cannot collect all the waste. If you look over there, you can see some of our trucks have broken down. ... But if we have the money, we can repair these trucks and increase our coverage". ... That is why Kumasi is saddled with this waste problem ...] (In-depth interview with the manager, Anthoco Waste Ltd, 2012)

Similarly, the manager of Zoom Lion Ltd complained that:

[We have a big problem with finance. Payment is not prompt at all. The KMA doesn't pay us well and it is not regular too. So at the moment it is hard for us. We always have to depend on our bankers but these days the interest rate is very high. ... It used to be better. Some time back we were being paid every month. But for a long time now, we have not been paid for about a year. This makes things hard for us].

When asked how the delays in contract payments affected the operations of his company, the manager said *[it affects everything we do because money is everything. Look, just before you entered my office, I was having a meeting with my accountant to think about getting money to pay our staff for two months arrears. We are finding it difficult to pay salaries and buy fuel for operations. Some of our trucks are off the road. We have no money to repair them which affects our operations].*

The inability of the municipal authorities to pay the waste contractors promptly has forced some contractors to adopt a cold attitude towards waste collection resulting in the accumulation of garbage in some parts of the study areas. This was evident in Asafo „Moonlight“ central container where the attendant indicated that garbage has been accumulated at the site for closed to two weeks. This is because the company in charge has run out of funds to put the trucks on road to transport the waste to final disposal site. Because the municipal authorities have failed to fulfill their part of

the bargain, they seem to lack the moral courage to blame the contractors for their poor performance. It is evident from the views expressed by the waste contractors that inadequate financing of waste management affects the quality of service they render. Among other things, the shortage of funds affects their ability to purchase and maintain waste trucks and other equipment, recruit staff and bear the day to day operational cost of waste collection and transportation to disposal sites.

The financial constraints of the waste management sector were also confirmed by an official of the finance office of the Kumasi Metropolitan Assembly. In an interview, one of the finance officers of the assembly reported that most of the assembly's recurrent expenditure is incurred in maintaining environmental sanitation with the bulk of it spent on waste management, especially on payments to contractors and the maintenance and fuelling of waste management equipment. However, the management of one waste company operating in the city (ASADU) also complained about the low rates they receive and the delays in payments which affect their operations. In an interview, the operations manager of ASADU noted that *[sometimes, it takes so long before KMA pays us. When payments delay like this, we find it difficult to work, we need the money to pay salaries and buy fuel for the trucks]*. At the premises of ASADU Waste, the branch manager also complained that even though fuel prices kept rising, the municipal assembly had failed to increase the contract fee for waste collection.

According to him, profits have fallen greatly due to the rising cost of fuel and spare-parts for fleet maintenance and this has made the waste business less profitable than before. To a large extent, therefore, inadequate funding of waste management is a major factor contributing to the poor solid waste situation in the Kumasi Metropolitan Assembly.

c) Inadequate Logistics

The organization of solid waste management in any large city requires an adequate supply of logistics including vehicles and tools for waste collection and transportation as well as equipment for waste treatment and management of disposal facilities. To provide a sustainable waste management service, there is also the need to maintain a back-up of equipment and ready availability of spare parts for fleet maintenance. However, this is one area where the solid waste management in the metropolis appears to be greatly constrained. Among other things, the study found that inadequate logistics hamper solid waste management in the metropolis. Interviews with stakeholders in the waste sector and field observations conducted in the city showed that the municipal authorities and their private contractors lack the logistics required for the collection and transportation of solid waste to disposal sites and for the maintenance of the disposal sites. In all the communal collection sites I visited attendants reported that there were no stand by containers to cater for additional refuse when the main ones get full. Sometimes when the skip trucks come to pick the containers that are already full, the attendants have no option but to allow users to dump their refuse on the ground. This situation has the tendency of breeding diseases such as malaria, typhoid, cholera, chicken pox which are sanitation related diseases. In another development the situation brings about additional cost burden on the contractors since they have to hire the services of other people to gather and load the refuse back into the skips when they are brought back after disposal at the landfill site. In line with this, an attendant at the central container at Abrepo-Asubonten recounted his story. *[the road to my container is poor and because of that the skip truck is unable to pick the refuse regularly, this results in the overflow of the container and dumping on the ground, within just two days my site was flooded with heaps of refuse and I had to pay about One hundred Ghana cedis to get the refuse back into the skip]*. It is evident from the study that

inaccessibility to the communal collection site as well as inadequate skips at the site brings about additional operational cost to the contractors. The study also found that containers given to residents involved in the house-to-house collection services were woefully inadequate. This situation usually results in the overflow of the containers on many occasions. A common practice to deal with this problem has been the adoption of bagging refuse in polythene bags as shown in Figure 4.4 and placing them beside the containers.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

5.2 Solid waste situation and the components of solid waste generated in the KMA

In keeping with what other researchers have found about the solid waste situation in the poor cities around the world, the study found that the solid waste situation in Kumasi has witnessed a marked improvement since the involvement of the private sector. The research found that organic waste constitutes the largest waste component in the waste stream generated in the metropolis. It is made up of 44 percent of (greens, vegetables and fruits) and 44.6 percent of ash, food and sand, all contributing about 88.6 percent of the waste generated in the KMA. The remaining 11.4 percent constitutes other waste components such as plastics, papers, bottles and cans.

Even though there have been some improvements in the waste collection by the private contractors much needs to be done to clear the waste deficit in the metropolis. Apart from the low rate of waste collection in the city, the study also found that municipal authorities and waste companies

concentrate their waste collection activities in high income communities while many low income communities receive little or no service for waste collection. The data also revealed that the residents of high-income areas generally receive regular house to house collection services which keep their surroundings clean and safe. However in the middle and low income communities, waste collection is irregular and unreliable with overflowing waste bins and decomposing waste which exude smell and cause other nuisances to the residents.

5.3 The level of performance and service quality of the private waste companies

The study found that the level of performance in terms of efficiency and service quality of the private companies was high as compared to KMA/WMD. This is due to the fact that the private companies possess independent economic, political and financial qualities which enable them operate effectively. It was also found that unlike the KMA/WMD, the private contractors have adequate waste management equipments such as skip trucks, compactor trucks and roll on and off trucks which enhance reliability of waste collection and quality service delivery. The equipment base of the private companies has significant influence on the efficiency and service quality of the companies. The data shows that KMA/WMD could not organize adequate and safe solid waste collection because of inadequate and constant break down of waste management equipments. The WMD could boast of only 17 Tipper trucks with no compactor truck and this adversely affected the reliability of waste collection thereby affecting service quality as well. However the four companies put together have a total of about 42 vehicles consisting of skip loaders, tipper trucks, compactors and roll on and off trucks. This explains the reasons why the private companies can organize more regular and efficient solid waste collection than the KMA/WMD. This confirms the assertion of Cointreau (2004), more and good condition of vehicles and equipment ensures not only trouble-free operation but also results in higher output and profitability in waste management.

5.4 Roles and Responsibilities of other actors in solid waste management in KMA

5.4.1 Kumasi Waste Management Department

The study found that the KMA/WMD had the sole responsibility of managing solid waste in the metropolis before private sector involvement in waste management. After the PSI in solid waste management, the KMA/WMD has the special responsibility of monitoring and evaluating the activities of the private companies to ensure efficient and quality service delivery. The department also give skips and waste bins to the waste contractors at a subsidized price. It is also the responsibility of the KMA/WMD to manage the final disposal site at Dompouse.

5.4.2 Households

Households are very important stakeholders in solid waste management. The willingness of the households to pay for the waste that they generate affects the efficiency and service quality of the waste companies. The study found that, majority of households in the high income residential areas that access house-to-house collection services are always willing to pay for waste collection services but expressed the opinion that charges for waste management services should collectively be borne by the Assembly, Government and the generators. With communal collection which is usually practiced in the middle and low income communities, about 50% of the respondents expressed the same opinion as those from the high income communities. In effect greater number of households across the communities shows some willingness in paying for waste collection services.

5.5 Challenges faced by the Private Waste Companies

Despite the marked improvements in solid waste situation in terms of efficiency of waste collection and service quality brought by the private companies. The study cited lack of public sensitization, lack of political will, financial constraints and inadequate logistics as the main challenges facing the smooth operations of the private companies in the KMA. The lackadaisical attitudes of the residents in throwing refuse about without due diligence to waste bins as well as the unwillingness of the households to pay for waste management services seriously undermine the activities of the private companies. Lack of political will to make payments of debts accumulated for years to the private companies renders them inefficient to provide services to the residents. These monies are supposed to be used in paying salaries of staff of the companies and also to maintain waste equipments to ensure quality service delivery. However the payment is either ignored or delayed unnecessarily by the Assembly or the government. This situation cripples the effective running of the private companies.

5.6 Conclusion

The study focused on the involvement of the private sector in solid waste management in the KMA and in particular the level of performance of the private companies in terms of efficiency and service quality and factors that influence the efficiency and service quality of the companies. The study established that organic constitutes the largest waste component in the waste stream generated in the metropolis. Organic waste alone constitutes about 88.6 percent of the waste generated in the KMA. The remaining 11.4 percent constitute other waste components such as plastics, bottles, papers and cans. This means that organic can be composted for manure while components in other waste stream such as plastics and polythenes will be recycled. The study also

found that there has been an increase in reliability of waste collection since the involvement of the private sector in solid waste management in the KMA. Before private sector involvement in solid waste management, the percentage of waste remaining uncollected was about 40 percent after full participation of the private sector in solid waste collection only about 13.5 percent of waste remains uncollected. The research further established that the efficiency and service quality at the house-to-house collection was higher than communal collection. This is as a result of the fact that house to house waste collection is practiced in the high income residential areas where majority of households are always willing to pay for waste collection services. Inversely efficiency and service quality were lower at the communal collection sites (central containers) where most of the households are from low and middle income communities who normally show some reluctance in paying for waste collection services. The study also found that the private companies were able to perform better than the KMA/WMD because they were economically, politically and financially independent. This enables them to operate effectively.

The study again established that the efficiency and service quality of the private companies were higher than the KMA/WMD because the capacity of the private companies in terms of equipment holdings was higher than the KMA/WMD. The study found that households' willingness to pay for the waste that they generate as well as supervision of operations of the companies by KMA/WMD affect efficiency and service quality of the private companies. The inefficiency of supervision of operations explains the poor performance of the private companies. The current study has also shown that the issue of solid waste management has become a monster in the metropolis staring the authorities and the private companies in the face while they look on rather helplessly. As noted earlier, the problem largely results from the lack of political commitment to address the issue of waste management. This is reflected in government failure to resource

municipal authorities to deal with the rather complex issue of waste management. Apart from the acute lack of funds and logistics for the organization of solid waste management, KMA/WMD also lack well-qualified technical personnel such as planners, engineers, administrators, accountants and researchers to tackle important issues regarding solid waste management. Besides, lack of the required legal strength to enforce existing by-laws on waste disposal, and to check the rather poor waste-handling attitude of the Ghanaian populace as well as the inability to enforce standards on land use and shelter development within the city continue to frustrate the efforts of Metropolitan authorities in their attempts to keep the city clean and safe. The frustrating waste problem, however, has also been caused by poor governance practices in the organization of waste disposal. Municipal authorities in the city have failed to promote partnership with the waste-producing public and to involve them in the various aspects of waste management including needs assessment, financing, waste collection and final disposal.

Besides, the authorities usually fail in their obligation to make prompt payment to the private companies to enable them function efficiently. In view of the above, the solution to the growing waste problem in the city will be for both the national and municipal governments to commit themselves to the issue of waste management. This could be done by improving the capacities of municipal governments in the areas of finance, logistics and personnel, as well as providing them with legal support to enforce regulations on waste disposal and other aspects of urban environmental management.

5.7 Recommendations

Based on the findings of the study, the following measures are recommended for efficient and effective management of solid waste in KMA. These are discussed below.

5.7.1 Provision of adequate Logistics

Adequate logistics such as compactors, pay loaders and skip trucks as well as waste bins and skips should be provided by the KMA/WMD at a subsidized price to the Private Waste Companies for efficient and effective solid waste management in the KMA. At least, each communal dump site should have one standby container (skip). These should be placed at least within 30 meters radius and at most 50 meters radius in the low class residential areas. With this, residents in the low class residential areas will spend less time to dispose off their domestic waste at the skip site. Also, adequate waste bins should be supplied by the private companies particularly for the high income class residential areas. Each household should be given at least a 250 litter waste bin and 120 litter bins as standby bins to avoid waste overflow from bins and also to curtail the practice of putting refuse in polythene bags because of inadequate waste bins.

5.7.2 Regular Collection of Solid Waste

There should be regularity of solid waste collection by the private companies, particularly in the middle and low income class communities to avoid heaping of waste and overflowing of skips with solid waste. This should be done by strictly enforcing the pay-as-you-dump policy (PAYD) to make sure that every household pays for the waste that they generate. Households who flout the regulations of this policy must be fined and the fines be given to the contractors in charge of that particular area. Levies accrued from dumping as well as the fines will enable the private companies to increase the regularity of waste collection and also to ensure service quality at the dump sites.

At least, waste should be collected four times a week in these areas and thrice in the high class residential areas. There should be regular monitoring of waste collection by the Metropolitan Assembly. This will keep the place constantly clean and prevent any possible outbreak of communicable diseases such as cholera and typhoid.

5.7.3 Full Cost Recovery and Proper Monitoring

The private waste management companies should strive to achieve full cost recovery to ensure better service quality and waste minimization. This should be done through the following;

First, the regulation of user charges needs to cover full cost and cross-subsidy for the urban poor (low income communities) to ensure financial sustainability and better service quality. This can be achieved through pay-as-you dump (PAYD) mechanism for communal collection. The success of PAYD depends on public awareness, involvement of the households, and enforcement of by-laws on illegal/indiscriminate dumping. PAYD affords the households the opportunity to reduce cost through waste reduction and recycling. In another development, to achieve full cost recovery in the middle and high income communities, more house-to-house collection services should be introduced and user fee charged and paid any time the compactor truck come for collection. This will involve all households in the cost recovery process and will offer them the opportunity to minimize waste. This should be done through public education and sensitization. Households particularly in the low income class residential areas should also be involved in any decision affecting solid waste collection and disposal in their communities. For instance, they should be involved in the fixing of charges for dumping. This will help them to understand that they are not in any way cheated but rather they are only being helped to clear the waste they themselves have generated. Second, to better facilitate and regulate private sector participation in solid waste

collection, clearly defined standards and service quality need to be included in the contract for regulating the private sector activity. This requires capacity building of the officials of Waste Management Department.

Third, the capacity of Assembly needs improvement in order to be better able to facilitate, monitor, and regulate the private sector. Last, the KMA as well as the government should do well to make prompt payments of debts to the private companies to enable them function effectively.

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APPENDICES

Appendix A

Questionnaires for Private Waste Collection Companies

Questionnaire Number.....

Interviewer Name.....

Level of Education.....

Date of Interview (DD/MM/YY)...../...../200.....

1) Name of private waste collection company (NPWCC).....

2) Coverage area (Name of Sub-metro Covered).....

3) Amount of waste collected daily / month.....

4) Methods of collection from different sources

House to House collection []

Communal collection using transfer stations []

Others (Specify).....

5) How many houses does the compactor vehicle go to before it is full?

50-100 []

100-150 []

150-200 []

Above 250 houses []

6) How many houses contribute waste to the central containers?

50-100 []

100-150 []

150-200 []

Above 250 houses []

LOGISTICS FOR SOLID WASTE COLLECTION AND DISPOSAL

7) How many vehicles do you use in collecting waste in the catchments area.....

8) Are there other forms of transport used for the collection of waste?

Yes [] No [] If yes, (Specify) them.....

9) Are they approved routes by KMA to be used by these vehicles?

Yes [] No []

10) Indicate the specific routes the vehicles use from the collection points to the final disposal site.

.....
.....

11) Do you provide Households with waste bins?

Yes [] No []

If yes, which ones?and how many?

12) Do you encourage source separating of waste at the household level? Yes [] No []

If yes, what type of waste normally dominate in what you collect?.....

13) Would you be willing to give any incentives for source separating of waste? Yes [] No []

14) Do you cover the loaded truck of refuse with net?

Yes [] No []

If no, when do you intend to do so?

15) How were the transfer stations designated?

KMA []

EPA []

Private Waste Companies []

Others

(Specify).....

16) How many of the transfer stations are within your sub metro catchments area?

17) How many collection containers do you place in each transfer station?

One []

Two []

Three []

Other specify.....

18) What activities are undertaken at the transfer stations?

Loading []

Raking to uniform or spread the waste in the container []

Collection of fees []

Others

(Specify).....

19) Are the collection containers protected from the weather?

Yes [] No []

20) From the transfer stations where do you send the waste?

Recycling centre []

Energy/Compost recovery centre []

Incinerations Plants []

Landfill centre []

21) Does your company have a recycling unit?

Yes [] No []

22) Does your company own a Landfill?

Yes [] No []

If No, where do you dump your waste?

KMA landfill sites []

Others

(Specify them).....

23) Do you have suggestions on how you can improve upon the collection system?

Yes [] No []

If yes, (specify them).....

24) Are there ways we can re-use the waste?

Yes []

No []

If yes, how?

.....

If no, why?

.....

25) What times of the day do you collect the waste?

Mornings []

Afternoons []

Evenings []

Others (Specify).....

MEANS OF SOLID WASTE COLLECTION AND DISPOSAL

26) How often do you collect the waste from the Houses and transfer stations?

Daily []

Weekly []

Others (Specify).....

27) Where do you dump the refuse collected from the households and the transfer stations?

Open Dump []

Landfill Site []

Other (specify) []

28) How far is the collection point from the disposal end?.....km

29) How many times can a vehicle collect waste to the landfill in a day?

Once []

Twice []

Thrice []

Others (Specify).....

30) Does your company charge any fee when collecting the waste? Yes [] No []

If yes, how much do you collect?

A. House to house
collection.....

B. Communal
collection.....

31) What standard do you use in charging the fee?.....

32) How much do you spend every month in collecting the waste?...cedis

33) What account for the cost?

Fuel []

Spare parts []

Servicing of vehicles []

Others (Specify them).....

34) Do you pay fees before disposing of waste at the land fill site?

Yes []

No []

If yes, how much?

.....

If no, why?

.....

35) What activities are undertaken at the disposal points?

Unloading []

Weighing []

Spreading []

Others

(Specify).....

36) What are the main problems militating against waste collection in your catchment area?

.....
.....
.....

37) What are your recommendations to promote effective waste collection?

Appendix B

Questionnaire for Beneficiaries (Households) of Solid Waste Service Delivery

Questionnaire Number.....

Interviewer Name.....

Age of Respondent (Specify in
years).....years

Gender of Respondent.....

Date of Interview (DD/MM/YY)...../...../200.....

Name of the Area.....

House Number.....

Educational level of Respondent

Primary []

Junior []

High []

Tertiary []

Others (Specify).....

Marital status of respondent

Married Single []

Divorced []

Other (Specify).....

Public Awareness and appreciation of waste collection service quality

1. House hold size

1 – 3 []

4 – 6 []

7 – 10 []

2. Do you have a waste bin or container? Yes No

If yes, who supplied you with this waste bins?

District assembly []

Waste companies []

Bought it []

Others

(Specify).....

If no, how do you keep your waste?

Jute sacks []

Old baskets []

Broken buckets []

Others (Specify).....

3. Where do you keep your waste bins in the house?

At the backyard

At the gate

At the yard

At the kitchen

Others

(Specify).....

4. Do you source separate your waste?

Yes []

No []

If yes, how do you separate them?

Food waste []

Non-food waste []

Others

(specify).....

If no, would you be willing to separate your waste?

Yes []

No []

5. Do you need any incentives to separate your waste?

Yes [] No []

6. Does someone come to your home to collect the waste?

Yes [] No []

If yes who/which company does
that?.....

If no, where do you dump your household refuse?

Open dump []

Communal collection site []

Other (specify).....

7. How often do you dispose of your house hold waste?

Once daily []

Once every week []

Others (Specify).....

8. Who carries the waste bins to the disposal sites (Bola)?

Children []

Women []

Maid []

Others (Specify).....

9. By what means does the person carry the waste to the Bola?

Head or hand carrying []

Wheel barrow []

Tricycle []

Others (specify).....

10. How far is the disposal site (Bola) from your home?

10 meters ☐

30 meters ☐

50 meters ☐

Above 50 meters ☐

11. Have you received education on how to handle and dispose of your waste? Yes/ No If yes

(specify) what type of training? ☐

Safety keeping of waste bins to prevent breeding of mosquitoes and insects ☐

Hygienic way of keeping waste bins ☐

Others (specify).....

12. Who is responsible for collecting your waste in your community?

Ve Mark ☐

Zoom lion ☐

ABC waste group ☐

Others (specify).....

14. How often do they collect the waste?

Daily ☐

Once every week ☐

Monthly ☐

Others (specify) []

13. What was the state of your sanitation before the waste collection companies took over?

Better []

No change []

Worse off []

14. How do you assess your environment after the takeover of the companies?

Better []

No change []

Worse of []

15. How will you rate the quality of solid waste collection service in the city?

Very poor []

Poor []

Fair []

Good []

Very good []

Payment of user fees for solid waste collection

16. It cost Assembly more money for waste collection and disposal.

Who should pay for solid waste collection?

Generators only []

Generators and Assembly []

Government and Assembly []

17. Do you pay for the collection service? Yes [] No []

If yes, how much do you pay per month in Ghana cedis?

a) For communal collection, GH¢

b) For door-to-door collection, GH¢

If yes, how do you rate the existing tariff?

High []

Moderate []

Low / affordable []

18. Would you be willing to pay MORE for the collection service?

Yes [] No []

19. How much are you willing to pay per month in cedis per Household for solid waste collection?

a) For communal collection, GH¢

b) For door-to-door collection, GH¢

20. What is your total household income per month?

GH¢ 100-200 []

GH¢ 200-400

GH¢ 400-600

Other (specify)

21. Who contributes to household income?

22. What is your monthly Expenses on?

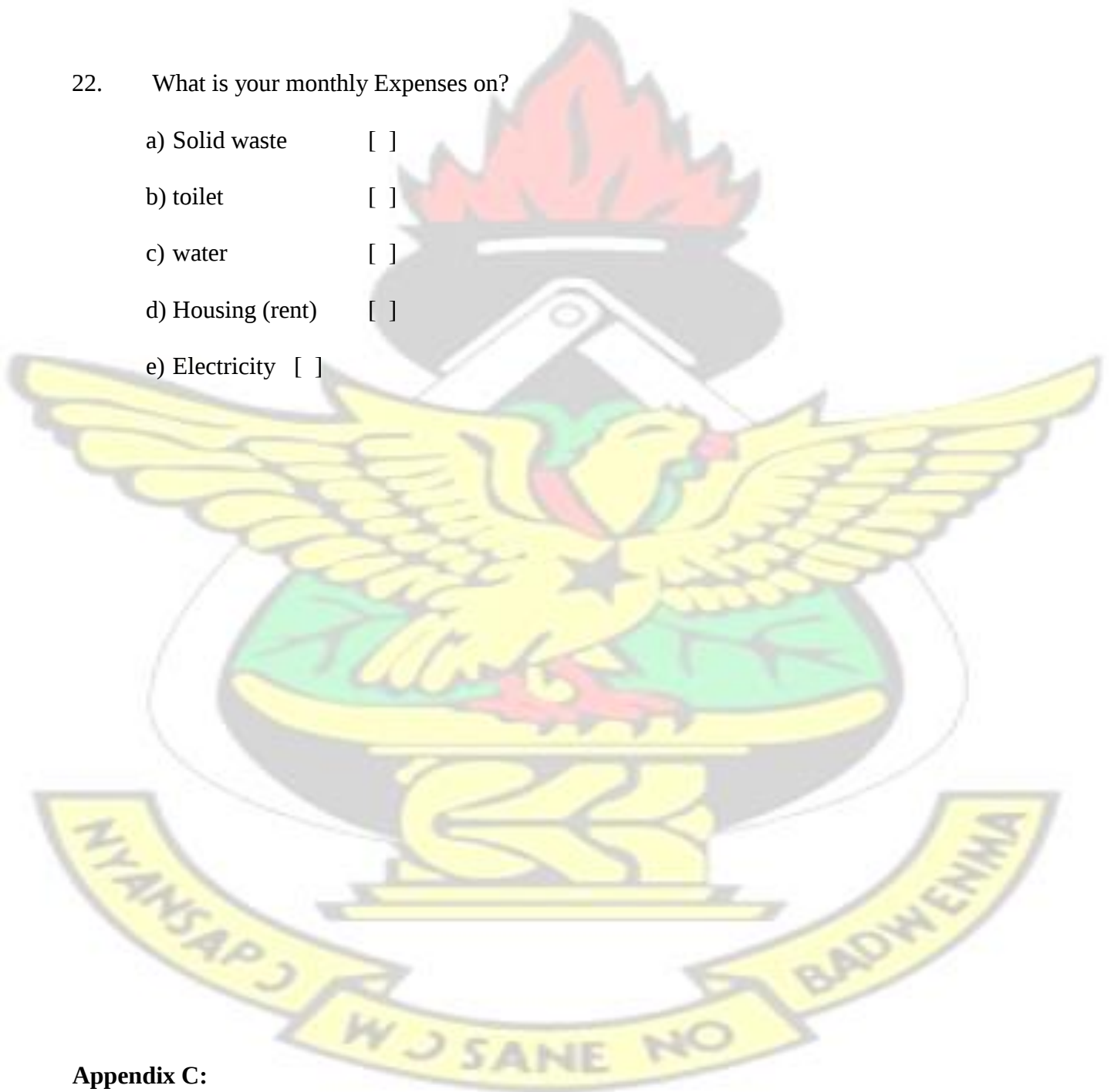
a) Solid waste []

b) toilet []

c) water []

d) Housing (rent) []

e) Electricity []



Appendix C:

Questionnaires for KMA/WMD Officials

Questionnaire Number.....

Interviewer Name.....

Position of the Respondent.....

Level of education.....

Date of Interview (DD/MM/YY)...../...../200.....

WASTE GENERATION

1. When did you hand over the collection and dumping of solid waste to private companies?.....

2. Why did you hand over the collection to the companies?

Inadequate vehicles []

Lack of qualified personnel []

Financial problems []

All the three []

Other (specified).....

3. What was the volume of waste generated in a day before privatization?

.....
.....

4. What is the volume of waste generated in a day now after the takeover?

.....

5. Before privatization, how many tonnes of solid waste did you collect in a day?

.....

.....

6. How many tones of solid waste are collected in a day at present?

.....

.....

AMOUNT OF MONEY PAID FOR WASTE DELIVERY SERVICE

7. Did you collect money from waste generators before privatization?

Yes [] No []

If yes, how much?.....

A. Communal collection.....

B. Door to door.....

8. Do the waste generators pay fees for services rendered at present?

Yes [] No []

If yes how much do they pay?

A. Communal collection.....

B. Door to door.....

If yes, is the fee the same for all waste generators? Yes [] No []

If no, why the disparities?.....

9. Do all the companies charge the same fee? Yes [] No []
If no why the disparities?.....
10. Who determines how much is charged?
KMA [] Solid waste companies []
Other (specify).....
11. What standard do you use in charging the fee?.....
12. Where does the money collected go?
KMA [] Solid waste companies []
Other (specify).....
13. Why was the pay and dump scheme introduced?
Generate income [] Minimize waste generation []
Other (specify).....
14. Before privatization, was the metropolis demarcated into zones?
Yes [] No []
15. If no, why did you decide to zone the metropolis after privatization? Allotment to
companies [] Easy monitoring []
Other (specify).....
16. How did you select the companies?

Competitive bidding []

Lobbying personal judgments []

Other (specify).....

17. What was the nature of the contract given to the companies?

Franchising []

Open competition []

Contracting out []

Leasing []

Other specify.....

18. What was the duration of the contract?

.....
.....

19. How do you finance the activities of solid waste collection and disposal at present?

.....
.....

20. What was the monthly expenditure on solid waste collection and disposal before privatization?

.....
.....
....

21. With the involvement of the private companies, what is the monthly expenditure on solid waste collection and disposal?

.....

.....

22. How has your outfit been able to extend its coverage of solid waste collection after privatization?

.....

.....

23. How do you monitor the operations of the companies?

.....

.....

24. What happens to companies that do not live up to expectations?

.....

.....

25. What exactly does the KMA do now, in terms of solid waste management?

.....

.....

26. What are some of the problems you have identified with the companies in their operations?

.....

.....

27. What do you think can be done to solve these problems identified above?

.....

.....

28. Apart from collection and disposal, do you have any idea on recycling and other options?

29. What are some of the problems affecting the KMA in the management of solid waste?

.....

.....

30. What do you think should be done to make your operations effective?

.....

.....

Appendix D

Interview Guide for Refuse Attendants at the Central Container

Interview Number.....

Interviewer Name.....

Level of Education.....

Date of Interview (DD/MM/YY)...../...../200.....

1. What is the name of the Private Waste Company you work for?..... 2.

What time do you start work and close from work?.....

3. How many houses contribute waste to your container?.....

4. How many quantities of quantities of solid waste do you collect in a day or a month?

5. How many days does it takes for the container to get full?.....

6. How long does it takes for the skip truck to come for the container full of waste?.....

7. Do you have standby skip containers in case the container gets full?.....
8. What do you normally do when the container gets full and there are no standby containers?
9. How much do you charge for a bucket full of solid waste?.....
10. How do you determine the charge for a particular solid waste brought at the container?
11. What are the challenges you face daily at the central container point?.....
12. What do you suggest should be done to improve the solid waste management situation in your area?.....

Appendix E

CALCULATION OF SAMPLE SIZES FOR SELECTED COMMUNITIES

Communities	Number of Houses	Calculation	Sample Size (SS)
Bantama	1106	$1106/6257*100\%=18\%$ $SS=18/100*156$	28
Asafo	587	$587/6257*100\%=9\%$ $SS=9/100*156$	14
Patasi	721	$721/6257*100\%=12\%$ $SS=12/100*156$	19
Ahodwo	270	$270/6257*100\%=4\%$ $SS=4/100*156$	6
Maakro	1048	$1048/6257*100\%=17\%$ $SS=17/100*156$	27
Asawase-Zongo	2525	$2525/6257*100\%=40\%$ $SS=40/100*156$	62
Total	6257	100	156

Source: Author's Fieldwork, 2012

*The percentage share for each community was calculated and based on that the sample size was also calculated.

KNUST

Appendix F

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

Where;

n is the sample size

N is the total number of houses.

α is the margin of error

By substituting the sample frame of 6257 and a margin of error of 0.08 in the equation:

$$n = 6257 / 1 + 6257(0.08)^2 \quad n = 6257 / 6258 \quad (0.0064)$$

$n = 6257 / 40.0512$ $n = 156.2250$ $n = 156$ which is the total sample size for the study.

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