

UNIVERSITY OF CAPE COAST

SOLID WASTE MANAGEMENT: A CASE STUDY OF CAPE COAST
METROPOLIS.

BY

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DECLARATION

Candidate's Declaration

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

Candidate's Signature:Date.....

Candidate's Name: Paul Yelluzie

Supervisor's Declaration

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

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Supervisor's Name: Dr. K. S. Aikins

ABSTRACT

Over the years, solid waste disposal in Ghana has become a major challenge to Metropolitan, Municipal and District Assemblies (MMDAs). As a result of urbanisation and increasing densities, Metropolitan Assemblies finds it difficult to deal with the large quantities of solid waste generated in their area of jurisdiction. This study investigated the nature of the urban solid waste situation in Cape Coast Metropolis, and the causes of the problem from the perspective of key stakeholders in the waste management sector. The main aim of the study was to examine the factors affecting effective waste management in Ghana's urban areas with regards to solid waste management in Cape Coast Metropolis (CCM) and how social justice can be applied in the waste management sector, and thereby advance possible solutions to address the problem. The researcher gathered data from secondary and primary sources. The main technique employed in gathering the primary data was structured interview schedule.

The sampling technique that was employed to select the 110 respondents for the study was proportionate sampling, purposive and simple random sampling. Factors such as inadequate skip supply for storing waste, lack of routine collection of waste, poor methods of waste management, inadequate resources for waste management institutions to effectively collect the waste generated and human resources challenges were identified as main challenges. Some of the major recommendations were that CCM should employ more human resources, equipments such as skips and vehicles to enhance their waste management work.

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DEDICATION

This work is dedicated to my wife, Vida and our little daughters,
Trisha and Brenayah.

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LIST OF ACRONYMS

AMA	Accra Metropolitan Assembly
CCMA	Cape Coast Metropolitan Assembly
CCMA-WMD	Coast Metropolitan Assembly Waste Management Department
CED	Centre for Environment and Development
CWSA	Community Water and Sanitation Agency
DACF	District Assemblies' Common Fund
EPR	Extended Producer Responsibility
GNP	Gross National Product
IWM	Integrated Waste Management
MDG	Millennium Development Goal
MLGRD	Ministry of Local Government and Rural Development
MMDA	Metropolitan Municipal and District Assemblies
MSW	Municipal Solid Waste
PPP	Producer Pays Principle
SPSS	Statistical Product and Service Solution
UEM	Urban Environmental Management
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WH	Waste Hierarchy
WHO	World Health Organisation
WMD	Waste Management Department
ZGL	Zoomlion Ghana Limited

CHAPTER ONE

INTRODUCTION

Background of the study

Sustainable management of the urban environment has become one of the major challenges of the 21st century. This development calls for control of the environmental impacts of urbanisation which include growing traffic, increasing waste emissions, deteriorating air and water quality, and growth in energy and resource consumption. Inadequate water supply, sanitation, waste collection and waste management systems are the causes of serious urban pollution and health hazards in many Asian, African and Latin American cities (Wageningen University, 2011). With urbanisation and its attendant indiscriminate waste disposal and pollution of water resources, local authorities are now facing increasing demands from their citizens for better environmental quality. City officials and their representatives who are responsible for waste management are being held accountable for their environmental performance. Urban growth has created an increasing demand for houses, offices, shops, factories, roads and other services. This has resulted in an improved urban quality of life, but has left in its

wake waste generation which must be managed to ensure sustainable environment.

According to United Nations Environment Programme [UNEP] (2009), in 2006 the total amount of Municipal Solid Waste (MSW) generated globally reached 2.02 billion tons, representing a seven percent annual increase since 2003. It is further estimated that between the year 2007 and 2011, global generation of municipal waste rose by 37.3 percent, equivalent to roughly eight percent increase per year (UNEP, 2009). Furthermore, UNEP says that, as per World Health Organisation's (WHO) estimation, the total healthcare waste per person per year in most low income countries is between 0.5kg to 3kg. Following from these figures, it tends to suggest that greater number of people in this world would be without waste management services in the foreseeable future if pragmatic measures are not taken to manage the wastes that society generates. According to the Ministry of Foreign Affairs (1998, p. 35) "less than a fifth of the world's population lived in urban areas in the 1950's. This figure has now risen to almost half and the increase is expected to continue, with two thirds of the world's population living in urban areas by the year 2025".

In the Americas and Europe more than 70 percent of people live in urban areas, compared with about 40 percent in Asia and Africa. Asia has the largest number of mega-cities while Africa has a higher proportion of small cities and towns (Ministry of Foreign Affairs, 1998). Viewing this from the international perspective, the developed world has been able to manage their waste more effectively than developing countries. Their laws, good education, participation

by the private sector in managing waste effectively, good waste storage facilities, collection of waste on time, as well as the transportation and treatment of these wastes are managed effectively. Many developing countries lag behind when it comes to the development of basic infrastructural services, namely sewage and water supply. Rapid population growth and its associated urbanisation have caused serious environmental problems in urban areas of developing countries. Most of the diseases that developing countries suffer from are as a result of bad environmental management practices with regard to waste. Wastes are disposed of indiscriminately and these find their way into the gutters and hence, the waste choke them giving rise to flooding when it rains. A major problem with disposal of waste in developing countries has been lack of suitable disposal structures (Jones, 1995).

Many governments in the world today are still struggling with waste management. Domestic wastes are produced in large quantities as a result of population growth, the setting up of industries and the importation of foreign electronic and non-electronic goods both used and unused. These goods finally get their way into the drains and gutters and aggravate the already precarious circumstances such as seasonal flooding. The mounds of refuse also create leachate and air pollution. The World Bank Report (1994) asserts that solid waste services in most developing countries are rudimentary. Developing countries have not developed the necessary infrastructure to be able to deal with the enormous waste generated daily in their cities. In furtherance of the above, Cunningham and Saigo (1999) mentioned that many third world cities have

enormous garbage disposal problems. It is significant to note that not until recently, most of these tumultuous outpouring of waste were left in larger piles in the open environment, and sometimes in curds unattended to. Urban areas grow as a result of migration from the countryside. It attracts people because of more job opportunities, better schools and other facilities such as housing, healthcare delivery services and recreational centres. These facilities acts as pull factors and thereby attract people who wants to enjoy better services in the cities. This situation brings along its own waste generation problems. Cities and towns in developing countries also show a high rate of natural increase in population and this has major implications for the human beings and the environment.

Also, Cunningham and Saigo (1999) have further found out that third world cities have enormous garbage disposal problems. Mexico City, the largest city in the world, generates about 10,000 tons of garbage each day. This sad situation is not quite different from Ghana. In terms of sanitation, the United Nations Development Programme (UNDP) Human Development Report (1997) ranks Ghana 129th out of 174 developing countries where 9.5 million of her estimated populations of were without access to good sanitation.

Kendie's (2002, p. 23) report confirms the findings of UNDP (1996) that "household sanitation conditions and hygiene practices are poor in the Upper Regions of Ghana". And by extension the matter is equally graphic in many cities in Ghana. This report has been confirmed by Tsiboe and Marbell (2004) who indicated that the metropolitan authorities in Accra have not been able to keep pace with the rapid accumulation of waste in the city of Accra. This has resulted

in waste being thrown into gutters, drains, and in rivers in Accra. Some of the metropolis' final garbage disposal site is also located near the sea and is polluting the Korle Lagoon and these practices have created an unhealthy environment. Events of the 20th and 21st centuries indicate that waste in whatever form or classification- solid, liquid or toxic have become a major consequence of modernisation and economic development (Tsiboe & Marbell, 2004). The situation is aptly captured by Songsore (2004, p. 5) when he observes that “in virtually every urban centre in Ghana, from regional capitals to district centres and small towns, many people live in neighbourhoods with little or no provision of infrastructure, services and facilities that are essential to good health”. Many urban residents, therefore, live in health and life threatening conditions (Hardoy, Mitlin & Satterthwaite, 2001).

This waste phenomenon is uncommon in our urban centers as waste is seen scattered everywhere including gutters and drains. Rapid, uncontrolled urbanisation in our urban centres including Cape Coast Metropolis (CCM) has saddled the city with problems of physical, socio-economic and environmental nature. Besides the physical problems of poor infrastructure, inadequate housing, congestion and lack of accessibility to waste management facilities, CCM is confronted with socio-economic challenges including increasing levels of unemployment and poverty, social exclusion, rising crime and violence. Furthermore, environmental conditions in the city are appalling due to inadequate provision for services such as water supply, sanitation and waste disposal. These problems and many others constitute obstacles to the socio-economic

development of CCM and, therefore, hinder improvements in the lives of the population. The worsening environmental conditions in CCM can be blamed on the rapidly growing urban population in an unfavourable economic environment whereby city governments lack the resources to provide basic infrastructure and services for environmental management. On the other hand, Tamakloe (2006 as cited in Baabereyir, 2009) attributes the poor environmental conditions in the cities to low institutional capacity for urban management, poor physical planning and the lack of enforcement of development laws, poor provision of infrastructure and services for environmental maintenance and low public awareness of environmental hygiene. Thus, while it is true that rapid population growth is the source of pressure on urban infrastructure and services, the lack of institutional capacity to plan and manage urban settlements and to confront the challenges that accompany urbanisation is also a major contributing factor to the chaotic urban development and poor environmental conditions in Ghanaian cities (Tamakloe, 2006 as cited in Baabereyir, 2009).

Among the many problems that confront CCM, solid waste disposal is a particularly worrying issue that seems to overwhelm the authorities. In fact, the problem appears intractable and staring the authorities in the face while they look on helplessly. Tamakloe, (2006 as cited in Baabereyir, 2009) has observed that if the waste problem is not tackled effectively it would seem that many of the Millennium Development Goals (MDGs) are far from achievable by the target year of 2015 in the waste-laden city environments since solid waste disposal affects most of the issues to be addressed by the MDGs. The issue of social justice

should be applied fairly to all producers of waste irrespective of their economic, social or other standing as espoused by the philosopher of social justice. Social justice is a theoretical framework which according to Miller (1999: p. 1) argues that “a just policy or state of affairs is one that ensures that no person, or more usually category of persons, enjoys more or less of the advantages due them or bear more or less of the burdens they ought to bear relative to other members of the society”. In this sense, a situation of social justice exists when all members of a given society, irrespective of status or class, receive equitable shares of public assets and bear equitable shares of collective burdens.

Statement of the problem

The problem under research is the intractable solid waste situation found in our urban settlements and its graving consequences to human health. In the early days, waste disposal did not pose any difficulty as human habitations were sparse and land was plentiful. Waste disposal became problematic with the rise of towns and cities where large numbers of people started to congregate in relatively small areas in pursuit of livelihoods (Shafiul & Mansoor, 2003). While the population densities in urbanised areas and per capita waste generation increased, the available land for waste disposal decreased proportionately. Solid waste management thus emerged as an essential, specialised sector for keeping cities healthy and liveable. Development activities are going on everyday coupled with the concentration of people and business activities in Ghanaian cities. These activities are being accompanied by the rapid increase in the volume of solid

waste generated from production and consumption of goods and services. As a result of this situation of escalating waste generation, municipal, metropolitan and district authorities in the country seem unable to provide adequate collection centres as well as safe disposal of waste within their jurisdictions.

As a result, urban dwellers in the country are confronted with a worsening solid waste situation which proves to be intractable and threatens public health and the environment. With a cursory observation, the environment in Cape Coast Metropolis (CCM) shows appalling sights and aspects of the solid waste problem including mounds of garbage scattered everywhere. It is often seen that huge piles of solid waste are left at the mercy of the environment. In many of such cases we see animals scavenging on the waste leading to the spreading of diseases. Some of such scenes can be found at Siwudu, Kotokuraba, Tantri, Adisadel and Abura all in CCM where there are huge refuse dumps. These refuse dumps pose a threat to human lives because anytime it rains these refuse are washed into gutters and drains. There is also the problem of leachate which also affects the land quality as well as sources of water and aquifers. Equally, when the wind blows, dust and other rubbish are carried into the air and consequently affecting air quality that human breath. There is also heavy street litter, waste-clogged drains, polluted water bodies and stinking gutters. In addition, people throw raw human excreta away in open spaces and other types of household waste such as food waste in black polythene bags into gutters and even water bodies. Despite the concerns frequently raised by people and institutions in the country, the solid waste

situation in our urban centres continues to worsen. There is irregular collection and transportation of refuse in CCM which makes these waste rot and stench.

Furthermore, the environmental problems associated with the protracting solid waste situation appears to fall more heavily on the poor in our society even though waste removal and disposal are public funded and regulated. In many cities in the third world, the appalling environmental sanitation situation created as a result of waste militates against the achievement of the major objective of solid waste management which is to protect human health and the environment from the threat posed by waste (Hardoy *et al.*, 2001). Furthermore, the achievement of the Millennium Development Goals (MDGs) depends on maintaining a sustainable human settlement. In sum this research was, therefore, undertaken in order to obtain a deeper understanding of the factors, challenges and issues that are bedeviling the solid waste management sector in our urban centres and thereby facilitate the way forward towards finding lasting solution to the waste problem.

General objectives of the study

The main objective of the study was to examine the factors affecting effective waste management in Cape Coast Metropolis.

Specific objectives of the study

The following are the specific objectives for the research:

1. Identify the types and components of solid waste generated in CCM.

2. Examine waste disposal practices by households.
3. Examine the capacity of the waste management institutions in managing solid waste fairly.
4. Examine the frequency of waste collection in CCM.
5. Recommend strategies for effective management of solid waste in the CCM.

Research questions

The following were the research questions for the study:

1. What types of solid wastes are generated in the CCM?
2. How do people dispose of their domestic waste?
3. How frequent is the waste collected and disposed off by the waste management bodies?
4. What causes the unsatisfactory waste management in the Metropolis?
5. How can waste disposal be effectively managed?
6. Is the Metropolis well equipped to manage waste?

Significance of the study

The study would give further understanding of the solid waste problem affecting Ghanaian cities and provide a useful reference point for addressing an otherwise mulish problem. In furtherance of the above, the study will lay bare the realities on the ground so that policy makers can make appropriate interventions to improve sanitation issues in CCM. The study again will not only offer practical solutions to the problems of solid waste management in CCM, but it will also

serve as a reference point for further research when it comes to waste management and its effects on urban environment as population grows.

Organisation of the study

This research work is divided into five main chapters. The first chapter provides the genesis of the problem of lack of effective urban environmental management in developing countries. Chapter two explores extensively on available literature on urban environmental management when it comes to solid waste management. This literature review explains what waste, solid waste, classification of waste and problems of waste management are, especially in Ghana. Chapter three covers the research methodology adopted for the study, and it employed the descriptive and exploratory study design and was non-interventional in order to help the researcher to achieve the objectives of the study. Also, nine communities were clustered for the study. Chapter four constitutes finding and discussions of results, which involved the use of tables, frequencies and percentages. Lastly, the fifth chapter dealt with the summary, conclusions and recommendations from the study. Suggestions to policy makers on how the problem of urban solid waste situation could be solved in a more sustainable manner are the focus of the recommendations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

Chapter two was devoted to presenting a review of the literature related to conceptual issues addressed in this research. These include the concept of waste and waste management; the objectives, principles and strategies of waste management, as well as some tools for waste management. The literature review also covered the solid waste situation in developing countries, examining the nature of the problem and the factors militating against effective solid waste management in these countries. One of these factors has to do with deficient management capacities of institutions involved in urban environmental management in poor country cities. Solving the waste problem in poor cities will, therefore, require improvements in the institutional arrangements and capacity building for waste management and other aspects of the urban environment.

Urban environmental management

According to the School of Environment, Resources and Development of the Wageningen University, Urban Environmental Management (UEM) is an area of academic discourse and professional practice in which urban planning and urban management are studied and practised from an environmental management perspective. It draws on and integrates theories and perspectives in established

disciplines of waste management, urban planning, urban and regional development and urban policy and management studies into a distinctive framework of problem, issues and questions concerning the urban environment. It enables students to identify problems; apply appropriate analytic methodologies; design, plan and implement programs and projects; and monitor impacts and challenges within the context of sustainable development in developing societies (Wageningen University, 2011).

Rapid urbanisation, which occurred in the developed world in the late 19th and early 20th centuries, is now underway in the developing parts of the world. In Asia, Africa and Latin America, cities are growing rapidly, fuelled by large-scale rural-urban migration and natural increases within the cities (Songsore, 2005). According to Hardoy *et al.* (2001) the urban population in these regions grew more than fivefold from 346 million in 1950 to 1.8 billion in 1995. However, Songsore (2005) argues that even though Asia and Africa are relatively less urbanised, they both have very large urban populations and rapidly growing cities. Current projections show that most of the world's future population growth will take place in developing countries with more and more people in the urban areas (Tannerfeldt & Ljung, 2006). The rapid urbanisation that is currently occurring in the developing parts of the world has many positive impacts including economic growth and modernisation, but it is also accompanied by problems of a social, economic and environmental nature. Thus, while cities in these countries grapple with socio-economic problems such as poor shelter, unemployment, poverty and misery, there are also mounting environmental problems including poor sanitation

and water quality, slum development and a worsening solid waste situation which, among other problems, have become great challenges to metropolitan authorities (Kwawe, 1995). In particular, the urban solid waste situation in most poor countries is worrying. The growing consumption of products among the rapidly increasing urban populations is leading to mounting waste generation well above the capacities of municipal authorities responsible for waste management. Most metropolitan authorities in developing countries are, therefore, overwhelmed by an intractable waste situation as shown by recent studies in major urban centers in Africa, Asia and Latin America (Onibokun & Kumuyi, 1999).

The causes of solid waste problem in developing countries

The causes of solid waste in developing countries are multipronged and the following account indicates what other researchers have done. In researching into the solid waste problem in Tanzania, Kironde (1999) attributed the abysmal performance of the waste sector to resource constraints including the scarcity of financial, physical, human and technical resources for the organization of waste management operations. In a study of the solid waste problem confronting the city of Kampala, Uganda, researchers from the Namilyango College (2001) identified several causes of the waste problem including the lack of dumping sites, ignorance of the masses about the need for proper waste disposal, inefficient collection methods, poor governmental attitude towards waste management, poverty of the people, corruption among public officials and lack of trained personnel for waste management. There is also the problem of financial and

economic constraints. In the context of Nigeria, Onibokun and Kumuyi (1999) have blamed the lack of fiscal autonomy among municipal governments on excessive central government control of the lucrative sources of revenue, a situation which leaves local governments with few options. Armah (1993) has also attributed the financial difficulty of metropolitan governments to over reliance on central government subventions for the provision of metropolitan services. According to him, any organisation that relies so much on central government subventions to operate a waste management service is bound to fail because such subventions are often limited and unreliable.

Moreover, the technologies employed in solid waste management in most developing countries are also said to be inappropriate and inadequate. Zurbrugg (2002) has observed that adoption of the conventional waste collection vehicles used in rich countries constrain solid waste management operations in developing countries. Apart from the high acquisition and maintenance costs involved, developing countries actually lack the engineering capacity to support the operation and maintenance of such sophisticated equipments like compactors and skip lifts. Besides the shortage of suitable equipments, the poor spatial organisation of many developing country cities, characterised by unplanned housing developments, poor road quality and poor access within settlements do not support the use of large and heavy western type waste collection vehicles (Armah, 1993). Usually, the large waste trucks cannot gain access to many unplanned residential areas due to poor roads.

The poor waste disposal situation in poor country cities has also been attributed to the general dearth of qualified personnel in the waste sector (Ogawa, 2002). According to Onibokun and Kumuyi (1999) most metropolitan authorities are unable to attract suitably qualified personnels for the various aspects of waste management such as planning, operations and monitoring. Ogawa (2002) corroborates this observation when he noted that developing countries characteristically lack the technical expertise required for solid waste management planning and operation and this is usually the case at both national and local levels. He argues that many officers in charge of solid waste management have little or no technical background training in engineering or management. Without sufficiently trained personnels, however, solid waste management projects cannot be effective and sustainable.

Finally, institutional constraints also hamper the waste management problem, and Ogawa (2002) has observed that there are often no clear roles or functions of the various agencies involved in urban environmental management and this is as a result of bad governance. At the same time, no single agency is usually designated to coordinate the activities of waste sector agencies (Attahi, 1999).

Good governance

Governance is derived from the Greek word 'Kybernan' and 'Kybernets' meaning to steer and to pilot or to be at the helm of things. However, the current notion of governance transcends this traditional sense and sees governance as the

mechanism, processes, institutions and relationships through which citizens and groups articulate their interests, exercise their rights and obligations and mediate their differences (UNDP, 1997). Good governance emphasizes effective and accountable institutions, democratic principles, a reliable electoral process, representative and responsible structures of government. There is also the need for the institutionalisation of appropriate policies, programs, and strategies for urban management that help to eliminate or ameliorate the problems posed by rapid urbanisation, and the need to ensure an open and legitimate relationship between civil society and the state.

Both the central government and city councils lack democracy, transparency, accountability, and cooperation with the public in their operations, and processes and in their relationship with civil society and this has affected negatively how waste is managed in the cities. Lack of good governance is the root cause of urban problems, particularly in waste management. Therefore, appropriate structures are urgently needed to ensure good governance (Kazungu, 2010). Urban managers need to emulate experiences from all over the world that depict institutionalisation of good governance that hinges on democratisation and participation. This entails bridging the gap between the rulers and the ruled and increasing trust, interdependence, reciprocity, responsiveness, and accountability in governance. Good governance requires the cooperation of the people and a lot of improvements can be made if urban managers and the populace sit together to find ways and means of solving urban problems. People should be encouraged to establish local-community organisations to enhance urban governance.

Central governments should encourage local governments, by example and by regulation, to operate more transparently and accountably, both to themselves and to the citizens. If systems for solid-waste removal are to be efficient, citizens need to know their daily responsibilities, the routines, the collection timetables, the standard procedures, and the locational factors. An elaborate system of public education should therefore be called for, with a focus on critical issues, such as methods for waste minimisation, collection, storage, and delivery to the refuse dumps and the inherent dangers of giving inadequate or no attention at all to waste (Kazungu, 2010). Good governance has 8 major characteristics namely participatory, consensus oriented, accountability, transparency, responsiveness, effectiveness and efficiency, equitability and inclusiveness, and rule of law (UNDP, 1997).

These characteristics are explained as follows. Transparency-the degree of clarity and openness with which decisions are made. Accountability involves the extent to which political actors are responsible to society for what they say and do. Participation is the involvement of all stakeholders in decision making. Equitable distribution and sharing of resources are also factors. Efficiency deals with the extent to which limited human and financial resources are applied without waste, delay or corruption or without prejudicing future generations. Consensus oriented involves a broader unanimity among all stakeholders and in this case waste management and responsiveness involves reacting quickly, strongly and favourably to a problem. This would culminate in ensuring that political, social and economic priorities are based on broad consensus in society

and that the voices of the poorest and the most vulnerable are heard in decision-making over the allocation of development resources (United Nations Economic Commission for Europe, 2008).

Conceptually, good governance results from good leadership skills, motivation, and high level of qualification, adequate training, and effective set of rules and good representation by interest groups (Community Water and Sanitation Agency [CWSA] (2004). According to United Nations Economic and Social Council (2009) implementation and enforcement of waste regulations and conventions is severely constrained by the lack of good governance and transparency and prevalence of corruption in some cases, and that policies should be put in place and existing standards be enforced to reverse this trend. If this is effectively done it would lead to effective waste management in our urban centres.

Waste management

Waste is more easily recognised than defined. Something can become waste when it is no longer useful to the owner or it is used and fails to fulfill its purpose (Gourlay, 1992 as cited in Freduah, 2004). There are basically two types of waste, namely liquid and solid waste. But for the purpose of this study, the focus is on solid waste. Waste is an unavoidable by-product of human activities. Economic development, urbanisation and improved living standards in cities increase the quantity and complexity of waste generated. Davies (2008, p. 5) notes that “what some people consider to be waste materials or substances are

considered a source of value by others”. This relative attribute of waste can be compared with the concept of ‘resource’ which has also been defined as a material that has use-value (Jones & Hollier, 1977, p. 20) and “a reflection of human appraisal” (Zimmermann, as cited in Jones & Hollier, 1977, p. 20). Just as a material becomes a resource when it gains use-value, it also becomes waste when it loses its use-value. Like resources, waste is also a relative concept or human appraisal because what constitutes waste can vary from one person to another, one society to another and over time.

The term solid waste has been defined differently by various authors. Solid waste is any material that arises from human and animal activities that are normally discarded as useless or unwanted (Tchobanoglous, Theisen & Vigil, 1993). According to Zerbock (2003), solid waste includes non-hazardous industrial, commercial and domestic waste including household organic trash, street sweepings, institutional garbage and construction wastes. Furthermore, solid waste is defined to include refuse from households, non-hazardous solid waste from industrial, commercial and institutional establishments (including hospitals), market waste, yard waste and street sweepings (Schubeler, 1996). Also, Ghana Innovation Market Place (2009) defines solid waste as neither waste water discharges nor atmospheric emissions, arising from domestic, commercial, industrial, and institutional activities in an urban area. Operationally, it can therefore be said that, solid waste is any material which comes from domestic, commercial, and industrial sources arising from human activities, which have no

value to people who possess it and is discarded as useless. Having analysed what solid waste is the next section examines the sources and types of solid waste.

Sources and types of solid waste

Tchobanoglous *et al.* (1993) have classified types of solid waste in relation to the sources, typical location and generation facilities, and activities. This is presented in Table 1 below.

Table 1. Sources and types of solid waste.

Source	Typical Location	Types of Solid Waste
Residential	Single-family and multifamily dwellings, low-medium, and high-rise apartments.	Food wastes, rubbish, ashes, special wastes.
Commercial/ Municipal	Stores, restaurants, markets, office buildings, hotels, motels, print shops, auto repair shops, medical facilities and institutions.	Food wastes, rubbish, ashes, demolition and construction wastes, special wastes, occasionally hazardous wastes.
Industrial	Construction, fabrication, light and heavy manufacturing, refineries, chemical plants, lumbering, mining, demolition.	Food wastes, rubbish, ashes, demolition and construction wastes, special wastes, occasionally hazardous wastes.
Open areas	Streets, alleys, parks, vacant plots, playgrounds, beaches, highway and recreational areas.	Special wastes, rubbish.
Treatment plant sites	Water, wastes water, and industrial treatment processes.	Treatment plant wastes principally composed of residual sludge.
Agricultural	Field and row crops, orchards, vineyards, dairies, feedlots and farms.	Spoiled food wastes, agricultural wastes, rubbish, hazardous wastes.

Source: Tchobanoglous *et al.* 1993.

Wherever people gather, waste is generated and measures must be put in place to manage it. According to Kumah (2007, p. 2) “solid waste management is the administration of activities that provide for the collection, source separation, storage, transportation, transfer, processing, treatment, and disposal of waste. And this thereby gives the elements of urban environmental management in connection with solid waste management”. On the other hand solid waste management involves a complex task which depends as much upon organisation and cooperation between households, communities, private enterprises and metropolitan authorities as it does upon the selection and application of appropriate technical solutions for waste collection, transfer, recycling and disposal (Schubeler, 1996). Solid waste management is an essential task which has important consequences for public health and well-being, the quality and sustainability of the urban environment and the efficiency and productivity of the urban economy. In most cities of developing countries, waste management is inadequate: a significant portion of the population does not have access to a waste collection service and only a fraction of the generated waste is actually collected. Systems for transfer, recycling and/or disposal of solid waste are unsatisfactory from the environmental, economic and financial points of view (Schubeler, 1996).

From the foregoing, it is significant to get the relationship involved in the concept of solid waste management identified in order to be able to deal with solid waste management in an efficient manner. It can be elicited from Tchobanoglous *et al.* (1993) that in managing solid waste, it is important to have the following elements in mind such as source separation, storage, collection,

transportation and disposal of solid waste in an environmentally sustainable manner. This is depicted in Figure 1 below.

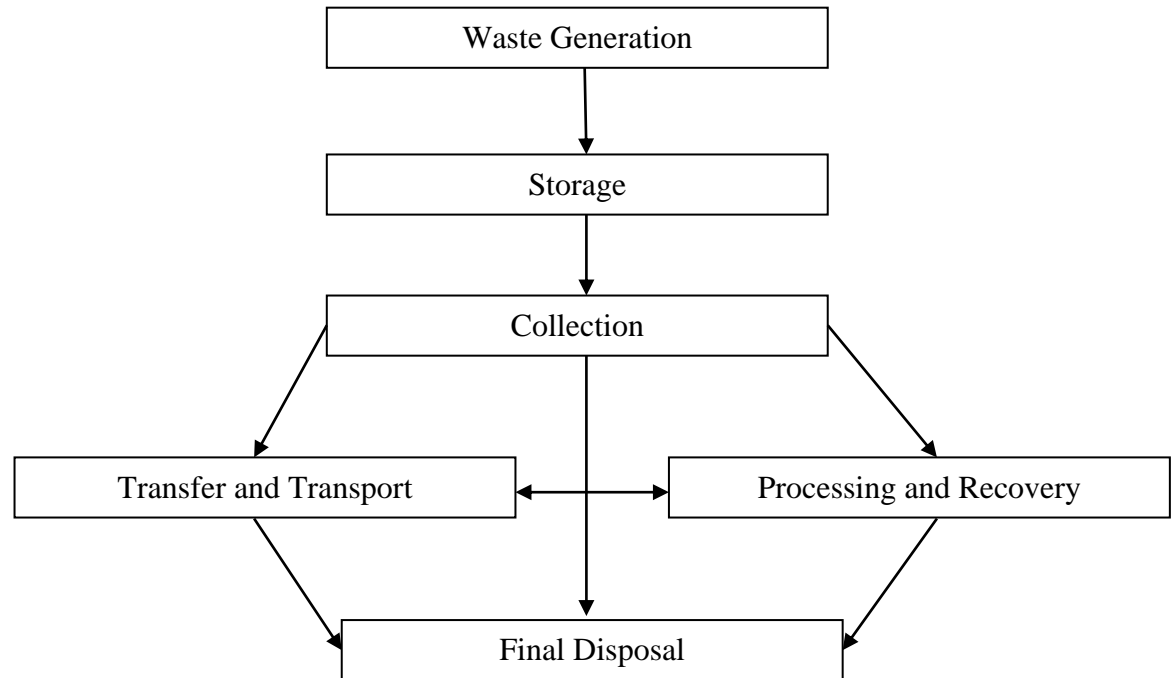


Figure 1. Key elements of solid waste management.

Source: Tchobanoglous *et al.*, (1993).

Solid waste management process

When waste is generated it is first stored in containers like skips or dustbins or containers of similar nature. It can also be collected and finally disposed off in landfill sites. Again, when waste is collected it can be transferred from small collection equipments like the tricycle to a much bigger truck for final disposal at the disposal site or landfill site. Furthermore, waste collected can be processed and recovered for materials to be reused. Economic development, urbanisation and improved living standards in cities increase the quantity and

complexity of solid waste that is generated. If waste is accumulated for unduly long time, it leads to degradation of urban environment, stresses natural resources and leads to health problems. Cities in the world are facing a high level of pollution; the situation in developing countries is more acute. This is partly caused by inadequate provision of basic services like water supply, sanitation facilities, transport infrastructure and waste collection [United Nation Conference on Human Settlement- Habitat](UNCHS-H, 2001). Rapid increase in volume and types of solid and hazardous waste as a result of continuous economic growth, urbanisation and industrialisation, is becoming a burgeoning problem for national and local governments to ensure effective and sustainable management of waste. It is estimated that in the year 2006 the total amount of municipal solid waste (MSW) generated globally reached 2.02 billion tones, representing a seven percent annual increase since 2003 (Global Waste Management Market Report, 2007 as cited in UNEP, 2009). It is further estimated that between the years 2007 and 2011, global generation of metropolitan waste rose by 37.3 percent, equivalent to roughly eight percent increase per year (UNEP, 2009). Waste generation is increasing at a faster rate globally as indicated by UNEP and this is confirmed by Mensah and Larbi (2005) as well as Palczynski and Scotia (2002) concerning solid waste generation. Worldwide, low income countries have the lowest percentage of urban populations and the lowest waste generation rates, ranging between 0.15 to 0.33 ton/person/year. All of the countries that have a Gross National Product (GNP) per capita less than US \$400 produce under 0.25 ton/person/year. As GNP increases toward the middle income range, the per

capita waste generation rates also increase ranging from 0.18 ton to 0.40 ton per year (Palczynski & Scotia, 2002).

Crude way of solid waste management-Early concepts of waste disposal

Although it is essential to public health and environmental protection, solid waste management in most cities of developing countries is highly unsatisfactory. During the first century of the industrial revolution, the dominant method of waste disposal was known as dilute and disperse. The amount of waste produced during this period was relatively small compared to present times and factories were usually located near streams and rivers to take advantage of the availability of cheap running water for the transportation of raw materials, finished goods and discharge of waste into streams and rivers. Because the population at this point in history was sparse and the quantity of waste being produced was small, dilute and disperse proved adequate in removing waste from the immediate environment (Botkin & Keller, 2003). Burning of dumps is also common in peri-urban and rural communities in Ghana and in many other less developed countries. A study carried out in Nairobi, Kenya by Karanja (2005) showed that, the methods of solid waste disposal included dumping of waste in gutters, drains, by roadside, unauthorised dumping sites and stream channels during raining season and burning of wastes on unapproved dumping sites during the dry season. This has gone to confirm that the practices of solid waste disposal in the olden days still exist today and the study area is not an exception.

On the other hand, Karanja's (2005) assessment of waste situation in Nairobi, Kenya is questionable as she did not further explain what brought about the indiscriminate dumping. It could be that people dumped the waste any how because there were no skips or dustbins for the people to store their waste for collection. Further, the waste generated by a population is primarily a function of the people's consumption patterns, and thus, of their socio-economic characteristics. At the same time, waste generation is conditioned to an important degree by people's attitudes towards waste. Again, their patterns of material use and waste handling, their interest in waste reduction and minimisation, the degree to which they separate wastes and the extent to which they refrain from indiscriminate dumping of waste. Karanja's (2005) study did not find out more about this human behaviour. This particular study intends to go further to investigate why people dump waste indiscriminately.

Modern/Contemporary methods of managing solid waste

There are a number of concepts about waste management which vary in their usage between countries or regions. Some of the most general, widely used concepts include first Waste Hierarchy (WH). The WH refers to the "3Rs" reduce, reuse and recycle, which classify waste management strategies according to their desirability in terms of waste minimisation. The waste hierarchy remains the cornerstone of most waste minimisation strategies. The aim of the WH is to extract the maximum practical benefits from products and to generate the minimum amount of waste. Second Extended Producer Responsibility (EPR) is a

strategy designed to promote the integration of all costs associated with products throughout their life cycle (including end-of-life disposal costs) into the market price of the product. EPR is meant to impose accountability over the entire lifecycle of products and packaging introduced to the market. This means that firms which manufacture, import and/or sell products are required to be responsible for the products after their useful life as well as during manufacture. Third is Polluter Pays Principle (PPP). The PPP is a principle where the polluting party pays for the impact caused to the environment. With respect to waste management, this generally refers to the requirement for a waste generator to pay for appropriate disposal of the waste (United Nations Economic and Social Council, 2009).

In modern times the move has been to consider wastes as a resource out of place. The idea is to consider all wastes reusable, thus there would be no such thing as waste. Waste when produced would be a resource to be used again. This is what has been termed the zero waste movement. Zero waste forms the core of the concept called industrial ecology. Industrial ecology is the study of relationships among industrial systems and their links to natural systems (Botkin & Keller, 2003). Under this concept industrial society will function just like the natural ecosystem whereby waste produced by one part of the system becomes a resource for another section of the system. The dominant concept today however in the management of waste is Integrated Waste Management (IWM) defined as a set of management alternatives that include reuse, source reduction, recycling, composting, landfill and incineration. The ultimate aim of reuse, source reduction

and recycling is to cut down the quantity of metropolitan waste ending up in landfills and incinerators (Botkin & Keller, 2003).

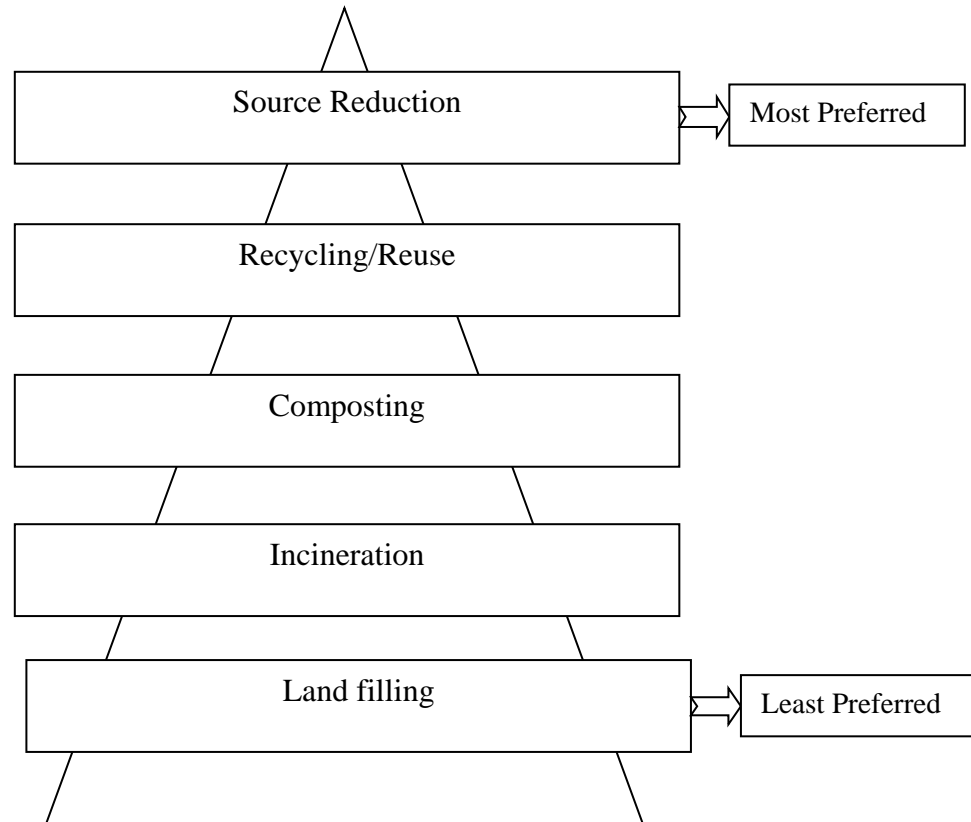


Figure 2. The hierarchy of integrated solid waste management

Source: Palczynski and Scotia (2002), with additions from author.

Good waste management begins with source reduction/preventing waste from being produced in the first place-after all. What is not produced does not have to be disposed of. Waste source reduction/prevention is becoming more and more important as the global population increases and we eat away at our finite supply of natural resources. One of the key tools being used to encourage waste source reduction/prevention is eco-design, which focuses on environmental

aspects during the conception and design phase of a product. Denison and Ruston (1990) view source reduction as any action that reduces the volume or toxicity of solid waste prior to its processing and disposal in incinerators or landfills. According to Tsiboe and Marbel (2004) Austria, the Netherlands, and Denmark developed a waste management processes to efficiently resolve the waste disposal problem by essentially coaxing their citizens to separate their domestic solid waste into glass, paper and plastic categories. This enabled easy collection and consequently reuse. As suggested by these authors, one way of effectively managing solid waste is to minimise solid waste generation through source reduction/prevention.

Recycling as a process of waste management is the separation and collection of secondary materials for remanufacturing. Kreith (1994) has also added that, recycling is the most positively perceived and doable of all the waste management options. According to him recycling will return raw materials to market by separating reusable products from the rest of the metropolitan waste stream. According to Momoh and Oladebeye (2010), recycling has been viewed as a veritable tool in minimizing the amount of household solid wastes that enter the dump sites, and also, provides the needed raw materials for industries.

On the other hand, composting involves biological decomposition of biodegradable solid waste under controlled predominantly aerobic conditions to a state that is sufficiently stable for nuisance-free storage and handling and is satisfactorily matured for safe use in agriculture. Composting, which is a controlled aerobic degradation of organic material, can reduce waste volumes by

about 50 to 80 percent. A characteristic that renders composting especially suitable is its adaptability to a broad range of situations, hence to effectively manage waste it is important to adopt composting as an option (UNEP, 2009).

Incineration, however, is a method of combusting waste at high temperatures up to about 1000°C in order to reduce the waste to ashes. If all conditions are normal, incineration can bring about a reduction in waste by as much as 95 percent. However, in most cases due to maintenance problems or insufficient supply of waste it usually is closer to 50 percent (Botkin & Keller, 2003).

According to the Centre for Environment and Development (CED), sanitary land filling includes confining the waste to an area of land, then waste is spread in layers, compacted and covered with soil or other materials to minimise air and water pollution. Modern sanitary landfills collect and treat leachate and methane gas. Landfill is the oldest form of waste treatment and the least desirable option because of the many potential adverse impacts it can have (CED, 2003). Landfills are one form of waste management that nobody wants but everybody needs. There are simply no combinations of waste management techniques that do not require land filling to make them work. Of the basic management options of solid waste, landfills are the only management technique that is both necessary and sufficient (Kreith, 1994).

Theoretical framework for the study and waste management

The concept of social justice provides a useful framework for the analysis of managing solid waste disposal service delivery in developing country cities. It is desirable, at least from an egalitarian perspective, that the collective benefits of society such as public money and natural resources as well as its collective burdens such as public debt and pollution are equally allocated among its members. In the real world, however, vulnerable members of the population such as the poor and minority groups are discriminated against as they frequently receive less of the benefits and bear more of the burdens (Tilly, 2004). Such discrimination against vulnerable groups in society has been conceptualised as ‘social injustice’ (Clark, 1985; Miller, 1999).

With regard to the meaning of social justice, Miller (1999) has suggested that the term is best understood as forming part of the broader concept of ‘justice’ in general. According to him, actions are ‘just’ when they are taken in attempt to bring about a “just state of affairs”, or when they actually have this desirable result. In line with this view, Miller (1999, p. 1) argues that “a just policy or state of affairs is one that ensures that no person, or more usually category of persons, enjoys more or less of the advantages due them or bear more or less of the burdens they ought to bear relative to other members of the society”. In this sense, a situation of social justice exists when all members of a given society, irrespective of status or class, receive equitable shares of public assets and bear equitable shares of collective burdens. A more extreme advocacy for social justice therefore regards economic inequality as unjust and studies have shown that

social inequality or social injustice, therefore, finds expression in spatial terms in the provision of waste disposal services. Also, there can be enormous spatial disparities in the levels of waste disposal services provided for wealthy and poor communities in poor country cities (Hardoy, *et al.* 2001; Pacione, 2005). The result is that while the poor majority of urban residents live in squalid and dehumanising environmental conditions created by the lack of waste disposal services, the wealthy segments of the population live in cleaner and safer environments.

Solid waste generated in the cities can be regarded as a collective burden that needs to be managed while the service for waste removal can be regarded as a collective benefit of the urban society. In most cities, garbage collection is a duty entrusted to public funded metropolitan authorities and should, therefore, be extended to all areas of the city for the purpose of protecting human health and the natural environment and to promote human dignity (Schubeler, 1996). To achieve the objectives of waste management, and in line with the requirements of social justice, it becomes important to ensure that services for waste removal are fairly and equitably provided for all residents of the cities, irrespective of such variables as class, ethnicity or culture. Social justice in its different manifestations would require the organisers of solid waste disposal service to ensure fairness and equity in providing the service to the various segments of the populations within their jurisdictions. In other words, metropolitan authorities responsible for the organisation of solid waste disposal have a social duty to ensure that all residents of the city, irrespective of social class, ethnicity or gender receive fair, equitable

and adequate service for waste disposal to protect them from the nuisances associated with waste. The review of studies on the solid waste situation in developing countries has shown that the organisation of waste collection services is usually unfair and inequitable. While metropolitan authorities and their waste contractors are usually unable to undertake adequate waste collection in cities, their efforts are usually concentrated in the few high-income residential areas and official premises where they provide regular waste removal and ground cleansing service.

On the other hand, low-income residential areas usually receive little or no service for waste collection (Hardoy *et al.*, 2001). Thus, there are usually great spatial disparities in environmental quality between rich and poor areas within cities so that while the wealthy populations usually enjoy patches of clean space and fresh air, the poor residents of the cities usually suffer health and life-threatening squalor. This class-based discrimination can be regarded as social injustice as it provides one category of residents-the rich, a disproportionate share of a public service and causes another category of residents-the poor, to bear a disproportionate share of the burdens or nuisances associated with the non-collection of waste. There are a number of grounds for making a claim for social injustice in waste management. In defense of their discriminatory practices in delivering waste collection services, some metropolitan authorities have argued that the rich residents of the cities pay for the regular services they receive while the poor are unwilling to, or cannot pay for waste disposal (Koboe, 2000 as cited in Hardoy *et al.*, 2001). However, some studies have shown that poor residents

appreciate clean environments and are willing to pay for waste disposal if the service would be provided (Devas & Koboe, 2000 as cited in Hardoy *et al.*, 2001). Therefore, the excuse that the poor are unwilling to pay for waste disposal is not entirely valid. Moreover, it is often government policy that exempts poor urban residents from the payment of waste disposal levies (Armah, 1993) so it is not justifiable to use their 'non-payers' status as reason to deny them good services.

Analytical framework for effective waste management

This research would adopt the conceptual framework developed by CWSA (2004) to explain how effective solid waste management could be achieved. This is depicted in Figure 3 below. The framework explains that for the waste problem to be solved certain factors such as effective leadership, good motivation, high level of academic qualification, adequate training, effective rules and representation by interest groups must work together to ensure good governance and that would culminate in good training, accountability and good information management. Other factors include public awareness, integrated approach, institutional capacity, access to collection centres and cooperation. The success of effective solid waste management will depend on how best these factors are managed. However, if these factors are not exploited positively then there would be inefficiencies that would lead to ineffective waste management.

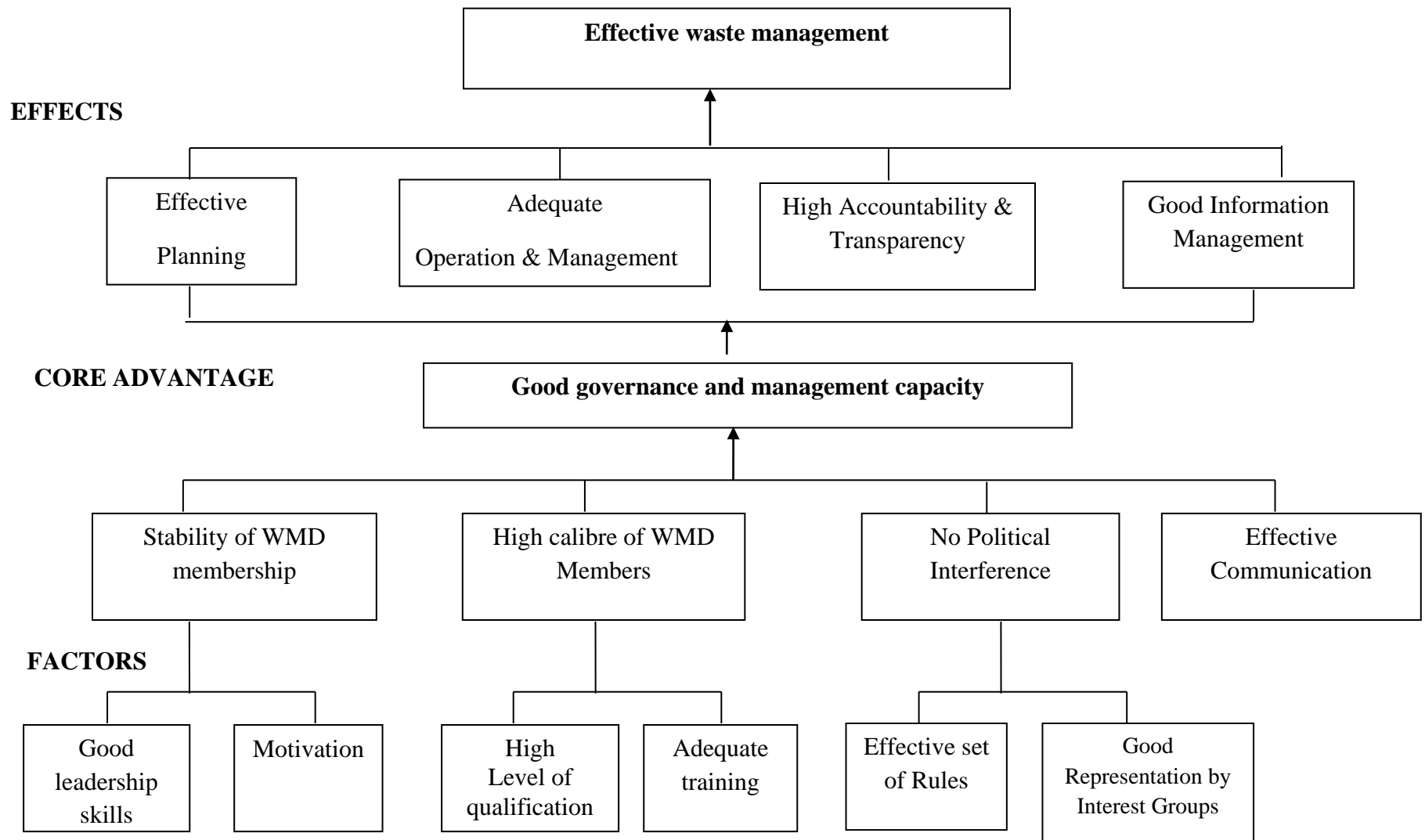


Figure 3. Analytical framework.

Source: Adopted from CWSA (2004) and adapted by author (2012).

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

This chapter deals with the methodology employed in doing the study. It highlights the study area, the target population, sources of data, sample size and sampling procedure, research instruments, and methods of data analysis.

The study area

Cape Coast is of historical and cultural importance and is very strategic when it comes to tourism development in Ghana. The metropolis occupies an area of 1700 square kilometers and lies between longitude 2° and 1° south and latitude 5° and 6° E and is 145 kilometers from Accra, the capital town of Ghana. It is also bounded on the north by Jukwa, Asebu and Abakranpa, to the south by the Gulf of Guinea, to the east by Ekon, Moree and Biriwa and lastly to the west by Elmina, Nkwanda and Komenda as shown in Figure 4. Cape Coast was also the capital of the Gold Coast until 1877, when the capital was moved to Accra. It was in the castle of Cape Coast that the historic bond of 1844 was signed between the British and the Fante Confederation. The only major festival in the area is the Fetu Afahye.

The people of Cape Coast are the Fantis and their main occupations are fishing, mainly in the Atlantic Ocean and in the Fosu lagoon and food crop farming. The Kotokuraba market is where a lot of the people in the city do their trading activities. The people are also engaged in bottled/sachet water manufacturing which has contributed to the solid waste problem in the city. Again, the city has a host of vehicle maintenance workshops at Siwudu where vehicles are serviced. Cape Coast has one University, University of Cape Coast and two other colleges. Ola College of Education and Cape Coast Nurses and Midwifery College. The metropolis has excellent educational institutions like Mfantsipim School, St. Augustine's College, Wesley Girls' High School, Adisadel College and Holy Child that have produced some of the prominent citizens in the country (View Ghana, 2011).

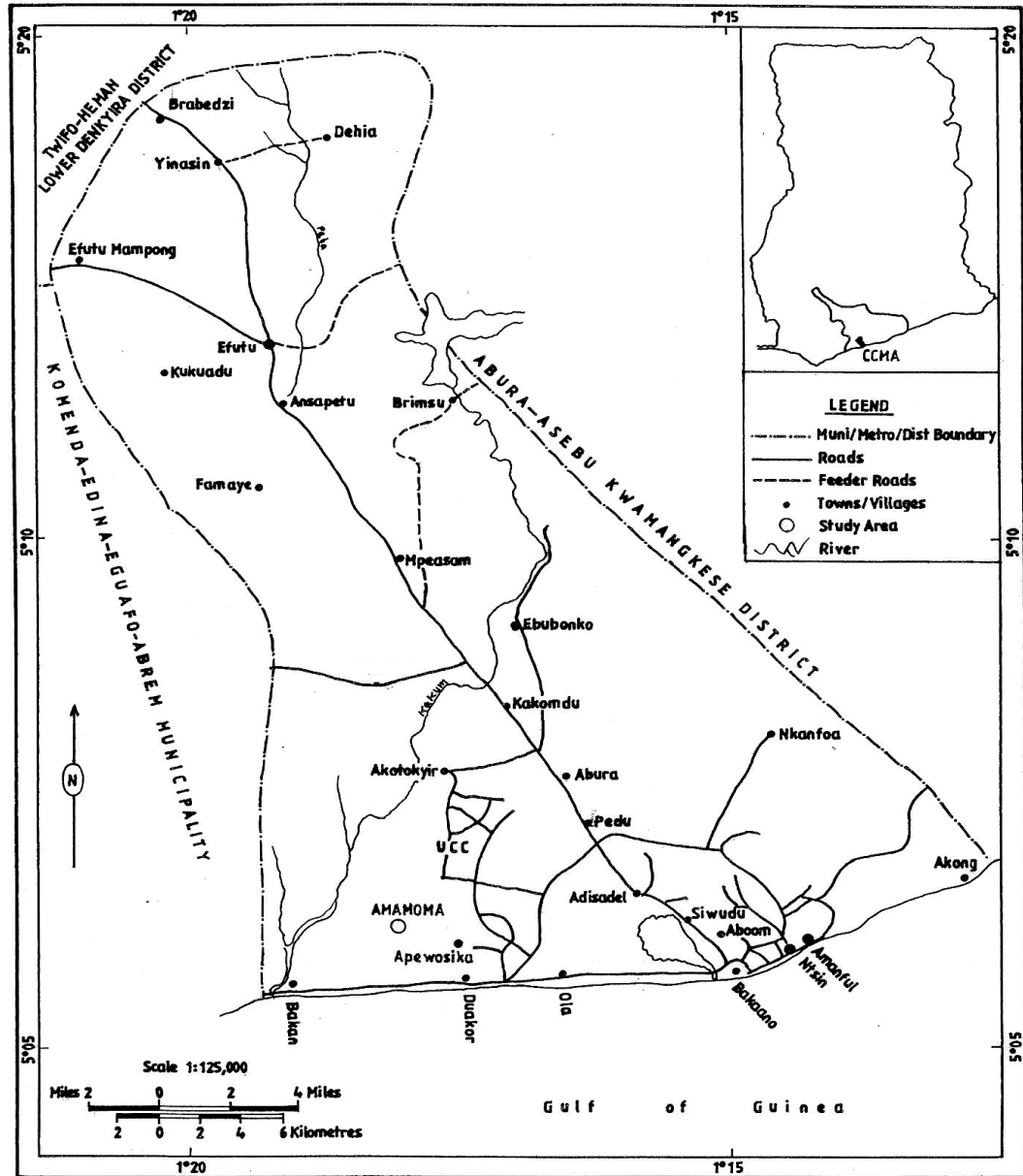


Figure 4: A map of Ghana showing the study area.

Source: Cartography/GIS, Geography and Regional Planning, UCC, 2012.

Research design

The design for this research was basically descriptive and exploratory and was non-interventional. This design was chosen because it would provide a quantitative or numeric description of trends, the attitudes and views of a population by studying a sample of that population. Through this the researcher can generalise or make claims about the population from the sample results (Creswell, 2003). This design was chosen because the research is on a small scale and of a short duration that seeks to collect information to describe the situation on the ground. Further, this design was to help the researcher make conclusions from frequencies, as well as percentages from which conclusions can be drawn from numerical values that have been presented. Moreover, this design is informed by the fact that it can be used to obtain information concerning current status of a phenomena with the ultimate purpose of describing the actual situation with respect to some situational variables that the data collection instruments sought to determine. Finally, a descriptive design was chosen because it would allow the collection of data through oral or written questions to answer research questions concerning the current status of a study and findings quantified (Gay, 1992).

The target population

The target population for the study was adult individual members of households in CCM who were 18 years and above as well as officials of Zoomlion Ghana Limited (ZGL) and that of CCM waste management department.

The communities where the solid waste situation was a problem was selected for the study. The selected communities was Adisadel and Pedu. These communities are in the southern part of CCM and are of homogenous characteristics in terms of their social, economic, cultural background and waste disposal habits. They are given community dump and skip for their waste disposal. The others are Green Hill, Ghana National, and First Ridge. This group is made up of people with different educational backgrounds and they live in well planned communities and for that matter would exhibit better waste management practices. Their means of waste collection by the waste management entities was through dustbins. The next selected communities are Bakaano and Aboom which are beach communities and their waste collection methods are through skip. Kotokuraba and Tantri which are in the central part of CCM have people who are mostly market women and from observation exhibited poor waste management practices. Their waste collection method is through community dump.

Sample and sampling techniques

The sampling technique which was employed to select the respondents for the study was proportionate cluster sampling. It was used to select households based on the number of households in each cluster and out of which households were selected for the study. In the selection of the households, the formula $S=n\alpha$ (Alreck and Settle, 1985) was adopted for the calculation as indicated in the Table 2 below. **S** is the number of sampled houses in the cluster; **n** is the total number of houses in each cluster and **α** is the rate of percentage of houses selected for the

study. In all 10 percent of houses in every cluster was chosen for the study because Alreck and Settle (1985) indicated that a sample size of 10 percent of a population is enough to obtain adequate confidence. By substituting the number of houses in each cluster into the formula: $S = n\alpha$, for example $S = 442(10/100)$, it implies $S = 44$ for cluster 1. The process is repeated for all the clusters to get the sampled houses as indicated in the Table 2 below. Therefore, the sample size for the study is 110. Having obtained the households in each cluster the simple random sampling process was used to select the houses. The houses in each cluster was numbered and put into a bowl and the researcher picked one item from the bowl and wrote the number of the household down. The paper was put back into the bowl and the process was repeated until the required sample was obtained for each cluster. In the process of selecting the next household, if that household was earlier selected it was put back into the bowl and another one was selected.

Table 2. Names of cluster and number of houses in each cluster

Name of cluster	Number of houses in each cluster	Sample
Cluster 1	442	44
Cluster 2	251	25
Cluster 3	211	21
Cluster 4	202	20
Total	1106	110

Source. Field work, 2012.

In each of the selected households, the person in charge of waste clearing/gathering/disposal or the head of each selected household was selected as the respondent for the study because they were in the position to provide the needed information in terms of waste disposal. One official each from the CCM waste management department and Zoomlion was purposively selected for the study.

Sources of data

The study made use of both secondary and primary sources of data. The primary source of data was members of the household and officials of CCMA waste management department as well as ZGL. Secondary data concerning waste management was obtained from records of the CCMA and Zoomlion Ghana Limited as well as other research work such as books, journals, reports and the internet.

Data collection instruments

The research instrument employed was interview guide which contained both closed and open ended items. Different interview guides were used for households, the officers in charge of the CCMA waste management department and Zoomlion Ghana Limited. Written permission was sought from them with dates given for the interview. Only written records of the interview were made from the officials. Apart from this an observational tour was made to Zoomlion

Ghana Limited compound to have a feel of their equipments and operations as well as a visit to some dump sites.

Data collection methods

Information was sourced from respondents through the administration of interview guide which contained both closed and open ended questions. The interview guide was used to collect data concerning the socio-demographic background of respondents. Again, some of the issues on the interview guide was types of solid waste households generate, household waste management practices as well as respondents' assessment of the waste situation in CCM. The items on the interview guide were answered with the help from the researcher, and others too were administered with the help from research assistants. In cases where respondents were unable to speak and or write English, the interview guide was administered with the aid of a translator who translated it into the local language. Data from the waste management officials was obtained through interview guides and it involved the field supervisors of the waste management companies.

Pre-test

The data collection instrument was pre-tested to ensure internal consistency and this was done at Ola, a suburb of Cape Coast in the Central Region of Ghana. Ola bears similar characteristics to the sample in CCM in terms of their varied educational background, ethnicity, trade and occupation. Leedy (1989) indicates that questions should be pre-tested on a small population of

similar characteristics to see whether there would be any item(s) respondents might find difficult understanding. It is significant to note that, the pilot study helped the researcher in ascertaining the reliability of the data collecting instruments. After the pre-testing exercise, the items were corrected to help the respondents to better understand it when the actual administration was done.

Methods of data analysis

The data collected was cleaned, sorted, coded and inputted into the computer for analysis. In order to obtain quality data, responses were cross-checked on the field. Thus the responses were filtered and cleaned to avoid discrepancies and inconsistencies so as to ensure the quality of data collected. The analysis was done using modern computer software such as Statistical Product and Service Solution (SPSS). The results were presented in tables using percentages and frequencies.

CHAPTER FOUR

FINDINGS AND DISCUSSIONS

Introduction

This chapter presents the findings from the data analysis which was done using SPSS. The findings were described in accordance with the research questions and objectives of the study. It was to examine the factors affecting effective waste management in our urban areas with regards to solid waste management in CCM and thereby advance possible solutions to address the problem. The main issues discussed here included the demographic characteristics of respondents and their attitude towards urban environmental management in terms of their solid waste generation, collection and disposal. The interview guide that was administered to all the respondents was 110 including one official respectively from ZGL and CCMA WMD. Out of the 110 interview guides that was administered, 100 was answered and returned giving a response rate of 91 percent. One key finding was that CCM was not sufficiently equipped to carry out the waste management activities, and for that matter there was the need to equip them with waste storage equipments and the provision of more human resources.

Background characteristics of respondents

The socio-demographic characteristics of respondents were analysed. This was done in this section in terms of sex, marital status, age, level of education, occupation and respondents' income level.

Distribution of respondents by sex.

Out of the 100 sampled respondents, 30 percent were males and 70 percent were females. Female respondents were more than males because they were the people who mostly generated household waste and were more willing to contribute to the research. The males were hardly at home to contribute to the research and in most cases asked us to talk to the women. This is shown in Table 3 below.

Table 3: Sex of respondents

Sex	Frequency	Percent
Male	32	32.0
Female	68	68.0
Total	100	100.0

Source: Field work, 2012.

Age of respondents.

Age was important because it tells us the economically active age group and those who actually generate waste at home so that they could be targeted through programmes to help in urban environmental management in CCM. Half

(50 %) were between the age bracket of 28-37. These are part of the people who are very active in our society and through their activities both at home and at work generate various kinds of waste that poses a difficult challenge to solid waste management. This result is presented in Table 4 below.

Table 4: Age of respondents

Age group (Years)	Frequency	Percent
18-27	10	10.0
28-37	50	50.0
38-47	30	30.0
48-57	5	5.0
58+	5	5.0
Total	100	100.0

Source: Field work, 2012.

Educational background of respondents.

Educational background of respondents was also taken into consideration during the study. This was to find out how their educational background of the respondents could influence their attitude towards solid waste management. The respondents have varied academic qualifications from no schooling, primary to tertiary level. The finding shows that 12 percent had no formal education, did not attend school at all. Eight percent had primary education, 30 percent had

respectively Middle/JHS and Secondary/Technical/Vocational education, and 20 percent had tertiary education as shown the Table 5.

Table 5: Educational background of respondents

Educational Level	Frequency	Percent
No schooling (None)	12	12.0
Primary	8	8.0
Middle/JHS	30	30.0
Secondary/Technical/Vocational	30	30.0
Tertiary	20	20.0
Total	100	100.0

Source: Field work, 2012.

Income status of respondents.

The income status of respondents was also determined. This was to ensure whether respondents have adequate funds for their upkeep and also to pay for their own waste management services. The research revealed that three percent earned below GH¢ 50 a month, 22 percent had between GH¢ 50-GH¢ 200 a month, 49 percent received between GH¢ 200-GH¢350 a month, 18 percent got between GH¢ 350-GH¢ 500 per month, whilst eight percent received more than GH¢ 500 per month. This is indicated in Table 6.

Table 6. Income of respondents

Income per month (GH¢)	Frequency	Percent
< 50.00	3	3.0
50.00-200.00	22	22.0
200.00-350.00	49	49.0
350.00-500.00	18	18.0
>500	8	8.0
Total	100	100.00

Source: Field work, 2012

Types of solid waste

The environment constitutes the natural domain of all developmental activities. There is the need for concerted effort to effectively manage it. To do that, knowledge on types and the components of solid waste generated in households will help in this direction. This study looked at the peculiar nature of urban environmental management in CCM. The areas considered for analysis was types of solid waste generated in CCM and the second was the major components of household solid waste. For the first issue, respondents were asked to assess whether or not there was an environmental pollution or problem in CCM so that solution could be found to it. In all, 96 percent of the 100 respondents perceived that the environment of CCM has been polluted with all kind of wastes. Some of their reasons were that the gutters and streets of CCM have been choked with all kinds of solid wastes, mounting heaps of refuse and burning of refuse. The four

percent who dissented indicated that cleanup campaign have been going on in the metropolis. For the second issue respondents were asked to indicate the types of solid waste they generated mostly at home. The results are indicated in Table 7.

Table 7: Types of solid waste (Multiple responses)

Types of solid waste generated	Frequency	Percent
Food waste	70	40.0
Rubbish	30	17.0
Ashes	25	14.0
Demolition and construction waste	16	9.0
Hazardous waste	14	8.0
Special wastes	12	7.0
Agricultural waste	10	5.0
Total	177	100.0

Source: Field work, 2012

From Table 7 above, 40 percent of the responses indicated food waste, 17 percent indicated rubbish, and 14 percent indicated ashes and so on. The rest recorded less than 10 percent of the responses. During the field work it was evident that some of the wastes in the households were mostly food waste, rubbish, ashes, etc. It was also very common to see refuse dumped in gutters and on the streets. The increase in food waste can be attributed to the nature of Ghanaian food which is mostly raw and bulky unprocessed agricultural produce. When these food items were processed in the homes it came along with huge solid

wastes. This is in tune with the classification of solid waste by Tchobanoglous *et al.*, (1993) who classified metropolitan solid waste into food wastes, rubbish, ashes, demolition and construction wastes, special wastes, and occasionally hazardous wastes. When the types of waste generated by households are known, it would help in waste management in terms of waste separation for the purpose of reducing waste generation, recycling of waste as well as re-use of some of the waste generated. This is in line with the 3R's.

How waste is disposed off

From the research, eight percent of the respondents dumped their solid waste by the roadside, 37 percent dumped their refuse into skip, five percent in drains, 15 percent threw their solid waste into nearby gutter, nine percent did so in open spaces, and 25 percent disposed of their solid waste at the block collection points as shown in Table 8 below.

Table 8: Place of solid waste disposal

Place of solid waste disposal	Frequency	Percentage
Roadside	8	8.0
Skip	37	37.0
Drains	6	6.0
Nearby gutter	15	15.0
Rivers	0	0.0
Open spaces	9	9.0
Curbside	0	0.0
Block collection point	25	25.0
Total	100	100.0

Source: Field work, 2012.

It is evident from Table 8 that most of the respondents dumped their waste at various odd places such as road side, gutters and open spaces (38% when combined) and this practice has contributed to the pollution of the environment. As observed from Table 8, 62 percent of the respondents disposed of their solid waste at an approved site (both the skip and block collection points).

Cape Coast is considered as one of the poorest regions in the country and from the income table, Table 6, most of the respondents have low income per month. It would, therefore, be difficult for residents to pay for waste collection services, hence the indiscriminate dumping of the waste. It was also due to the fact that waste disposal facilities were not provided them to properly dispose of their waste. Most houses are also closed to gutters, drains and streets, hence

respondents found it easy to just dump the waste there for the rains to carry it away because they probably cannot pay for waste collection and disposal.

Reasons for throwing waste at unapproved site.

An assessment of the reasons why respondents threw their solid waste at unapproved site was done and the results are as indicated in Table 9.

Table 9. Reasons for throwing waste at unapproved site (Multiple responses)

Reason	Frequency	Percent
There was no skip	65	46.43
Can't pay for waste collection	45	32.14
Just don't like dumping in skip	30	21.43
Total	140	100.0

Source: Field work, 2012.

From Table 9, 65 responses from respondents representing 46.43 percent of the total responses indicated that they dumped solid waste at unapproved site because there was no skip. In order to ensure efficient management of the waste sector, it is important to ensure that the people are provided with containers for waste disposal. Again, about 32.14 percent also stated that they cannot pay for waste collection. Those who are poor and also are not provided with waste bins as well as free waste collection services would definitely throw their waste at unapproved site with the possibility of outbreak of cholera and other environmental related diseases if such practices continue. A further, 21.43 percent of the respondents further said that they just do not like dumping into skip. This is

a strange finding and it can be attributed to many factors such as the height of the skip, sanitation situation around the dump site being unclean as well as the distance covered before reaching the dump site. The practice of indiscriminate waste dumping goes to support Namilyango College (2001) that lack of dumping sites is one of the causes of the solid waste problems and the reason why people dump their solid waste haphazardly.

Time taken to dump waste into skip.

The researcher was particular in determining the time taken for respondents to dump their solid waste into skip containers and the results are shown in Table 10.

Table 10: Time taken to dump waste into skip

Time (Minutes)	Frequency	Percent
5-10	10	16.1
11-15	22	35.5
16-20	25	40.3
21-25	5	8.1
More than 25	0	0.0
Total	62	100.0

Source: Field work, 2012.

From Table 10 above, 16.1 percent of the respondents took between five to ten minutes to dispose of their waste into skips. This goes to suggest that the skips were closer to their houses so they found it easier to do that. On the other

hand, 35.5 percent of the respondents also took 11 to 15 minutes to dispose off their waste. This group of people took much time to dump their waste and it goes to explain that the dump sites are farther apart from their homes. The study further revealed that respondents who chose to dump their solid waste into skips took much time to do that and that also contributed to the indiscriminate waste dumping. From table 10, 40.3 percent took between 16 to 20 minutes to dump their solid waste at an approved site. These people are much farther away from the dump sites hence sometimes their indiscriminate waste disposal habit.

Table 11 supports this conclusion drawn as 92 percent of the respondents indicated that time and distance was a problem to their indiscriminate waste disposal habit. Finally, eight percent of the respondents took between 21 to 25 minutes to dispose off their waste. It could be seen that these are the people who live very far from dump sites and it will be very difficult to walk such a long distance to dump waste into skips. If dustbins are not provided in homes, on the street corners as well as skips sited close to residential places, respondents would always chose the easier way out and, that is, dumping their waste at the nearest unapproved site. The waste itself is a bulky material and there is the need to have a short distance to a disposal site hence skips and blocks collection points must be sited close to residential buildings to enhance easy access.

Inconveniences for dumping waste over a long distance.

Still from the study 92 percent indicated that the distance from their residence to the skip site was a problem to them. This result is shown in Table 11.

Table 11. Inconveniences for dumping waste over a long distance.

Inconvenience	Frequency	Percent
Yes	92	92.0
No	8	8.0
Total	100	100.0

Source: Field work, 2012.

If the distance is a problem definitely people would dump their waste at unapproved sites. It is significant to note that the time spent by respondents to dispose of their solid waste into the skip goes to add up the dumping of waste at unapproved sites. The field visits also confirmed that there were about 14 skips available in the selected areas of study that was visited. This further explains why people resort to burning of waste, dumping of waste in open spaces and in gutters. We can, therefore, infer that solid waste collection is an inevitable exercise in solid waste management if we want to ensure good sanitation in our urban environment.

Institutions that collect waste for disposal

Waste that households generate must be collected by the appropriate bodies for proper disposal, but this is usually not the case. In order to assess the frequency of waste collection and disposal, the study found out from respondents about which waste management institution collects waste in their area. The purpose for this was to enable the study come out with measures to enhance household waste collection and disposal. The study revealed that about 84 percent

of the respondents indicated that Zoomlion Ghana Limited was responsible for collecting solid waste in their area as indicated in Table 12.

Table 12: Institutions that collect waste for disposal

Waste Management Body	Frequency	Percent
CCMA	3	3.0
Zoomlion Ghana Limited	84	84.0
Do not know	10	10.0
None	3	3.0
Total	100	100.0

Source: Field work, 2012.

These results gave a fair idea that respondents are aware of the body that does the waste collection and hence will appreciate the need to use their services and not to indulge in indiscriminate waste dumping. The study further revealed that only three percent of respondents' wastes were collected by CCMA waste management department. This is due to the fact that waste collection in CCM is predominantly Zoomlion Ghana LTD's work and they are mostly on the field collecting waste.

Waste collection frequency.

The study sought to find out the number of times respondents' solid waste was collected for disposal. Table 13 shows the outcome that emerged.

Table 13: Frequency of waste collection.

Frequency of waste collection	Frequency	Percent
Not at all	16	16.0
Daily	24	24.0
Once	31	31.0
Twice	17	17.0
Thrice	7	7.0
More than thrice	5	5.0
Total	100	100.0

Source: Field work, 2012.

From Table 13 above, 16 percent stated that their solid waste was never collected for disposal by the waste management bodies in the week. It implies their waste will overflow, get rotten and produce bad scent in the area. If this is the trend people will do indiscriminate dumping. Again 24 percent of respondents waste was collected for disposal daily. A good sign of clean environmental management practice. Still from the table, about 31 percent indicated that their waste was collected for disposal once in a week. Also 17 percent had their waste collected twice in a week. About seven percent of the respondents said their waste was collected for disposal thrice in a week. Only five percent had their waste collected for disposal more than thrice in a week. This regularity of waste collection will make the people practice better waste management habits. Definitely the 16 percent whose waste was never collected for disposal will resort to indiscriminate waste disposal practice and this affirms Karanja's (2005)

statement that in such situations waste was indiscriminately dumped into gutters, drains and roadside.

Solid waste situation in CCM.

On the solid waste situation in CCM respondents indicated that the situation was not the best and the findings are written in Table 14.

Table 14: The solid waste situation in CCM (Multiple responses)

Solid waste situation in CCM	Frequency	Percent
Never collected for disposal	25	11.47
Waste wholly or partially block drains and streets	58	26.61
Market places littered with waste	38	17.43
Drains are blocked by solid waste	72	33.02
Waste always collected for disposal	10	4.59
Waste sometimes collected for disposal	15	6.88
Total	218	100.0

Source: Field work, 2012.

About 11.47 percent representing 25 responses revealed that solid waste was never collected for disposal. This means that either there was insufficient coverage of the collection system or the waste management body was not sufficiently equipped to carry out the waste collection. A further 26.61 percent of the respondents were of the view that waste wholly or partially block drains and streets. If the wastes are not collected for disposal indeed it will be washed into

drains by the rain and in some cases people will also dump their waste on the street. Another 17.43 percent indicated that market places are littered with waste and this tells us that there was either no skip containers in the market places or the people have negative attitude towards waste management. The people in the sampled area indicated that the Metropolis's solid waste situation was not the best because drains are blocked by solid waste, and that gave a response figure of about 33.02 percent as depicted in Table 14. They claim that because there was not enough education about solid waste management, inadequate skip containers and the negative attitude of the people, this has resulted in the environment being abused in that manner. From Table 14, 4.59 percent representing 15 responses said their waste was always collected for disposal. This tells us that they are the people who benefited from waste collection in their homes. Lastly, 6.88 percent representing 15 responses from respondents were of the view that waste was sometimes collected for disposal. This revelation supports that of Achankeng (2003) that in many parts of our cities, streets and drains are wholly or partially blocked by solid waste and leads to flooding and other disasters.

Ways of managing solid waste effectively.

It was also important to find out ways and means by which solid waste can be managed effectively. Since respondents live in the study area and hence part of the problem, they can be part of the solution as well. Their suggestions were captured in Table 15.

Table 15: Ways to effectively manage the disposal of solid waste (Multiple responses)

Ways of managing solid waste effectively	Frequency	Percent
Employing more human resources	71	27.0
Sufficient coverage of collection systems	20	8.0
Provision of trucks for the waste collection	67	26.0
Proper disposal of municipal waste	40	15.0
Provision of skip containers	63	24.0
Total	261	100.0

Source: Field work, 2012.

From Table 15 above, 71 responses from respondents representing 27 percent of total responses indicated that employing more human resources will help in managing the waste problem effectively, and that percentage was 29. Work can be effectively done when there are committed people around to do the job. It is important to employ more qualified and hardworking people to be engaged in the waste collection service. Moreover, a further eight percent of responses advocated for sufficient coverage of collection systems. If all areas in the city are covered and human and material resources well distributed waste management can be effectively done. About 26 percent indicated the provision of trucks for the waste collection and that would help curb the solid waste situation in the metropolis. Acquisition of equipments alone were not enough, it required people to operate them. About, 15 percent called for proper disposal of municipal waste to ensure that the sanitation situation becomes better to live in. Finally, 24 percent representing 63 responses from the respondents called for the provision of

skip containers as a means of curbing the indiscriminate dumping of solid waste situation in the metropolis.

Managing waste satisfactorily.

In order to find out if the waste management bodies in the metropolis were managing the solid waste situation satisfactorily, respondents were asked to give their views on this matter and their responses have been captured in Table 16.

Table 16: Satisfactory waste management

Satisfactory waste management	Frequency	Percent
Yes	68	68.0
No	32	32.0
Total	100	100.0

Source: Field work, 2012.

In the opinion of the respondents 68 percent of them said the waste management institutions were not managing the solid waste situation satisfactorily. This means that the waste management bodies lack the capacity to do the waste collection or may have the resources, but were not motivated enough to do the work. The 68 percent of respondent’s view is supported by Palczynski and Scotia (2002) who opined that major urban settlements are characterised by waste accumulations and poor environmental sanitation. This is further supported by Hardoy, *et al.*, (2001) that in many third world cities, large proportions (between 30% and 50%) of the solid waste generated by the residents are never

collected for disposal and end up rotten on the streets, in drains and in streams. This is also supported by Table 9 where about 64.52 percent of the respondents said they dumped waste indiscriminately because there was no skip.

Causes of unsatisfactory waste management.

If the solid waste situation in the metropolis is not being managed properly, then there might be some cause(s) and Table 17 shows the responses from respondents.

Table 17: Causes of unsatisfactory waste management

Causes of unsatisfactory waste management	Frequency	Percent
Poor Governmental attitude	9	9.0
No finance to acquire waste equipments	46	46.0
Lack of proper technology to manage waste	24	24.0
Unplanned housing	6	6.0
Poor road and poor access to settlements by waste trucks	15	15.0
Total	100	100.0

Source: Field work, 2012

From Table 17, nine percent of the respondents expressed their view that the unsatisfactory solid waste management is as a result of poor Government attitude. In fact if the Government does not show much commitment in the waste management sector and thereby provide resources towards waste management, there would be indiscriminate dumping of waste on the environment. Also, 46 percent said the problem was due to lack of finance to acquire waste management

equipments. Indeed the most important factor that can help the waste management bodies to deal with the waste menace is to have access to finance. The workers would not only be paid well, but the waste management institutions would be able to acquire waste management equipments to manage waste effectively. Also, 24 percent attributed the solid waste unsatisfactory management to lack of proper technology to manage the waste. This means that in their view the acquisition of proper technology to manage waste would go a long way to help in the management of waste in the metropolis. Furthermore, six percent indicated that the problem was due to unplanned housing. This goes to explain the haphazard housing system that we have in our cities where access by waste trucks to pick waste becomes a problem. If the waste is generated and vehicles cannot enter residential areas to collect them it will heap, rot and pollute the environment.

Finally, 15 percent mentioned that poor road quality and poor access to settlements by waste trucks be blamed for the manner in which the solid waste situation is being managed badly in the metropolis. From the foregoing results, respondents have given mixed reactions which go to confirm the fact that the causes are multifaceted. This confirms the views expressed by Armah (1993) and Kironde (1999). Armah (1993) indicated that besides the shortage of suitable equipments for managing waste, the poor spatial organisation of many developing country cities, characterised by unplanned housing developments, poor road quality and poor access within settlements do not support the use of large and heavy western type waste collection vehicles to manage waste. Also, Kironde (1999) express his frustration by attributing the abysmal performance of the waste

sector to resource constraints including the scarcity of financial, physical, human and technical resources for the organisation of waste management operations.

The role of CCMA in solid waste management in CCM

This part of the research takes a look at the solid waste management in CCM and how the Waste Management Department (WMD) handles solid waste as households generate them. The official interviewed in this regard was the head of the CCMA-WMD, and his responses have been captured in this section. I will also quote some of his statements for us to better appreciate what some of his actual feelings was in some cases. The CCMA-WMD is a unit under the CCMA, which is in charge of waste management in CCM, it also takes a supervisory role over ZGL. The official revealed the strategies involved in the management of solid waste in the area. They included collection, transportation and disposal of all forms of waste in the city as well as the treatment of waste at its final disposal site.

The official indicated that there is the adoption of the 'polluter pays' principle where those who generate the waste must in some cases pay for its collection and disposal. There is also the review of the assembly's bye-laws on waste such that people are punished when they dump waste indiscriminately at unapproved site. The respondent also indicated that there should be public education on how households should manage their waste. Finally, the provision of vehicles and other logistics to manage the waste and when that is done it would go a long way to help in this endeavour. These were some of the concrete

strategies being adopted by the WMD in dealing with the problem of waste generation in the metropolis. CCM is a place where the polluter pays principle cannot hold, and if that is strictly adopted residents would rather go for indiscriminate dumping. Apart from this, their effort to manage waste is hampered by resource constraints.

When asked about the types of solid waste generated in CCM, the official indicated in descending order that plastic, rubbish, food waste, ashes, demolition and construction wastes were predominant. According to the official, though statistics are lacking, about 0.5-1.0 kilograms of waste is generated per capita daily and they do everything possible to cart the waste to its final disposal site. It was indicated that waste in CCM is the sole responsibility of ZGL, and that they do the collection of waste in the entire metropolis. In the metropolis there is door to door or house to house as well as central container system at prescribed locations. No fee is charged for the central container service, but GHc10.00 is charged for the house to house waste collection for the 240 litre bins. It was further indicated that, in low income residential areas waste collection is mostly container collection/block collection point. In middle income residential areas it is both house to house/central container collection and finally in high income residential areas waste collection is mainly house to house. Depending on the area, the waste is either, a daily collection, once a week, twice a week or thrice per week. 'Also, as and when the skip gets full we go for them' and the vehicles also go from house to house to pick household waste", he said.

On the question of human resources, it was revealed during the interview that there were varied people of different qualifications from no formal education to master’s degree. The human resource issue was a big challenge to them, ‘because without them you cannot do anything’, he observed. On the equipment needs of the CCM WMD the results are posted on Table 18.

Table 18: Equipments need of the WMD

Equipments	Number Available	Number Required
Dustbins	420	1,500
Skip containers	63	120
Oboafo tricycles	50	120
Motorised tricycles	–	50
Grader	1	3
Skip trucks	20	50
Compaction trucks	2	4
Roll on Roll Trucks	1	3
Bulldozer	1	2
Payloader	–	2

Source: Field work, 2012.

From Table 18, it is abundantly clear that the waste management sector is under resourced, hence their present challenges and the need to resource them. Emphasis was also placed on participatory waste management and that it is a shared responsibility. Hence, households should change their attitude by avoiding indiscriminate waste dumping and for that matter waste reduction at their homes.

According to the official, the assembly's policy on waste management is to ensure a clean, safe and healthy environment in the city to enhance productivity. If the citizens are not healthy the nation cannot develop. To ensure that the policy is achieved, the WMD waste management activities have been outsourced to ZGL and they are practically in charge of the waste collection, storage, transportation and disposal at the final disposal site. This is in line with the Ministry of Local Government and Rural Development (MLGRD) policy of ensuring a clean and safe environment for all.

Waste management, the role of Zoomlion Ghana Limited.

This section seeks to find out from the officials of ZGL Ghana Limited (ZGL) on their role in managing solid waste in CCM, their waste management practices, their capacity and challenges. The MMDAs used to be totally responsible for the collection and final disposal of solid waste through their Waste Management Departments (WMDs) and their Environmental Health and Sanitation Departments (EHSD). However, ZGL and other private waste management companies have now come in to do the waste collection and disposal. The researcher found out from the official of ZGL as to the body mandated to carry out waste management activities in CCM. The response gathered from the interview revealed that ZGL is the sole body mandated to manage waste in general, particularly solid waste in the metropolis.

The official revealed that the effective ways to manage waste is to adopt purposeful, systematic measures to control the generation, collection and disposal

of waste. There should be the provision of effective waste collection, storage and transportation. Households should be provided with dustbins to collect their waste and the waste must be collected daily for disposal. Where it is not possible to give dustbins to households, skips and central container are provided in clustered areas where waste can be disposed of easily and caretakers are employed to manage the skips. "If dustbins are provided at vantage points, in our houses, streets and market places can you imagine how the environment would look like", he observed.

The interview further revealed that there should be an integrated approach to waste management such as the three R's (Reducing the amount of waste generated, Re-use of the waste in some form that would be beneficial to us as well as Recycling the waste). Also, the waste can be disposed off in a landfill site, leveled and then covered with soil and where possible the waste or some of the waste should be incinerated.

The interview also revealed that more human resources should be employed if the waste sector is to be managed effectively. The workers must be motivated not only by salaries, but by their uniforms and other protective equipments as well as other enticing incentives. Further, the respondent disclosed that the waste management sector involves the use of heavy equipments and without them work cannot be done. It is, therefore, imperative to acquire heavy equipments such as skip containers, manual and motorised bi/tricycles, graders, skip trucks, compaction trucks, roll on roll trucks, bulldozers, payloaders and hand pulling carts. "To effectively manage solid waste we need the equipments I

have mentioned above as well as funds to ensure routine maintenance of the equipments to ensure that they last longer", he stated. It was realized that most of the vehicles have broken down and the respondents suggested that they need more funds to buy spare parts to maintain the vehicles.

Central Government has been the sole financier of the waste management services. Monies are deducted from the CCMA's Common Fund and given to the ZGL, but these monies are woefully inadequate. On governance issues, the concepts of good governance should be applied in the waste management sector as well. According to the official at the ZGL, good governance emphasises the principles of effective and accountable institutions as well as the application of democratic principles, representative and responsible structures of government to manage the waste sector. The interview further revealed the need for the adoption of appropriate policies, programs, and strategies for urban management that help to eliminate or ameliorate the problems posed by rapid urbanisation and its concomitant waste generation issues. Moreover, there is the need to ensure synergy between civil society and the state in the solid waste management sector.

The interview further revealed that central government and city councils lack democracy, transparency, accountability, and cooperation with the public in their operations. And this has affected their relationship with civil society and this has further culminated negatively on how waste is managed in the cities. According to the official at ZGL, lack of good governance is the root cause of urban problems, particularly in waste management because "everybody tends to do what he or she likes and corruption is embedded in everything".

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter summarises the whole research as well as the findings of the study. It goes on to give conclusions as well as recommendations on how the problem can be tackled in the future. It was realised during the research that the general waste situation in CCM was poor.

Summary of findings

The main aim of the study was to examine the factors affecting effective waste management in our urban areas with regards to solid waste management in CCM and thereby advance possible solutions to address the problem. To achieve the above objectives interview guides were administered to respondents in the study area and frequencies and tables were used to analyse their responses.

The findings of the study are as follows:

1. It was realised that households generated different types of solid waste and they included food wastes, rubbish, ashes, demolition and construction wastes.

2. With regards to waste disposal indiscriminate waste disposal was the norm in CCM as a result of inadequate skip containers and dust bins for storing waste before being cart to the disposal site.

3. There was inadequate supply of skip containers in the various study areas and for that matter people resorted to indiscriminate waste dumping. Also, the skip containers that were provided got overflowed creating insanitary environment around the skips.

4. Other reasons respondents gave for their indiscriminate dumping of waste was the fact that they could not pay for waste collection services, and others too indicated they just did not like dumping waste into skips.

5. On the frequency of waste collection it was realised during the research that waste collection in CCM was not on regular basis. Some respondents indicated that they had daily collection of their waste, some twice a week and others thrice a week and others not at all.

6. Resources for managing waste was another finding the research came up with. As a result of serious resource inadequacy, the waste management institutions were unable to render their services adequately. Equipments for waste management were inadequate. The metropolis needed 1,500 dustbins, but what were available was 420. The analyses have shown that the waste generation in the metropolis has greatly outstripped the capacities of the authorities for waste collection and disposal as a result of resource constraints.

Conclusions

The study has revealed that different types of solid waste and their waste disposal practices are not in tandem with acceptable means of disposal. In furtherance of the above, the waste management bodies are seen to lack the capacity to deal effectively with the waste situation in the city. Their lack of

capacity is as a result of the scarcity of resources including finance; equipment, personnel, and land space for waste disposal have gravely affected the way waste is managed in the metropolis. The increasing solid waste generated in the metropolis has not been accompanied by adequate sanitation facilities and management programs. Notable among the waste management problems are inadequate operational funding from the metropolis's budget allocation for the collection and disposal processes. The disposal methods mostly depend on the obsolete dumping with the associated environmental and social risks. Since the formal systems of solid waste disposal cannot cope with the ever-increasing volume of solid waste being generated in the city, the public itself employs various means of waste disposal. Waste is thus disposed off indiscriminately especially in drainage, gutters, roadside and open spaces.

Recommendations

Based on the findings presented above, the following recommendations have been put forward for the improvement of solid waste management situation in CCM.

First and foremost, the poor waste disposal culture among Ghanaians can be addressed through waste separation since the respondents generate different types of wastes and that can be separated for the purposes of recycling and re-use by industry and individuals.

Also, it is recommended that integrated solid waste management (ISWM) be adopted as a guiding framework within which to conduct the business of waste

management in the country. In this regard, metropolitan authorities in CCM and for that matter Ghana should prioritise the various strategies of solid waste management. All waste producers such as households, businesses and institutions should be enlightened on the merits of good waste management and encouraged to practice waste prevention, waste reduction and re-use while measures are instituted to promote recycling, composting and incineration for energy with waste disposal being the last option.

Moreover, solving the solid waste problem in Ghanaian cities will also require massive investment in equipments and logistics for waste management operations. Adequate investment, therefore, has to be made in the logistics for waste management including collection trucks, containers, and also in equipments for the maintenance of disposal sites. At the same time, the private waste companies must be supported to acquire adequate equipments and other necessary resources to enable them to discharge their duties effectively. The waste management departments of the various cities should also be supported to establish equipped garages with the necessary spare parts, and to recruit qualified engineers and supporting mechanics to maintain the equipments.

There should be the provision of places for waste disposal such as skips and waste disposal sites should not be too far from respondents' houses to enhance easy access and also the skip environments should be kept clean. The waste must also be emptied frequently to their final disposal site. Household waste collection must also be done frequently. Moreover, waste collection entities

must be increased. Private companies should be involved in the waste management sector.

Finally, in order to improve waste management in Ghanaian cities, the perennial financial crisis that have characterised the waste sector also needs to be addressed. In this regard, there is a need for the Central Government to greatly improve its allocations to metropolitan Governments and also make these allocations more regular to prevent delayed payments to waste contractors who need the money so badly to meet the operational costs of waste collection. At the same time, the metropolitan Governments must be supported to improve revenue mobilisation from local sources. This can be done by attracting qualified finance and accounting staff that will help identify additional sources of funds such as taxes on properties and businesses.

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APPENDIX A
UNIVERSITY OF CAPE COAST
INTERVIEW GUIDE FOR RESPONDENTS IN CCM

Dear Respondent,

This questionnaire seeks to examine urban solid waste situation in Cape Coast. It is part of a research work in partial fulfillment of the award of Masters Degree in Development Management. I would therefore be grateful if you could complete the items below to help in the achievement of the intended objective. The study is purely for academic purpose and hence any information you provide shall be treated with outmost confidentiality and anonymously and will be used solely for the purpose of this research. The questionnaire consists of five pages and would take you about ten minutes to complete it.

Instruction

Please tick [] only the box of the response given/state briefly for an unprovided item.

SECTION A. BACKGROUND INFORMATION OF RESPONDENTS

1. Sex

Male [] Female []

2. Marital status

Single [] Married [] Separated []

Divorce [] Widowed []

3. How old are you?

18-27 [] 28-37 [] 38-47 [] 48-57 [] 58+ [].

4. What is your highest level of education?

None [] Primary [] Middle/J.H.S []

Secondary/Technical/Vocational [] Tertiary []

5. What is your occupation? Tick/write only one.

Farming [] Petty Trading []

Business [] Public Servant []

Other, specify.....

6. Indicate your income in one of the following categories.

Less than GH¢50 [] GH¢50-200 []

GH¢200-350 []

GH¢ 350-500 [] More than GH¢500 []

7. Do you agree with the view that the environment in CCM is polluted?

Yes [] No []

8. How will you describe the environment (sanitation) situation in CCM in terms of its cleanliness?

Very poor [] Poor [] Satisfactory [] Very satisfactory []

7. Which of the following types of solid waste do you generate in your home?

(Tick all that apply).

Food wastes [] Rubbish []

Ashes [] Demolition and construction []

Hazardous wastes [] Special wastes [] Agricultural wastes []

8. What is the major component of your solid waste?

Food wastes [] Rubbish []
Ashes [] Demolition and construction []
Hazardous wastes [] Special wastes [] Agricultural wastes []

9. Which of the following types of waste do you generate mostly in your household?

Food wastes [] Rubbish []
Ashes [] Demolition and construction []
Hazardous wastes [] Special wastes [] Agricultural wastes []

10. How do you store your waste before disposal?

In a closed container [] In an open container [] In a polythene bag/sack [] Other.....

11. Is your waste container close to your home or other homes in the neighborhood?

Yes [] (If yes how long is the distance in metres.....) No []

How will you describe the sanitation situation around the container?

Very poor [] Poor [] Satisfactory [] Very satisfactory []

12. Where do you dispose of your waste?

- | | | | |
|--|--------------------------|---------------|--------------------------|
| Roadside | <input type="checkbox"/> | Nearby gutter | <input type="checkbox"/> |
| Skip | <input type="checkbox"/> | Rivers | <input type="checkbox"/> |
| Drains | <input type="checkbox"/> | Open spaces | <input type="checkbox"/> |
| Central communal skip <input type="checkbox"/> Curbside <input type="checkbox"/> Block collection point <input type="checkbox"/> | | | |

13. Have you ever dumped your refuse at unapproved site before?

- Yes No If **no go to 15**

14. What reasons(s) accounted for the throwing of waste at the unapproved site?

You may tick more than one in item 14.

- | | |
|---------------------------------|--------------------------|
| There was no skip | <input type="checkbox"/> |
| Can't pay for waste collection | <input type="checkbox"/> |
| Just don't like dumping in skip | <input type="checkbox"/> |

15. If you do dump waste in skip, how long does it take you to do that?

- | | | | |
|------------------|--------------------------|-----------|--------------------------|
| 5-10mins | <input type="checkbox"/> | 11-15mins | <input type="checkbox"/> |
| 16-20mins | <input type="checkbox"/> | 21-25mins | <input type="checkbox"/> |
| More than 25mins | <input type="checkbox"/> | | |

16. Does it inconvenience you for dumping waste over a long distance?

- Yes No (**If No, go to 18**)

17. If yes, what do you do with the waste? I/dump them in/on the

- | | | | |
|-------------|--------------------------|---------------|--------------------------|
| Roadside | <input type="checkbox"/> | Nearby gutter | <input type="checkbox"/> |
| Open spaces | <input type="checkbox"/> | Drains | <input type="checkbox"/> |

18. Which of the following waste management practices do you practice?

Open burning [] Land filling [] Compositing (Community dump) []

Participation in pay as you dump programme []

Indiscriminate dumping []

19. Which waste management institution collects waste in your area for disposal?

You can tick more than one item.

CCMA Waste Management Department []

Zoomlion [] None []

Don't know [] Other, specify:

21. How often is your waste collected for disposal?

Not at all [] Daily [] Once []

Twice [] Thrice [] More than thrice []

22. What is the solid waste situation in Cape Coast (CCM)?

Never collected for disposal [] Waste wholly or partially block drains and street []

Market places littered with waste [] Drains are blocked by solid waste []

Waste always collected for disposal [] Sometimes collected for disposal []

Tick all that apply.

23. In your own view, give four ways you can effectively manage the disposal of solid waste in your area (**You can tick more than one item**).

Employing more human resources [] Provision of skip containers []

Provision of sufficient collection methods [] Sufficient coverage of collection systems [] Provision of trucks for the waste collection []

Proper disposal of municipal waste []

24. Do you think the waste management institutions are managing waste in the city satisfactorily?

Yes [] No [] **If yes go to 26.**

25. If No, what do you think is/are the cause(s) of their unsatisfactory waste management?

Poor governmental attitude [] In adequate finance [] Lack of proper technology [] Unplanned housing [] Poor road quality [].

Tick all that apply.

26. What is/are the common feature(s) of the waste problem in your area?

Stinking heaps of uncollected waste [] Waste disposed of haphazardly by road site []

Burning of waste in open spaces [] Do not know []

27. Are the available human and material resources been used effectively for waste management? Yes [] No []

APPENDIX B
UNIVERSITY OF CAPE COAST
INTERVIEW GUIDE FOR OFFICIALS OF CAPE COAST
METROPOLITAN ASSEMBLY (CCMA) WASTE MANAGEMENT
DEPARTMENT (WMD)

Dear Respondent,

This questionnaire seeks to examine urban solid waste situation in Cape Coast. It is part of a research work in partial fulfillment of the award of Masters Degree in Development Management. I would therefore be grateful if you could complete the items below to help in the achievement of the intended objective. The study is purely for academic purpose and hence any information you provide shall be treated with outmost confidentiality and anonymously and will be used solely for the purpose of this research. The questionnaire consists of nine pages and would take you about ten minutes to complete it.

Instruction

Please tick [] only the box of the response given/state briefly for an unprovided item.

SECTION A: BACKGROUND INFORMATION OF RESPONDENTS

1. Gender of respondent. Male [] Female []
2. Marital status: Single [] Married [] Other []
3. Age of respondent 21-30[] 31-40[] 41-50[] 51-60[]

4. Position (Job title):
5. Length of working period in CCMA WMD:.....
6. Educational Background. Diploma [] HND [] Bachelors Degree []
Masters []

Professional Background:.....

7. What is CCMA's policy on waste management?
8. What strategies do you use in waste management?
9. How do you ensure that the strategies thrive?
10. Give the types of solid waste generated in Cape Coast.
11. Do you have adequate resources to manage the waste?
12. Indicate your equipments needs on the table below:

Equipments	Numbers Available	Number Required
1. Dustbins		
2. Skips containers		
3. Obafo Bicycle		
4. Motorised Tricycle		
5. Graders		
6. Skip trucks		
7. Compaction Trucks		
8. Roll on Roll of Trucks		
9. Bulldozers		
10. Others		

13. How is the waste management funded?

What percentage of the assembly's funds is spent on waste management?

14. What are your major challenges when it comes to waste management?
15. Which body is responsible for waste management in CCM?
16. How often is the waste collected from households?
17. What form does the waste collection takes?
18. What is the volume of waste generated per head in CCM?
19. How can you improve upon waste collection services?
20. What steps have adopted to ensure to ensure proper disposal of waste by households?
21. Do you provide dustbins and skips for waste disposal?
22. Is waste management a problem in CCM?
23. What are the causes of the haphazard waste disposal situation in CCM?
24. Do you have an elaborate system of public education on waste generation, collection and disposal.
25. Is your outfit having adequate qualified personnel?
26. Indicate the number of staff members in your outfit under each of the education qualification:
27. In your view what are some of the problem(s) facing outfit in terms of managing the waste
28. How can the problem(s) be solved?

APPENDIX C

UNIVERSITY OF CAPE COAST

INTERVIEW GUIDE FOR OFFICIALS OF ZOOMLION GHANA LTD.

Dear Respondent,

This questionnaire seeks to examine urban solid waste situation in Cape Coast. It is part of a research work in partial fulfillment of the award of Masters Degree in Development Management. I would therefore be grateful if you could complete the items below to help in the achievement of the intended objective. The study is purely for academic purpose and hence any information you provide shall be treated with outmost confidentiality and anonymously and will be used solely for the purpose of this research. The questionnaire consists of nine pages and would take you about ten minutes to complete it.

Instruction

Please tick [] only the box of the response given/state briefly for an unprovided item.

SECTION A: BACKGROUND INFORMATION OF RESPONDENTS

1. Gender of respondent. Male [] Female []
2. Marital status: Single [] Married [] Other []
3. Age of respondent 21-30[] 31-40[] 41-50[] 51-60[]
4. Position (Job title):

5. Length of working period in ZGL:.....

6. Educational Background. Diploma [] HND [] Bachelors Degree []

Masters [] Other [].

Professional Background:.....

7. What is Zoomlion's role in waste management?

8. What are your waste management practices?

9. Do you have the capacity to manage waste?

10. What challenges do you face in your work?

11. What measures to you have to ensure that waste is managed effectively

12. How is the waste sector funded?

13. How often is the waste collected from households?

14. What form does the waste collection takes?

15. What is the volume of waste generated per head in CCM?

16. How can you improve upon waste collection services?

17. What steps have adopted to ensure to ensure proper disposal of waste by households?

18. Do you provide dustbins and skips for waste disposal?