

**UNIVERSITY OF CAPE COAST**

**EFFECTS OF PUBLIC-PRIVATE PARTNERSHIP ON WASTE  
MANAGEMENT IN THE HO MUNICIPALITY**

**BY**

**SETH OPOKU-ABIMA**

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## **DECLARATION**

### **Candidate's Declaration**

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

Candidate's Name: Seth Opoku- Abima

Signature ..... Date.....

### **Supervisor's Declaration**

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

Supervisor's Name: Prof. J.V. Mensah

Signature ..... Date .....

## **ABSTRACT**

The study set out to investigate the effects of Public-Private Partnership on waste management in the Ho Municipality. The study is a descriptive research of how waste management is carried out by both public and private sectors in the municipality. It aims at presenting relevant information on the effectiveness of Public-Private Partnership in waste management. The study covered 129 respondents made up of 89 households in the municipality, 20 market women, 10 Environment Officers, and 10 Zoomlion staff. Purposive and simple random sampling techniques were employed to select the respondents. The main instruments used to gather data were interview schedules and interview guide.

The main factors that contributed to ineffective waste management were the indiscriminate dumping of waste on the streets, in streams and undeveloped lands within the municipality; and inadequate public toilet facilities for residents in the municipality. Even though the Public-Private Partnership was the preferred option for the waste management, the services offered were unsatisfactory in some parts of the municipality due to irregular collection of waste at the dumping points and lack of waste containers.

The study recommended prioritization of education sensitization, and location of more waste collection points, more waste containers be placed at vantage points, creation of competition to remove the monopoly of the current service provider, and enforcement of rules and regulations by the appropriate agents and departments.

## **ACKNOWLEDGEMENTS**

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## **DEDICATION**

Dedicated to my lovely children Enam, Edem and Elikem, my wife Vida and Mr. & Mrs. Koka and their children.

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## LIST OF ACRONYMS

AMA	Accra Metropolitan Assembly
BS	British Standards
CEEC	Central and Eastern European Countries
CIWMB	Californian Integrate Waste Management Board
CPUs	Central Procession Units
CRT	Cathode Ray Tube
ECD	European Commission Directive
EHD	Environmental Health Department
ESCAP	Economic and Social Commission for Asia and the Pacific
GBA	Greater Beirut Area
GOC	Government of China
GRRN	Grass Roots Recycling Network
HMA	Ho Municipal Assembly
ICIW	Industrial, Commercial and Institutional Wastes
ISWM	Integrated Solid Waste Management
MMDAs	Metropolitan, Municipal and District Assemblies
MSW	Municipal Solid Waste
OEE	Office of Education and Environment
PPP	Polluter Pay Policy
PPP	Public-Private Partnership
PSP	Private Sector Partnership
WMD	Waste Management Department

## CHAPTER ONE

### INTRODUCTION

#### **Background to the study**

Waste is an inevitable by-product of human activities. People have been generating and discarding materials since hunter-gatherers threw bones and vegetable remains outside their caves. For many hundreds of years, those wastes consisted exclusively of matter which biodegraded easily (such as vegetable and human wastes), or were inert (such as bones and wood ash). Given the relatively small population, the quantities of waste were minor and could be readily absorbed by the environment. Indeed, they had value in fertilizing the soil (Thanalak, Sureeporm & Philip, 1990).

As the global population grew, urban and industrial development accelerated, the opportunities to dispose of materials include biodegraded ones, diminished while the quantities and nuisance value wastes increased. Society now has large volumes of waste to deal with. In the United Kingdom, for example, more than 500 million tones of wastes are generated each year, of which some 30 percent are mineral wastes, 20 percent industrial, 40 percent agricultural and 5 percent municipal (Thanalak et al. 1990).

Solid waste is probably the most visible form of pollution. Every year, people dispose of billion tones of solid garbage in the environment. Not excluding industrial wastes which account for the majority of discarded materials. Solid wastes from homes, offices, and stores are called Municipal Solid Wastes. These include paper, plastic, bottles, cans, food scrap and yard trimmings. Others consist of junked

automobiles, scrap metal, leftover materials from agricultural processes and mining wastes known as spoil (Chertow, 1995).

In Ghana, increase in population growth, urbanization and consumption patterns of the populace have considerably increased in waste generation in urban areas and cities. Waste has been a major problem in most cities because of the problems associated with its management. Ho municipality has its share of waste generation and management. The consumption patterns of the populace result in large generation of solid waste such as sachet water rubbers, polythene, garbage from households, scraps from garages, papers and cartons from offices and stores, coconut fibres and shields. Other wastes include waste water from homes and restaurants, liquid waste from septic tanks (cesspoll) and garages.

The above mentioned wastes have sharply increased mountains of refuse in the municipality. This resulted in sharp increase in population growth in the Ho municipality. Management of wastes has become source of worry in the country as well as in Ho Municipal Assembly. In disposing of wastes, there are several methods used, which include landfills, open dumps, burning, incineration, recycling and many other methods.

In the Ho Municipality, open dumping, burning and landfills are the main methods of disposing of wastes. The Environmental Health Department of Ho Municipal Assembly has been the sole management body responsible for collection and conveying wastes to the dumping sites over the years. However, population growth has increased waste generation in the municipality. This also put pressure on the logistics and equipment used in the management of waste disposal.

Anomanyo (2004) notes that, having exhausted the dumping grounds at Djaman and Mallam, the attention shifted to the Oblogo dump site. This has been receiving an average daily waste load of about 1200 metric tons, according to the Waste Management Department (WMW) of Accra Metropolitan Assembly (AMA). Donnelan (2000) also emphasizes that, 90 per cent of domestic waste in the UK goes directly to landfill or dumping sites to be leveled and covered with earth. The Ghana government in anticipating this problem engaged private participation in waste management across the length and breath of the country to manage wastes. This brought Zoomlion Wastes Management Experts to help clear mountains of wastes all over the country.

Hoornweg, Lam & Chaudhry (2005) notes that, there is a need to deepen and strengthen the reform process in order to develop an effective Public-Private Partnership (PPP) environment for solid waste management. These reform strategies include:

- Strengthen the Supervisory Role of Government: PPP requires a shift in responsibility for the public sector from that of operator to manage/monitor. It must also retain sole responsibility for policy and market guidance.
- Creating Sustainable Market Development: until user fees cover costs, government must develop coherent strategies to supply alternative means of support, possibly in the form of direct payments or tariff subsidies.

- Protecting the Public Interest: not only should the public be properly informed, but they also should be integrated into the decision making and monitoring process. This is especially crucial if they are pay user charges and accept private provision of services.
- Adapting to Local Conditions: government stress that each locality is different and that there is no one solution or template that is applicable across cities. Each PPP must be tailored to specific party needs and objectives.

According to Anomanyo (2004), the high population and its associated increase in urbanization and economic activities in Accra made the impact of the society's solid waste very noticeable. The urban areas of Accra produce about 760,000 tons of municipal solid waste (MSW) per day or approximately 2000 metric tons per day and these figures are expected to increase to 1.8 million tons per year or 4000 metric tons per day.

### **Statement of the problem**

Managing wastes is a growing concern in many countries. The long-term impacts and costs of improper waste disposal can be very high, and the emphasis must be on prevention. A comprehensive managing system should include policies, institutions and effective regulations and adequate and acceptable disposal facilities, either public or private (World Bank Group, 1998).

For planning purposes, it is necessary to estimate the total volume of waste produced. Many countries adopted comprehensive approach in managing or disposing

of waste without polluting or degrading the environment. However, management of waste has become a major problem in developing countries like Ghana. This can be attributed to many factors which include lack of education in waste disposal, difficulty in separating wastes, indiscriminate disposal of waste and enforcement of rules and regulations. Couple with this is the increase in socio-economic activities which has not commensurate with increase in essential logistic for effective and efficient waste management services emphasized by the World Bank Group (1998).

In Ho Municipality, government is solely responsible for managing and disposing of wastes. The World Bank Group (1998) reiterates that, “The overall design and implementation of waste management programme is normally a government function, but the private sector can play a major role in the provision and operation of the necessary facilities. Transport of waste is nearly always a private function, although careful control and licensing by the relevant authorities may be required”. Hall (2007), revealed that, in 18 months from the start of 2006 there have been 16 major mergers and acquisition in waste management companies in Europe, with a total price of over €12.5 billion Euros. The companies which have changed hands have a total turnover of €6.6 billion Euros, employing 39,000 workers. Some of the large companies remain owned and controlled by private individuals and families, like Remonds/Rthmann and Alba in Germany, Saubermacher in Austria, Nicollin in France, Ragn-Sell in Sweden, Biffa in UK, Ferrovial in Spain, Delta in Netherlands and Lassila and Tikanoja in Finland.

Managing and disposing of wastes in cities and urban centres including Ho Municipality have been a concern to the citizenry and successive governments over



the years. Anomanyo (2004) observes that, the problem of solid waste in Accra has been characterized by single and ad hoc solutions such as mobilizing people to collect wastes and desilt choked gutters after flood disaster. The AMA is also faced with the problem of land acquisition for siting landfills as residents reject the siting of this facility. These lead to the flow-back of waste into the environment and the need for the construction of new landfills. It is important to note that, the waste management system makes no provision for income generation to support its activities. The waste management is therefore limited by the revenue from the Municipal Assembly's budgetary allocations.

In 2006, government puts in place contingency plan to mitigate the problem by setting up what is called Public-Private Partnership (PPP) for managing wastes in all over the country. This brought the waste management company called the Zoomlion Wastes Management Ghana Ltd. It is upon this that, this research work would ascertain the effectiveness of Public-Private Partnership in wastes management in Ho Municipality.

### **Objectives of the study**

The main objective of the study is to examine the effects of Public-Private Partnership on waste management in the Ho Municipality.

The specific objectives are to:

- Identify the problems facing the Ho municipality.
- Examine the sources and volume of waste generation in the Ho municipality.
- Investigate waste disposal practices and methods of waste management in the municipality.

- Assess the effectiveness and efficiency of Public-Private Partnership plays in waste management.
- Make recommendations based on the results of the study.

### **Research questions**

The research questions that guide the study are:

- What are some of the problems or issues facing the Ho municipality?
- What are the sources and volume of wastes generation in the Ho municipality?
- Which methods are used to dispose of wastes in the municipality?
- What are the effects of Zoomlion Waste Management Company on wastes management in Ho municipality?
- What other ways can be used to manage waste in the municipality?

### **Significance of the study**

The significance of this study is to come out with effective wastes management system to reduce volumes wastes that pollute our cities and urban areas. The study will come out with some useful waste management policies and regulations to facilitate effective and efficient wastes disposal practices. In addition, this work will establish monitoring and evaluation system to assess all wastes management bodies. It will further provide documentation audit and review of waste management functions government and private waste contractors. The study will again look at capacity-building and training services for waste management personnels. Safe environmental practices at wastes disposal sites will also be studied in this research work.

This research is significant because, it will equip Metropolitan, Municipal, and District Assemblies (MMDAs) and especially Ho Municipal Assembly for effective and efficient waste management practices. Significant among all, will be the improved waste management services and sound environmental sanitation services delivery. The study will enable the stakeholders in waste management strategize to improve efficiency and sustainability in waste management sector.

### **Scope of the study**

This research work is conducted in Ho municipality. The study centred on effective ways of managing and disposing wastes. It looks at other strategies and approaches that were adopted and could be adopted for efficient service delivery in wastes management in the Ho municipality. The study again focuses its work on how the private company, the Zoomlion and Environmental Health Department collaborate in managing (disposing) wastes in the municipality. However, the study will also cover the following group of people:

- Market women;
- Household heads;
- Environmental Health Officers; and
- Zoomlion Company – Private Waste Management provider in Ho.

## **Organisation of the study**

The study is divided into five chapters. The first chapter focuses on introduction, which covers issues background, statement of the problem, objectives of the study, research questions, significance of the study and scope of the study. Chapter Two focuses on definition of concepts or terms such as waste, classification of wastes, wastes generation, disposal and treatment wastes as used in the study and the review of literature. It also covers the review of waste management and Public-Private Partnership on waste management.

Chapter Three involves the methodology used in the study and focuses on study area, study design, study population, sample and sampling procedure, sources of data, instruments, pre-test of instruments, field work, challenges during field work, data processing and analysis. Chapter Four presents results and discussion. Chapter Five deals with summary, conclusions and recommendations.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

#### **Introduction**

This chapter reviews literature relevant to the study. The review looks at the following: definition of waste, classification, generation, disposal, treatment, reduction and minimization of waste, waste management system and waste hierarchy. Further related literature also looks at examples of waste management in some countries and public-private partnership in waste management.

#### **Definition of waste**

Nowak, Steiner and Wiegel (2006) define waste as “waste is a material for which the generator has no further use for own purpose of production, transformation or consumption and which he discards or is required to discard”. Wastes may be generated during the extraction of raw materials, during the processing of the raw materials and after the consumption of final products.

Craig (2000) notes that, waste is a well-known law of physics that matter cannot be created or destroyed. We can change its physical (solid, liquid or gas) or chemical form, but we cannot make it disappear. If we throw something away it does not disappear, it may be burnt but it is still there as still leaves the rotten materials that produce gases. It may stay where it is but it will not disappear.

Craig (2000) observes that, waste can be classified in three ways:

- According to where it comes from (arising);

- According to its pollution potential (environmental impact); and
- According to its state ( liquid or solid or gaseous).

Jones (1995 pg.1) defines waste as “ that for which there is no further use”. A better, but by no means perfect definition is provided by section 75 of the Environmental Protection Act 1990 in United Kingdom (UK) which considered as:

- any substance which constitutes a scrap material, or an effluent, or other unwanted surplus substance arising from the application of process; and
- any substance or article which requires to be disposed of as being broken, worn out, contaminated or otherwise spoilt.

Further reviews of the above three definitions established that, the range of waste is enormous, but for the vast majority of industrial processes, wastes can be identified according to the stages at which they arise (Jones, 1995 pg. 1).

### **Classification of waste**

Waste is categorized according to the form in which it is generated during extracting, processing, and consumption of the final product. According to Jones (1995), it is widely recognized that wastes can be effectively grouped into:

- Origin like household or municipal solid wastes, clinical wastes, industrial wastes, radioactive wastes and wastes arising from agriculture;
- Form like liquid, solid, gaseous, slurries, powders and gels;
- Properties like toxic, hazardous, reactive, acidic, alkaline, inert, volatile, flammable, carcinogenic; and
- Legal definition like household, industrial, controlled, directive and hazardous.

## **Generation of waste**

Waste is everyone's business, we all produce wastes in nearly everything we do. There are organic materials such as yard and garden wastes, food wastes, sewage sludge from treatment plants, junked cars, worn out furniture, consumer product of all types, newspapers, wood and concrete from construction sites all these varied and voluminous wastes are finally rest at someplace (Cunningham & Saigo, 1997). Hoornweg, Philip, and Manisha (2005) observe that, China recently surpassed the US as the world's largest municipal wastes generator. In 2004, the urban areas of China generated about 190,000 tones of wastes and by 2030 this amount is projected to be at least 480,000 tones. According to Anomanyo (2005), the Waste Management Department of Accra Metropolitan Assembly revealed that, about 1800 tons of municipal solid wastes generated per day in the metropolis and the average waste generated per capita per day is estimated at 0.5 tons.

Nowak, Steiner and Weigel (2006) categorically spelt out the sources and generation of wastes as:

- Industrial Commercial and Institutional Wastes (ICIW); wastes that are generated in different economic sectors and institutions like schools, households, hospitals and similar wastes from government buildings can be treated like household wastes.
- Mining Waste consists of soil, sand, rock, and stones from recovering mineral resources. This compared to other wastes, mining waste is generated in very high amounts. Usually the management of mining waste is outside the responsibility of municipalities.

- Municipal Solid Waste (MSW) includes almost all dry wastes created in the municipality, such as household waste, industrial, commercial and
- Public Service Wastes are wastes from selected municipal services, i.e, waste from maintenance of parks and gardens, waste from street cleaning services, litter containers and market-cleansing waste.
- Agricultural Waste consists of all residues from crops and animal production, especially harvesting residues liquid manure. Agricultural waste is generated in very high amounts, but is almost completely recycled on site.
- Dry Recyclable are all materials include glass, textiles, packaging materials, paper, plastic containers, scraps from garages and sawn dust.
- Green waste is the sum of all organic waste that is generated at green areas such as private gardens and public parks. It includes grass clippings, leaves, branches of trees etc that is able to be recovered. Green waste forms part of household waste and (ICIW) or is separately collected.
- Hazardous Waste requires special handling and disposal practices due to its endangering character for people. Hazardous waste includes; waste oil from cars and garages, old batteries, paints, chemicals like pesticides, solvent-larden, acids, disinfectants, toxic, carcinogenic, mutagenic or teratogenic substances.
- Healthcare/Medical waste includes used bandage, used cotton wool, syringes, needles, used gloves substances of organic carbon from pharmacy and wastewater from theaters.



- Electronic Waste (E-Waste) also formed part of hazardous waste. The advent of computers and increasingly advanced electronic equipment generate e-waste which include, obsolete and discarded computers, televisions, computer parts, such as Cathode Ray Tube (CRT) monitors, wire installation, circuit boards etc.

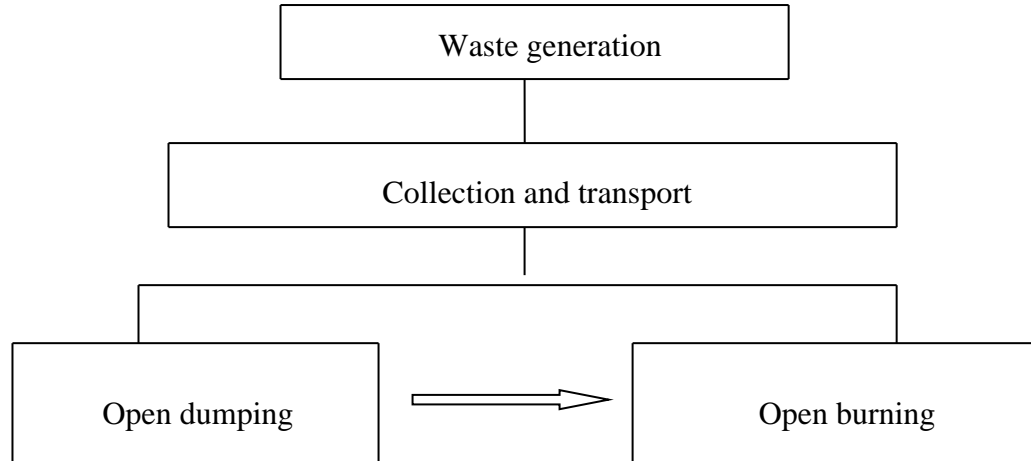
Hoornweg et al. (2005) observe that, developed countries have failed to adequately manage their own e-waste problems ahead. Instead, a dangerous e-waste “export” market ships thousands of tones of discarded waste each year to communities in China, India and other Asian countries. These communities are ill prepared to manage such imports and to confront the accompanying pollution and risks to human health.

Special Wastes has a specific legal definition under the Control of Pollution (Special Waste) Regulations 1980. This is currently undergoing revision to harmonize with European Commission Directive (ECD) 91/689, which itself has yet to be implemented. As things stand at present, a waste is considered ‘special’ if it contains any one of the following substances explosive, oxidizing, highly flammable, irritant, harmful, toxic, carcinogenic, corrosive, infectious, teratogenic, mutagenic, ecotoxic and is also considered to be dangerous to life.

The above classification of waste represents almost the most simplified set of definitions of waste. It is obvious to say that there is no universally accepted classification system of wastes. As a consequence, waste managers are confronted with a wide variety of definitions and classifications which have evolved over many years (Jones, 1995).

## Disposal and treatment of wastes

Massoud and El-Fadel (2002) observe that, the ever-increasing amount of solid waste generation has created disposal problems for many developing countries and Lebanon is no exception. Refuse generation continues to increase with population and economic growth rendering waste management as one of a host challenging development-related issues that the government is facing. Historically, refuse collection and disposal have been the responsibility of municipalities. Consequently, the municipalities were unable to continue providing a much-needed service and until recently slow burning and uncontrolled dumping hillsides and seashore have been common methods practiced for solid waste disposal in the Greater Beirut Areas (GBA) of Lebanon. Figure 1 gives the basic components of waste disposal practices.



**Figure 1: Basic components of municipal solid waste**

Source: Massoud and El-Fadel (2002).

Handling of waste is a problem because most disposal methods are harmful to the environment and pose threat to human health. Jones (1995) observes that, for waste which cannot be re-used or recycled, there remain only two basic options: treatment and or disposal. Waste treatment involves chemical, biological or thermal processes which destroy or neutralize waste or reduce its volume. Any residue which remains can be more readily disposed of at landfill sites.

### Open Dumps

Open dumps ruin the natural beauty of the land and provide home for rats and other disease-carrying animals. Both open dumps and landfills may contain toxins that seep into ground water or flow into streams and lakes (Chertow, 1995).

According to Cunningham and Saigo (1997), for many people the way to dispose of waste is to simply drop it at anyplace. Open dump is unregulated dumps that are still predominant method of waste disposal in most developing countries. The giant third World mega-cities have enormous garbage problems. Mexico City, the largest city in the world generates some 10,000 tones of trash each day. Until recently, most of this torrent of waste was left in giant piles, exposed to the wind rain as well as rats, flies and other vermin.

Cunningham and Saigo (1997) observed that, most developed countries forbid open dumping, at least in metropolitan areas, but illegal dumping is still a problem. There exists trash accumulating along roadsides and vacant weedy lots in the poorer sections of cities. Similarly, Hoornweg et al. (2005) note that, open dump is an unplanned “ landfill” that incorporates few in any of the characteristics of a controlled landfill. There is typically no leachate control, no access control, no cover, no management and any waste pickers need to be legitimized and

cooperatively involved in the waste collection system.

### Landfills of Wastes

The final disposal of solid waste by placing it in a controlled manner in a place is intended to be permanent. Manual landfill is a place in which most operations are carried out without the use of mechanized equipment (Hoornweg et al. 2005).

The World Bank Group (1998) noted that, sanitary landfills are land disposal sites for nonhazardous solid waste at which wastes are spread in layers, compacted to smallest practical volume, and covered at the end of each operating day. Secure chemical landfills are disposal sites for hazardous wastes that are selected and designed to minimize the chance of release of hazardous substances into the environment.

Jones (1995) notes that, landfilling, usually goes with some prior treatment. It is the commonest and far the cheapest waste disposal method in the UK which accounts for about 90 percent of all household wastes and 80 percent of hazardous wastes. It is an operation very familiar to the general public and has been established in Britain for over 150 years. A typical landfill operation is nowhere near the basic principle is obvious enough-it is essentially that tipping of waste into a suitable pit, usually disused quarry which are certain geological, chemical and engineering factors to be taken into account.

All wastes deposited in landfill sites whether above or below the ground undergo a complex series of biodegradation reactions initiated by bacterially-or fungal-assisted decomposition of vegetable matter.

Rainwater percolates the rotting mass and takes waste components including heavy metal salts into solution.

The resulting aqueous liquor known as the “leachate” drains to the base of site and could cause major pollution if it were to seep into ground waters. Penetration of the underlying water table by the leachate would be particularly serious.

Cunningham and Saigo (1997) observe that, over 50 years, most American and European cities have recognized the health and environmental hazards of open dumps. Increasingly, cities have turned to landfills where solid waste disposal is regulated and controlled. To decrease smells and litter and to discourage insect and rodent populations, landfill operations are required to compact the refuse and cover it every day with a layer of dirt.

Craig (2000) notes that, 90 percent of domestic waste in the UK goes directly to landfill or earth. This costs about £1 million a day. Once the rubbish has been covered the organic matter starts to rot down producing methane, an inflammable gas which makes its way to the surface. In some tips, the methane is piped off and used as fuel for heating. Landfill waste remains a potential environmental hazard. Weeds killers in the rubbish, chemicals from car batteries and other dangerous liquids can be washed through the soil contaminating drinking water. In landfill sites where toxic industrial wastes have been dumped indiscriminately, the land can become poisoned and unsafe for farming or building. Today, waste disposal is regulated by a number of European community directives which help to ensure that the disposal of waste is controlled and safe.

## Incineration of Wastes

Incineration is one of the methods used to disposed wastes in developed and industrial countries. Incineration involves;

- Burning of certain types of solid, liquid or gaseous materials.
- A treatment technology involving destruction of waste by controlled burning at high temperatures, eg, burning sludge to remove the water and reduce the remaining residues to a safe, non-burnable ash that can be disposed of safe on land in some water or in under ground locations (The World Bank Group, 1998). The group further revealed in their reports that, incineration is an acceptable form of disposal for certain wastes in industrial countries, where careful gas cleaning and monitoring are required. Similar system can be suitable for developing countries if adequate attention is given to the management and monitoring aspects.

Jones (1995) pointes out that, incineration involves mostly purpose-built plant operation at high temperatures. It is inevitably a relatively expensive waste disposal option with running cost up to 10 times those of equivalent to landfill operations.

The principal objectives of waste incineration are to:

- reduce the amount of waste going to landfill, thereby extending the life of landfill site operations; and
- dispose of organic wastes which are toxic and highly inflammable and resistant to bio-degradation in landfill site operations.

The incineration process consumes the bulk of the waste material fed into it and leaves a solid residues or ash which is finally removed to landfill.

It also generates large volumes of combustion gases which have been the subject of much misinformation and many scare stories in the past.

According to Hoornweg et al. (2005), incineration is the process of burning solid wastes under controlled conditions to reduce its weight and volume and often to produce energy. Incineration is a possible component of an integrated waste management programme for large cities where space for landfill maybe limited and citing of landfills outside the jurisdiction may be politically difficult. Incineration is often pursued by municipal officials as a key waste disposal option since they are perceived to have less public opposition to landfilling. However, incineration is usually constrained by three aspects; very high cost, potentially toxic emissions and an incinerator's ability to acts a disincentive to other more economically and environmentally sound waste disposal options.

As a result of the three key aspects in the use of incinerators, the government of China has issued a series of favourable policies to encourage investment in incinerators. These incentives include VAT refunding, prioritized commercial bank loans, state subsidy (2%) for loan interest and guaranteed subsidized price for purchase of electricity. These policies are expensive and may encourage municipalities to develop more incineration capacity than is warranted. It is recommended that all incineration subsidies and incentive policies be reconsidered.

Cunningham and Saigo (1997) observe that, municipal incinerators are specially designed burning plants capable of burning thousands of tones of wastes per day. In some plants, refuse is sorted as it comes into remove unburnable or recyclable material before combustion.

This is called refuse-derived fuel because the enriched burnable fraction had high energy content than the raw trash.

The proponents of incineration argue that if they are run properly and equipped with appropriate pollution-control devices, incinerators are safe to the general public.

### Recycling of Wastes

According to Jones (1995), re-use and recycling possibilities are at first sight the economic and environmental case for materials recycling appears unanswerable because it offers the prospect of conserving natural resources, eliminating the energy requirements for primary production and easing pressure on landfill sites. However, recycling is the only practicable waste materials that can be segregated sufficiently prior to re-processing and not all categories of waste are amenable to this sort of preparation.

Scott and Myers (2007) observed that, the California Integrated Waste Management Board (CIWMB) Recycling is the practice of recovering waste materials from the waste stream and then incorporating these same materials into the manufacturing process. Many communities in California now offer curb-side collection or drop-off site for certain recyclable materials. The board in addition said, successful recycling also depends on manufacturers making products from recovered materials and in turn, consumers purchasing products made of recycled materials. CIWMB gave an example of how Californians used a lot of tires which can be recycled to produce crumb rubber for new products recycled in Rubberized Asphalt Concrete (RAC) used in civil engineering applications or combusted as fuel.



Further literature reveals that, CIWMB is the state agency designated to oversee, manage, and track California's 92 million tons of waste generated each year. The board is tasked to promote sustainable environment where these resources are not wasted but can be reused or recycled in partnership with all Californians. In addition to many innovative programmes and incentives, the board promotes the use of new technologies for the practice of diverting California's resources away from landfills.

Hoornweg et al. (2005) note that, recycling is the process of transforming materials for manufacturing new products which may or may not be similar to the original product. Items that can be re-processed into feedstock for new product are paper, glass, aluminum, corrugated cardboard and plastic containers. In reviewing literature, it is established how recycling of waste can be used to reduce wastes generation. For instance, Guiyu is a group of four villages lying along the Lianjiag River in the Greater Province in China. An estimated 100,000 people in Guiyu are involved in the E-Waste recycling business, most apparently agrarian regions. Recyclers' make on average 1.50 a day dismantling computers and printers, collecting toners, burning copper wires and using fires and acids baths on circuit boards.

Recycling is the practice of recovering used materials from the waste stream and then incorporating these same materials into the manufacturing process (Scott and Myers, 2007). They gave the materials that are recyclable such as:

- Construction debris .eg. asphalt drywalls and metals
- Plastics wastes .eg. acrylic, nylon, high density polyethylene and low density polyethylene.

- Electronic wastes .eg. televisions, monitors, cell phones, CPUs.

Craig (2000) reveals that, recycling is the processing of waste or rubbish back into raw materials so that it can be made into new items. The work listed some items that are recyclable as glass, paper, cards, plastic bottles, steel and aluminum cans, used and old textiles, furniture, garden tools, white goods like refrigerators and freezers. Cunningham and Saigo (1997) gave some benefits of recycling as; recycling is usually better alternative to either dumping or burning wastes. It saves money, energy, raw materials and land space while also reducing pollution. Recycling also encourages individual awareness and responsibility for the refuse generated.

### **Reduction and minimization of wastes**

Waste reduction has the means of reducing the amount of waste that is produced initially and that must be collected by solid waste authorities. This ranges from legislation and product design to local programmes designed to keep recyclables and compostables out of the final waste stream (Hoorweg et al. 2005).

Waste reduction (or prevention) is the preferred approach to waste management services because waste that never gets created doesn't have any associated waste management costs (Scott and Myers, 2007). California Integrated Waste Management Board (CIWMB, 2007) gave an example of waste reduction is reducing unnecessary packaging from manufactured products and produce. If this excess packaging were never produced in the first place, no one would have to be concerned with the cost and effort of collecting the excess packaging, separating it for recycling, breaking it down,

transporting it to manufacturers, and then integrating the recycled materials back into the manufacturing process.

Craig (2000) observes that, reducing the amount of waste we produce means that less ends up in already overflowing landfills. It reduces the need for new raw materials and so helps preserve the environment from destructive processes such as mining, power generation and water exploitation. Less waste means less pollution and reducing waste can save money. Waste can be reduced by reducing, reusing and recycling. Craig (2000) gave many examples of how to minimize wastes as:

- Buy in bulk to reduce the amount of packaging required
- Choose durable articles that will last a long time
- Buy products with a recycled content
- Use rechargeable batteries where possible cloth dishtowels and napkins instead of paper ones
- Take your own basket or reusable plastic bags to market
- Glass and plastic bottles should be returned to shops for reuse
- Wash and dry plastic bags for reuse
- Repair things than throw them away.

Harwell (2003) gave some waste reduction techniques by European Commission as, waste minimization recycling are major goals of the European Commission's waste management strategy and priority waste stream, to which this policy should be applied, are being identified. The US Environmental Protection Agency has a research and development programme which focuses on waste minimization and there are programmes in individual states, some of them backed by legislation. In Britain, comparable attention has not yet been given to this issue

but a number of companies have their own programmes.

According to Harwell (2003), waste reduction techniques include:

- Raw material changes means, less toxic alternatives, replace solvent-based raw materials, change in specifications and redesign finished product.
- Technology changes means of mechanical for chemical, membrane technologies, micro processing and non-solvent paints and inks.
- Reuse means, recover solvent, recycle process water, recycle scrap metal and recycle plastics.
- Product innovation means, new uses for rejects/wastes stream, convert wastes to saleable products, and design products to aid recycling.
- Good household means, floating ceiling storage, spillage controls, planned maintenance and sensors and meters.
- Process changes means, closed loop for single pass, catalyst for changes in production scheduling and clean procedures.
- Reclamation means, ultra filtration, iron exchange, adsorption and condensation.

According to Jones (1995), one of the most important ways in which all types of waste, not just the solid variety, can be minimized is through the application of tighter process control at all stages. Jones further explained that waste minimization has a number of obvious benefits. It will reduce the cost of off-site disposal and increase overall profitability by improving utilization of raw materials and energy and reducing water consumption. There might also be scope for reducing insurance costs and improving competitiveness by demonstrating cleaner environmental performance.

Jones (1995) observes that, “ in any sound waste management system waste minimization is an essential preliminary to disposal”. Some examples of waste minimization strategies as follows:

- Avoidance of waste, ie, the prevention philosophy.
- Re-use of waste products.
- Recycle back into the process to reclaim usable material.
- Combustion of waste as fuel.
- Waste disposal by the least environmentally-damaging route.

Hoornweg et al. (2005) note that, waste minimization is mainly driven by individual habits that value environmental protection and resource conservation. However, it does not negate the value of setting specific targets and implementing aggressive waste minimization programmes as follows:

- Establish tipping fees for waste receiving facilities, ie. Transfer stations, landfills, incinerators, compost plants, and fees should be based on mass or volume.
- Establish provincial and national and possibly international materials exchanges.
- Set a waste reduction goal (generation growth rate) that recognizes the link to economic growth.

### **Waste management systems**

Many countries adopted different approaches in managing waste through the rate at which wastes are generated and disposed off. Jones (1995) notes that, in the face of increasing pressure from legislators, pressure groups, financial institutions and the general public,

industrialists decided some years ago that there was an urgent need for some kind of national standard against which the environmental performance of their organizations could be judged. The management of waste could then become part of a comprehensive package of environmental management control and not something to be pursued in isolation.

Jones (1995) notes that, environmental improvement through the management of waste of new British Standard ( BS7750) which was first published in March 1992 and re-issued in January 1994, is the first attempt by any government to secure permanent improvements in environmental performance. The following specific activities are implicit in BS7750 for developing a waste management strategy:

- Collect and analyze data for all waste generated;
- Explore the possibilities for waste minimization by changing product design, raw materials or process technology;
- Examine waste material recovery, treatment, re-use or recycling possibilities;
- Explore the possibilities of detoxifying, or otherwise rendering less harmful and any waste which might otherwise be classified as special; and
- Select the most appropriate form of disposal, whether by incineration, landfill, sea disposal, and an appropriate waste disposal contractor to do the job.

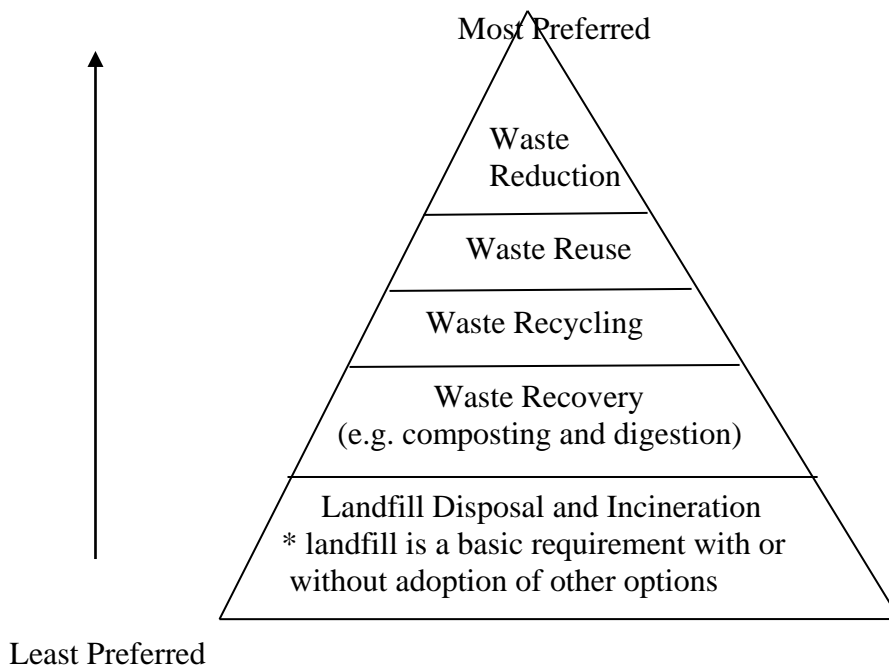
Scott and Myers (2007) observed that, California Integrated Waste Management Board believes that, through education current and future waste generators will respect and conserve natural resources by making informed waste prevention choices. The Board's Office of Education and the Environment (OEE) provides standards-based K-2 curriculum and assistance for schools and districts.

The OEE works with local agencies to promote waste management education in local schools and informal settings, such as science centres and museums. The Board's Office of Local Assistance continues to assist school districts in developing waste reduction programmes and addressing other solid waste management needs. This is one of ways California adopted in waste management system.

In China, Integrated Sustainable Waste Management (ISWM) is successful concept that has evolved after years of solid waste management experience. The ISWM concept rests on all key stakeholders being involved in the integrated planning of all waste system elements that is, from the point of generation to ultimate disposal and including all steps of waste reduction, recycling, reuse and resource recovery in between these points and addressing all system aspects (Hoorweg et al. 2005).

#### The Waste Management Hierarchy

According to Hoorweg et al. (2005), the integrated sustainable solid waste management strategies are usually based on the Hierarchy of Waste Management. The hierarchy of waste management simply advocates that the best approach to waste management is to first and foremost try to reduce waste generation and separation potential recyclables at source to improve the quality of materials for reuse, including organics for composting or anaerobic digestion. Pyramid of waste management hierarchy is shown in Figure 2. Advanced technology solution in the long term will provide a greater use and wider range of waste management solution. Those options further up the hierarchy demonstrate an increasing focus on waste minimization and reuse of materials for increasing proportions of total waste.



**Figure 2: Waste Management Hierarchy**

Source: Hoornweg et al. (2005).

### **Examples of wastes management in some countries**

Hoornweg et al. (2005) gave examples of waste management in some countries as: In United Kingdom, regulations implement on packaging or packaging waste, which relate to essential requirements to be satisfied by packaging. The regulations apply to all packaging placed on the market in the UK, and are enforced by trading standards officers of local authorities. The regulations placed a responsibility on any company that introduces packaging onto the marketplace to ensure that it is minimal, safe and either reusable, recoverable or recyclable.

Japan leads the world in the recycling of packaging such as glass, paper, steel and aluminum, despite the fact that it has no quotas for recycling. Under the Japan recycling law, food and other industries are obligated to promote the use of recycled



resources as raw packaging materials and to encourage consumers to recycle product packaging. Brazil's National Environment Council (CONAMA) has the power to enact packaging regulations with the force of law without any new legislation. CONAMA concept follows European packaging waste laws. The primary article says that, manufacturers, formulators, fillers, retailers, re-packagers, and importers of packaged products placed on the Brazilian market are all responsible for collecting and ensuring "environmentally adequate" final disposal of packaging and its wastes.

South Africa's National Waste Management Strategy presents a long-term plan (up to the year 2010) for addressing key issues, needs and problems experienced with waste management. The strategy gives effect to the Bill of Rights, Constitution of South Africa, on the basis of which the people of South Africa have the right to an environment that is not detrimental to their health. The strategy translates into action Government's policy on waste as set out in the Draft White Paper on Integrated Pollution and Waste Management for South Africa (published in 1998). The objective of integrated pollution and waste management is to move away from fragmented and uncoordinated waste to integrated waste management. Such a holistic and integrated management approach extends over the entire waste cycle from cradle to grave, and covers the prevention, generation, collection, transport, treatment and final disposal of waste. Integrated waste management thus presents a paradigm shift in South Africa's approach to waste management, by moving away from waste management through impact management and remediation and establishing instead a waste management system which focuses on waste prevention and waste minimization.

Hawken (2008) observes that, “Zero Waste Beyond Recycling” is adopted by USA as waste management strategy. According to his work, Zero Waste embodies approaches that enable rapid waste reduction outcomes, breakthrough strategies rather than incremental changes. Zero Waste is a new planning approach for the 21<sup>st</sup> Century that seeks to design the way that resources and materials flow through society, taking a whole system approach. It is both a back end solution that maximizes recycling and minimizes waste and a design principle that ensures that products are made to be reused, repaired or recycled back into nature or marketplace.

Hawken (2008) reveals that, a group spearheading the call for Zero Waste in North America is the Grass Roots Recycling Network (GRRN), a national network of waste reduction activists and professionals promoting the message: Zero Waste; Create Jobs from Discard; and End Corporate Subsidies for Wasting. GRRN was founded in the late 1995 by the Sierra Club, the Institute for Local Self-Reliance and the California Resource Recovery Association.

Johannessen and Boyer (1999) observe that, the design and optimization of solid waste management technologies and practices that aim at maximizing the yield of valuable product from waste, as well as minimizing the environmental effects have had little or no consideration in the Africa region. They also noticed that while there is potentials for productive uses of landfill gas for instance; most landfills in Africa do not practice gas recovery except one landfill in South Africa where active pumping and flaring of landfill gas is practiced. These observations are not different in Ghana. At the national and municipal levels, Ghana has not taken steps to construct, operate, or maintain sanitary landfills. Johannessen and Boyer (1999)

again found out that, in major cities of Ghana (Accra, Kumasi and Takoradi) open dumps were the means of solid waste disposal. It is under the World Bank's Urban Sanitation Project that Ghana developed plans to build its first sanitary landfill in these major cities.

In further literature review, a 'Community Primary Waste Collection' was used in Samaki communities of Cambodia as a waste management strategy. According to Sprague (2007), an important development in 2005 was the beginning of primary waste collection in the Samaki communities, where collections by truck are impossible due to road quality. Collections have started and a total of 540 m<sup>3</sup> was collected, with organic and other recyclable material being separated, while remaining waste is stored and collected every two weeks by private company responsible. About 1 tone of waste is collected every day and the collections have had a high visible and significant impact on the sanitation in the communities, as well as providing much needed employment.

Hari (1997) gave following examples of waste management in Japan as: Recycle tote bag, in the Soppero City and the local Lion Club designed and distributed special tote bags to encourage people to carry recyclables to market with them when they go shopping. Many supermarkets collect Styrofoam trays, paper milk cartons, plastic grocery bags and even empty cans. Ibaraki recycling pays by the bag garbage collection is catching on all over the country. In Ibaraki prefecture a coalition of seven communities is improving their recycling and waste handling by requiring residents to put out garbage in special bags.

In Kumamoto City in Kyushu, the city has been paying registered citizen group 3 yen/kg for collection paper, glass, cans, etc. The 586 registered groups collected

over 7300 tons in the ten month period ending last June.<sup>32</sup>

In addition, since the program's introduction, the city's regular recycling collection service has experienced a 20 percent jump in volume. Officials feel the program has been successful not only in reducing waste but in changing the public's awareness regarding recycling. In Yokohama, the nation's third largest city, a coalition of 38 groups representing citizens, business and government formed a city-wide group for waste reduction and recycling promotion. It's the first of its kind in the nation. The city already has ward-level groups with a similar purpose so the new group will serve as an umbrella and help coordinate activities among the ward-level groups.

Hari (2007) observes that, as at 1991 there were fourteen industrial waste exchanges in Japan, the first one having been established in Kanagawa prefecture in 1987. Hokkaido came on line with its programme last year and already has had over 1000 inquiries. The exchange, a prefecture-sponsored project, publishes a booklet twice a year and provides a telephone referral service. Paper products made from waste corn and sugar cane are slowly finding their ways into conventional markets. Stores in Kyoto are stocking notepaper and stationery made from corn waste and some department stores are using sugar cane paper for shopping bags. Aichi prefecture has joined the ranks of government entities forming Garbage Reduction. The Aichi version is made up of various local governments and citizen groups and plans to undertake at least five different projects including: utilization of collected household recyclables, litter, especially empty cans, appropriate disposal methods for large garbage items, and using special garbage bags.

The Construction Ministry is setting up an information service for the re-use of waste construction materials. They are starting out with concrete and if that is successful, they will add more materials. Other major components are asphalt, dirt and wood. In 1990, the industry generated 76 million tons of waste nationally, which represents 20 percent of the entire industrial waste stream. One fourth of all supermarkets in Hokkaido have special “recycled goods” sections. Main items are toilet paper, notebooks, aluminum foil and other foil-type products, garbage bags, etc. The Environment Ministry has been providing assistance for government agencies to join the Buy Green Network to buy “earth-friendly” recycled items, including toilet paper, copy paper, paper clips, pencils, soap, vacuum bags, etc.

According to Anomanyo (2004), in Accra Metropolitan area, solid waste collection and disposal is the responsibility of Accra Metropolitan Assembly’s (AMA) waste management department. The department therefore sees to the collection, transport, treatment and disposal of municipal solid waste. The Waste Management Department (WMD) is thus responsible for the management of the solid waste disposal sites at Mallam, Djanman and Oblogo waste dump sites, the composting site at Teshie and new sanitary landfill site under construction at Kwabenya in Accra. According to WMD sources, solid waste collection in the city is both on franchise and contract basis. On the franchise basis, a house-to-house collection is done in high income areas and the contractors charge the household some fees with weekly collection frequency. Each household has plastic containers with covers. The contractors pay a tipping fee to the AMA for the use of its dump site. The user fees charged form about 20 per cent of general service to the beneficiaries whose wastes are collected.

On contract basis, waste contractors are paid by the AMA to perform both block and communal container collection. Block collection occurs in middle-income residential areas including Dansoman, Adablaka, Kanishie and other parts of Accra. According to the WMD sources, approximately 75 per cent of the waste generated is collected in these areas. Central communal container collection occurs in low income and high dense populated and deprived residential areas such as James Town, Nima and other parts of Accra where houses were not planned with poor access roads. Market places are also covered under this arrangement. Residents deposit their wastes in such communal containers and the frequency of collection is at least once daily. Waste generators here do not pay user charges.

### **Concept of Public-Private Partnership**

The public sector has been the main actor in the development process of most countries in Africa and beyond until the mid 1980s. The sector was the main actor in production and distribution of goods and services in most economies, especially those that embraced centrally planned economic policies. From the mid 1980s, however, following the winds in the form of many and far-reaching social, political and economic reforms the role of the public sector in the development process has substantially changed in many countries. The role of the private sector in bringing about sustainable development in most economies has increasingly been recognized and acknowledged (Ngowi, 2005).

According to Ngowi (2005), private sector-led economic growth and development is generally more efficient and effective. The sector is more dynamic, resilient, creative, innovative and vibrant than the public one.

However, this sector is purely profit-oriented as it embraces the concept of free interplay of market forces of supply and demand in the production and distribution of goods and services.

The use of Public-Private Partnership in the production and distribution of some goods and services is inevitable for attainment of sustainable development. There is a need therefore to forge and promote strong, efficient, effective, sustainable, dynamic and vibrant public-private partnerships so that the private sector can produce and deliver some goods and services hitherto produced and delivered by the public sector.

Ngowi (2005) observes that, public-private partnerships have conceptual management systems and techniques as:

- Contacting Out; this is the placing of a contract by a public agency to an external private company.
- Franchising/Concession; a private partnership take over responsibility for operating a service and collecting charges and possibly for funding new investment in fixed assets.
- Affermage; public authority controls construction and owns the fixed assets but contracts out operations, maintenance and collecting service charges.
- Leasing; making use of equipment/assets without purchasing but paying a lease.
- Privatization; public service is entirely sold to a private partner.
- Management Contract; private organization takes over responsibility for managing a service to specified standard by using staff, equipment etc, of public authority.

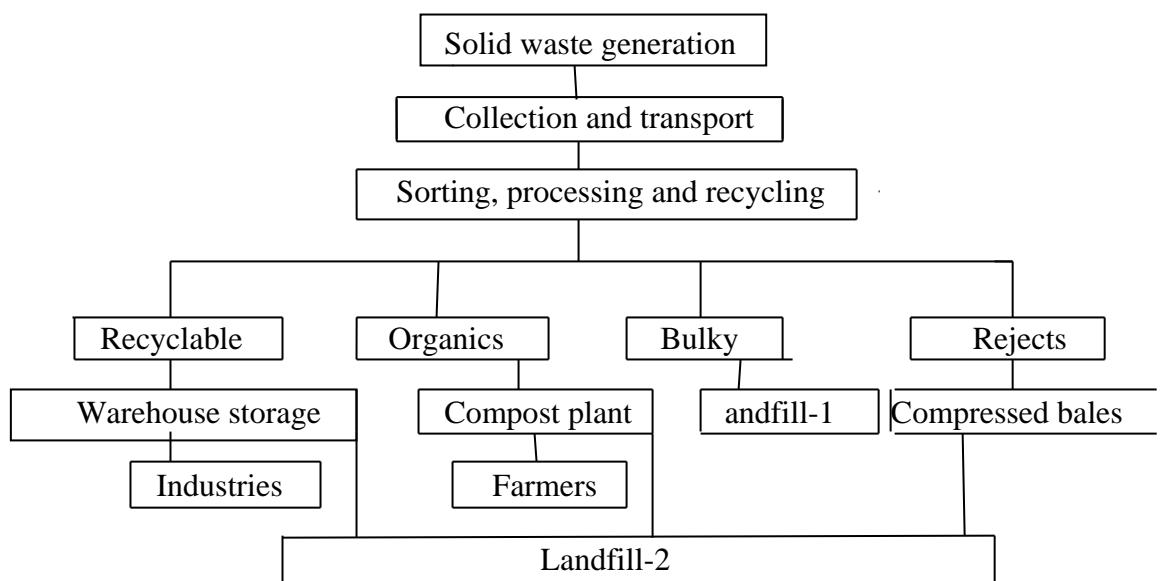
- Build, Own and Operate (BOO); partnership between public and private sectors whereby the private firm may operate the asset/service.
- Build, Operate and Transfer (BOT); same as BOO but the asset/service will be transferred to the public sector after a period of time.
- Management Buyout (MBO); the management of well run internal functions negotiate the purchase of that function and becomes a private venture.
- Cooperatives; self governing voluntary organizations designed to serve the interest of their members, working in partnership with public authorities.

According to Sohail, Plummer, Slater and Heymans (2003), there is no strict public-private partnerships classification that can be made, because partnership classification depends on the services, the nature and strength of the partner and the objective of the public-private partnerships. Partnerships are basically institutional arrangements which constitute rules defining the relationships that govern the partnerships, roles, responsibilities and accountability mechanisms. The overall aim of public-private partnerships is to meet public needs which would not been realized without joint efforts. Public-Private Partnerships between private companies and states are well-established means of providing infrastructure and services that the states have neither the resources nor expertise to supply alone. In such cases, partnerships may commonly take the form of Build-Operate Transfer or related schemes which allow companies to construct infrastructure and operate it profitably until a time when it is transferred to the ownership (Forsyth, 2005).



## Public-Private Participation in Waste Management Services

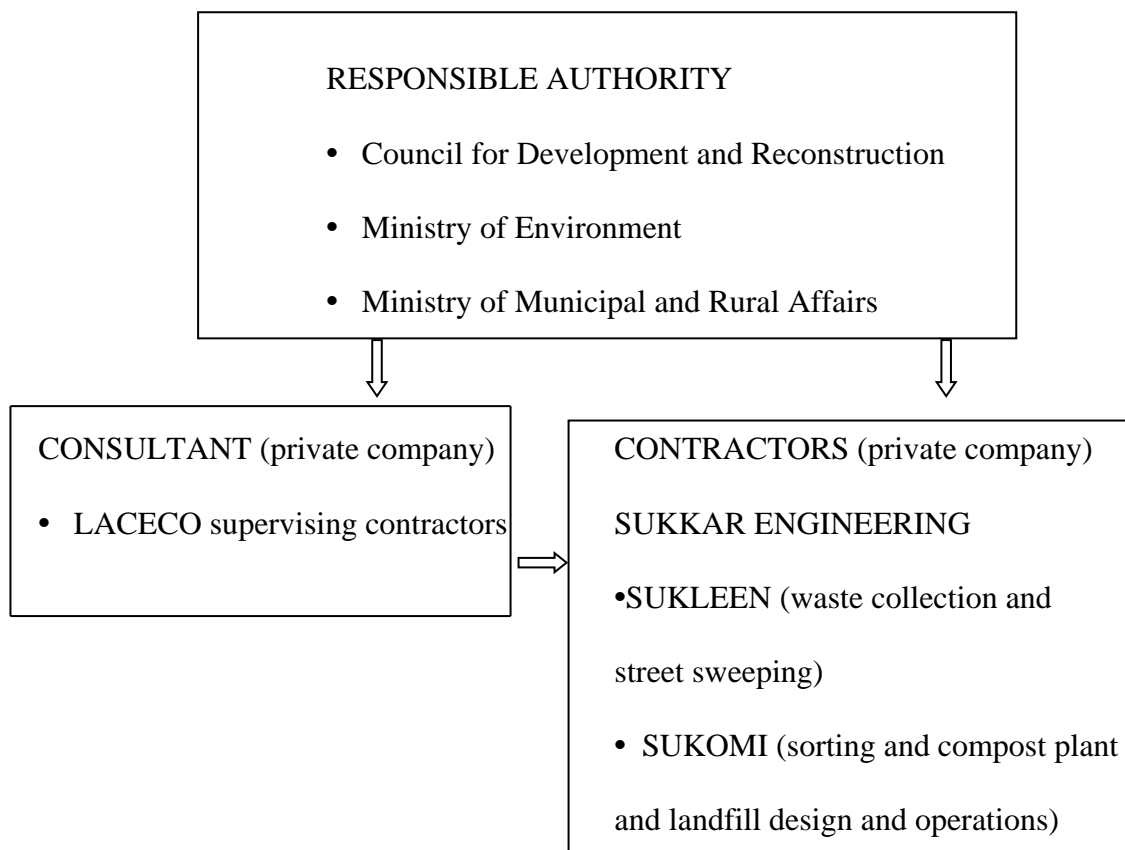
The increasing cost of waste management has led local governments in many countries to examine if this service is the best provided by the public sector or can better be provided the private sector. Public-private partnerships have emerged as a promising alternative to improve municipal solid waste management performance with privately owned enterprises often outperforming publicly owned ones. In Lebanon, several municipalities are transforming waste management services from a public service publicly provided into a public service privately contracted (Massoud and El-Fadel, 2002). The basic components of solid waste management in the Greater Beirut Area (GBA) of Lebanon are shown in Figure 3.



**Figure 3: Basic components of solid waste management in the GBA by PPPs**

Source: Massoud & El-Fadel (2002).

Official and public concerns about municipal solid waste has peaked in recent years, bringing about the closure of existing dumpsites and a great need to identify alternative methods for the disposal of refuse, particularly from the GBA, where land is scarce and prohibitively expensive. Under these conditions, the Lebanese government embarked on developing a national policy and management plan to find a solution for the management of municipal solid waste. In its effort to ensure proper development and operation, the government designated an independent consulting company (LACECO) to provide technical assistance to government through the supervision of operator' activities primarily the operation of the processing plants, compost facility and landfills (Massoud & El-Fadel, 2002).



**Figure 4: Organizational Framework of solid waste management in the GBA**

Source: Massoud and El-Fadel (2002).

Public-Private Partnership is the policy which supports different form of ownership and financing within a public-private partnership framework in operating waste management services, with options supporting progressive transfer of assets, profit shearing and the establishment of joint ventures. China's solid waste infrastructure is struggling to cope with unprecedented levels of waste generation. Aware of these issues, China's government (GOC) is seeking to address the situation through tightening environmental regulations, increasing public investment, introducing "marketization" reforms and encourage Private Sector Participation (PSP). It is hoped that operational, managerial, financial and legislative reform will improve the investment climate sufficiently enough to attract funds, technology and managerial expertise from the private sector (Hoornweg et al. 2005).

Privatization of waste management/ garbage collection may seem to have an advantage edge over public services, because since Malaysia has adopted the privatization system, garbage collection standards and consumer satisfaction have been raised. With a better work culture among the workers and the contractors, and the gradual introduction of modern technology into solid waste management, the service is becoming more reliable and there has been positive improvement (ESCAP, 2003). Beigl (2003) notes that, as a result of the problems associated with the proper disposal of wastes, there is a clear need for a multi-stakeholder partnership in proper and integrated waste management in all stages for collection, transportation, treatment, and disposal, but especially at the source where it is generate and integrate it with policies that encourage the 3R-reduce, reuse and recycle.

Panithan (2003) affirmed this assertion that, privatization of waste management is the effective way of addressing proper disposal of wastes. In Malaysia, the case of Phitsanulok Municipality is rather interesting especially when considering the trend for waste management these days is shifted towards privatization in order to improve efficiency. Hall, (2007) observes that, private waste management companies in Europe as at January 2006 to June 2007 and added that, in 18 months, 16 major mergers and acquisitions in waste management companies in Europe, with a total price of over 12.5 billion Euros. A number of companies that are involved in waste management in European countries are shown in Table 1.

**Table 1: Selected waste management companies in Europe**

Companies	Countries
Veolia/Onyx	France
Sita	France
Rethman	Germany
FCC	Spain
Bifa	UK
Alba	Germany
Lassila/Tikanoja	Filand
Ragn-Sells	Sweden
Delta	Netherlands
Saubermacher	Austria
Cleanaway	UK

Source: Hall (2007)

In Ghana, managing and disposal wastes in the cities and urban areas including Ho municipality have been major concern to the citizenry and successive government over the years. In 2006, government puts in place the contingency plan to mitigate the problems of waste management whereby setting up Public-Private Partnership (PPP) in waste management. This brought the waste management company Zoomlion Waste Management Expert Limited.

Zoomlion (2006) notes that, a major component of Environmental Sanitation in Ghana over the years has been a major headache of successive central government and local authorities in the proper maintenance of the environment of the major towns and cities. While the growth of the towns and cities has resulted in increased population coupled with increased socio-economic activities, there has not been a commensurate increase in essential logistics for effective and efficient waste management services to be delivered.

The key objective of Zoomlion is to develop systems and practices to revolutionize waste management services through the following specific objectives:

- The use of brand new waste management vehicles and equipment;
- Full implementation of the “TRICYCLE CONCEPT” nation-wide in waste management;
- Development of capacity in the fabrication and assembling of waste equipment and recycling of waste components;
- Provision of total waste management services effectively and efficiently.

It is against this background that Zoomlion Ghana Limited has emerged on the scene with the requisite expertise, technical and management competence and

resource to support government and the MMDAs to clean up the cities and towns, improve the environmental quality and consequently to give tourism, both internal external a huge boost.

### **Solid Waste Management in Accra**

According to the Waste Management Department of Accra Metropolitan Assembly, about 1800 tons of municipal solid wastes are generated per day in the metropolis and an average waste generated per capita per day is estimated at 0.5 tons (Anomanyo, 2004).

Anomanyo (2004) observes that, the involvement of the private sector in the collection and recycling and treatment is important to run an efficient waste management. Facilitating community and private entrepreneur in the waste collection has the advantage of job creation, elimination of illegal dumping and non-payment of service fees due to regular and efficient service by people from the community. It is therefore important that the AMA provides the private sector with information on updates of waste generation rate, type and composition, type of infrastructure required in collection and recycling of wastes. This kind of information provides the private sector the opportunity to be able to identify viable markets and opportunity to upgrade and run the waste collection, recycling and treatment business.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **Introduction**

This chapter deals with the research methodology of the study. It covers the study area, study design, the study population, sampling procedure, sources of data, data collection, instruments, pre-test of instrument, field work, challenges of field work, data processing and analysis.

#### **Study area**

The study was carried out in the Ho Municipality of Volta Region which is also the regional capital. The Ho Municipality is one of the 18 districts in the Volta Region of Ghana. It shares boundaries with the Adaklu- Anyigbe District to the South, the Hohoe Municipality to the North, South Dayi District to the West and the Republic of Togo to the East. There are three Traditional Councils in the municipality. These are Asogli Traditional Council, Awudome Traditional Council and Hokpe traditional Council. The municipality covers about 32 km<sup>2</sup> area with diverse ethnic background of people (Ho Municipal Assembly, 2010).

In line with the Local Government Act 1993 (Act 462), the Ho Municipal Assembly is the highest political and administrative authority in the municipality. The Assembly has a total of 81 members, made of 54 elected Assembly Members, 24 government appointees, 2 Members of Parliament as well as the Municipal Chief Executive of the Assembly. The governance structures and decentralized departments of the Ho Municipal Assembly include; Education, Youth & Sports,

Social Welfare & Community Development, Works Department, Physical Planning Department, Finance, Central Administration, Natural Resource Conservation, Department of Trade & Industry, Disaster Prevention & Management Department, Health & Environment and Foods & Agriculture. Both public and private establishments like bank, school, agencies and departments are springing out daily. The economic activities in the municipality brought about rural-urban shift which increased the population growth. Couple with this, Ho is the central point which surrounding villages visit for their economic activities. The formal sector has seen tremendous expansion which brought various professionals of different backgrounds to the municipality. The Zoomlion Company Limited, the only waste management experts in collaboration with the Ho Municipal Environmental Health Department are responsible for waste management in the municipality.

### **Study design**

The study is a descriptive research of how waste management is carried by both public and private sectors in the Ho municipality. It aims at presenting relevant information on the effectiveness of Public-Private Partnership in waste management. The descriptive research involves the collection of data to answer questions covering the study. It determines the effective ways in which the private and public sectors do collaborate in the management of wastes in the municipality. The study used both qualitative and quantitative approaches. Both interview schedule and interview guide were used to collect data from the field. The qualitative described the positions of how the results were analyzed whilst the quantitative approach described the results using tables and figures for the analyses.





**Figure 5: Map of Ho Municipality**

Source: Ho Municipal Assembly (2012)

**Key:** \* Capital town of Ho Municipality

▣ Capital town of other districts

° Major towns

..... Boundaries

— Major roads

## **Study population**

The main issue of the study centred on effects of Public-Private Partnership on waste management in Ho Municipality. In this respect, the focus was on the following groups of people:

- Market women;
- Household;
- Officers of Environmental Health Department; and
- Staff of Zoomlion Company - the private waste management provider in Ho.

These target groups constituted the study population. Considering the topic being studied, market women were one of the focus groups in better position to offer relevant information since they generate and dispose of wastes in markets. Households comprised group of persons living together as one family. The heads of households are one of the most important groups when it comes to matters of waste disposal in Ho Municipality. They would serve as the source of gathering information and providing ways of addressing and achieving waste management in the communities.

Officers of Environmental Health Department of the Ho Municipal Assembly were managing wastes and sanitation issues before the introduction of the private wastes management services. The researcher therefore found necessary as one of the groups that would give credible information for this work. Currently, Zoomlion Company is the only private wastes management provider in Ho municipality. The researcher deemed it necessary as part of the population that would provide the relevant information for this work.

### **Sample and sampling procedure**

The population of the municipality has its unique features and always experienced growth in numbers over the years. The population of the Ho Municipality is about 108,788 at time of the study. However, the total sample for the study was 129 drawn from the municipality. These are made up of 89 households, 10 officers of Environment Health Department (EHD), 10 staff of Zoomlion Company and 20 market women. Ho Municipality has about 13 settlements which the researcher collected data from by randomly selected the households. Both purposive and simple random sampling employed for selection of target groups because the researcher needed specific issues and information for this work. The market women were selected according to what they sell to enable the researcher gather first information for the work. Both EHD and Zoomlion staff were selected according to their scheduled offices. Merriam (1998) notes that, purposive sampling emphasis criterion-based selection of information-rich case from which a researcher can discover understand and gain more insight on issues crucial for the study.

Interview schedules and interview guide were used. Interview schedules were administered to the households, EHD, and market women whilst interview guide was administered to the Zoomlion staff.

### **Sources of data**

The study was based on both primary and secondary data. Primary data were obtained from the market women, households in communities, Environmental Health Department and Zoomlion officers who formed the target groups and the secondary source of data included books, journals, reports and other relevant materials.

### **Data collection instruments**

The study used interview schedules and interview guide as instruments to collect data from the field (see Appendices). The instruments were put into various sections such as general issues, personal information, waste disposal practices and waste management services. The general issues sought to gather information on three most pressing issues faced by the Ho municipality including the one under study and their possible solutions to address them. The personal information presented socio-demographic characteristics of the respondents to ascertain sex, age, marital status and educational attainments. The other sections were structured according to the specific objectives of the study as well as the type of respondents who could provide the relevant data.

### **Pre-test of instruments**

The interview schedules were pre-tested with ten members of the study population at Ho Polytechnic to test the validity and reliability. This took two days to complete. The lessons from the pre-test helped to review the various types of interview schedules.

### **Field work**

The researcher administered the interview schedules to the target groups. The schedule interviews were conducted by the researcher who also recorded the views, opinions and suggestions of the market women. They were conducted in the local language since most of the market women could not express themselves well in English Language. The study also took the researcher to the Zoomlion Company Limited at Ho, the Ho Municipal Assembly, the Environmental Health Department, the Statistical Service and some waste dumping sites to gather data for the study.

This field work was conducted within Ho municipality and took about four weeks to complete.

### **Challenges during field work**

This study could have covered as many respondents in the municipality but only 129 interview schedules were administered to the study population. This was as a result of the location of target groups within the municipality. The most challenges faced during the field work were unavailability of some target group of the study and unwillingness to give information. For instance, the researcher visited the offices of Zoomlion Company and Environmental Health Department (EHD) for a number of times since most of them are field workers. Notwithstanding these challenges, granting interview to officers of these entities took a number visits to get the officers interviewed.

Another problem encountered from the field work was that some items of interview schedules were left uncompleted because some respondents were not ready to share information. The schedule interview conducted for the market women was challenging because the women were busy selling during the time of visit or they did not have time at all grant them the interview. Recording of the interview also posed problem since the interview was conducted in local language. Finally, the necessary data were collected and the researcher revisit those who were absent during the first visit.

### **Data processing and analysis**

Data collected from the field were analyzed qualitatively and quantitatively. Interview schedules were pre-coded before administered on the field. In order to

obtain quality data, the responses were filtered and cleaned to avoid discrepancies and inconsistencies. Interview schedules were scrutinized to verify clarity of expressions, legibility unanswered questions and other discrepancies.

Data were analyzed using Statistical Product and Service Solutions (SPSS) – Version 16. Tables, figures, frequencies and percentages were used to present the results. Based on this, the method of analysis was based on the deductive method.

## **CHAPTER FOUR**

### **RESULTS AND DISCUSSION**

#### **Introduction**

This chapter discusses the results of the study. Interview schedules were administered to 129 respondents and interview guide was used to collect data from the Zoomlion's Company manager. This chapter covers the socio-demographic characteristics of respondents, the most pressing issues in the municipality, sources and volume of waste generation, waste disposal practices and public-private partnership on waste management.

#### **Socio-demographic characteristics of respondents**

The socio-demographic characteristics of the respondents are presented in terms of sex, age, marital status and educational attainments. The representation is done in other to put the study in context.

Table 2 shows sex of respondents which were made up of 69.7 percent males 30.3 percent of females from different communities. Environmental Health Officers are 60 percent male and 40 percent females. Zoomlion Officers are 70 percent males and 30 percent females. All the 20 market women selected for the study were interviewed.

Table 3 shows age group of respondents made up of 41.8 percent for 21-30 years, 37.2 percent for 31-40 years, 16.3 percent for 41-50 and 4.7 percent for 51-60. This shows that, the majority of the respondents who handle waste management services are between the ages of 21-50 years.

**Table 2: Sex of respondents**

Respondents	Male		Females		Total	
	Freq	%	Freq	%	Freq	%
Household head	62	69.7	27	30.3	89	100
Officers of EHD	6	60.0	4	40.0	10	100
Staff of Zoomlion	7	70.0	3	30.0	10	100
Market women	0	00.0	20	100	20	100
Total	75	100	54	100	129	100

Source: Survey data (2011)

**Table 3: Ages of respondents**

Age group (years)	Frequency	Percent
21 – 30	54	41.8
31 – 40	48	37.2
41 – 50	21	16.3
51 – 60	4	4.7
Total	129	100

Source: Survey data (2012)

The data in Table 4 show the educational level of respondents. Fifty-five respondents representing 42.6 percent were degree holders and 33 (25.6%) of respondents were HND holders. Others made up of graduates from TTC, SRN, and School of Hygiene constituted 10.8 percent while Senior High School graduates represented 9.3 percent. In all, 102 (79%) of the respondents had attained tertiary education.



**Table 4: Educational level of respondents**

Level of Education	Frequency	Percent
Primary	2	1.6
Middle School	6	4.7
Junior High School	7	5.4
Senior High School	12	9.3
Higher National Diploma	33	25.6
Degree	55	42.6
Others	14	10.8
Total	129	100.0

Source: Survey data (2011)

#### **The most pressing issues in the Ho Municipality**

Table 5 explained how 129 respondents in Ho municipality gave the three most pressing issues in their respective areas and communities. However, responses are more than 129 because there were multiple responses. About 23 percent of the respondents reported poor road network with good drainage systems. Around 21.6 percent of the respondents mentioned poor sanitation and indiscriminate dumping of wastes. Fifteen percent of the respondents indicated inadequate public toilet facility in their communities. About 8.7 percent of the respondents reported inadequate refuse dump points and containers while 6.4 percent indicated lack of industries in the municipality. It was observed that, inadequate refuse dump points and inadequate waste containers in these areas have contributed to indiscriminate dumping of wastes in the municipality. Inadequate public toilet facilities and poor drainage system have also resulted in poor sanitation conditions in the municipality.

**Table 5: The three most pressing issues in Ho Municipality**

Issues	Frequency	Percent
Poor road network with poor drainage system	65	22.9
Poor sanitation and indiscriminate dumping of waste	45	21.6
Inadequate public toilet	45	15.0
Inadequate refuse dump/containers	26	8.7
Lack of industries	19	6.4
Frequent power outage	13	4.3
Inadequate Senior High School	13	4.3
Accommodation	11	3.7
Security and theft cases	10	3.3
Poor BECE results	8	2.7
Inadequate water supply	7	2.3
Unemployment	6	2.0
High cost of living	5	1.6
Bush fire	4	1.3
Total	296	100.0

Multiple responses; Sample size = 129

Source: Survey data (2011)

### **Sources and volume of waste generation**

Table 6 shows the volume of waste generated daily by the 129 respondents. This implies that, 1,011 cubic metres of wastes are generated daily in Ho municipality. To further explain and proof the data collected from the field as shown;

129 generate 2.64 cubic metres daily.

Number of households in the municipality estimated as 49,395

If 129 = 2.64 cubic metres,

Therefore  $49,395 = \xi \text{ m}^3$

$\xi = 49,395 \times 2.64$

129

Volume of wastes generated daily = 1,011 m<sup>3</sup>

**Table 6: Volume of waste generated in households**

Volume (34) Bucket	Frequency	Total no. of buckets (0.034m <sup>3</sup> )	Cubic	Metres
(m <sup>3</sup> )				
Bucket ( $\frac{1}{4}$ ) full	30	7.5	0.26	
Bucket ( $\frac{1}{2}$ ) full	53	26.5	0.90	
Bucket ( $\frac{3}{4}$ ) full	10	7.5	0.26	
Bucket full	36	36.0	1.22	
Total	129	77.5	2.64	

Source: Survey data (2011)

### **Waste disposal practices**

About 58.9 percent of the respondents reported that they dumped their wastes at public waste collection points while 26.3 percent disposed by burning. However, 1.6 percent either buried or dumped in the stream while 13.2 percent paid for the waste collectors.

**Table 7: Household waste disposal practices**

Disposal practices	Frequency	Percent
By dumping at waste collection point	76	58.9
By burning	34	26.3
By paying for the waste collectors	17	13.2
Others (buried, stream)	2	1.6
Total	129	100.0

Source: Survey data (2011)

**Table 8: Respondents' attitude towards waste disposal option**

Waste disposal option	VUF		UF		N		F		VF	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Open burning	61	55.9	30	27.6	11	10.0	3	2.8	4	3.7
Landfill	7	6.7	25	22.9	20	18.4	40	36.7	17	15.6
Recycling	11	10.1	4	3.7	10	9.2	30	27.5	54	49.5
Pay as you dump	19	17.4	31	28.4	16	14.7	29	26.6	14	12.8
Indiscriminate dumping	99	90.8	8	7.3	0	0.0	2	1.8	0	0.0

Key: VUF (very unfavourable), UF (unfavourable), N (neutral), F (favourable), VF (very favourable)

Source: Survey data (2011)

Open burning of wastes in the municipality is not the best option as 55.9 percent of the respondents reported that it was very unfavourable as shown in Table 8. Again, 27.6 percent indicated unfavourable because, open burning pollute the environment as the smoke (carbon dioxide) is emitted into the atmosphere causing harm to the ozone layer.

According to Chertow (1995), the uncontrolled burning of solid waste creates smoke and other air pollutants and may also release toxic heavy metals into the environment. Cunningham and Saigo (1997) also buttressed this with the problems associated with open burning that in Philippines, scavengers sort through the trash at “Smoky Mountain”, one of the huge metropolitan dumps in Manila where some 20,000 people live and work on these enormous garbage dumps. The health effects are tragic.

With regard to landfilling, 36.7 percent and 15.6 percent of the respondents reported favourable and very favourable respectively. Thus, the majority (52.3%) of the respondents indicated that, landfilling is a favourable waste management option. According to the World Bank (1998), the main environmental threat of a landfill is water pollution. A landfill should be sited where the geological and hydrological characteristics are least likely to allow impacts on groundwater or surface water. Craig (2000) also revealed that, 90 percent of domestic wastes in the UK go directly to landfill or dumping sites to be leveled and covered with earth. In landfill sites where toxic industrial wastes have been dumped indiscriminately, the land can become poisoned and unsafe for farming or building.

Recycling of waste is another waste disposal option. The majority (77%) of the respondents indicated that recycling was their favourable or very favourable option. However, about 14 percent of respondents reported either unfavourable or very unfavourable with recycling. Hoornweg et al (2005) revealed that, recycling is an important component of any integrated waste management system. Much of the waste stream can be recycled. Cunningham and Saigo (1997) also revealed that, recycling is usually a better alternative to either dumping or burning wastes.

It saves money, energy, raw materials and land space while also reducing pollution. According to Beigl (2003), an example of increase in recycling and consequent decrease of the amount of waste going for landfill, comes from Nova Scotia, Canada. In 1989, Canada set a target to half of the amount of MSW by the year 2000. As a result of a comprehensive Solid Waste Resource Management Strategy, Nova Scotia (641,575 tons in 2000) managed to reduce the waste sent to landfills and incinerators by 46 percent and increased recycling and composting.

The respondents in the municipality responded to a waste disposal option “Pay as you dump”. About 28.4 percent and 17.4 percent of the respondents indicated unfavourable and very unfavourable respectively with this option. Around 14.7 percent reported neutral with “pay as you dump”. Less than 29 percent of respondents were favourable with the option. Anomanyo (2004) recommended that, in considering the level of waste collection tariffs, a reasonable level of fees could be charged per household per month and these fees must be subject to gradual upwards review to achieve a cost recovery rate. ESCAP (2003) documents that, in the past the semi-annual assessment rates imposed by the local authorities included garbage collection. However, with privatization, householders and commercial property owners now have to pay a separate fee for solid waste collection. However, the issue of pay as you dump has to be treated with the utmost care as it has political-social implications (ESCAP, 2003).

Finally, the majority (90.8%) of the respondents were very unfavourable with indiscriminate dumping of waste and 7.3 percent also unfavourable (Table 8). However, 1.8 percent was in favour of the option. This means about 98 percent of the respondents disagreed that indiscriminate dumping is a favourable option.

About 62 percent of the respondents have toilet facility in their residents and 38 percent used public toilet (Table 9). The amount paid by respondents as 26 paid 10 pesewas per visit, two paid 15 pesewas, 16 paid 20 pesewas, two paid 30 pesewas and three paid 40 pesewas each per visit.

**Table 9: Toilet facilities in Ho Municipality**

Respondents	Frequency	Percent	Amount paid per visit (GHp)				
			10p	15p	20p	30p	40p
Toilet Facilities	80	62	0	0	0	0	0
Without Facilities	49	38	26	2	16	2	3
Total	129	100	26	2	16	2	3

Source: Survey data (2011)

Table 10 gave a number of toilet facilities in the Ho municipality. About 13 public toilet facilities are available to 38 percent (40,194) residents of the municipality. Thirty-eight percent represented the respondents without toilet facility (Table 9). It is therefore indicated that, the Ho municipality has inadequate public toilets which could contribute to the poor sanitation in the municipality. The sanitation situation in the municipality where an average number of 3098 residents used each of these 13 public toilets daily was not desirable.

**Table 10: Public toilet facility available in Ho Municipality**

Communities	Population	Toilet facility
Bankoe/Anlokodzi	12,798	3
Ahoe	7,625	1
Dome/Awatidome	10,496	2
Hliha	5,264	1
Heve	4,548	1
Housing/Tsiyikpota	10,765	1
Central Market	8,644	3
Fiave/Deme/Zongo	12,504	1
RTC/Police Down	6,491	–
Akpenamawu/Somey Down	8,907	–
Other Settlements	17,738	–
<b>Total</b>	<b>105,780</b>	<b>13</b>

Source: EHD and HMA on Sanitation (2010)

### **Effects of Public-Private Partnership on waste management**

Public-Private Partnership has been the effective and efficient towards service delivery and better management policy approach that many countries adapt for sustainable development. The private sector is the main actor that injects finance and expertise for growth in production and service delivery. The sector is more dynamic, resilient, creative, innovative and vibrant than the public sector (Ngowi, 2005). It is upon this that the study sought the views of the respondents on the preferred strategy for the municipality.



**Table 11: Strategies for improvement of waste management services**

Strategies	Frequency	Percent
Partial Privatization	36	33.0
Community Participation	31	28.4
Full Privatization	26	23.9
Solely Managed by EHD	16	14.7
Total	109	100.0

Source: Survey data (2011)

About 33 percent of the respondents preferred partial privatization of waste management services in the municipality while 28 percent were in favour of community participation (Table 11). However, 23.9 percent of the respondents indicated full participation and 14.7 percent reported solely managed by Environmental Health Department.

Owing to the rate at which waste is generated in the municipality, the government and other stakeholder in waste management must come out with the concerted strategies and efficient waste management programmes. This would help reduce some amount of wastes that engulfed Ho municipality. The case of Phitsanulok Municipality is rather interesting, especially when considering the trend for waste management these days is shifted towards privatization in order to improve efficiency (Panithan, 2003).

ESCAP (2009) and Panithan (2003) reiterated the privatization scheme those contractors have now been placed under management umbrella of Alam Flora Sdn Bhd. The company trains the contractors and provides them with modern technology to enable them to carry out their work professionally.

As a result of its economy of scale, Alam Flora Sdn Bhd is motivated to introduce up-to-date technology to this field of management. The work further revealed that privatization has resulted in better community services with a better work culture among the workers and the contractors, and the gradual introduction of modern technology into solid waste management, the service is becoming more reliable and there has been positive improvement. ESCAP adopted relevant policies and measures where privatization of waste management/garbage collection may seem to have an advantage edge over public services, because since Malaysia has adopted the privatization system, garbage collection standard and customer satisfaction have been raised.

Similarly, China's government is seeking to address the situation through tightening environmental regulations, increasing public investment, introducing "marketization" reforms, and encouraging private sector participation (PSP). It is hoped that operational, managerial, financial and legislative reform will improve the investment climate sufficiently enough to attract funding, technology and managerial expertise from the private sector (Hoornweg et al., 2005).

Information on whether the respondents were satisfied with the services provided by the current private management service provider is shown in Table 12. About 61.2 percent of the respondents were dissatisfied while 38.8 percent were satisfied with the services provided.

**Table 12: Satisfaction of the current private waste management service provider**

Satisfaction	Frequency	Percent
Satisfied	50	38.8
Dissatisfied	79	61.2
Total	129	100.0

Source: Survey data (2011)

The respondents who were dissatisfied gave the reasons that, the Zoomlion sweepers only sweep the street without cleaning the gutters, the gutters are chocked with water sachets rubbers and polythene bags, the service providers only concentrate their activities in the central areas, the sweepers gather the refuses at a point without collecting them to the dumping points and refuse containers are not emptied regularly and lack of proper supervision and monitoring by managers of waste collectors. Additional reasons were inadequate refuse containers, inadequate refuse dumping points (collection points) and inadequate logistics to manage waste collection.

For those who were satisfied gave reasons that, the service provider cleans the street regularly, provide containers at vantage points, collect refuse from house to house, and cleaned the gutters regularly. The coming of Zoomlion Company has reduced the mountains of refuse in the municipality and their services have helped to maintain clean environment.

The foregoing discussion shows that, the Zoomlion Company has made a significant improvement in waste management in the municipality but much more is needed to improve on waste management in all part of the municipality

Table 13 gives major logistical stand of Zoomlion Company in delivery of waste management services in Ho municipality. The municipality, as at 2009, has an estimated population of 105,780 with annual population growth at 14.4 percent in 32 km square area which generates waste over 120 cubic metres daily. This means that 28 refuse dumping (collection) points served 105,780 people in the municipality. Concerning the population of Ho municipality, Zoomlion Company is inadequately resourced to carry out any effective and efficient waste management service in the municipality. However, the Company is striving on inadequate resources to manage waste in the municipality.

**Table 13: Data on Waste Management in Ho Municipality by Zoomlion Company**

Resources and Logistics	Number
Number of refuse container for residential	500
Volume of wastes evacuated daily in cubic metres (m <sup>3</sup> )	120
Number of refuse collection points	28
Number of refuse containers for the public	28
Number of waste collection tricycles	25
Number of refuse trucks	4

Source: Zoomlion Company Limited, Ho (2012).

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

In this chapter, summary is made, conclusions are drawn, and recommendations are offered. Summary covers what the study set out to do, the methodology used to conduct the study and the main findings of the study.

#### Summary

The study set out to examine the effects of Public-Private Participation on waste management in the Ho Municipality. It was also to examine the possible measures that could be adapted for effective waste management system. It explored the roles played by the private sector for effective participation in the waste management sector.

The study covered 129 respondents made of market women, household heads, School and Institutions, Environmental Health Officers and Zoomlion Officers. These respondents consisted of 75 males and 54 females. About 102 respondents were degree and diploma holders which accounted for 89 percent. Both purposive and simple random sampling techniques were used to select the respondents. The main instruments used to gather data were interview schedules and interview guides. Tables, frequencies and percentages were used to analyse the data.

The main findings of the study were:

- The volume of waste generation in the Ho municipality was 1,011 cubic metres daily.

- About 58.9 percent of the respondents disposed waste at the public waste collection points and 27.9 percent either burned or buried whilst 13.2 percent pay as they dump waste.
- The main factor that contributed to ineffective waste management is indiscriminate dumping of waste in the municipality.
- There are only 13 public toilet facilities to about 40,194 people which also contributed to unsanitary environment within the municipality.
- About 23.9 percent of the respondents wanted full participation and 33.0 percent preferred partial privatization of waste management in the municipality which means that public-private partnership (PPP).
- Even though 56.9 percent of the respondents preferred PPP, they were dissatisfied of the services of the current private service provider.
- The respondents called for other private waste management service provider to participate so as to remove the monopoly for effective service delivery.
- The Ho Municipal Assembly as a matter of agency establish mechanized landfill because the current opened landfill site which produces stink and flies to the communities around the site.
- The Ho Municipal Assembly should introduce “Pay As You Dump” policy to serve as a source of revenue for waste management.
- Rules and regulations must be enforced and the Environment Health Officers should be empowered to carry out the task.

## **Conclusions**

It can be argued that the waste management in the municipality was relatively improved for the past few years. However, it was observed that, the daily waste collection has increased tremendously in the municipality as several factors have contributed to ineffective waste management services. These are attitudinal behaviour of people towards waste disposal, indiscriminate dumping of wastes in gutters, streets and undeveloped lands within the municipality.

Additionally, inadequate public waste disposal points, irregular collection of waste at the dumping points by service providers, inadequate waste containers (waste bins) in the municipality, insufficient waste collectors, lack of logistical needs like waste collection trucks, public waste containers and other basic equipments. It was found out that, only 500 residential waste containers were distributed in the municipality whilst 28 public waste containers are placed at vantage points in the municipality. It is worth noting that, the waste management service provider has only four waste (refuse) trucks to evacuate 120 cubic metres of wastes daily. This is one of the many factors that result in irregular collection on waste at the dumping points.

Most of the factors hindering the effective and efficient waste management service are attitudinal behaviours towards waste disposal, lack of logistics, lack of financial resource base, lack of qualified and motivated human resource base of service providers. More also lack of capacity building for long term planning to deal with disposal facilities. The respondents therefore suggested education and sensitization of people in the municipality, enforcement of rules and regulations by Environmental Health Officers, regular and adequate financing of waste

management services and establishment of compost recycling plant in the municipality. In conclusion, government cannot solely handle wastes management issues. It needs the collaborations of both public and private sector participation to put their expertise together to inject efficiency and sustainability of waste management systems.

### **Recommendations**

Based on the findings and conclusions of the study, the following recommendations are made:

- The Ho Municipal Assembly should provide more waste containers at vantage points of at least 300 metres interval along the streets and alleys.
- The Assembly should increase the public waste collection points from the current 28 to 50 new collection points to enable every community have access to a dumping point.
- The Zoomlion Company should provide more waste collection trucks and tricycles to evacuate waste containers on time to prevent overflow of waste at collection points.
- The Ho Municipal Assembly should build a recycle plant and mechanical landfill for the municipality.
- The “Pay As You Dump” policy should be enforced the Ho Municipal Assembly to cover all communities to generate more revenue to assembly.
- The Environmental Health Officers should intensify, sensitize and enforce the rule and regulations in the communities on proper waste disposal practices.



- More private waste management service providers must be contracted to remove the monopoly and inject competition, performance monitoring and accountability exist for efficiency in waste management service.

### **Suggested areas for further research**

The areas for further research are:

- The issue of changing the attitude of people towards indiscriminate dumping waste. This calls for a longitudinal study and should be introduced into the regular school curriculum at the basic education system.
- The problem of waste separation is a critical area for study where wastes could be sorted during disposal of refuse. This study may involve exploratory research which will develop an accurate picture of the research object.
- The issue of financing waste management services and the introduction of the Polluter Pay Policy. This may involve applied research, which is directly related to social and policy issues and aims at solving specific problems.

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**APPENDIX A**

**INTERVIEW SCHEDULE FOR HOUSEHOLD HEADS AND OFFICER OF ENVIRONMENT HEALTH DEPARTMENT**

The objective of the survey is to assess the effects of PPP on waste management in Ho Municipality and to see how best private waste management companies can improve and ensure proper waste management services in Ho municipality. We wish to solicit your participation knowing well that the study will be relevant to improve waste management in the Ho municipality. We assure you that the information you provide would be treated confidentially. Also the findings and recommendations arising from the study would be shared with the concern people in the municipality.

**Section A: General Issues**

1. What are the three most pressing issues facing Ho municipality? Please state them in order of priority.

(i) .....

(ii).....

(iii).....

2. What is the municipality doing to address the issues?

.....

3. What do you think should be done to address these issues?

.....

.....

**Section B: Personal Information**

Please, indicate your responses as accurately as possible.

Type of respondents: Household  Zoomlion Company  Officer of EHD

4. Sex  Male  Female

5. Age (years).....

6. Highest Education attained

(i) Primary  (ii) Middle School  (iii) JHS  (iv) SHS  (v) TTC

(vi) HND  (vii) Degree  Other (specify).....

7. How long have you lived in the Ho municipality? .....(years).

8. What is your current marital status?

(i) Married  (ii) Divorced  (iii) Single  (iv) Widow  (v) Co-habitation

9. What is your occupation/profession?

(i) Student  (ii) Public/Civic Servant  (iii) Artisan/Self Employed

(iv) Unemployed  (v) Other (specify).....

**Section C: Perception of Waste Disposal Practice**

10. Are you satisfied with the current waste management practice in Ho municipality?

(i) Yes (ii) No

11. If yes, how do you perceive the management of waste in the municipality?

(i) Extremely serious (iv) Not at all serious

(ii) Quite serious (v) Don't Know/No option

(iii) Slightly serious

12. If your answer to question 11 is option (i) or (ii) above, what do you think might

be the contributing factors?.....

.....

13. To what extent have you personally given a thought of waste disposal problem in your community?

- (i) Very high degree
- (ii) Fairly high degree
- (iii) Only somewhat
- (iv) Not at all

14. How do you expect the waste disposal issue to be in Ho municipality with in the Next five years? (i) More serious (ii) The same (iii) Less serious

- (iv) Don'tknow/ No option

15. Listed in the table below are various waste management options. I would like you to find out your attitude towards each option. Please, indicate by circling the number on the scale that corresponds to your feeling.

Options	VUF	UF	N	F	VF
Open burning	1	2	3	4	5
Landfilling	1	2	3	4	5
Recycling	1	2	3	4	5
Pay as you dump	1	2	3	4	5
Indiscriminate dump	1	2	3	4	5

Key: VUF = Very unfavourable

UF = Unfavourable

N = Neutral

F = Favourable

VF = Very favourable



16. How do you dispose off the refuse collected in your household?

- (i) by burning (ii) by dumping indiscriminately
- (iii) by dumping at waste collection point
- (iv) by paying for waste (refuse) collectors
- (v) Other (specify).....

17. If you pay for waste (refuse) collectors, are you satisfied with the services provided? (i) Yes (ii) No

If No, give reasons.....

18. What is the volume (0.034 m<sup>3</sup> per bucket) of waste generated daily in your household?

- (i) ~~¼~~ (34) bucket (ii) ~~½~~ (34) bucket (iii) ~~¾~~ (34) bucket (iv) 1 (34) bucket

19. How often is your household refuse container emptied?

- (i) Once a day (ii) Twice a day (iii) Once a week (iv) When full

20. Are you prepared to pay more for improved service? (i) Yes (ii) No

21. If you dispose off refuse indiscriminately, what accounts for this practice?

- (i) Inability to pay for fee charged.
- (ii) Absence of refuse Transfer Station in your area.
- (iii) Other (specified) .....

22. Do you have toilet facility in your house? (i) Yes (ii) No

23. If you don't have a toilet in your house which of the following practices do you engage in? (i) Patronize public toilet (ii) Open defecation

- (iii) Use the chamber pot which is later emptied

(iv) Use black polythene bag

24. If open defecation, indicate where.

- (i) Nearby bush      (ii) Refuse dump site      (iii) Drains/Gutters

25. If you patronize public toilet, how much do you pay?

GH¢ .....

26. Are you satisfied with the service provided in the public toilet?

- (i) Yes      (ii) No

**Section D: Information on Waste Management Services**

27. Which of the following would you choose as a strategy for the improvement in the provision of waste management services?

- (i) Full privatization of the waste management functions in the municipality  
(ii) Partial privatization  
(iii) Solely managed by Environmental Health Department  
(iv) Community participation

28. Are you satisfied with the services of the current private waste management provider in Ho municipality?      (i) Satisfied      (ii) Dissatisfied

29. What are your reasons?

.....  
.....

30. What other ways will you suggest to improve waste management services in Ho municipality?.....

.....

31. Do you know of any rules or regulations concerning waste disposal?

(i) Yes            (ii) No

If        Yes,        who        enforces        these        rules        or  
regulations?.....

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32. What sanctions are prescribed for any breach of these rules or regulations?

.....  
.

33. Please, give some suggestions and recommendations for effective waste  
management services in Ho municipality.

Suggestions.....

.....  
.....

Recommendations.....

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

**THANK YOU** for cooperating with us on this issue. The information obtained  
would be shared with you.

**APPENDIX B**

**INTERVIEW SCHEDULE FOR MARKET WOMEN**

This interview schedule has been designed to collect information on Market Women in Ho Municipality. The main purpose of the study is to write a dissertation to UCC as partial fulfillment of the requirements for the award of a Master of Arts Degree in EMP. Your cooperation as a respondent is highly solicited in making this research a success.

Module 1: Background of Respondent

1. Sex: Male [ ] Female [ ]
2. Age: [ ] years
3. Occupation: .....
4. Marital Status: Married, Single, Widow, Divorced
5. Educational Background: Primary, Middle School, JHS, SHS, TTC, SRN, HND, Degree.

Module 2: General Issues

1. What are the most pressing issues in your area?
  - a .....
  - b .....
  - c .....
2. What is the Ho Municipality doing to address these issues?  
.....  
.....  
.....

Module 3: Perception of Waste Disposal Practice

1. What is volume (0.034m<sup>3</sup> per bucket) of wastes generated daily in your household?

$\frac{1}{4}$ (34) bucket       $\frac{1}{2}$ (34) bucket       $\frac{3}{4}$ (34) bucket      1(34) bucket

2. How do you dispose off your wastes in the house and market?

a. House .....

b. Market .....

3. Do you have waste (refuse) collection point in your area? Yes or No.

If Yes, how often is the container emptied?

.....

4. Do you pay for dumping waste at collection point? Yes or No.

If Yes, how much do you pay? .....

If No, how much do you suggest? .....

5. Do you have toilet in your house? Yes or No.

If No, which toilet facility do you attend and how much do you pay?

.....

Module 4: Waste Management Services

1. Who is responsible for collection of waste (refuse) in Ho Municipality?

.....

2. Are you satisfied with the services provided?

If Yes or No. Please give reasons

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

3. Do you know of any rules and regulations concerning waste disposal in the Municipality? Yes or No. If No, what do you suggest?

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

4. Generally, what do you suggest to improve on current waste management services provider in the municipality?

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

Thank you for shearing this information with me.

## **APPENDIX C**

### **INTERVIEW GUIDE FOR HO MUNICIPAL WASTE MANAGER OF ZOOMLION COMPANY LIMITED**

I will be very grateful if you allow me to grant a short interview to gather some information on waste management services in the Ho Municipality.

1. How many waste collection points are located in the municipality?
2. How many public waste containers are placed in these collection points?
3. What is the capacity or volume of one container in cubic metre?
4. How many private waste containers distributed to individual residents in the Ho municipality?
5. How many waste (refuse) trucks that transport waste in the municipality?
6. How many tricycle waste collectors are deployed in the municipality?