A COST BENEFIT ANALYSIS OF PAY AS YOU DUMP WASTE MANAGEMENT PROGRAMME BY THE KUMASI METROPOLITAN ASSEMBLY

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DECLARATION

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

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DEDICATION

I dedicate this piece of academic excellence to the Glory of God and to the memory of my father Albert Kofi Darku, my wife Charlotte, my children Xorse, Aseye and Klenan and my mum Mad. Justine Mana Kodjo, my siblings Elias, Eric and Phil whose understanding and encouragement has brought me this far.

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ABSTRACT

. This study generally sought to examine the cost benefit analysis of the pay as you dump waste management program practiced by the Kumasi Metropolitan Assembly (KMA). The research method used was descriptive. The population of households within the Asokwa Metropolitan area is estimated at 140,161. Out of this number, 200 households were sampled in addition to 4 waste collectors. Both primary and secondary sources of data were harnessed for the study. The main sampling technique used was cluster and purposive sampling. In ascertaining the effects of pay as you dump on household waste generation, the results indicated that, pay as you dump policy forced households to reduce volume of waste generated. The study also found that, lack of waste segregation on the part of households was a major challenge for waste collectors in addition to the fact that huge proportions of plastic waste form part of the total waste generated and collected. Poor Street naming in the community was also identified as a challenge. In view of the above, it is recommended that, District Assemblies ensure transparency in the way revenue generated from pay as you dump system is used. There is also the need for strict enforcement of by-laws on sanitation to compel households to change their attitude. Even though, the National Sanitation Day exercise is a good initiative, it would lose its value if people are not educated on the need to clean their immediate environs.

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

Waste generation is associated with our day-to-day activities and its disposal. It is a common practice found universally around human settlement. Management of these generated wastes is one of the main problems for authorities all over the world. Rapid population growth, increasing urbanization, fast development of infrastructure, changing lifestyle and economic conditions increased the waste generation rate. The composition and volume largely depend on consumption patterns and the industrial and economic structures in place. Along with these conditions, rising costs and increasing public awareness exerts more pressure on the limited resources of the municipalities for waste management (Mensah, 2006). Municipal solid waste (MSW) also known as urban solid waste or garbage or trash includes discarded materials like paper, plastic, cans, glass, metals, dirt, ash, carcasses, etc., and usually collected by local government authorities. Municipal solid waste management (MSWM) involves activities associated with six basic principles of waste generation, storage, collection, transfer and transport, processing and disposal (Robinson, 1986). However, in most cities, the MSWM system comprises only four activities, i.e. waste generation, collection, transportation and disposal (Sharholy et al., 2007).

Studies show that most municipalities in developing countries spend a large proportion of their budgets on the collection, transport and disposal of solid waste. According to Cointreau (1984), in most cities in developing countries, municipal SWM costs consume 20-50% of municipal revenues yet collection service levels remain low with only 50-70% of residents receiving services and most disposals being unsafe. This deplorable situation is not different in the urban areas of Ghana such

as Accra, Tema, Cape Coast, Kumasi, Tamale and Sekondi-Takoradi. Based on an estimated population of 24 million and an average daily waste generation per capita of

0.45kg, Ghana generates annually about 3.0 million tonnes of solid waste. Accra, the capital and Kumasi, the second largest city combined have a population of about 4 million and a floating population of about 2.5 million that generates over 3,000 tonnes of solid waste daily. It is however, estimated that throughout the country only about 10 percent of solid waste generated is properly disposed-off (Mensah & Larbi, 2005). In Accra, for example, only 11 percent of the 1.4 million residents benefit from home collection (Songsore, 1992), while the remaining 89 percent dispose-off their waste at community dumps, open spaces, in water bodies and in storm draining channels (Asomani-Bonteng & Haight, 2004). Indeed, environmental damage not only results from the amount of waste generated but also from the way the waste are disposed (Choe and Fraser, 1999). Uncollected waste in the street causes bad smell, drain blockage, invites scavengers, general public nuisance and become good breeding site for insects. The problem of municipal waste management is high in many underdeveloped African countries due to lack of awareness, education, resources, technology and finance which has resulted in open dumping, low collection and uncontrolled incineration of waste.

Establishing effective municipal solid waste management should be a priority for emerging cities, given their crucial role in protecting public health and the environment. However, in the past, most attempts by cities to improve solid waste management focused on the different technical means of collection and disposal (World Bank 1992; Altaf and Deshazo 1996; Medina 2002). More recently, government has begun paying more attention to enhancing municipal systems and sustainable solid-waste service delivery, with special emphasis on involving the private sector. One of these systems include the introduction of the pay as you dump by the Kumasi Metropolitan Assembly.

By this system, each person generating and disposing solid waste in the metropolis pays an amount of money. At the end of each day, the waste contracting companies obtain quite an amount of money through the pay as you dispose waste strategy. This amount then reduces substantially the amount paid by KMA to the contractors thereby reducing the direct expenses incurred by KMA. Surprisingly, there are still heaps of solid wastes in several locations in the Kumasi Metrpolis and indeed the effect of revenue mobilization through this strategy is not felt. This study explores the cost-benefit analysis of pay as you dump waste management programme by the Kumasi Metropolitan Assembly (KMA).

1.1 Problem statement

According to the United Nations Environment Programme (UNEP, 2004), solid waste generation is an increasing global environmental and public health problem. Due to lack of appropriate planning, inadequate governance, resource constraint and ineffective management of solid waste especially insufficient collection and improper disposal is a major concern for many rapidly growing cities in developing countries (Chuen-Khee and Othman 2010; Medina 2010). The quantum of waste generated and the lack of proper urban planning has resulted in serious financial, management and technical problems in waste management. The resultant effect is that budget constraints have made Metropolitan, Municipal and District Assemblies (MMDA‘s) unable to meet the cost of managing the ever increasing volumes of waste. The Kumasi Metropolitan Assembly (KMA) in particular has for a long time been grappling with the problem of waste management in the metropolis. Even though waste management alone takes about 17% of the capital expenditure of KMA, people in Kumasi are deeply engulfed in waste. As a result,

KMA now adopts a new strategy to deal with the waste management problem which is the pay as you dispose waste strategy. This study therefore looks at the cost benefit analysis of the pay as you dump waste management program by the Kumasi Metropolitan Assembly (KMA).

1.2 Research Objectives

The study generally sought to examine the cost benefit analysis of the pay as you dump waste management program practiced by the Kumasi Metropolitan Assembly (KMA). The specific objectives include:

1. To assess household perception about pay as you dump programme
2. To analyze the effect of pay as you dump on household waste generation.
3. To explore the cost associated with pay as you dump system by KMA
4. To explore the benefits associated with pay as you dump system
5. To identify social and political challenges that have the potential of hampering the effective implementation of the pay as you dump policy of waste management.

1.3 Research Questions

The following research questions were designed to guide the study:

1. What is the perception of households about pay as you dump programme?
2. What is the effect of pay as you dump on household waste generation?
3. What is the cost associated with pay as you dump system by KMA?
4. What benefits are associated with pay as you dump system?

5. What social and political challenges hinder the effective implementation of the pay as you dump policy of waste management?

1.4 Significance of the study

Municipal waste problem is frequently discussed and it has become one of the topical issues in urban management. The issue of waste management is predicted to be more complex and challenging in the future due to the tremendous growth in urban population and their consumption patterns. In line with this, the research expects that the findings of this study would help address waste management issues which have consumed a chunk of government resources that could have been channeled to other sectors of the economy. This research is also expected to promote proper waste disposal and recycling on the part of waste collectors. Again, households and communities would be compelled to reduce the volume of waste generated and to further encourage attitudinal change. It is also expected that the findings would provide rich information regarding the pay as you dump policy being implemented by the KMA. There is also no doubt the study would contribute to existing work in the waste management and the cost implication which happens to be the focus of the study.

1.5 Scope of the study

The study covered selected households within the Asokwa-Sub Metropolis. It also includes the waste management practices by KMA. The focus was on the cash generation relative to pay as you dump system. A considerable part of the study also looked at empirical economic benefit of the pay as you dump system. In the area of theoretical scope the study reviewed waste management literature from the developing economy perspective. Attempts were also made to examine models and approaches used by previous researchers. The researcher also extended the scope to include

some private waste management organisations which partner the KMA in ensuring the city is kept clean. The intent was to analyse the payment and charges of these outsourced waste management partners.

1.6 Organization of the study

The study is organized into five chapters. Chapter one presented the general introduction, the problem statement, the objectives, the research questions, justification, the scope and limitations of the study. The Second chapter reviewed existing literature that primarily dealt with discussions and review of literature related to the concepts of the research. The conceptual framework of the topic was also discussed in this chapter. Chapter three presented the research methodology. It contains research design, population, sample size, discussion of validity and reliability issues and the method of data analysis. The Fourth chapter comprised compilation, analyses of data and discussions. Chapter five presents the summary and concise highlight of the various findings of the study and the conclusions of the researcher. Appropriate recommendations were made in this chapter based on the research findings.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Studies on solid waste management in Ghana, especially those involving cost benefit analysis of pay as you dump system are scanty. In this section, the researcher looks at a review of the broader literature, particularly studies in other developing countries that look at the demand for improved waste management practices using contingent valuation technique. First, we look at waste management problems facing Ghana and many developing economies. Next is to look at theories and approaches to managing waste whilst the final parts would be devoted to waste management challenges and empirical review on the subject area.

2.1 Definitions of Waste and Related Concepts

In the past, the term waste was mistakenly held to be synonymous with solid waste, ignoring the broader perspective. As a result, it has not been possible to define the term waste accurately owing to this broad spectrum of waste and its heterogeneous character. However, from a systems point of view, the term waste may be defined as any unnecessary input to or any undesirable output from any system (Freduah, 2004). This includes waste of all types of resource: material, energy, manpower, capital, services, etc. Waste is a relative term which depends upon input requirement, present technology and the definition of system boundaries. The waste for a subsystem may or may not be waste for the whole system; it may act as a resource to other subsystems. Considering the characteristics of waste, it can alternatively be visualized as any lost, idle, over consumed or unutilized (non-recoverable) resource available to the system and the auxiliary output from the system which may or may not be directly usable or disposable and may or may not create environmental pollution and other ecological disturbances is termed as waste (Gourlay, 1992).

2.2 Sources of Solid Waste

The term solid waste has been defined differently by various authors. Solid waste is any material that arises from human and animal activities that are normally discarded as useless or unwanted (Tchobanoglous et al, 1993). According to Zerbock (2003), solid waste includes non-hazardous industrial, commercial and domestic waste including: household organic trash; street sweepings; institutional garbage and construction wastes. The Ghana Innovation Market Place (2009) popularly known as _GIM` defines solid waste as either waste water discharges or atmospheric emissions, arising from domestic, commercial, industrial and institutional activities in an urban area. Operationally, it can therefore be said that, solid waste is any material which comes from domestic, commercial and industrial sources arising from human activities which has no value to people who possess it and is discarded as useless.

With respect to the different functional elements of waste management, waste management may be conceptualized as the discipline associated with the identification, reduction, storage, collection, transfer and transport, reuse and recycling and effective treatment and disposal of waste. This is done in a manner that is in accordance with the best principles of management, economics, engineering, public health, conservation, aesthetics and other environmental conditions, including all administrative, financial, legal, planning and engineering functions involved in the whole spectrum of solutions to the problem of waste. This may involve interdisciplinary relationships among various fields such as management, sociology, economics, political science, geography, city and regional planning, demography, public health, conservation, ecology, environmental sciences, material science, engineering, etc. Using a broader perspective, waste management is defined as a multidisciplinary activity involving engineering principles, urban and regional

planning, management techniques and social sciences to economically minimize the overall activity of the system under consideration.

Tchobanoglous et al (1993), classified types of solid waste in relation to the sources and generation facilities, activities or locations associated with each type. Tchobanoglous et al (1993) has further explained the types of solid waste which include food waste, rubbish, ashes and residues and special waste. Household solid waste include plastics, paper, glass, textiles, cellophane, metals and some hazardous waste from household products such as paints, garden pesticides, pharmaceuticals, fluorescent tubes, personal care products, batteries containing heavy metals and discarded wood treated with dangerous substances (White and Franke, 1995). These are further explained below.

Food wastes are all the animal, plant or vegetable residues resulting from the handling, preparation, cooking and eating of foods (also called garbage). The most important characteristics of these wastes are that they are highly putrescible and will decompose rapidly, especially in warm weather. Often, decomposition will lead to the development of offensive odors. In many locations, the putrescible nature of these wastes will significantly influence the design and operations of solid waste collection.

Rubbish consists of combustible and non- combustible solid waste of households, institutions and commercial activities. This excludes food wastes or other highly putrescible materials.
Typically, combustible rubbish consists of materials such as paper, cardboard, plastics, textiles, rubber, leather, wood, furniture and garden trimmings. Non-combustible rubbish consists of glass, tin cans, aluminium cans, ferrous and other non-ferrous metals and dirt.

Ashes and Residues are materials remaining from the burning of wood, coal and other combustible wastes in homes, stores, institutions, industrial and municipal facilities for purposes of heating, cooking and disposing of combustible wastes. These are referred to as ashes and residues.

Special waste includes street sweepings, roadside litter, litter from municipal containers, catchbasin debris, dead animals and abandoned vehicles. The Centre for Environment and Development (2003) has also classified types of solid waste based on origin (food waste, rubbish, ashes and residues, demolition and construction, agriculture waste), based on characteristics (biodegradable and non-biodegradable), based on the risk potential (hazardous waste). The Centre also enumerated sources of solid waste as residential, waste from shops, commercials establishment, hotels/restaurants/eating stalls, slaughter houses and others. This has confirmed the sources and types of solid waste outlined by Tchobanoglous et al (1993). Based on the types of solid waste enumerated by Tchobanoglous et al (1993) and the Centre for Environment and Development (2003), it can be said that types of solid waste include the following: food waste, rubbish, ashes and residues, demolition and construction and agriculture waste. The sources of solid waste also include domestic, commercial and industrial.

2.3 Waste Management Concept

Solid Waste Management (SWM) has become a major public health problem in developing countries especially in urban centers. The public sector, in these nations, is unable to deliver adequate waste management services. Regulations and policies are also outdated and monitoring and enforcement is severely lacking. This has resulted in the illegal dumping of residential,

commercial and industrial waste being common practice (UNEP, 2005). Generally, solid waste management have been given low priority in developing countries and as a result very limited financial and human resources are attached to the government agencies responsible for its proper management. As a consequence, holistic SWM service is not provided resulting in significant dis-amenities to people and the environment. The problems are even more acute at the local government level where the local taxation system is inadequately developed resulting in a weak financial base to provide adequate services. The changing lifestyle of citizens in developing countries continues to compound this already perilous situation as the waste management system in developing countries are incapable of frequent adjustment to these changes. More than 80% of the total waste management costs in low-income countries are collection costs (World Bank, 1999).

In Latin America, the cost of waste collection is about 46% of the total municipal solid waste management cost (UNEP, 2005). Per capita waste generation in this region averages 0.91 kg per day whereas in developed nations, such as the U.S., per capita waste generation stands at 2.02 kg per day. In other industrialized nation such as France and Japan, daily per capita waste generations is around 1.29kg and 1.12 kg, respectively (PAHO, 2005). According to ECLAC (2009) in Latin America and the Caribbean, on average, only 23% of waste is disposed of in sanitary landfills. In addition, of the over 369,000 tons of waste collected on a daily basis over 74% ends up being disposed off indiscriminately in the environment. This poses a serious environmental and public health problem since open dumps continue to proliferate. Conventionally, these low income countries have financed solid waste management services through general revenues or attempted to charge for the service through inefficient property tax as is the case of the study site to which this research is being applied.

2.4 Waste Management Theories

This section looks at three related theories in understanding the behaviour of people when it comes to waste management. Theories discussed included Schwartz's norm activation theory (Schultz & Zelezny, 1998); the theory of reasoned action based on the studies by management researchers that have successfully included attitude and norm components in their analyses of environmental management practices (Cordano & Frieze, 2000; Flannery & May, 2000); and the values-beliefs-norms model (Stern et al. 1999).

2.4.1 Theory of Reasoned Action

The theory of reasoned action contains two variables, attitudes and subjective norms that determine behavioral intention, which leads to behavior. Attitudes toward a behavior measure a person's evaluation of a specific behavior. These attitudes are determined by a person's beliefs about the consequences resulting from the performance of a behavior and the person's affective response to those consequences. The theory of reasoned action proposes that a person's intention to perform a behavior will increase as his or her attitudes toward a behavior become more favorable. The subjective norms variable adds a social component to the theory of planned behavior. It measures the perceived social pressure to perform or not to perform a behavior (Bagozzi, 1992).

Subjective norms are a function of a person's perception of important referents' evaluation of a behavior and a person's motivation to conform to those evaluations. According to the theory of reasoned action, a person's intention to perform a behavior will increase as subjective norms toward a behavior become more favorable. Some researchers have successfully applied the enhanced version of the theory of reasoned action that Ajzen (1991) labeled the theory of planned behavior to single culture pro-environmental behavior (Boldero, 1995; Oom Do Valle, et al. 2005;

Taylor & Todd, 1997) and to cross-cultural pro-environmental behavior (Oreg & KatzGerro, 2006). The theory of reasoned action preceded the theory of planned behavior and is different from the theory of planned behavior only by the addition of the perceived behavioral control variable.

2.4.2 Norm Activation

Schwartz originally outlined the norm activation model in the late 1960s (1968) and then made some refinements to this model in a series of articles in the 1970s (1970, 1973, 1977). In an earlier article about changing attitudes toward environmental issues, Heberlein (1972) suggested that Schwartz‘s norm activation model would provide a good foundation for investigating proenvironmental behaviors such as recycling and conserving energy because Schwartz‘s model was intended to investigate pro-social behaviors.

Schwartz poses three antecedents of pro-social behavior. These three antecedents are awareness of consequences, ascription of responsibility and personal norms. The model is labeled norm activation because it argues that an awareness of potentially harmful consequences and ascription of personal responsibility activate personal norms that determine whether a person should act to intervene to prevent harmful outcomes. The model is a theory of intervention behaviors. It only applies when processes or events are already in place that someone believes will lead to harmful consequences for others or others and oneself collectively. Schwartz originally called his model a theory of altruism because it focuses on behaviors in which the motivation is not apparent selfinterest.

The logic of Schwartz‘s theory revolves around the intensity of the awareness of consequences and acceptance of responsibility components and the content of an individual‘s norms. The theory contends that as the salience or intensity of awareness of consequences and acceptance of

responsibility increases, the likelihood that personal norms will be evoked increases. If the content of a person‘s norms prescribes action, then a person will act to prevent the expected harmful consequences. Schwartz noted that this process need not be a deliberate calculus but might be quite spontaneous if the situation is of high enough intensity and the individual‘s norms are strong and prescribe behavior.

Although some earlier research examining pro-environmental behaviors such as recycling did apply elements of Schwartz‘s norm activation model (Heberlein & Black, 1976), it was not until the mid-1980s that the model began to be successfully applied more extensively in a series of studies that examined pro-environmental behavior (Black et al. 1985; Guagnano et al. 1995; Hopper & Nielson, 1991; Stern et al. 1995; Vining & Ebreo, 1992). Recent studies have underlined the utility of the norm activation model in predicting pro-environmental behaviors such as recycling (Oom Do Valle et al., 2005) and travel-mode choice (Wall et al., 2007).

2.4.3 Values-Based Approaches

Approaches focusing on values are premised on the assumption that individuals‘ values influence their behavior, either directly or through attitudes and beliefs. Values are defined as ―desirable trans-situational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity‖ (Schwartz, 1994, p. 21). Schwartz‘s (1992) scale of values is commonly used for studies of pro-environmental behavior. Schwartz‘s values scale draws from Rokeach‘s (1973) values survey instrument and the Kahle‘s list of values (1983). Some values have consistently been found to be related to pro-environmental behaviors such as recycling (Seligman et al., 1994; Thogersen, 1997).

Rokeach postulated that, once formed, values are stable throughout life. He created a widely used value survey instrument to measure a comprehensive list of individual values. Rokeach‘s value

survey did not explicitly include environmental values but did include the terminal values labeled ―a world of beauty‖ and ―a comfortable life.‖ Simmons et al. (1992) added ―a clean environment‖ to Rokeach‘s scale and found that ―a clean environment‖ was part of other values and was not an independent value. Other studies using Rokeach‘s scale found links to particular value clusters and pro-environmental behavior. For instance, Dunlap et al. (1983) organized Rokeach‘s values by Maslow‘s hierarchy of needs and found that those who recycle tended to seek higher order needs than those who did not recycle. Schwartz‘s (1992) model builds on Rokeach‘s scale.

Schwartz‘s scale of values includes two dimensions, with one continuum spanning ―selfenhancement‖ and ―self-transcendence.‖ This dimension . . . arrays values in terms of the extent to which they motivate people to enhance their own personal interests (even at the expense of others) versus the extent to which they motivate people to transcend selfish concerns and promote the welfare of others, close and distant, and of nature (Schwartz, 1992, p. 43). The second dimension spans ―openness to change‖ through ―conservative approach to change.‖

―Openness to change‖ is associated with ―self-direction‖ and ―stimulation.‖ Both value dimensions and types are hypothesized to influence specific pro-environmental behaviors.

Schwartz‘s model has offered mixed results. Using a subset of Schwartz‘s scale, Stern and Dietz (1994) found a positive relationship between self-transcendence and willingness to engage in environmental political action. Karp (1996) tested Schwartz‘s complete scale and found that individuals valuing ―self-transcendence‖ and ―openness to change‖ were positively related to pro-environmental behavior and that those who valued ―self-enhancement‖ and ―conservatism‖ were negatively related to pro-environmental behavior. Stern et al. (1995) also found a relationship between high ―self-transcendence‖ and pro-environmental behavior. Thogersen and

Grunert-Beckmann (1997) also examined the relationship between Schwartz's value scale and environmental behavior, finding support for the association.

2.5 Pay as You Dump System

Often solid waste management service is perceived as a free service by residents, as the costs are covered by property taxes or flat monthly fees. As a result, residents produce varied volumes of garbage with little motivation for recycling or composting as they incur no additional costs (US EPA, 1994). SWM service however is a costly service and in many cases borne by city governments. Traditionally, in many countries a fixed fee is charged for solid waste management services generally disjointed from volume, weight or type of waste being disposed. As a result, the costs or reward to them for reducing the volume of waste disposed is zero (Repetto et al. 1992)

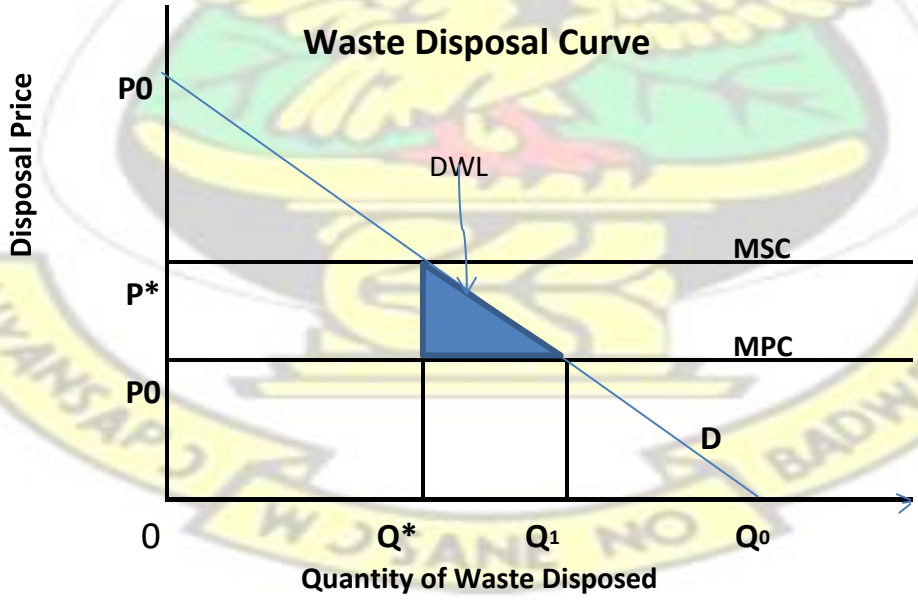

Figure 2.1 Waste Disposal Curve

Source: Repetto et al (1992)

Figure 2.1 shows a demand curve for a residential solid waste service where MSC is the marginal social costs, MPC is the marginal private costs, Q is the quantity of waste produce and P is the price of Solid Waste Services. The figure shows that the demand for solid waste services decreases as city governments implement a program to pass the private costs of solid waste management services, P*. Households will produce high levels of waste when they are not charged based on how much waste they produce, Q_1 With a payment (PAYD) program less household waste is produced Q*. As the program considers social and environmental costs, P**, households considers efficiency, recycling and composting and further decrease the amount of household waste produced, Q** (Kinnaman and Fullterton 2000, Feicock 1996, Folz 1991).

In a similar fashion in which utility companies charge their customers a flat monthly administrative fee for access to a service and additional fees based on the amount of service consumed, PAYD is a mechanism for city governments to charge residents for solid waste collection services based on the amount of waste produced for collection. Furthermore, unitbased-pricing or PAYD is a mechanism that has been used by developed countries to meet the costs of solid waste management as well as serve as an incentive for recycling and reducing the amount of household wastes. PAYD takes into account variations in waste generation rates by charging households or residents based on the amount of trash they place at the curb or take to a drop-off site, thereby offering individuals an incentive to reduce the amount of waste they generate and dispose (Skumatz 1996).

There are three main ways cities may implement a variable fee policy. Customers may be required to purchase for a certain price approved bags, tags or stickers that residents use or affix to the containers set out at the curb. The advantage of this strategy is that it eliminates the need for a billing system. Cities also may use unit pricing for different levels of subscription service. Customers subscribe to a waste collection service level that varies in price based on the number or size of cans/containers used. Finally, collection crews may actually weigh the solid waste disposed at the curb and charge customers based on these data (Folz, 1999).

2.5.1 Cost Benefit Analysis (CBA) of Pay as you Dump

With development projects having potentially global impacts even more so evident with the impacts of global climate change; policy makers, environmentalists, investors and the general citizenry is taking an increasing role in invigilating these effects and their impact to the environment. Cost-benefit analysis (CBA) was designed as a tool providing stakeholders with a consistent basis for decision making. CBA provides the arena for discipline, accountability and transparency in the decision making progress. The United Nations Environmental Program (UNEP) defines CBA as a tool which provides a framework for identifying, quantifying and comparing the costs and benefits for a proposed policy (UNEPSCS, 2012). CBA is mainly concerned with efficiency in allocation of economic resources by comparing gains and losses associated with an investment project or with a policy. These gains and losses are defined in terms of increments in human welfare and is measured in individuals willingness to pay (WTP) for a gain, to avoid a loss or to accept compensation or benefit gains (Pearce, 1998).

2.5.2 Key Elements of CBA

CBA assess the feasibility of a project by looking at the cost and benefit i.e. the project is feasible if the benefit outweighs the cost. To allow a comparison between alternative options, benefits and

costs are valued in a consistent manner using cedi values. Furthermore, not only do the benefits and costs of a project have to be expressed in terms of equivalent money values, but they have to be expressed in terms of money at a particular time. These future costs and benefits are therefore, discounted to reflect present worth. The analysis of a project should include the _without-project' option or the ―status quo‖. Status quo options provides an idea of the future situation should no interventions be made. With the identification of streams of costs and benefits of status quo and proposed option, a performance or decision criterion is required. The common criteria used are the Net Present Value (NPV) and Benefit Cost Ratio (BCR).

With development agencies such as the World Bank, the Organization for Economic Cooperation and Development, the United Nations and other international development agencies seeking to make greater impact with investments being made in developing countries, CBA became the primary focus for project appraisal in the 1970s. According to the Overseas Development Administration of the UK, national budget planning during this time focused on the public sector. As trading declined for primary commodities which were supplied by developing nations, manufacturing was being seen as the new vehicle for growth. The public sector then needed to see an infusion of resources for innovation leading to production and to use them in the most effective and efficient way.

2.6 Benefits of Pay as You Dump System

Communities across the world are increasingly turning to unit-based pricing systems for financing residential solid waste management, whereby households are charged according to the amount of waste they set out for collection rather than on a fixed fee-for-service basis. This trend has been motivated by factors such as rising waste disposal costs and growing concern by local citizens

regarding the dis-amenities (e.g., environmental, noise, traffic) of traditional disposal methods such as landfilling and incineration (Kinnaman and Fullterton 200). Local governments have been searching for ways to reduce their reliance on landfilling in particular and unit pricing systems are attractive because they provide a direct incentive to households to curtail their use of municipal solid waste collection and traditional disposal services.

Meanwhile, economists have generally advocated unit-pricing approaches because of their efficiency-enhancing properties. Under traditional no-fee or fixed-fee systems, once a household has made its payment for service, the marginal cost of solid waste disposal is simply the cost to the household of processing, storing and setting out more trash for collection, whereas the true marginal cost to the community is greater-it includes, at a minimum, the resources necessary to collect and dispose of the additional waste. As a result, solid waste services are overused from an efficiency standpoint (Skumatz, 1996). In principle, a properly designed unit-pricing system will increase the marginal cost to households so that it reflects the true marginal resource cost of waste management services.

In this way, households will face the proper incentives for using these services. In many cases, the institution of unit pricing programs has been concomitant with curbside recycling programs. Because there is typically no unit-based charge for curbside recycling, unit pricing of traditional waste collection also provides an incentive for households to divert their waste flows towards recycling collection. Recycling has been widely promoted because it may provide a more environmentally friendly alternative to traditional disposal methods, but this should not obscure the fact that recycling involves resource costs as well. For a waste management system to be fully efficient, all management alternatives, including recycling must be priced at their true marginal

cost. Because most unit-pricing systems do not charge by the unit for recycling, they may not be wholly consistent with the efficiency objective (Kinnaman and Fullterton 2000).

Communities that have adopted unit pricing programs have reported a number of benefits, ranging from reductions in waste generation to greater public awareness of environmental issues.

The USEPA (1994) identified some general benefits in the implementation of a PAYD program. These benefits include:

1. Waste reduction. Unit pricing can help substantially reduce the amount of waste disposed of in a community. Globally municipalities that have implemented at PAYD in their communities have recorded waste reduction at the source.
2. Reduced waste disposal costs. When the amount of waste is reduced, communities often find their overall MSW management costs have declined as well.
3. Increased waste prevention. To take advantage of the potential savings that unit pricing offers, residents typically modify their traditional purchasing and consumption patterns to reduce the amount of waste they place at the curb. These behavioral changes have beneficial environmental effects beyond reduced waste generation, often including reduced energy usage and materials conservation.
4. Increased participation in composting and recycling programs. Under unit pricing, new or existing recycling and yard waste composting programs become opportunities for residents to divert waste for which they otherwise would pay. Experience in the U.S. has shown that these programs are the perfect complement for unit pricing: analysis of existing unit pricing systems shows that composting and recycling programs divert 8 to 13 percent more waste by weight when used in conjunction with a unit pricing program.

5. Support of the waste management hierarchy. By creating an incentive to reduce as much waste as possible using source reduction and to recycle and/or compost the waste that cannot be prevented, unit pricing supports the hierarchy of waste management techniques defined by EPA.
6. More equitable waste management fee structure. Traditional waste management fees, in effect, require residents who generate a small amount of waste to subsidize the greater generation rates of their neighbors. Under unit pricing, waste removal charges are based on the level of service the municipality provides to collect and dispose of the waste, similar to the way residents are charged for gas or electricity. Because the customer is charged only for the level of service required, residents have more control over the amount of money they pay for waste management.

2.7 Perception about Pay as you dump and Recycling

Household recycling rates in Ghana are currently extremely low with only a small percentage of households engaging in some form of recycling. Elsewhere a substantial proportion of households are not recycling or reusing specific recyclable materials, including aluminium (19%), steel cans (30%), glass (10%), plastic bottles (10%), and paper/cardboard/newspapers (9%; ABS, 2006). These statistics would suggest that not all eligible material is being recycled in some households and that it is important to continue to understand people‘s decisions to recycle household waste. Many studies have been conducted to identify the factors that are associated with individuals‘ decisions to engage in recycling behavior (Schultz, et al. 1995). Recently, Do Valle et al. (2008) suggested that the Theory of Planned Behavior (TPB) provides a useful basis for modeling recycling decisions. Indeed, many recycling studies have supported the utility of this theory in predicting people‘s waste generation recycling intentions and behavior (e.g.,

Boldero, 1995; Cheung et al. 1999; Mannetti et al. 2004; Taylor & Todd, 1995; Terry et al. 1999; White et al. 2009). As such, this study adopted the TPB in the current study to understand waste management and recycling decisions of a sample of community residents in the Ashanti Region.

In brief, the TPB (Ajzen, 1991) proposes that intention (i.e., readiness to act) to perform a behavior is the most proximal determinant of behavior. Intention, in turn, is predicted by three constructs: attitudes (positive or negative evaluations about performing the behavior), subjective norms (perceived pressure and expectations of important others to perform or not perform the behavior), and perceived behavioral control (PBC; perceived control over performing the behavior, also thought to be a direct predictor of behavior; Ajzen, 1991). A meta-analysis of 185 tests of the TPB provided significant support for the model, with intention accounting for 27% of the variance in behavior (with a further 2% of variance attributable to PBC), and attitudes, subjective norms, and PBC explaining 39% of the variance in intention (Armitage & Conner, 2001). Despite its success in predicting both intentions and behavior, many researchers have proposed revisions of the TPB to include variables that may increase the predictive ability of the model (Conner & Armitage, 1998). A number of the proposed additions to the model focus on self-perceptions that relate to enduring qualities or characteristics that people ascribe to themselves that may impact on behavioral decision making. In this vein, variables such as personality traits (i.e., enduring emotional, interpersonal, experiential, attitudinal, and motivational styles; McCrae & John, 1992) and self-identity (i.e., the extent to which performing a particular role behavior is an important component of an individual‘s self-concept; Hogg et al.
1995; Stryker, 1987) have been examined.

Despite the TPB‘s original contention that personality factors should only exert an indirect effect on intentions via beliefs, attitudes, norms, and control (Ajzen & Fishbein, 2005), there is increasing support for the direct impact of personality on intentions and behavior within a TPB framework (Norman & Conner, 2005) in the health (e.g., Conner & Abraham, 2001) and exercise domains (e.g., Rhodes et al. 2002). There is evidence also to suggest that self-identity adds significantly within the TPB across a variety of domains to the prediction of intentions (e.g., Fielding et al. 2008; Nigbur, et al. 2010; Sparks & Shepherd, 1992; Theodorakis, 1994) and behavior (e.g., Bissonnette & Contento, 2001; Nigbur et al., 2010; Theodorakis, 1994). In their review, Conner and Armitage (1998) found that self-identity accounted for, on average, an additional 1% of the variance in intentions over and above the standard TPB predictors.

In the context of household waste generation and recycling, general personality factors (e.g., responsibility) have been examined (Simmons & Widmar, 1990); however, the contribution of the personality traits in the five-factor model (openness, conscientiousness, extraversion, agreeableness, and neuroticism; McCrae & Costa, 1987) has not been considered in this context within the framework of an established decision-making model. Given previous findings linking sense of responsibility to waste generation and recycling, it is likely that of the personality traits in the five factor model, it is conscientiousness (i.e., characterized by adherence, responsibility, planning, dependability, and self-discipline; Costa, McCrae, & Dye, 1991; McCrae & John, 1992) that may be the most relevant to the performance of consistent recycling behavior. In support of a potential role for conscientiousness in decision making about environmental behaviors, Fraj and Martinez (2006) found that those people reporting higher levels of conscientiousness were more likely to purchase ecologically friendly products. Furthermore, research in other domains has established that it may be the specific lower order facets of the five personality factors that are

important in determining people‘s behavior given that global estimates do not allow much precision in demonstrating which forms of a trait domain are most characteristic of a person or behavior (e.g., Rhodes et al., 2002; Rhodes, 2005).

For instance, Rhodes et al. (2002) found support for extraversion‘s lower order facet of activity as a direct influence on exercise behavior. Thus, in the current research, we focus specifically on the role of conscientiousness, and its lower order facets of order, dependability, and goal striving, in recycling decisions.

In contrast to personality factors, the role of self-identity in the prediction of recycling intentions is well established. Terry et al. (1999) showed that self-identity as a recycler predicted intentions to recycle after the standard TPB variables were taken into account. Mannetti et al. (2004) also found support for the role of self-identity, as assessed by identity similarity (comprising the relationship between responses to perceptions of a typical recycler and descriptions of oneself), in a TPB-based study predicting differentiated collection and refuse disposal for 230 Italian householders. Although the influence of self-identity on waste generation and recycling decisions has been explored previously, to our knowledge, no studies have used the TPB as a basis to test the influence of personality traits (specifically conscientiousness) as well as selfidentity on individuals‘ decisions to recycle household waste.

In the single study that used the TPB, including both influences of self-identity (i.e., perceptions of oneself as a ―good student‖) and personality traits from the five-factor model to predict examination performance; Phillips et al. (2003) found that self-identity and conscientiousness had a direct effect on examination performance intentions. These findings suggest that it may be beneficial to consider both personality and identity in their contribution to conceptualizations of

self in the TPB model, especially for behaviors other than academic performance, which involve a person being committed to overcome potential barriers such as laziness, lack of time, and inconvenience (Boldero, 1995; Schultz et al., 1995).

2.8 Challenges of Pay As You Dump System

While there are clearly benefits associated with unit pricing programs, there also are potential barriers. Communities considering unit pricing should be aware of the costs and possible community relations implications associated with the following issues (Pierro, & Livi, 2004; Taylor & Todd, 1995):

1. Illegal dumping. Some residents have strong reservations about unit pricing, believing it will encourage illegal dumping or burning of waste in their area. Communities can counter this fear with an effective public education program. Since most communities with unit pricing programs have reported that illegal dumping proved to be less of a concern than anticipated, providing residents with this information can help allay their concerns over illegal dumping.
2. Recovering expenses. Since unit pricing offers a variable rate to residents, the potential exists for uneven cash flow that could make it harder to operate a unit pricing program. To address this, communities must be sure to set prices at the appropriate level to ensure that, on average, sufficient funds are raised to pay for waste collection, complementary programs and special services.
3. Administrative costs. Effectively establishing rates and collecting payments under a unit pricing program will likely increase a waste management agency‘s administrative costs. Communities need to set waste collection prices at a level that can cover these costs.

4. Perception of increased costs to residents. While a unit pricing program offers residents greater control over the cost of collecting their waste, it could initially be seen as a rate increase. An effective public outreach campaign that clearly demonstrates the current costs of waste management and the potential reductions offered by unit pricing will help to address this perception.
5. Building public consensus. Perhaps the greatest barrier to realizing a unit pricing program is overcoming resistance to change, both among citizens and elected officials. Informing residents about the environmental and economic costs of current waste generation patterns can help overcome this resistance and build support for unit pricing. Careful planning and design of a unit pricing program to meet specific community needs is the best solution to these potential difficulties. In particular, an effective public education program designed to communicate the need for unit pricing and address the potential concerns of residents will help meet these challenges (Terry, 1999).

2.9 Strategies for Waste Reduction

Solid waste generation is growing all over the world, especially in developing economies (e.g., Boadi & Kuitunen, 2003; Idris et al. 2004; UN-HABITAT, 2007). Uncontrolled waste disposal poses problems to both human beings and the environment (Schertenleib & Meyer, 1992; UNEP, 1996). As a rule, environmental psychologists tackle these kinds of problems by applying intervention programs that are aimed at behavior change. Several intervention strategies have been developed, tested and evaluated (Abrahamse et al., 2005; Huffman et al., 1995; Porter et al.,1995).

To achieve effective and persistent behavioral changes, several researchers propose combining different intervention strategies (e.g., Boyce & Geller, 2000; Staats et al., 2004). Although this is

a very appealing and sensible proposal, financial and temporal constraints often prevent applying a whole array of strategies, especially when officials and policy makers are seeking to minimize costs. As a consequence, intervention planners often have limited funds at their disposal. One reasonable way to deal with limited financial, temporal, and human resources would be to select and implement only those intervention strategies that usually provide the best results in terms of efficiency. Several reviews summarizing different intervention strategies and their relative effectiveness are available (e.g., Porter et al., 1995; Schultz, 1995) and would allow such a procedure. However, this approach would ignore the fact that the success of an intervention is affected by more factors than the relative effectiveness of its strategy. Although a given intervention strategy might generally prove to be very effective, some situations would call for other, usually less effective intervention strategies. For example, information alone is usually not a very effective intervention strategy. However, if the target population consists of subjects who are aware of a certain environmental problem and are willing to take action but do not know how to achieve this goal, providing information might be very effective. This example illustrates that intervention planners should consider the specific characteristics of their target group. Features especially worth considering are physical environment (e.g., the relationship between local topography and non-motorized travel behavior, Rodriguez & Joo (2004), infrastructure (e.g., the influence of many vs. few waste bins on litter reduction, see Huffman et al., 1995), attitudes, level of knowledge, environmental concern, and socio-demographic variables (see also Schultz et al., 1995).

Some researchers (e.g., Matthies & Kromker, 2000) try to adapt the intervention design to the specific characteristics of the target group by means of participatory interventions. This means that the target groups (or representatives of it) are involved in the intervention process and especially

in the planning of the intervention. Such participatory interventions offer two major benefits (compare Matthies & Kromker, 2000): First, they contribute to an optimal tailoring of the intervention to the target group. Second, this approach stimulates the intrinsic motivation of the target group, which is likely to positively influence the long-term effectiveness of the intervention. Despite these advantages, the participation approach has one major disadvantage with respect to large-scale interventions: because they involve the population as a whole, they usually do not account for differences *within* the population.

Besides the participatory approach, another way of taking into account the specific characteristics of the target population is to use tailored interventions. In contrast to ―sweeping attacks,‖ where either one or various interventions are implemented regardless of how they affect different people, tailored interventions are aimed at adapting interventions to the ―characteristics, needs and interests of the individual‖ (De Nooijer et al., 2002, p. 239). In view of the benefits of tailored interventions, it makes sense to apply this promising approach to environmental psychology too. Nevertheless, only one tailored intervention has been reported in this field. In their study, Daamen et al. (2001) tried to reduce the oil pollution of wastewater that is caused by garages. They assessed the procedures and behaviors that caused oil pollution in different garages. Subsequently, some garages received tailored messages concerning the prevention of oil pollution, whereas others received generalized (nontailored) information. Three months after the intervention, both pro-environmental behavior change and accurate knowledge of the message content were significantly higher among garages that received tailored information than among those that received general messages. So there is strong support for the claim that tailoring is an effective approach to changing behavior.

2.10 Social and Political factors affecting Waste Management

Many authors have analyzed the effects of socioeconomic and cognitive variables on household's willingness to pay for a service. Afroz et al. (2009) in their analysis on the household's willingness to pay for improved solid waste management in Daka city, Bangladesh maintained that age, household size and income maintain an increasing function with consumers' willingness to pay (WTP) for improve solid waste management system. However, they found female to have positive influence on consumers WTP and males to have negative influence on consumers WTP. Aggrey & Douglason (2010) confirmed the findings of Afroz *et al* (2009) by stating that these variables and other variables like household expenditure, quantity of waste generated and consumer's level of education also pose a significant influence on consumers WTP. Aggrey and Douglason (2010) hypothesized that the higher the level of education the more people would appreciate the consequences of mishandling of solid waste and the more value the individual would give in order to avoid the risk of being a victim of unclean environment. Afroz *et al* (2009) also reiterated the fact that education relates to a better understanding of the problem of solid waste and hence WTP for waste management.

Interestingly empirical results on age on WTP are mixed. Afroz *et al* (2009) pointed out that holding all other factors constant, older people are willing to pay more than younger people. This suggest that older citizens make more mature decisions related to evaluating health and environmental issues, possibly due to their age , leading them to express a high WTP value. However, according to Aggrey & Douglason (2010), age affects WTP waste management negatively. Old people may consider waste collection as government's responsibility and could be less willing to pay for it. Whiles the younger generation might be more familiar with cost sharing and could be willing to pay.

Household size is another factor that influences WTP for waste management. Chuen-Khee & Othman (2002) pointed out that the more the number of people in the household, the more willing the household will appreciate a clean environment. Tamura (2005) in analysing the individual attributes of the demand for solid waste collection in Accra, Ghana found that the more income people have, the more willing they are to pay for solid waste collection. The quantity of waste generated by a household also influences WTP for waste management. Aggrey & Douglason (2010) pointed out that, the higher the generation of waste, the more the household faces the challenges of waste disposal and the greater the willingness to pay. Satisfaction on waste collection services also influences WTP for improved waste management. People who are more satisfied with waste collection services are willing to pay more than dis-satisfied people (Afroz *et al*, 2009 and Kassim & Ali, 2006).

Previous research suggests that several features, policies, or characteristics might distinguish cities that adopt PAYD (Kinnaman and Fullterton 2000, Feicock 1996, Folz 1991, 1999, Skumatz 1996). As Kinnaman and Fullterton (2000) observed, treating PAYD as exogenous, or independent of other features or characteristics, might lead to biased estimates of its effect, in either direction, if particular variables that co-vary with it are ignored. The policy‘s effect might be overstated, for example, if the estimation process omits an important characteristic of the population such as its environmental awareness or receptivity to ―green‖ programs. Likewise, various characteristics of the population might account for their receptivity to a PAYD policy. A city also may be more likely to adopt a PAYD policy if the magnitude of their solid waste disposal problem is larger and they confront a landfill space shortage.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents a methodological framework for the study. This involves the research paradigm, purpose of the study, population, sample and sampling procedure, data collection methods, data analysis, quality of research and research ethics.

3.1 Research Design

Research design has three common methods, the exploratory, descriptive and the explanatory (Saunders, 2009). Descriptive research is a study designed to depict the participants in an accurate way. More simply put, descriptive research is all about describing people who take part in the study. There are three ways a researcher can go about doing a descriptive research project, and they are: Observational, Case study and survey. Exploratory researcher design on the other hand seeks to investigate into a problem or situation which provides insights to the researcher. The research is meant to provide details where a small amount of information exists. It may use a variety of methods such as trial studies, interviews, group discussions, experiments, or other tactics for the purpose of gaining information. Finally, Explanatory design implies that the research in question is intended to explain, rather than simply to describe, the phenomena studied. This type of research has had a contested history in qualitative inquiry, and divergent views of the appropriateness of such goals in qualitative research are currently held (Saunders, 2009).

The design adopted for this study was descriptive because the study sought to examine the cost benefit analysis of the pay as you dump waste management programme practiced by the Kumasi Metropolitan Assembly (KMA). Again, choosing this method allows the researcher to conduct both qualitative and quantitative analysis. The essence is to portray an accurate descriptive profile of respondents and issues relating to waste management in Ghana.

3.2 Population of the Study

As stated by Punch (2000**),** the population of any research is made up of the individual units or an aggregate, that is the unit or the individuals that form the population whereas a sample is a section of the population selected randomly or otherwise to represent the population. Generally, the population comprised households and waste management units within the Kumasi Metropolis. However, Asokwa Sub-Metro was selected to give the study a focus. The population of households within the Askowa Metropolitan Area is estimated at 140,161 (GSS, 2010) the number of waste collection companies stands at 8.

3.3 Sample Size and Sampling Technique

Sample is the portion of the population selected to generalize for all the cases from which it was chosen. Out of 140,161 households in Asokwa, 200 households were selected across communities. In addition, 4 waste collectors were included. This puts the sample size at 204.

The study adopted both cluster and simple random sampling techniques in drawing the 200 households. Purposive sampling was used to select 4 waste collectors and stakeholder institutions. This method (purposive) involves selecting respondents who have knowledge in a chosen area and

for which the researcher believes have the requisite expertise and knowledge to give accurate information in support of the study.

3.4 Data Collection

The study made use of both primary and secondary data. Primary data is defined as consisting of materials that the researcher gathered through systematic observation, information from archives, the results of questionnaires and interviews and case study (Jankuwics, 2002). Secondary data on the other hand refers to data collected by third parties. The reason for using this form of data is to save time and cost in having to repeat data collection processes when such information already exists (Punch, 2000).

Primary data was gathered using researcher-administered questionnaires as a research instrument. This was done through face to face with the respondents. Questionnaires were appropriate for the study because data collected using questions can be stable, constant and has uniform measure without variation. It also reduces bias caused by the researcher‘s presentation of issues. A five point likert scale used was anchored as 1= strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree.

3.5 Data Analysis

According to Bernard (1998), data analysis consists of systematically looking for patterns in recorded observations and formulating ideas that account for those patterns. The quantitative data was run using Statistical Package for Social Science (SPSS) 17.0. Mean, standard deviation, standard error of the mean and percentages were used to assign meaning to data.

3.6 Reliability and Validity of Data

Generally, validity of a study refers to the extent to which a test measures what it is supposed to measure. The question of validity is raised in the context of the three points, the form of the test, the purpose of the test and the population for whom it is intended (Cronbach, 1990). Reliability is the degree to which a test consistently measures whatever it measures. Errors of measurement that affect reliability are random errors and errors of measurement that affect validity are systematic or constant errors. According to Cronbach (1990), a validity coefficient of 0.7 and above is acceptable, though that is far from perfect prediction.

3.7 Ethical Consideration

According to Finnis (1983), ethics is a branch of philosophy, said to have been initiated by Aristotle, which takes human action as its subject matter (Seale et al, 2004:116). A central issue in ethics, Ali and Kelly argue, is the relationship between the individual and the social world (Ibid: 117).The following aspect of protection, participation and partnership demonstrate the ethical consideration. This study protects all the participants involved as it does not cause indirect or direct harm to the participants or researcher. The participation is voluntary and consent is required. All the information is anonymous, which protects the participant‘s confidentiality. Participants can come from a range of cultural backgrounds and have the right to decide their own actions.

3.8 Organizational Profile of Kumasi Metropolis

The city of Kumasi was founded in the 1680‘s by King OseiTutu I to serve as the capital of the Asante State (Fynn, 1971). Given its strategic location and political dominance, Kumasi as a matter of course developed into a major commercial centre with all major trade routes converging on it (Dickson, 1969).However, it came under the influence of the British rule in 1890 (Adu-

Boahen, 1965). With time the city began to expand and grow thereby making it second only to Accra in terms of land area, population size, social life and economic activity. Its strategic location has also endowed it with the status of the principal transport terminal and that has assured its pivotal role in the vast and profitable distribution of goods in the country and beyond.

Kumasi is located in the transitional forest zone and is about 270km north of the national capital, Accra. It is between latitude 6.35o – 6.40o and longitude 1.30o – 1.35o, an elevation which ranges between 250 – 300 metres above sea level with an area of about 254 square kilometres. The unique centrality of the city as a traversing point from all parts of the country makes it a special place for many to migrate to. The metropolitan area shares boundaries with Kwabre East District to the north, Atwima District to the west, Ejisu-Juaben Municipal to the east and Bosomtwe to the south.

Its beautiful layout and greenery has accorded it the accolade of being the ―Garden City of West Africa‖. From the three communities of Adum, Krobo and Bompata, it has grown in a concentric form to cover an area of approximately ten (10) kilometers in radius. The direction of growth was originally along the arterial roads due to the accessibility they offered resulting in a radial pattern of development. The city is a rapidly growing one with an annual growth rate of 5.47 per cent (Regional Statistical Office, Kumasi). It encompasses about 90 suburbs, many of which were absorbed into it as a result of the process of growth and physical expansion. The 2010 Population Census kept the population at 2,035,064.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.0 Introduction

This chapter consists of the analysis of the study data collected using questions from both households and waste collection firms. The study used descriptive as well as inferential statistical techniques to explore and answer the study objectives. The chapter is organized into six sections. The first section presents descriptive summary of the household and firm respondents. The remaining five sections are organized in the order of the research objectives.

4.1 Characteristics of Respondents

This section presents descriptive summaries of characteristics of both household respondents and waste collection companies.

4.1.1 Household Characteristics

Table presents frequency distribution of household respondents on their property type, number of household members, their employment status, and household average income. The study sampled data from a total of 200 households.

On the property type of the respondents, 54 out of the 200 households, representing 27 percent, lived in detached houses, 49 out of 200 representing 24.5 percent of the households lived in semi-detached houses, 21 out of 200 representing 10.5 percent lived in bungalows, 13 percent lived in flats, 18 percent lived in their own properties, and 7 percent lived in other types of houses.

On the number of household members, out of the 200 households, only 51 representing 25.5 percent of the households have less than 5 household members, 87 out of 200 households, representing 43.5 percent of the have less than 10 but more than 5 household members. About 15.5 percent of the household have more than 10 household members but less than 15. The remaining 15.5 percent of the households have more than 15 household members.

Table 4.1 Characteristics of Households

	Categories	Frequency	Percentage (%)
PROPERTY TYPE	Detached House	54	27.0
	Semi-Detached	49	24.5
	Bungalow	21	10.5
	Flat	26	13.0
	Own Property	36	18.0
	Others	14	7.0
	Total	200	100.0
NUMBER OF HOUSEHOLD MEMBERS	Less than 5 5-10	51 87	25.5 43.5
	10-15	31	15.5
	Above 15	31	15.5
	Total	200	100.0
EMPLOYMENT			
	Self Employed	102	51.8
	Unemployed	29	14.7
	Retired	7	3.6
	Student	33	16.8
	Others	26	13.2
	Total	197	100.0
AVERAGE HOUSEHOLD INCOME	Less than GHC400 GHC401-GHC 1000	86 40	60.6 28.2
	GHC 1001-GHC1500	14	9.9
	ABOVE GHC2000	2	1.4
	Total	142	100.0

Source: Field work, 2015.

Table 4.1 also presents the frequency distribution of household respondents' employment statuses.

Out of the 200 household respondents, only 197 respondents provided information on their

employment statuses. Out of which, 102 representing 51.8 percent of the respondents were self-employed, 14.7 percent of the respondents were unemployed, 3.6 percent were retired, and 16.8 percent were students.

Finally Table 4.1 reports on the distribution of the household respondents based on their income groups. Only 142 out 200 respondents provided information on their income groups. Out of which, 60.6 percent earned less than 400 Ghana cedis per month, 28.2 percent earned between 401 Ghana cedis to 1000 Ghana cedis, 9.9 percent earned above 1000 but below 1500 Ghana cedis and only 1.4 percent earned above 2000 Ghana cedis.

4.1.2 Household Monthly Expenditure on Waste Disposal

Figure 4.1 presents the distribution of households' monthly expenditure on waste disposal. Out of the 200 households, only 1 percent spend above 80 Ghana cedis per month on waste disposal, 4 percent spend above 50 Ghana cedis but less than 80 Ghana cedis on waste disposal.

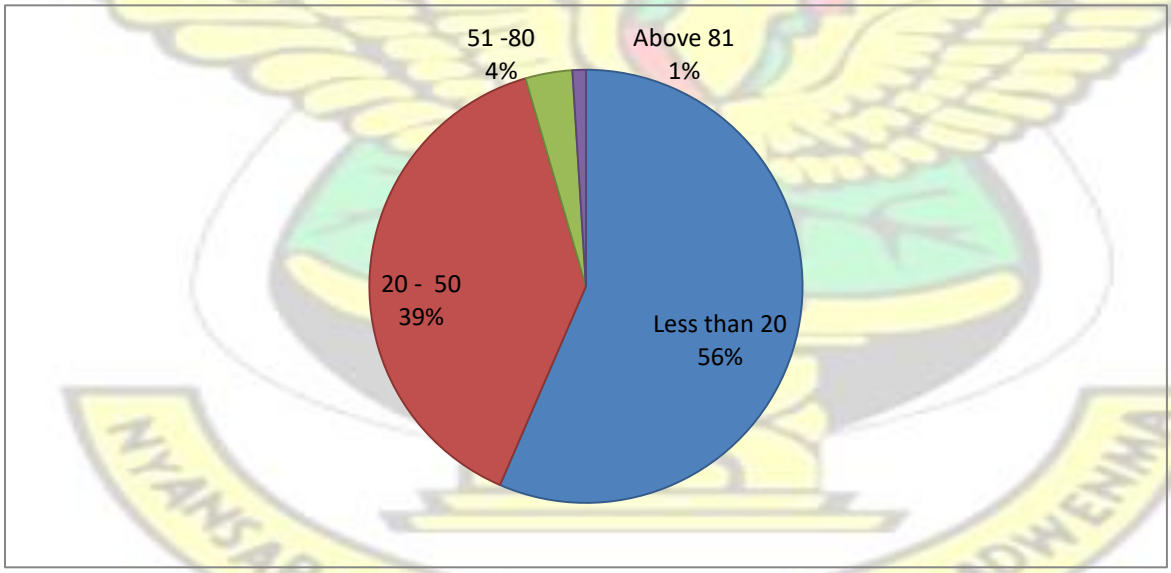

Figure 4.1 Household Monthly Expenditure on Waste Disposal Source: Field work, 2015.

Also 39 percent of the households spend above 20 Ghana cedis but less than 50 Ghana cedis each month on waste disposal while the remaining 56 percent spend less than 20 Ghana cedis each month on the disposal of waste. The results indicate that, majority of the respondents pay less than 20 Ghana cedis a month on waste disposal and that about 95 percent pay less than 50 Ghana cedis. Only about 5 percent of the households pay above 50 Ghana cedis on waste disposal.

4.1.2 Institutional Respondents

The study also collected data from waste collection companies within the Kumasi Metropolis. There were four waste collection companies – Kumasi Waste Management Limited, Sakm Company Limited, Vermark Environmental Services and Zoomlion Ghana Limited. There were two waste management types– solid waste collection and street sweeping. Some of the firms are engaged in only solid waste collection while some are engaged in sweeping and waste collection. Table 4.2 presents the type of waste management that each of the four waste collecting firms are into.

Table 4.2 Waste Collection Firms and Waste Management Type 0.2

Waste Collection Company	WASTE_MANAGEMENT	
	Solid Waste Collection	Street Sweeping
Kumasi Waste Management Limited	1	0
Sakm Company Limited	1	0
Vermark Environmental Services	1	0
Zoomlion Ghana Limited	1	1
Total	4	1

Source: Field work, 2015.

Table 4.2 indicates that, out of the four firms, only zoomlion was engaged in sweeping in addition to solid waste collection. Kumasi Waste Management Limited, Sakm Company Limited and Vermark Environmental Services only engaged in solid waste collection without sweeping.

4.2 Household Perception about Pay as you dump Programme

As part of the research objectives, the study sought to examine household‘s perception about the Pay-As-You-Dump (PAYD) program of the KMA where households are required to pay for waste disposal. The purpose of this program was to hold people accountable for the waste they generate and provide them with monetary incentives to reduce the amount of waste they generate per period.

A total of sixteen statements concerning the PAYD policy were presented to the respondents and asked to rate on a five point scale where ratings of 1 and 2 imply disagreement while ratings of 4 and 5 implied agreement. To evaluate if the respondents have agreed or disagreed with a particular statement, one sample t-test was used to compare the average ratings to the value of 3. Any statement with average ratings statistically higher than 3 has been agreed to by most of the respondents while statements with average ratings lower than 3 have been disagreed on by most of the respondents.

Table 4.3 presents the t-test results for all sixteen statements. It tests if households agreed on the statement, ―I don‘t need to pay before disposing off waste‖. The result showed the mean difference to be higher than zero and statistically significant at the 5 percent level of significance. What this suggest is that, majority of the respondents don‘t believed they don‘t have to pay for waste disposal.

Table 4.3 T-test on Household Perception on PAYD Program

Perceptions	Test Value	Mean	Mean Difference	T	Pvalue
I don‘t need to pay before disposing off waste	3	3.20	0.20	9.34	0.000
Paying for waste generated is a wrong system for managing waste	3	2.11	-0.89	-10.9	0.000
This system only creates opportunity to generate money for individual pockets	3	2.92	-0.08	-0.91	0.365
There is no transparency in the way fees are charged for waste disposal	3	4.47	1.47	3.99	0.000
People tasked to take money at collection points charge discriminatory fees	3	4.01	1.01	13.48	0.000
There is no proper system to manage revenues generated	3	3.41	0.41	5.09	0.000
Payment made are not even used to lift waste containers on time	3	3.89	0.89	13.33	0.000
I don‘t need to pay to dump solid waste when there is a free land in my community	3	1.82	-1.18	-13.0	0.000
Our Assembly does not charge for waste collection	3	2.07	-0.93	-11.4	0.000
Paying for waste generated adds to worsening economic situation	3	2.45	-0.55	-5.62	0.000
Community members should be encouraged to develop their own waste management system	3	2.82	-0.19	-1.84	0.067
Waste collection sites are not properly maintained, so why should I pay.	3	3.99	0.99	2.16	0.032
Fees charged are too high	3	3.24	0.24	2.66	0.008
Some communities should not be charged for waste disposal because they can‘t afford	3	3.14	0.14	1.48	0.140
Waste collectors are not punctual in collecting wastes	3	3.99	0.99	13.32	0.000
If I can generate waste, I must pay for its disposal	3	4.07	1.07	14.45	0.000

Source: Field work, 2015.

On whether they believed the PAYD system was a system for managing waste, the t-test results showed that the average ratings was statistically less than 3 at 2.11 indicating that the respondents disagree that PAYD was a wrong system for waste management.

The t-test results as indicated in Table 4.3 suggest that the respondents disagree that because there is free land in their community they don‘t have to pay for waste disposal, have disagreed that their assemblies don‘t charge for waste disposal, have disagreed that paying for waste disposal will contribute to the worsening economic conditions in the country, and disagree that community members should be persuaded to development their own waste management system.

On the other hand, the test results showed positive and significant mean difference for the following statements – that there is no transparency in the way fees are charged for waste disposal, that people tasked to take money at collection points charge discriminatory fees, that there is no proper system to manage revenues generated, that payments made are not even used to lift waste containers on time, that waste collection sites are not properly maintained, that some communities should not be charged for waste disposal because they can‘t afford, that waste collectors are not punctual in collecting wastes and that they should pay for disposal of wastes they generate.

4.3 Effects of Pay – As – You – Dump on Household Waste Generation

The study also sought to identify the benefits of the PAYD policy on household waste generation. The researcher therefore presented a number of ways he believed the PAYD policy could impact on household waste generate and asked the respondents to rate on a five point scale how they agree or disagree. A rating of 1 and 2 represented disagreement, while ratings of 4 and

5 indicated agreement. To evaluate if respondent agree or disagree with a statement, one sample t-test was used to compare the average ratings for each statement to the neutral value of 3. The results of the t-test are presented for all statements in Table 4.4 below.

The t-test test the hypothesis that the mean differences were not statistically different from zero. If the mean difference for a particular statement is found to be statistically higher than 3 it implies that statement has been agreed to by most of the respondents. On the other hand if the mean difference was found to be statistically less than 3, it means that statement was not agreed on by the respondents. The mean difference is said to be statistically different from zero if pvalue is less than 0.05.

Table 4.4 Effects of PAYD on Household Waste Generation

Effects	Test Value	Mean	Mean Diff.	t	Pvalue
I'm forced to reduce volume of waste generated	3	3.24	0.24	2.26	0.03
I will work at educating co-tenants to reduce their waste	3	3.42	0.42	4.81	0.00
I will resort to burning plastic and paper wastes	3	3.01	0.01	0.05	0.96
I believe waste problems can be addressed by the Assembly	3	3.80	0.80	9.31	0.00
I will explore cheaper ways of disposing my waste	3	3.49	0.49	5.27	0.00
There is likely to be conflicts among tenants	3	3.48	0.48	5.82	0.00
I'm sure people will be more responsible about not littering the environment	3	3.37	0.37	3.12	0.00
The KMA can engage more waste collectors to manage waste generated	3	4.24	1.24	20.82	0.00
Ghanaians will begin to change their attitude regarding waste issues	3	4.30	1.30	20.23	0.00
It is more effective to reach out to households	3	4.03	1.03	18.44	0.00

Source: Field work, 2015.

The results in Table 4.4 indicates that even though the mean difference was positive for the statement ―I will resort to burning plastic and paper wastes‖, the corresponding p-value (p-value = 0.96 > 0.05) was not significant at the 5 percent level of significance. Thus respondents neither agreed nor disagreed with this statement.

The p-value was significant for all the other statements. What this imply was that, the respondents have agreed that, the PAYD policy forced them to reduce the volume of waste they generate, that they will work at educating co-tenants to reduce their waste, that they believe the waste problems can be addressed by the Assembly, that they will explore cheaper ways of disposing of waste, that the PAYD policy is likely to cause conflict among tenants, that the PAYD policy will make people more responsible about not littering the environment. The results also showed that the respondents agreed that, the PAYD policy will help the KMA to engage more waste collectors to manage waste generated. Having household pay for the waste generate will create a market where it is profitable for companies to invest and make profit over time. The PAYD will therefore provide the incentive that firms need to engage in waste collection and keeping the environment clean. The result also showed that, the respondents have agreed that the PAYD policy will compel Ghanaians to amend their attitude toward the environment. If it becomes expensive to pollute, one have no choice but adopt attitudinal changes that do not pollute the environment indiscriminately.

Finally the results showed that the respondents have agreed that, the PAYD policy is an effective policy if the goal is to reach out to more households as collection points can be set in every community.

4.4 Cost Associated with PAYD

The study also sought to ascertain the cost associated with pay as you dump system. In the questionnaire the waste collecting firms were required to indicate the amount they spend monthly on waste collection. They have indicated a range which are reported in Table 4.5. The figures reported in Table 4.5 gives and indicate of how much waste collecting firms spend monthly on waste collection. The results indicate that the waste collection companies spend a little below 10000 to above 20000 Ghana Cedis.

The result showed that, Kumasi Waste Management Limited spends above 10,000 Ghana cedis per month but less than 15,000 Ghana cedis per month. Sakm Company Limited spends above 20,000 Ghana cedis each month on waste collections while Vermark Environmental Services spends less than a 10, 000 Ghana cedis each month on solid waste collection. Zoomlion spends above 20000 Ghana cedis monthly on waste collection and sweeping the communities in its area of operation.

Table 4.5 Cost of Waste Collection to Firms

WASTE COLLECTORS	EXPENDITURE ON WASTE COLLECTION			
	Less than GHC 10000	GHC 1000115000	GHC20001AND ABOVE	Area of operation
Kumasi Waste Management Limited	0	1	0	Nhyeaso
Sakm Company Limited	0	0	1	Asokwa
Vermark Environmentalservices	1	0	0	Kwadaso
Zoomlion Ghana Limited	0	0	1	Subin
TOTAL	1	1	2	

Source: Field work, 2015.

The results indicates that only one out of the four firms spends below 10000 Ghana cedis, one out of four spends between 10000 to 15000 and 2 out of 4 spend above 20000 Ghana cedis.

4.5 Cost Benefit Analysis of Pay as you Dump

Cost – Benefit analysis involves the comparison of the cost and benefits associated with a particular project to decide whether the benefits outweigh the cost or vice versa. Due to the limited information available, a few assumptions were made in order to estimate the benefits and cost of the pay as you dump policy.

4.5.1 Benefit Computation

Households were asked in the questionnaire to indicate the amount they paid each month to have their waste collected. The amounts given were in ranges but to allow for computation, the midpoint values of these ranges were used as proxies of how much households pay per month to get their waste collected. If we assume this amount represents households' willingness to pay for waste to be collected, it can be said to be their valuation of the benefit they derive from having others collect their waste. Column 1 in Table 4.6 indicates the benefits and column 2 indicates the percentages of households that value having their waste collected by others at those respective values. For example, 56 percent of the households value the benefit of having their waste collected at 10 Ghana cedis per month, while only 1 percent valued the benefit of having their waste collected at 85 Ghana cedis.

According to the 2010 population census, there are 512767 households living within the Kumasi Metropolitan Area. Column 3 in Table 4.6 indicates the number of households that value having their waste collected by others at 10, 35, 65 and 85 Ghana cedis respectively. This amount was computed by multiplying the total number of households by the correspondent percentages in column 2.

Column 4 multiplies the monthly benefits (B) by the number of households (H) to get the total benefit for each subgroup of households. These amounts were summed up to obtain the total benefit per month which is 11639811 Ghana cedis.

Table 4.6 Cost-Benefit Analysis

Monthly Benefit per Household (B)	Percentage of Households (P)	Number of Households (H)	Total Benefit (E x H) per month
10	56	287149.5	2871495
35	39	199979.1	6999270
65	4	20510.68	1333194
85	1	5127.67	435852
Total	**100**	**512767**	**11639811**

To obtain the annual benefit from pay as you dump, the monthly benefit has be multiplied by 12 (number of months in a year). The computation is shown in the equations below.

$$Total\ Annual\ Benefit = 12 \times Total\ Monthly\ Benefit$$

$$Total\ Annual\ Benefit = 12 \times 11639811 = 139677731$$

Thus the total benefit of the pay as you dump policy has been computed to be GHc139, 677,731.

Cost Computation

According to the Environmental Service Providers Association (ESPA) a total of 78,000 tonnes of waste are collected per annum in Asokwa - Kumasi and the average cost per tone was 55.58 Ghana cedis. Thus total annual cost of waste collection can be estimated as:

$$Total\ Cost = 78{,}000 \times 55.58 = 4{,}335{,}340$$

The annual net benefit of waste collection will be the difference between total benefit and total cost which is;

$$Total\ Net\ Benefit = 139677731 - 4335340 = GHC135342491$$

Thus the net benefit of waste collection per annum is GHC 135,342,491. However it should be noted that, even this computation does not include all the benefits associated with waste collection. For example, a cleaner environment may reduce the number of people who fall sick and the amount they have to spend on hospital.

Another way to show the relation between the cost – benefit is through the cost benefit ratio. This is computed as:

$$Cost - Benefit\ Ratio = \frac{Total\ Benefit}{Total\ Cost} = \frac{139677731}{4335340} = 32.21$$

The benefit cost ratio indicates that, for every Ghana cedi expended on waste collection by waste collectors, about GHC 32.00 worth of benefit is generated for local Assemblies. This shows that the benefits of waste collection outweigh the cost and it's a viable endeavor. It should be supported by all. This results is in line with the results found by Winston (2012) who also found the benefit of pay as you dump to outweigh the cost in Belize.

4.5.2 Benefits Associated with PAYD

The fourth objective of this study was to explore the benefits associated with pay as you dump system. The benefits here concern mainly the benefits the PAYD system bestow on households as they patronize it. A number of benefits were identified and presented to the respondents to rate on a five point Likert scale where 1 and 2 represent disagreement and 4 and 5 represent agreement that the benefit applies to them. To evaluate if majority of the respondents agreed or disagreed with a particular benefit, the average ratings has to be higher than 3 for agreement and less than 3 for disagreement. The figure shows that only BEN12 (‖Whether you generate more or less, you pay

same‖) and BEN9 (—There is proper monitoring of community waste problems‖) seem to be less than 3. Thus the respondents have agreed that the rest are of the benefits.

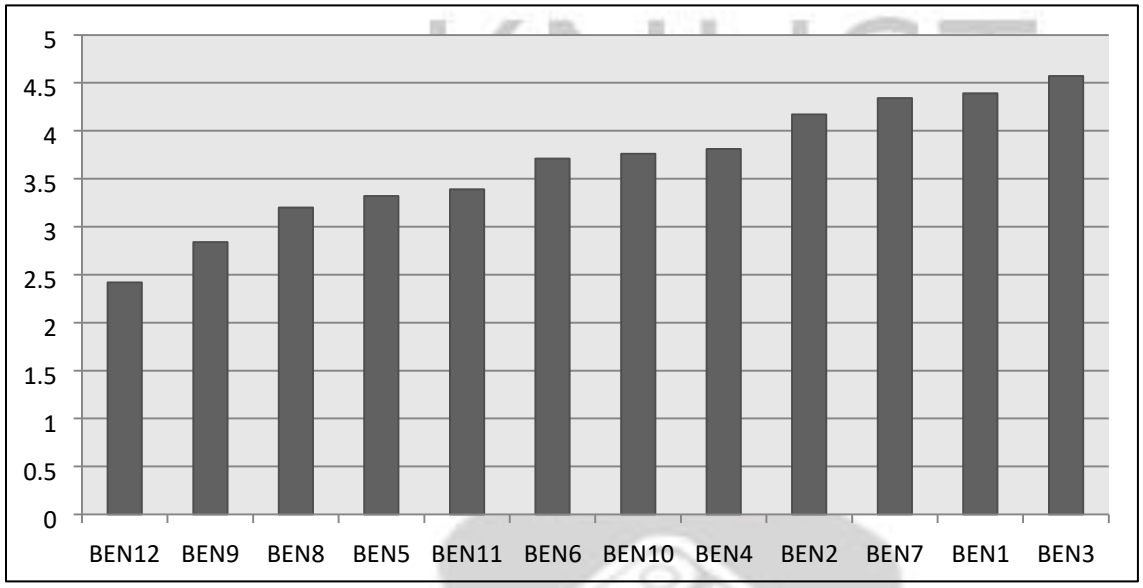

Figure 4.2 Benefits of PAYD Policy to Households Source: Field work, 2015.

To statistically compare the average ratings to 3, one sample t-test was conducted where the average ratings for each benefit was compared to the neutral value of 3. If majority of the respondents agree with a particular benefits the average ratings should be statistically higher than 3. Conversely, if majority of the respondents disagree with a particular benefit, its average ratings should be lower than 3.

Majority of the respondents have agreed on a particular benefit if the p-value associated with the a positive mean difference is less than 0.05, while majority of the respondents will be said to disagree with a particular benefit if the p-value of a negative mean difference is found to be less than 0.05. Table 4.7 presents the t-test result that was used to evaluate all 12 benefits.

Table 4.7 Benefits of PAYD Policy to Households

Benefits	Test Values	Mean	Mean Diff.	t	Pvalue
Having people pick my waste saves time	3	4.39	1.39	25.34	0.00
Pay as you dump is more convenient to households than doing it by my self	3	4.17	1.17	20.27	0.00
By paying for services, I can demand quality services from waste collectors	3	4.57	1.57	30.42	0.00
I am able to choose who collects my waste	3	3.81	0.81	10.29	0.00
I pay less amount for generating less	3	3.32	0.32	3.29	0.00
Pay as dump ensures that our environment is kept clean	3	3.71	0.71	6.47	0.00
Pay as you dump is a way of helping generate revenue for the Assembly	3	4.34	1.34	23.07	0.00
The approach ensures that people don‘t dump waste indiscriminately	3	3.20	0.20	1.90	0.04
There is proper monitoring of community waste problems	3	2.84	-0.16	-1.87	0.06
More jobs are created for local people in communities	3	3.76	0.76	8.00	0.00
Paying KMA for collecting waste is more expensive than doing it by myself	3	3.39	0.39	3.96	0.00
Whether you generate more or less, you pay same	3	2.42	-0.58	-6.26	0.00

Source: Field work, 2015.

The results showed that, the mean difference for B9 and B12 were negative and their corresponding p-values were also less than 0.05. This implies that majority of the respondents have disagreed that, there is proper monitoring of community waste problems. Thus the respondents did not believe that enough is been done to monitor the sanitation problems in their communities. Also, the results indicate that you pay regardless of whether you generate more or less. In other words, the respondents believed that the amount of waste you generate should be related to the amount you pay to dump the waste. This therefore provides incentives for people to reduce the amount of waste they generate and dump.

On the other hand, the mean differences were positive and their corresponding p-value were less than 0.05. This result suggest that, majority of the respondents have agreed that, having others pick up their waste saves them time and considered it beneficial. That majority of the respondents agreed that the PAYD system offer more convenience than disposing off waste on their own. The result also suggest that the PAYD system offers them choice to choose who collects their waste. Another benefit that the respondents agreed on was that, the PAYD policy helps keep the environment clean. Another benefit is that the PAYD system provides the District Assemblies with extra revenue source. Majority of the respondents also believe that the PAYD system helps to reduce indiscriminate disposal of waste. With PAYD, there is proper monitoring of community waste problems. PAYD also was believed to create employment for the youths. However, majority of the respondents believed that paying the KMA to collect waste was more expensive than do so themselves.

4.6 Social and Political Challenges

The fifth and final objective of the study was to identify the social and political challenges that have the potential of hampering the effective implementation of the pay as you dump policy of waste management. A number of challenges were identified and presented to the waste collectors to rate on a five point scale. Ratings lower than three implies the respondents disagree but ratings above 3 implies the respondents agreed. Given that the number of waste collectors was only 4, it was inappropriate to use the one sample t-test to compare the averages to 3. The small sample size make it impossible to assume normality in the data. As a result, only the average ratings are presented in Table 4.7 below. Figure 4.5 also presents the average to give a clear picture.

Table 4.8 Challenges that can hamper Successful implementation of PAYD

Challenges	Mean
Local Assemblies discourage indigenes from paying for waste disposal	2.50
People are not willing to pay because of the perception of misappropriation	3.00
Ghanaians make excuses when it comes to paying for waste	4.25
Charging more will force people to change their attitude	1.50
There are no properly planned sites for disposing waste	3.25
Waste recycling is a major challenge	4.25
There is no collaboration between communities and waste collectors	3.00
Households need to learn how to separate solid waste from other forms of waste	4.25
Plastic waste is a major challenge for waste collectors	3.25
Poor street naming and numbering affect waste collection activities	3.30

Source: Field work, 2015.

The result as indicated in Table 4.8 shows that the respondents failed to agree or disagree on the assertion that, people are not willing to pay because of the perception of misappropriation and that, there is no collaboration between communities and waste collectors. However the average ratings indicate that, the waste collector disagree that local assemblies discourage indigenes from paying for waste disposal. In other words, the respondents did not believe the District Assemblies discourage indigenes from paying for waste disposal.

The average ratings of (1.5) also indicate that most of the waste collectors disagree that charging more will force people to change their attitude. Thus, even though earlier results suggest that the respondents were in favor of the PAYD system, the current result indicated that however do not believe in increasing the disposal fee as this would not be effective in discouraging people from generating more waste.

The average ratings were higher than 3 for a number of the challenges. This implies that the waste collectors agree that there were challenges that could hamper the implementation of the pay as you dumb system. One of these challenges was that, most Ghanaians make excuses when it comes to paying for waste disposal. In other words, according to the waste collectors, most residents fail to pay for their waste by making excuses all the time.

The second challenge indicated by the respondents was that, there was a lack of properly planned sites for disposing waste. If there is not site for waste disposal, the whole purpose of the PAYD is defeated. Waste disposal sites are very important for the success of the program and efforts should be made to designate sites in the future.

Another main challenge cited by the waste collector is the lack of waste segregation by the households. Waste segregation is very vital for waste collectors if they are to do their job well. It also makes recycling faster and easier. According to the waste collecting companies, most households do not segregate their waste thereby making the job of waste collecting extra difficult.

Another challenge agreed on by most of the waste collectors is the problem with plastics. Because plastics are non-degradable, it makes disposing them off a challenge. It would be better if paper bags or other degradable alternatives can be found.

The last challenge was problem with street naming. This is because the average ratings of 3.3 was higher than 3. The lack or poor street naming makes it difficult for cleaners to go to a specific address where they are needed. It also makes it difficult for refuse collecting vans to go to their designated areas and collect waste on time.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This is the last and final chapter of the study, it summarizes the research findings, provide conclusions based on the research questions and recommendations based on the research findings. The primary objective of the study was to examine the benefits and cost of the pay as you dump waste management program. Specifically the study sought to examine the perception of households about the pay as you dump waste management system, to ascertain the effects of the pay as you dump system on household waste generation, to explore the cost associated with the pay as you dump, to explore the benefits associated with the pay as you dump system and to finally identify social and political challenges that could hamper the effective implementation of the pay as you dump waste management policy.

5.1 Summary of Findings

To achieve the research objectives two questionnaires were designed, one for households and the other for the waste collecting companies. Data was collected from 200 households and 4 waste collecting firms. Descriptive summary of respondents characteristics showed that majority of the respondents have income less than 1000 Ghana cedis, majority were self-employed and have between 5 to 10 household members.

On the monthly expenditure on waste disposal, majority of the households (56 percent) spend less than 20 Ghana cedis on waste disposal each month. Only about 5 percent of the households spend more than 50 Ghana cedis on waste disposal each month. On the waste collecting companies, all

four of the companies were into solid waste collection, only ZOOMLION was into sweeping as well.

To examine the perception of household about pay as you dump system, one sample t-test was used to compare households‘ perceptions on various issues related to the pay as you dump policy. The results revealed that the household respondents believe they have to pay for waste disposal even though there are free lands in their community on which they can dispose -off their waste. Most of the respondents also believed their assemblies do charge for waste disposal, which was a confirmation of the pay as you dump policy. The results also revealed that the respondents did not believe paying for waste disposal could contribute to worsening the economic conditions in the country.

Furthermore, majority of the respondents have agreed that, there was no transparency in the way fees are charged for waste disposal, that people tasked to take money at collection points charge discriminatory fees, that there is no proper system to manage revenues generated, that payments made are not even used to lift waste containers on time, that waste collection sites are not properly maintained, that some communities should not be charged for waste disposal because they can‘t afford, that waste collectors are not punctual in collecting wastes and that they should pay for disposal of wastes they generate.

The study also sought to ascertain the effects of pay as you dump on household waste generation, the results indicated that pay as you dump policy forced households to reduce volume of waste they generate, force households to explore new technologies that will enable them to reduce the amount of waste they generate. The pay as you dump policy also was believed by the households to cause dispute between tenants. Another effect was that the pay as you dump policy helps the

KMA to engage more waste collectors to manage the waste and thereby keep the environment clean. The pay as you dump policy if implemented well was believed by the households to be effective in making people more responsible about not littering waste into the environment. The pay as you dump policy to provide incentive for firms to engage into the waste collecting business. On the cost of the policy, the cost of waste collection was obtained from the waste collecting firms and the results indicated that the per monthly cost of waste collection among the waste collectors varies from less than 10000 to 20000 Ghana cedis. The result also showed that only one out of the four firms spends below 10000 Ghana cedis, the remaining three spends above 10000 Ghana cedis per month on waste collection.

Thus the net benefit of waste collection per annum is GHC 135,342,491. However it should be noted that, even this computation does not include all the benefits associated with waste collection. For example, a cleaner environment may reduce the number of people who fall sick and the amount they have to spend on medicals.

Another way to show the relation between the cost – benefit is through the cost benefit ratio. This is computed as:

$$Cost - Benefit\ Ratio = \frac{Total\ Benefit}{Total\ Cost} = \frac{139677731}{4335340} = 32.21$$

The benefit cost ratio indicates that, for every Ghana cedi expended on waste collection by waste collectors, about GHC 32.00 worth of benefit is generated for local Assemblies. This shows that the benefits of waste collection outweigh the cost and it‘s a viable endeavor. It should be supported by all.

The study also sought to identify some of the benefits of the pay as you dump policy and one of the benefits is that, the PAYD policy ensures that households pay amount commensurate with the

amount of waste they generate. As a result, the policy provides households with the incentives to reduce amount of waste generated.

The PAYD policy was also found to save households time as other would be responsible for disposing off their waste. The policy was also believed by the household to offer convenience and the choice to choose who collect their wastes. Another important benefit identified was that the policy helps to keep the environment clean. It does this by helping to reduce indiscriminate disposal of waste by individual. The pay as you dump policy also provides the District Assemblies additional source of revenue, which they can use to meet their financial obligations. Another important benefit identified was that the pay as you dump policy help create jobs for many people, who would otherwise be unemployed.

Finally, the study identified the social and political challenges that could hamper the effective implementation of the pay as you dump policy. The result revealed that the main challenges identified were that, households fail to pay most of the time by giving excuses, that there is lack of planned site for disposing waste. The results also found the lack of waste segregation on the part of households a major challenge for waste collectors, the huge proportion of plastic waste that form part of the total waste generated and collected and the poor street naming in the community also were viewed as major challenges.

5.2 Conclusions

Based on the research findings, the research concludes that, majority of the households was in support of the pay as you dump policy. They however believed there was no transparency about how the revenue generated is being spent and were worried about late lifting of waste by Waste Collectors from the communities. It is also the conclusion of this study that, majority of the households believed the waste collection sites were not being kept well and this could lead to the

spread of diseases in their communities. On the effects of the pay as you dump policy on household waste generation, the researcher concludes that the policy force or provides households with incentives to reduce the amount of waste they generate per period. The policy was also said to compel households to adopted new ways of doing things so as to reduce waste generated. On the cost of waste collection, the study concludes that it cost waste collecting firms a minimum of 10,000 Ghana cedis but the maximum amount depend on the size of the waste collecting firms. On the benefits of the pay as you dump policy, the study concludes that the policy ensure that people pay amounts commensurate to waste generated and that it saves time and offer households convenience if others were paid to collect the waste. The policy was also accredited for keeping the environment clean. The pay as you dump policy provides districts with extra revenue source and also provides employment for household members.

Finally the researcher concludes that the main challenges to the pay as you dump policy are the failure of most household to pay by always making excuses, the lack of planned designated site for waste disposal, lack of waste segregation by households, huge proportion of plastic waste generated per period and the poor street naming in our communities.

5.3 Recommendations

Based on the research findings, the researcher therefore made the following recommendations:

1. It is the recommendation of this study that, District Assemblies ensure transparency in the way revenues generated from pay as you ump system are used. This is because the sustenance of the PAYD system would depend largely on the extent of openness and transparency. If households perceive that local authorities misappropriate income from this programme, they are likely to explore other means of disposing off their waste.

2. Also, those employed in the communities to manage waste should ensure that the waste collection sites are kept clean at all times. Many waste collection points are poorly kept which has the potential for cholera outbreak.
3. District Assemblies must also ensure that waste sites are developed to help waste collectors dispose-off their waste. This would more likely help reduce the frequent flooding caused by indiscriminate waste disposal.

4. Finally, educational programs should be organized by the districts in collaboration with the waste collection firms to orientate households on waste segregation and the benefits if offers. The adoption of alternative such as paper bags to reduce the amount of plastic waste generated should be explored.

5.4 Areas for future Research

The following have been suggested for further investigation;

1. Addressing behavioral issues around waste management in Ghana. Evidence from Ashanti Region.
2. Financial analysis of Government Investment in Waste Management in Ghana.
3. Financial sustenance of Waste Management Models being implemented by Government of Ghana.

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Appendix I

QUESTIONNAIRE

My name is Francis Darku, a final year MBA (Finance) student at KNUST School of Business. I am undertaking a study on the ―*Cost Benefit Analysis of Pay as You Dump Waste Management*‖ programme being practiced by the Kumasi Metropolitan Assembly (KMA). I shall be grateful if you could take few minutes of your time to respond to statements or questions below. You are assured that all information provided would be treated as highly confidential. Thank you.

PLEASE NOTE

PAY AS YOU DUMP is a system of waste management in which local authorities and waste collectors charge residents for waste collection services.

PART 1: BACKGROUND INFORMATION

1. **What type of property do you live in?**

[ ] Detached house [ ] Semi-detached [ ] Bungalow [ ] Flat [ ] Own property

[ ] Other……

2. **How many people live in your household?**

[ ] less than 5 [ ] 5-10 [ ] b/n 10 -15 [ ] more than 15

3. **What is your employment status?**

[ ] Self-employed [ ] Unemployed [ ] Retired [ ] Student [ ] Other …….

4. **What is your Average disposable income per month?**

[ ] Less than ghc400 [ ] b/n ghc401 – ghc1000 [ ] b/n ghc1001 –ghc1500

[ ] b/n ghc1, 501 – ghc 2000 [ ] above ghc2, 000

5. **What waste disposal arrangement do you operate as a household?**

[ ] Fixed monthly contract with private waste collectors

[ ] Fixed monthly contract with KMA waste collectors

[ ] Daily payment at waste collection point

[ ] No-payment - Personal disposal

[ ] other……..

6. **How much does your household spend on waste disposal every month?**

[ ] Less than ghc20 [ ] b/n ghc20 – ghc50 [ ] b/n 51 – ghc80 [ ] Above ghc81

7. **What payment plan do you have with the waste collectors ?**

[ ] Fixed amount every month

[ ] Fixed amount every week

[ ] Fees charged depend on volume of waste generated

[ ] No agreed formula

PART 2: HOUSEHOLDS' PERCEPTION ABOUT PAY AS DUMP

This section requires respondent to use a 5point Likert scale in indicating what their overall perception is about PAY AS YOU DUMP.

PERCEPTION **1= strongly disagree , 2=Disagree, 3=Neutral, 4= Agree , 5=Strongly agree**						
		1	**2**	**3**	**4**	**5**
1.	I don't need to pay before disposing off waste					
2.	Paying for waste generated is a wrong system for managing waste					
3.	This system only creates opportunity to generate money for individual pockets					
4.	There is no transparency in the way fees are charged for waste disposal					
5.	People tasked to take money at collection points charge discriminatory fees					
6.	There is no proper system to manage revenues generated					
7.	Payment made are not even used to lift waste containers on time					
8.	I don't need to pay to dump solid waste when there is a free land in my community					
9.	Our Assembly does not charge for waste collection					
10.	Paying for waste generated adds to worsening economic situation					
11.	Community members should be encouraged to develop their own waste management system					
12.	Waste collection sites are not properly maintained, so why should I pay.					
13.	Fees charged are too high					
14.	Some communities should not be charged for waste disposal because they can't afford					

15.	Waste collectors are not punctual in collecting wastes					
16.	If I can generate waste, I must pay for its disposal					

PART 3: EFFECTS OF PAY AS YOU DUMP SYSTEM ON WASTE GENERATION

Likert scale 1= strongly disagree , 2=Disagree, 3=Neutral, 4= Agree , 5=Strongly agree						
With Pay as You Dump……..		**1**	**2**	**3**	**4**	**5**
1.	I'm forced to reduce volume of waste generated					
2.	I will work at educating co-tenants to reduce their waste					
3.	I will resort to burning plastic and paper wastes					
4.	I believe waste problems can be addressed by the Assembly					
5.	I will explore cheaper ways of disposing my waste					
6.	There is likely to be conflicts among tenants					
7.	I'm sure people will be more responsible about not littering the environment					
8.	The KMA can engage more waste collectors to manage waste generated					
9.	Ghanaians will begin to change their attitude regarding waste issues					
10.	It is more effective to reach out to households					

PART 4: BENEFITS OF PAY AS YOU DUMP SYSTEM

Likert scale 1= strongly disagree , 2=Disagree, 3=Neutral, 4= Agree , 5=Strongly agree					
	1	**2**	**3**	**4**	**5**

1.	Having people pick my waste saves time					
2.	Pay as you dump is more convenient to households than doing it by my self					
3.	By paying for services, I can demand quality services from waste collectors					
4.	I am able to choose who collects my waste					
5.	I pay less amount for generating less					
6.	Pay as dump ensures that our environment is kept clean					
7.	Pay as you dump is a way of helping generate revenue for the Assembly					
8.	The approach ensures that people don‘t dump waste indiscriminately					
9.	There is proper monitoring of community waste problems					
10.	More jobs are created for local people in communities					
11.	Paying KMA for collecting waste is more expensive than doing it by myself					
12.	Whether you generate more or less, you pay same					

Appendix II

QUESTIONNAIRE – WASTE COLLECTORS

My name is Francis Darku, a final year MBA (Finance) student at KNUST School of Business.

I'm undertaking a study on the ―*Cost Benefit Analysis of Pay as You Dump Waste Management*‖ programme being practiced by the Kumasi Metropolitan Assembly (KMA). I shall be grateful if you could take few minutes of your time to respond to statements or questions below. You are assured that all information provided would be treated as highly confidential. Thank you.

PART 1: BACKGROUND INFORMATION

1. Name of institution

   ……

   ……

2. What waste management services are provided by your company?

   ……

   ……

   ……

   ……

3. What is the coverage of your firm's activities

   (landmark)……

   ……

   …

   ……..

4. **Which of the following applies to how your firm manages waste collection activities?**

Please tick [√] as many as apply	***[√]***
17. The starting point is making initial contact with prospective clients	
18. Next is to agree on payment option	
19. Agreeing on point and waste collection days	
20. Storage and Processing	
21. Collection of waste	
22. Transfer and Transport	

23. Processing and Recovery
24. Disposal
25. Addressing complaints
26. Other……
……

PART 2: Cost - benefit analysis of PAY AS YOU DUMP SYSTEM ON WASTE GENERATION

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1. How much does your firm spend on waste management in a month per locality?

   [ ] less GHC10, 000 [ ] GHC10, 001 – 15,000 [ ] GHC15, 001 – 20,000 [ ] GHC20, 001 and above

Likert scale 1= strongly disagree , 2=Disagree, 3=Neutral, 4= Agree , 5=Strongly agree		**1**	**2**	**3**	**4**	**5**
11.	Pay as you dump makes payment difficult					
12.	Some households may not be able to pay fees charged					
13.	Households are not willing to pay higher for more waste generated					
14.	Payments are always in arrears					
15.	Communities prefer using private dumping sites					
16.	There is no proper co-ordination between waste collectors and local Assemblies					
17.	Pay as you dump forces households to reduce their waste					
18.	Pay as you dump enables the KMA to engage more waste collectors					
19.	Pay as you dump leads to behavioural change					
20.	Pay as you dump enables waste collectors to educate households on waste separation					
21.	Pas as you dump gives the KMA more revenue to manage waste issues					

2. Do you think households pay the right fees for waste disposal?

   [ ] Not at all [ ] Somehow [ ] Fees charged are appropriate

3. **What is your assessment of the following?**

PART 3: SOCIAL AND POLITICAL FACTORS HAMPERING THE EFFECTIVE IMPLEMENTATION OF PAY AS YOU DUMP SYSTEM

Likert scale	**1= strongly disagree , 2=Disagree, 3=Neutral, 4= Agree , 5=Strongly agree**					
		1	**2**	**3**	**4**	**5**
1.	Local Assemblies discourage indigenes from paying for waste disposal					
2.	People are not willing to pay because of the perception of misappropriation					
3.	Ghanaians make excuses when it comes to paying for waste					
4.	Charging more will force people to change their attitude					
5.	There are no properly planned sites for disposing waste					
6.	Waste recycling is a major challenge					
7.	There is no collaboration between communities and waste collectors					
8.	Households need to learn how to separate solid waste from other forms of waste					
9.	Plastic waste is a major challenge for waste collectors					
10.	Poor street naming and numbering affect waste collection activities					

11. How will you assess the sustenance of the PAY As YOU DUMP waste management approach?

[ ] Not at all sustainable [ ] Not really sustainable [ ] can‘t tell [ ] Sustainable [ ] Very sustainable

12. How do you think waste management problems can be effectively addressed by local Assemblies?

……
……
……
……
……