

**DETERMINANTS OF PUBLIC PRIVATE PARTNERSHIP IN SOLID WASTE
MANAGEMENT: THE CASE OF MOMBASA COUNTY, KENYA.**

BY

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DECLARATION

This research report is my original work and has never been presented for an award of diploma or a degree in this or any other university.

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DEDICATION

I dedicate this work to my parents Mr. and Mrs. Matheka and siblings; Agatha, Nico and Arnold for their unwavering support and belief in the value of education and to my loving husband Mr. Obiero for being my loudest cheer leader in this walk. God bless you all.

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ABBREVIATIONS AND ACRONYMS

- BOT** Build-Operate-Transfer
- CBO** Community Based Organization
- CCN** City Council of Nairobi
- CDM** Clean Development Mechanisms
- DBFO** Design-Build-Finance-Operate
- EMCA** Environment Management and Coordination Act
- JICA** Japan International Cooperation Agency
- MCN** County government Nakuru
- MDG** Millennium Development Goals
- MMC** Moshi Municipal Council
- MSES** Micro and Small Enterprises
- NEMA** National Environmental Management Authority
- NGO** Non-governmental Organization
- OECS** Organization of Eastern Caribbean States
- PPP** Public Private Partnership
- RWA** Resident Welfare Association
- SWM** Solid Waste Management

ABSTRACT

The purpose of this study was to establish the determinants of public private partnership in solid waste management in Mombasa County. Mombasa County has come under immense pressure to deal with solid waste issue and this challenge is aggravated by inadequate financial capabilities, improper selection of technology for collection and disposal systems and lack of public awareness and participation. The objectives of the study were; to determine the extent to which technology influences public private partnership in solid waste management in Mombasa, to assess the extent to which financial resources influences public private partnership in solid waste management and to examine how community participation influences public private partnership in solid waste management. This study used descriptive survey research design which was appropriate for this study due to its ability to ensure minimization of bias and maximization of reliability of evidence collected. The population target consisted of respondents from Mombasa County management, private firms and community participants. The sample of the study was 38 respondents of whom were randomly selected and data collection was done using observation, questionnaires and interviews of respondents in the study. The data was cleaned, coded and entered into SPSS and analysis was displayed in form of tables. The response rate was 100%. The study found that technology, financial resources, and community participation had a significant correlation with PPPs in solid waste management. The study concluded that technology, financial resources and community participation influence PPPs in solid waste management. The study recommended that technology needs to be at the center stage of all solid waste management programs of Mombasa County government as well as other counties in Kenya. Thus, technology needs to be adopted in solid waste management in the counties across the waste value chain. The study also recommended that since financial resources are important in PPPs in solid waste management, counties must devote adequate financial resources in order to see through PPPs in solid waste management in Kenya. As much as the private sector can commit to run solid waste management projects, the financial backing of the county governments is also key. Lastly, the study recommended that counties should inculcate the value of community participation in their PPPs in solid waste management. Thus, community members must be involved in the planning, execution and monitoring of PPPs in solid waste management in their counties if they are to be sustainable and successful in meeting their goals.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Sustainable urban development as defined by Hall (2003) is a form of development today which guarantees the continuing development potential of cities and urban populations in future generations; and indeed the continuing potential of the planet in which they live. In line with this definition, this study defines sustainable management as that intervention by all relevant stakeholders that provides relevant and harmonious long-term solutions for the identification, mobilization, administration and maintenance of the resources essential for a viable solid waste management process (Zamberia 2009).

In most developing countries, typically one to two thirds of the solid waste generated is not collected. As a result, the uncollected waste is dumped indiscriminately in the streets and in drains, contributing to flooding, breeding of insect and rodent vectors and the spread of diseases. Urban waste management is drawing increasing attention, as citizens observe that too much garbage is lying uncollected in the streets, causing inconvenience and environmental pollution, and being a risk for public health. Although government authorities apply all the means at their disposal, the piles of wastes only seem to grow from day to day. Such means as by laws and arresting tools in an era of shrinking municipal budgets and a restriction on the scope of municipal government jurisdiction, the problem is likely to intensify unless alternate approaches can be developed (Zerbock, 2003).

Municipal waste consists of household waste, construction and demolition debris, sanitation residue and waste from streets. This garbage is generated mainly from residential and commercial complexes. With rising urbanization and change in lifestyle and food habits, the amount of municipal solid waste has been increasing rapidly and its composition changing. Hazardous waste Industrial and hospital waste is considered hazardous as they may contain toxic substances. They would be highly toxic to humans, animals and plants; are corrosive, highly inflammable or explosive; and react when exposed to certain things e.g. gases. There is clear need to focus more attention on private sector involvement and to put a higher priority on achieving a greater degree of partnership between the public and private sectors in solid waste management (UNCHS, 1998).

Towards the end of twentieth century, there was an enthusiastic rush towards involving the private sector in the supply of public services. The telephone, electricity, and water supply sectors led the way and there were notable success and new hope for the millions still withholding satisfactory services, many even in major urban areas. Solid waste management has been provided by private enterprises for decades in the more prosperous nations and failures of municipal administrations to keep up with the demands of rapidly growing cities in the developing nations have encouraged the extension of various forms of private sector participation in those countries. However, these attempts have not all been as successful as was hoped, so it is time to stand back for a moment and look at what has been achieved in an effort to identify the best approaches and the conditions that favour sustainable solutions (Zerbock, 2003).

Over the years, the waste disposal problem has attracted the attention of the government, the groups and private citizens and various efforts have been directed towards clearing the city of the waste. All efforts have had varying impact on the problem and the duration of the Intervention has also differed, with some being ad hoc or period, and others more long term. Mombasa municipality has since 1997, sought private sector partnership and collaboration in the collection of solid waste, by the year 1998 it was estimated that there were 39 small companies owned by private households that are engaged in waste collection in Mombasa. Despite the large agglomeration of companies vying for the waste disposal business however industrial and domestic waste management has remained a serious environmental concern. Daily refuse collection by the council and private companies is estimated to be 600 tons which represents 45%. With the above scenario in mind, there is clear indication that the prospect for resolution of the solid waste crisis through privatization has imminent limitations. While the government continues to attribute the problem to "inadequate finances and resources, and low participation by both individuals and private companies" it is evident that there are an array of other factors that culminate in the current state of waste mismanagement notable for example, that community-level mobilization to address the crisis has been spontaneous and non-sustained (UNCHS, 1998).

Solid waste is an integral part of modern society. Human activities create solid waste and it is required to store, collect and dispose. If it is not properly managed then it causes risk to environment and public health. Municipal solid waste management is a major responsibility of local government. In Mumbai Metropolitan region, urbanization, population, industrial,

commercial unit growth is higher. Mumbai being a financial capital of India, the growth of services sector such as finance, IT, Telecommunication, Tourism, Entertainment, Advertising and Communication provides enormous employment opportunities in the region and this has resulted to a continuous migration from rural to Mumbai metropolitan region, increasing population, putting pressure on existing amenities such as water supply, housing, transportation, healthcare and solid waste (Schubeler, 1996).

Many developing countries are still struggling with solid waste collection and management. Solid waste is waste generated and discarded as useless or unwanted from activities in homes, institutions, public and commercial places and industries, though it is also a resource for reuse, recycle and recovery. Solid waste collection in developing countries, especially in Africa is a real challenge to public sector. Given the level of investment, the running cost of solid waste management, and the competing priorities water, health, education, roads, and energy of national governments, the public sector alone could not deliver the solid waste services. The private sector is partnering with public sector to provide the needed resources for the solid waste services delivery (Tchobanogious et al. 1993).

Many city administrations have not been able to cope with rapid escalation of the solid waste problem and consequently have left densely settled areas with no service, polluted precious air by the open burning of wastes and damaged land and waste resources by careless dumping of the residues of our proud civilization. Faced with these failures, Municipal administrations have looked for experts and new ways of raising funds to pay the ever increasing costs of solid waste management. First they recruited and trained their own experts, but the results were not always successful and failures were blamed on insufficient funds, increased population, inadequate technologies and inadequate decision-making procedures. Often small-scale entrepreneurs and groups of residents took action to fill in the gap, organizing or providing services on a local scale that at least moved their wastes out of their immediate neighborhoods and often earning much needed income from the reuse of materials separated from the mixed waste. The most decent approach has been to invite private enterprise to take over the task, to increase coverage improve efficiency and reduce the pollution of natural resources (Schubeler, 1996).

Various cities across the world have successfully applied this approach to manage their solid waste. In Kunming, China, the solid waste management is modernized. Collection occurs

daily in central business district and less frequently elsewhere. Collection and sweeping are operated by two levels of government under the city administrative level – the district level and the ‘street neighborhood’ or ward level. Kunming has an excellent waste collection system based on over 120 small transfer stations throughout the city and a combination of low-tech tricycles and high-tech compaction vehicles; all are operated by public employees. Since 2006, street sweeping has been progressively privatized in the city’s districts and the trend towards privatization is likely to continue in solid waste services in general (Wilson, 2007).

In India, Private participation in the provision of Municipal Solid Waste services has existed since 1985 whereby the Municipalities have employed private contractors for secondary transportation from the communal bins or collection points to the disposal sites. In New Delhi the capital city of India, segregation and storage of Municipal Solid Waste decomposable and non-decomposable wastes are often disposed off at a common communal dustbins or disposal centre. New Delhi has increasingly resulted to the use of private contractors for collection, transportation and disposal and private capital to supplement the mechanization or improvisation process over the years. Also, the engagement of private sector participation has increased from short term contracts to long-term partnership, close to 31 long-term Build-Operate-Transfer concessions being awarded to the private sector to manage solid waste,(Chartri, 2012).

Curepipe is an Island off the coast of Africa, located in south-central highlands of Mauritius Island. It has well-managed waste collection, waste disposal and street cleaning which results in an overall “tidy” city. Household wastes are collected door to door on weekly basis by a mixture of private contractors (40 per cent) and the Municipality (60 per cent). The waste from both residential and commercial collection systems goes to the transfer station at Brasserie, where wastes are compacted before being transported to the landfill at mare chicose. These landfills construction was funded by the national government as a strategy for controlling disposal and closing the unspecified number of unauthorized dumps that threatened the image of Mauritius as a beautiful tourist destination. The operation of the site was let out by tender to a private operator. Curepipe has set up a project with a non-governmental organization, Mission Verte, to put recycling bins around the city to collect general waste, paper, cans and plastic, even though there are no recycling facilities on the

island. This material after being separately collected is also mixed in the transfer station, (Prof. Stentiford, 2010).

In Moshi Tanzania, waste collection services are provided by the Moshi Municipal Council (MMC), a private contractor on a pilot basis, and communitybasedorganizations (CBOs). The private contractor provides services in one of three wards in the central business district (of 15 intotal in Moshi). The arrangement is that private contractors collect both waste and fee and pay 3 per cent of the total fee collectedto the county government. Oberlin (2012) reviewed the role of Community Based Organizations in solid waste management in Kinondoni municipality and in Dar es Salaam Tanzania. A triangulation method whereby information from the same sample area was collected using different techniques including household questionnaire survey, key informant interviews and direct observations was employed. The results of the study showed that CBOs were found to be involved in the provisioning of solid waste management services. Their services are, however, seriously hampered by infrastructure, policy, attitudinal and political challenges in implementing successful solid waste management services.

Nairobi the capital city of Kenya is a city where, for the last two decades, the private sector has been leading the way in waste collection and materials recovery initiatives. The flourishing private waste collection sector consists of more than 100 companies, micro- and small enterprises(MSEs) and community-based organizations (CBOs) registered to collect waste, recyclables and compostable. The city authority's focus has been in policy development and other donor-driven initiatives. In the year 2001, the City Council of Nairobi (CCN) published a policy document on private-sector involvement in solid waste management (SWM) to define a systematic approach and provide a framework of operation. It further formulated a policy framework in 2002 to promote the private activities of non-stateactors in composting and recycling. Acknowledging private collection efforts, the CCN instituted a formal registration process for collectors in 2006. The flip side of successful private initiative is the *laissez-faire* attitude shown by public bodies in relation to disposal. In the nearly 15 years of solid waste modernization since the Japan International Cooperation Agency (JICA) began its waste management plan in 1996, the CCN, which is responsible for disposal, has not yet made it onto the disposal upgrading ladder. As a result, the CCN relies entirely on the Dandora dumping site, situated in a former quarry some 25km to the east of the city centre, for uncontrolled disposal of municipal waste (Kiriimi, 2010).

Recovery of materials occurs in all stages of waste material flowthrough the city, but most extensively by about 1000 waste-pickers living on the Dandora dumpsite, with some coming from the neighboring suburbs. The main items of importance are paper, textile, glass, metals and bones. Recycling provides informal employment and a means of livelihood to many informal recyclers, and reduces CCN's waste management costs. With a Chandaria paper mill and a large industrial base, combined with many commercial relationships with regional powerhouse South Africa, markets for recyclables in Nairobi are better than in most other East African countries (Ikiara, et al, 2004).

1.2 Statement of the Problem

Solid waste management (SWM) is a major responsibility of local governments, typically consuming between 10% and 50% of municipal budgets in developing countries. Some estates have fully adopted privatization to cope with the growing frustration from the lack of effectual city council service. This proposal therefore presents a picture of the current state of public private partnership on solid waste management in Mombasa County. The management of solid waste in Mombasa is easily identified by the persistent heaps of uncollected waste found on the street sides or ubiquitous illegal dumps (Ikiara, et al, 2004).

According to a study done by the Mombasa Integrated Solid Waste Management Project on community waste based enterprises, Mombasa coastal town produces 750 tons of waste daily. Only 68% of the collected waste is disposed at the Mwakirunge dumpsite, the rest (32%) ends up in illegal dumpsites. According to Cointre and Levine and Coad (2000), there has been an increased involvement of private sector in solid waste management in many cities of the developing countries. However, despite the increasing interest in public private community partnership, there is evidence that coverage and the needed improvement in environmental sanitation have not been achieved (Onibokun and Kumuyi 1999, Oduro- Kwarteng et al. 2006). The essence of this study therefore was to identify the factors influencing public private partnership in solid waste management in Mombasa County.

1.3 Purpose of the Study

The purpose of the study was to examine the factors influencing public private partnership in solid waste management in Mombasa County.

1.4 Objectives of the Study

The study was based on the following objectives:

- 1) To determine the extent to which technology influences public private partnership in solid waste management in Mombasa.
- 2) To assess the extent to which financial resources influences publicprivate partnership in solid waste management.
- 3) To examinehow community participation influences public private partnership in solid waste management

1.5Research Questions

The study intended to answer the following research questions:

1. How doestechonology influence public private partnership in solid waste management?
2. How do financial resources affect public private partnership in solid waste management?
3. What is the extent to which community participation influence public private partnership in solid waste management?

1.6 Research Hypotheses

The following hypotheses were tested in this study:

1. H1; Technology influences public private partnership in solid waste management
2. H1; Financial resources availability influence private public partnership in solid waste management
3. H1; Community participation influence public private participation in solid waste management

1.7Significance of the study

Given limited budgetary allocations, county governments need to explore means of partnerships with the private sector. The study involving private sector performance, capacity and regulation in solid waste management in developing countries is least explored. Studies on local governance of solid waste services (Awortwi, 2003) and impact of decentralization on solid waste management (Obiri-Opareh et al. 2003) conducted in Ghana focused on the policies for urban solid waste management. These two studies in Ghana did not focus on the link between private sector performance and regulation by contract.

To better understand the linkages between private sector performance and the different factors influencing performance, a look at the solid waste market, using four theoretical issues relevant for practice and policy, is necessary. The empirical evidence of the various factors that influence the performances of the private actors will provide an understanding of the internal and external factors that drive performance or act as barriers to performance.

The results of this study are useful to a number of stakeholders. First, the study is important to the Municipality of Mombasa by offering a guideline on how they can improve solid waste management by partnering with the private sector.

The study is also useful to other counties in Kenya as they can understand the need to partner with private institutions and individuals to fund their activities and achieve their objectives.

The study is also important to the Government of Kenya as it provides guidelines for policy formulation to better manage solid waste in Mombasa Municipality.

The study further enriches literature on 3Ps in solid waste management. The perspective of 3Ps from county government can be very valuable for researchers in the field of management.

1.8 Basic Assumptions of the Study

This study was carried out under the following assumptions:

1. Technology, financial resources and community participation in Mombasa County, were expected to influence public private partnership in solid waste management.
2. It is assumed that the respondents participated adequately and they gave truthful and sincere information concerning public private partnership on solid waste in Mombasa.

All the assumptions seem to have held.

1.9 Delimitations of the Study

Since the study, while analysing the waste management options focused on urban areas, it was difficult to extrapolate these results as such to other small regions outside the urban centre.

Background information related to waste management in Mombasa is insufficient and not updated. In fact, a comprehensive study regarding the municipal waste sector in Mombasa has not been done, which increases the importance of this study. The research scope focused on the Municipal Solid Waste. However, it was particularly centered on household waste without any emphasis of specific waste stream such as plastic, paper and other

materials. Regarding the geographical boundaries, the study is limited to the urban centre based on the reason that, urban centre has the highest population in Mombasa County government and represents the main part of the City.

1.10 Limitation of the Study

The study faced the following limitations;

1. Funds were not sufficient to enable the researcher carry out a wider study. To mitigate this, the researcher reduced the sample to manageable size that gave representative information.
2. The collection of data was hard since the county management was adamant to give information as they felt it was a waste of their time. To mitigate this, the researcher proposed that the recommendations would be used to formulate positive national policies that would improve the solid waste situation in Mombasa County.

1.11 Definitions of Significant Terms

Community Participation – it is a process by which community act in response to public concerns, voice and their opinions about decisions that affect them and take responsibilities for changes to their community.

Financial Resources – this is money available to a business for spending in the form of cash, liquid securities and credit lines

Public Private Partnership – It is a method of working in which the public and private sectors cooperate and partner with each other to provide improved services to the users.

Solid Waste – These are substances or objects which are disposed off or are intended to be disposed off or are intended to be disposed off by the provisions of national law (based on Convention).

Technology – this is the application of scientific knowledge for practical purposes, especially in industry.

1.12 Organization of the Study

The study was divided into five chapters. Chapter 1 was the introduction where the background the problem was brought out, the purpose and objectives, the research questions and hypothesis developed from it. The significance of the study was also explained, with

limitations examined and mitigated. Key terms were also defined. Chapter 2 is the literature review where some of the researches that have been carried out in the past on public private partnership (PPP) on solid waste management in various economies in the world are presented. Chapter 3 is the research methodology which discussed the sample size, the research methodology and procedures used for data collection and analysis. Chapter four discussed the findings and chapter 5 discussed the summary of findings, conclusions, and recommendations of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the literature on areas related to the public private partnerships in solid waste management and the factors that influence this partnership. First, the chapter presents a theoretical background in the areas of public / private partnerships and solid waste management. This is followed by a literature review on the same. This is then followed by a conceptual framework and lastly, a summary of literature is presented.

2.2 Overview on Public Private Partnership and Solid Waste Management

Public/private partnership for SWM may be viewed in light of sociological theories of functionalism and general systems as elucidated by Abuyuan (1999). According to the functionalism theory institutions must survive by adapting to changing circumstances by means of interdependence on its various branches or partners. PPPs in SWM adapt to this theory well if we view the partners as parts of a whole organisation that delivers services. Here the partners (public and private) may be seen as interdependent organs of a larger organisation each having its specialised function working as a whole towards the common goal of delivering effective service.

The general systems theory analyses systems from three different viewpoints: (1) system relations to determine the nature of relationship between various components of a system; (2) system effectiveness to judge how satisfactory are relationships among various components of a system for the whole system to survive or make optimum use of resources; and (3) system dynamics to investigate what forces a system to change and the direction in which the change occurs. This theory is also relevant to PPP for SWM. Indeed it is a prerequisite to have a clear role demarcation and defined relationship to make PPP work in the SWM sector. It is necessary that the private sector be given the role in which they have the maximum potential to excel. For example, the private sector has a comparative advantage over the public sector in the case of primary collection. Conversely, financial and management inputs for operating secondary collection may be beyond the capacity of most private sector agencies, and it may be better to leave this activity to the public sector. It is also important to make an assessment on how comfortable the partners are in a PPP arrangement. Adjustments in the way each sector works may be necessary to nurture and sustain the partnership so that optimum

resource utilisation is ensured. The partnership arrangement should be considered dynamic, as various factors like population growth, new regulations and acquisition of new skills will necessitate change in the arrangement. The force and direction of change in the work performed by the private and the public sector should be carefully weighed to maintain the optimum balance. Both functionalism and general systems theory helps in visualising partnerships as adapting, living beings vying for survival in a changing world. This perspective is valuable in analysing the need, evolution and future direction of partnership (Ahmed & Ali, 2004).

Public- Private Partnership (PPP) is a system in which a service or a project is funded and operated through a partnership of government and one or more private sector organizations e.g. solid waste collection (Awortwi, 2004). PPP often starts when a crisis is identified. Crisis can occur when a service is not delivered, the need is high and the government cannot do it anymore. Also when there is long term planning, driven by a clear understanding of and respect for the needs of various actors and when there is an individual, somebody who pushes for change called the 'champion' that is very influential and can make a huge difference. PPP's are happening because public and private actors cannot meet their individual needs alone. State domination and public services has not worked all the way and there is a strong ideological belief in supremacy of the private sector that people think that the private sector is the solution for a better management and calling for a lean government (Gentry & Fernandez, 1999).

Public-private partnerships between private companies and states are a well-established means of providing infrastructure and services that states have neither the resources nor expertise to supply alone. In such cases, partnerships may commonly take the form of build-operate-transfer (BOT) or related schemes, which allow companies to construct infrastructure and operate it profitably until a time when it is transferred to state ownership (Osbourne and Rosenau, 2000). Other types of public private partnerships includes; Contracting (signing a contract with private party to design and build public facility which is financed and owned by public sector) and Design -Build-Finance-Operate (DBFO) this is a contract with a private sector contractor to design, build and operate a public facility for a defined period, after which the facility is handed back to the public sector and remains in the public ownership throughout the contract. In recent years, however, the remit of public-private partnerships has increased widely following the diversification of actors that

collaborate with foreign investors, and the growing use of partnerships to allow local participation in environmental and developmental policies in general. Rather than simply seeking to provide badly needed infrastructure at the cheapest cost to the state, such new approaches to partnerships may also occur with sub-state actors such as municipalities and citizen groups, and may be designed to allow greater participation of all non-state actors in shaping development policy (Plummer, 2002).

Local involvement in public-private partnerships has also been urged as a means of overcoming some of the political standoffs in implementing global environmental agreements, such as the UN Framework Convention on Climate Change (1992) and its Kyoto Protocol (1997). Under the Kyoto Protocol, the Clean Development Mechanism (CDM) was established to allow countries with specific greenhouse gas reduction targets to achieve some of these targets by investing in climate-friendly activities in countries that do not have these targets. In recent debates, however, some developing countries have criticized the CDM for allegedly encouraging projects such as plantation forestry that may assist global climate change policy simply by sequestering greenhouse gas emissions, but which offer little immediate developmental benefit for people in host countries. Yet, alternative projects that may maximize local benefits, such as investment in industrial technology, or new forms of renewable energy, are commonly considered expensive by investors. Such concerns have worked against the achievement of successful, long-term technology transfer (Forsyth, 1999).

Localized, public-private partnerships have been proposed as a means of reducing these problems with international investment in climate-friendly technologies. Collaboration with local citizens may reduce the costs of technology transfer by them to participate in the shaping of technologies implemented, or in identifying local needs. Moreover, economic cost sharing with citizens may offset costs if local civil groups perform certain tasks such as providing maintenance or financial management, or if the new investment provides complementary functions alongside local activities such as the collection of local waste products for fuel for certain types of renewable energy. Indeed, such civic environmentalism, or local cooperation with investors may lead to classic win-win situations where investors can successfully transfer a new technology to a new location, and local people can influence the nature and purposes of the investment and technology (Stiglitz & Wallsten, 2000). In eastern Indonesia, for example, the development agency Winrock has established new forms of decentralized electrification using wind turbines imported from the United States Of

America, but where local non-governmental organizations and community-based organizations administer the projects by creating new institutions for financial and technical management (Forsyth, 1999).

The rationale of effective public participation is clearly based on the fact that everyone generates waste and can be affected directly and indirectly if waste is not well managed. Solid waste (SW) can be hazardous to man and the environment if not appropriately managed. Apart from the threat to poor air quality, inadequate SWM increases risk of morbidity (leptospirosis, dengue fever, gastroenteritis etc). Poor management of SW can also affect ground water and marine ecosystems. Consequently everyone has to be involved in SWM for effective and efficient SWM systems. On the other hand waste can be a resource that can be used and provide employment opportunities that may contribute to poverty alleviation if the populations are informed, educated and included in the SWM decision making process. Consequently every effort must be made to maintain public health and environment quality for residents and tourists. It is not only important to involve individuals in SWM but also groups and the private sector as full ownership and management by the government may not be the most efficient approach (Pinnock, 1998).

Squires (2006) carried out a study on public participation in solid waste management in small island developing states the study was based on discussions with solid waste managers and other stakeholders in the Organisation of Eastern Caribbean States (OECS), actual participatory observation by the author, analysis of primary and secondary data and information collected from solid waste management (SWM) operations in the OECS countries, Barbados, Belize and from other developing countries. Some examples were also drawn from two sub-regions (Mashreq and Maghreb Countries) in the Mediterranean region. The paper presented information on public consultation approaches and particularly on the best practices for successful public participation and consultation on SWM projects (SWMPs) in the Caribbean countries. Based on the special nature of SWM, the paper, in conclusion, sets out some guidelines on how to engage the public throughout the SWM project cycle. It posits that the Caribbean should mainstream public participation and also agree on ways to measure and monitor participation. In keeping with their commitment to the Millennium Development Goals (MDGs), the Countries should agree on Guidelines for Social Impact Assessments. These should allow them to identify risks to be mitigated and to

adjust SWMPs designs to provide opportunities for the local population including the poor to participate in efficient and effective SWM (Pinnock 1998).

The interest for involving the private sector in service delivery and urban service provision is increasing worldwide. Many reasons are mentioned for the collaboration between private and public sector in provision and developing infrastructure services. These include increased efficiency and flexibility in service delivery, cost efficiency in operation and management, access to advanced technology and availability of expertise (World Bank & UNESCAP, 2011).

Organizing of public-private partnerships to assume functions that were formerly public sector responsibilities has potential benefits for both citizens and government. PPPs can increase competition and efficiency in service provision, expand coverage, and reduce delivery costs. As Gabriel Roth points out, PPPs allow optimal overall risk allocation between the public and private sectors, facilitating the distribution of risk to the organization that can most effectively manage it (Roth 1987).

Participation of the private sector ensures that projects and programs are subject to commercial discipline and sound financial due diligence. Furthermore the private sector can often manage more effectively than can government agencies. Public private partnerships can bring new ideas for designing programs and projects; and greater synergy between design and operation of facilities (UNDP, 2000).

By working in partnership with the private sector, governments can benefit from the strong incentives for private firms to keep costs down. Often, private firms can avoid the bureaucratic problems that plague national and municipal governments, and they can experiment with new technology and procedures. PPPs allow government to extend services without increasing the number of public employees and without making large capital investments in facilities and equipment. Partnering with the private sector gives local governments the ability to take advantage of economies of scale. By contracting with several suppliers, the government can assure continuity of services, by contracting competitively for services; they can determine the true costs of production and thereby eliminate waste. Lack of above mentioned advantages and capacities in the public sector are the main reasons of government's failure in providing municipal services for their population, and the attraction towards public private partnerships (Gerrard, 2001).

Public private partnerships could have significant limitations if so many important aspects such as economic, social, political, legal and administrative which need to be studied carefully before the approval of the contract. These aspects include projects not being feasible for different reasons such as political, legal, commercial viability; the private sector may not take interest in a project due to possible high risks or due to lack of technical, financial capacity to implement the project. A PPP project in some cases may be more costly unless additional costs (for instance due to higher transaction and financing costs) can be off-set through efficiency gains (UNESCAP, 2011). Encouragement of Municipalities for making public private partnership is hardly possible by private sector, NGOs or community based organization (CBOs) due to lack of access, skills and in most cases funds (Ahmad et al, 2006).

Solid waste is defined as waste arising from human activities and normally solid and is discarded as useless or unwanted, though it is also a resource for reuse, recycling and recovery. In other words, solid waste includes all solids or semi solid material that is of no value to retain in a given setting and is discarded. Urban solid waste encompasses domestic waste, street waste (sweepings from streets, parks, and playground), commercial waste, institutional waste as well as industrial waste. The U.S. Environmental Protection Agency defines urban solid waste to include food waste, yard waste, durable goods, containers and packaging, and miscellaneous inorganic waste from residential, commercial, institutional, and industrial sources. Urban solid waste excludes all categories of hazardous waste from industries, agricultural activities, sewage sludge, and medical waste (Tchobanoglous et al., 1993).

Solid waste collection has evolved over the years from collection of un-segregated waste and disposal on dumping grounds to collection of source separated waste streams through formal and informal service providers. The management of the processes involved which was traditionally public has now become public-private-community provision and partnerships arrangements. The management approaches depend on the culture and society where solid waste is generated and their perception about solid waste. There are four modes of solid waste collection services depending on the income levels of the people, housing types and the level of service required. First, the communal collection mode is rendered in low income areas. The householders discharge their waste into communal storage containers at transfer stations or designated locations and collection vehicles pick up the containers full of waste at frequent

intervals. Second, block collection mode is used where there are large apartment residential buildings. For this service, collection vehicle travels along a predetermined route at specific intervals (every 2 to 3 days) and stops at selected locations. The householders bring their waste bins upon hearing a bell sound and hand them to the crew who empties the bins and gives them back to the householders (Rotich, Zhao & Dong, 2005).

Third, the kerbside collection mode is rendered in middle and high income areas. The collection crew collects bins and bags of waste which are deposited at the kerbside on fixed days (e.g. 2 specific days in a week) when collection takes place. The householders leave their bins at the kerbside and collect them later in the day. Finally, the door-to-door or house to house collection mode is rendered in middle and high income areas. The collection crew enters each premise, takes out the bin and sends it back after emptying the waste into collection vehicles. No bins are left outside household premises. The residents served by the kerbside and house to house collection use standard bins to store waste. All the modes of collection are practice in developing countries but the common practice is the communal collection. Solid waste services concern the link between customers and the service provider, and it is an integral part of solid waste management (Rotich, Zhao & Dong, 2005).

Solid Waste Management (SWM) is one of the important obligatory functions of any urban local authority. It refers to all activities pertaining to the control, collection, transportation, processing and disposal of those in accordance with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations. According to Tchobanoglous et al. (1993), the fundamental target of solid waste management is to protect the health of the population, promote environmental quality, develop sustainability and provide support to economic productivity through utilization of waste as a resource. These objectives should be attained in a viable manner that is affordable by the residents over the long term with minimum risks involved to the persons doing it. This essential service, however, is not efficiently and properly performed by many cities in developing countries. For instance, many urban centres in Kenya are grappling with increasing piles of waste, disposal technologies and methodologies, and overflowing dumping sites. A combination of all of the factors including lack of resources - financial and personnel, institutional weakness, improper selection of technology, transportation systems and disposal options, public apathy towards environmental cleanliness and protection have made this service unsatisfactory in many of these cities (Rotich, et al., 2005).

Sound practice is a management system that embodies a reasonable balance of feasible, cost effective, sustainable, environmentally beneficial, and socially sensitive solutions to solid waste management problems (UNEP, 1996). In other words, sound practices function together to achieve defined solid waste policy goals, while appropriately responding to the entire set of conditions that constrain the choices available in specific MSWM decisions (UNEP, 1996). Therefore if solid waste management is to be accomplished in an efficient and orderly manner, the fundamental aspects and relationships involved must be understood clearly. On the basis of this solid waste management incorporates the following: source separation, storage, collection, transportation and disposal of solid waste in an environmentally sustainable manner (Zerbock, 2003).

Solid waste consists of many different materials. Some can burn, some cannot. Some can be recycled, some cannot. Therefore, a detailed understanding of the composition of solid waste will indicate the management methods that will be used. Solid waste is composed of combustibles and non-combustible materials. The combustible materials include paper, plastics, yard debris, food waste, wood, textiles, disposable diapers, and other organics. Non-combustibles also include glass, metal, bones, leather and aluminium. Waste generation encompasses those activities in which materials are identified as no longer being of value and are either thrown away or gathered for disposal (Hoornweg et al, 1999).

Storage means where solid waste is stored before it is collected. It could be stored in a skip or dustbins and not thrown away indiscriminately. Storage is of primary importance because of the aesthetic consideration appropriate storage containers are required to save the energy and labor and increase the speed of collection and reduce the crew size. It is important that the containers should be functional to the type of materials and the collection vehicles used. Containers should also be durable, easy to handle, economical as well as resistant to corrosion, weather conditions, and metals, glass tips etc. Usually these are made up of thick plastics. When mechanized collection system is used, the containers are especially designed to fit the truck mounted loading mechanisms (Tchobanoglous et al, 2002).

Collection is a key link in the MSWM system and it is usually undertaken by the municipality or contracted out to private companies. In either situation waste collection coverage is inadequate as it ranges from 20-80% with a mid-range of 40-50% (UNEP 1996). Collection accounts for a very high fraction of the total waste management budgets with Asia having as much as 80% (World Bank, 1999). With the inability of the official waste delivery teams to

serve the whole city efficiently, waste generators further arrange formal and informal groups to collect their waste for a negotiated fee. For most of the areas house to house collection is rare. The official waste collectors are responsible for collecting waste disposed of in public moveable containers placed at strategic spots of the city.

According to Kreith (1994), transfer and transport involves two steps (1) the transfer of wastes from the smaller collection vehicle to the larger transport equipment and (2) the subsequent transport of the waste, usually over long distances to the final disposal site. Various types of transportation equipment are applied to carry waste. These range from locally adapted equipment such as human or animal drawn carts (wheel barrows, tricycles, push carts) to convectional open-back trucks, side and rear compactors and trailers. These convectional trucks are often acquired from foreign friendly cities, governments and international non-governmental organizations (NGOs).

It is the ultimate fate of all solid waste whether they are residential wastes collected and transported directly to landfill site. The dumping of solid waste in landfill is the probably the oldest and definitely the most prevalent form of ultimate garbage disposal. Many "landfills" are nothing more than open, sometimes controlled, dumps. The difference between landfills and dumps is the engineering, planning, and administration involved. Open dumps are characterized by the lack of engineering measures, no consideration of landfill gas management and few, if any, operational measures such as registration of users, control of the number of "tipping fronts" or compaction of waste. In an examination of landfills throughout the developing world in 1997-1998, Johannessen (1999) found varying amounts of planning and engineering in MSW dumping: among the various regions visited in Africa (with the exception of South Africa) had the fewest engineering landfills, with most nations practicing open dumping for waste disposal. Recycling can or not be done.

The Indiana law defines recycling as "a process by which materials that would otherwise become solid waste are collected, separated or processed and converted into materials or products for reuse or sale." Recycling remains the most popular environmental activity among the peoples of industrialized nations, simply because it is done as often as we throw something away. These resources recovery programs extend the globe's mineral supply by reducing the amount of virgin materials that need to be removed from the globe to meet the demand. Resource recovery saves energy, causes minimal pollution and land disruption, cuts

waste disposal costs, and extends the life of landfills by preventing waste from residing there,(Miller and Tyler,1995).

2.3Effect of Technology on Solid Waste Management

Technology covers tasks regarding planning, implementation and maintenance of collection and transportation systems, waste recovery and final disposal. Thereby one has to take in to consideration the design and collection of facilities and equipment with regard to their operational characteristics, their performance and their maintenance requirements. The need for repair and availability of spare parts should not be forgotten either (Schubeler, 1996).

Literature suggests that technical factors influencing solid waste management system are related to lack of technical skills among personnel within municipalities and government authorities, deficient infrastructure, poor roads and vehicles, insufficient technologies and reliable data. We live in a world of increasing scarcity. Raw materials from natural resources are limited, financial resources are often insufficient and securing land for final disposal is more difficult,Hazra and Goel(2009) and Mrayyan & Hamdi,(2006).

According to study done by (Moghadam, et al,2009) revealed thatCollection, transfer and transport of solid waste was affected by improper bin collection systems, poor route planning and lack of information about collection schedule. Municipalities collected waste from the commercial areas with frequencies that varied from fourteen times a week to once a week. The solid waste generated wascollected at fixed stations or door to door and few cities had transfer stations. The door to door collection was done by variety of systems; rick saw, animal tractor, wheelbarrow, tractor, truck, compactor, motorcycle and hand trolley. In general, he concluded that there is a need for municipalities to provide sufficient infrastructure and equipment needed for waste collection, transfer and transport.

Efficient solid waste collection depends on proper selection of vehicles taking in to account of road conditions, availability of spare parts and servicing requirement. The compactor trucks which are very expensive and require high operating cost and additional maintenance are preferable due to the fact that its usage will solve the problem of scattering of waste during transportation to the dumpsites. Therefore Many cities have turned to foreign donors for provision of these collection vehicles, however this will only work if those vehicles are appropriate to the local waste, which tends to be wetter and denser in low-income countries than in the North, and the local roads, which often have lower legal weights for trucks, as

they are built to a lower specification. It requires that spare parts, specialized equipment and skilled labour are locally available for maintenance,(Serwoko, et at, 2007).

According to Cointreau (1982) solid waste professionals recommend open trucks over compactor trucks, because cost is much lower, maintenance is cheaper and the wastes tend to be very dense with little compatibility. Furthermore the waste collected in Kenya is mostly organic waste so the use of compactor truck implies large debts, more serving per length of time and a modern image.

Transfer station is a facility for transferring waste from the collection vehicle to a more appropriate vehicle where longer haul distances are necessary for final disposal. The need for a transfer station and the degree of sophistication required will be determined by the volumes of waste generated, the collection system implemented, and the distance to the disposal site. Transfer stations can be considered the final disposal point by the community, particularly where communal collection services are in operation. Communal disposal facilities, where open bulk containers are utilized, therefore need to be managed and controlled with the same care and responsibility as that required for a landfill site (Zuilen, 2006).

2.4Effect of Financial Resources on Solid Waste Management

Limited financial capacity to manage waste in the counties is a key issue. A limited budget for management of the existing waste management facilities exists. Funds to purchase the relevant equipments for compacting and spreading of the waste at the disposal sites and purchase other new compliant waste disposal receptacles are either not there or there is limited budgetary allocation of same. The Municipalities have failed to manage solid waste due to financial factors. The huge expenditure needed to provide the services are not recovered. Resources are required with the objective of having skilled personnel, appropriate equipment, right infrastructure, proper maintenance and operation,(Richard, 2014).

The financial support of the leaders of the central government, the interest of the municipal leaders in waste management issues, the participation of the service users and the proper administration of funds are essential for a modernized sustainable system. Municipal governments from developing countries may lack financial as well as institutional and organizational resources to handle waste management problems in their areas. One of so called quick fixes has been to use Public Private Partnership to improve the situation. Considering waste as a resource and a raw material, most of the municipal authorities

believed that private sector would jump in as soon as the offer is made. This would not only solve the problem but would also provide a new financial resource for the authorities(Sharholly et al, 2008).

The Kenyan county governments have dedicated income stream for solid waste services. The sources of financing which can be used for solid waste come either from the national government, from conservancy (environmental) fees, or from fees or charges for services (often combined with sewerage or water charges), or out of property taxes. All of these sources can be problematic for the financing of solid waste operations. Property taxes are often based on old, out of date or preferential assessments which under-tax the owners and provide insufficient revenues. While people are willing to pay for water and other services that are essential to their survival, solid waste removal does not always fall in to this category,(Kenneth, 2012).

Generally, a few economic instruments are used in Kenya's current waste management practice, and even these are not used effectively. The instruments that have been used in a limited manner include user charges, financial instruments (fees, licenses), fiscal instruments, import duty waivers, deposit refund system and property rights including institutional reforms and regulations. In addition, although the private sector has been participating in regulatory provisions, the Environmental management and co-ordination Act of 1999 (EMCA, 1999) and policy development efforts by the Nairobi city council (NCC) promised to make privatization a leading economic instrument for the management of the solid waste in the country. This act provides for taxes and other fiscal incentives, disincentives or fees to induce or promote the proper management of the environment and natural resources or the prevention or abatement of environmental degradation (Zuilen, 2006).

User charges is a commonly used instrument, which requires the waste generator to pay for the collection, transportation and disposal of the waste, according to research done by JICA (1998) found out that, households who pay for water services also pay for ksh.40 a month for dustbin hire (storage facility and also its collection), whether or not they actually get the bin or the service. Also the private waste collectors charge a fee ranging between ksh.200-600 per month per household, to collect the waste twice a week. The firms provide polythene bags free of charge to the household to store the waste. The service waste collectors who serve the commercial /industrial sector provide a bulk container at a fee of ksh.2000 per big container per collection, and ksh.250 per 200 litre drum and 70-litre polythene bag per

collection respectively. The main advantage of the user charge is that collection of revenue is relatively easy and cost effective for the council since the collection charges are tucked in the water bills whereas for the private waste collectors, the collection is made easy by the willingness to pay by the consumers.(Ikiara et,2004).

For the sustainability of solid waste, strategic planning, external support and technical assistance is required. Such technical assistance is often separated from that of the provision of loans and grants for facilities and equipments. The governments of developing countries having limited funds for solid waste management must develop measures to reduce and recover the expenditure and increase revenues where possible. They need to turn their solid waste management systems to more self-financing programmes. External support can be effectively used to develop different alternative cost-cutting, cost-recovering schemes (e.g, waste minimization, deposit-refund system for recyclable materials, import or sales tax on certain packaged products, collection of user service charges,etc.) and implement pilot studies on these economic incentive measures. Investing from private companies for solid waste management equipments and facilities, managerial expertise and technical skills provides a potential alternative towards self-financing solid waste management. Human resource development in financial planning and management is also necessary and often a key to the development of more self-financing schemes,(Ogawa,1994).

A strong transparent institutional framework and good governance is essential in solid waste sustainability as well. Without such a framework, the system will not work well over the long term. Conversely, it was suggested at the, (UN-HABITAT,2001) global conference that the cleanliness and effectiveness of city's solid waste management system could be used as a useful proxy indicator of good governance. Integrated solid waste management tests the full range of governance skills; priority setting, strategic planning, consultation, decision making, law making, delegation, contracting, human resources management, financial management, enforcement and conflict resolution. If waste services are to be effective, a city must have the capacity to streamline management responsibilities, manage finances and services in an effective and transparent manner, and work effectively with communities. For waste management to work well the city needs to address underlying issues relating to management structures, contacting procedures, labour practices, accounting, cost recovery and corruption. Clear budgets and lines of accountability are essential. The adequacy of services to lower-

income communities also reflects on how successfully a city is addressing issues of urban poverty and equity (Whiteman,2001).

Obuya (2011) carried out a study on the Factors influencing solid waste management in Nakuru Municipality, Kenya. The purpose of this study was to examine the underlying factors influencing solid waste management in Nakuru Municipality, Kenya. The study established that the County government of Nakuru had limited financial resources and inadequate personnel. It also established that there was an MCN by-law which required the residents and other solid waste generators to pay user charges. Whereas plastic wastes and food wastes were the major components of the solid wastes generated within the Municipality, there were no effective technologies for collection, storage, transfer and disposal of these wastes. The study findings also indicated that the private sector played a complementary role in partnering with the county government in solid waste management.

2.5Effect of Community Participation on Solid Waste Management

With NCC's appalling performance and the failure of private service to extend in to low income and unplanned settlement areas, community based initiative in waste collection, transport, storage, trading and recycling started to emerge in 1992. Syagga (1992), supports the involvement of the community sector as an effective way of increasing access of the poor to urban services, including waste management. In Nairobi, organization in the community sector, such as charitable organization, ethnic associations, professional "support" NGOs, welfare societies, village committees, self-help groups, and security committees are already providing many of these services. Despite individual and localized performances, the community in general plays a small waste management role, (Peters, 1998).

NGO's and international organization support CBOs through training,marketing and provision of tools and equipment, among other ways. A survey of eighty NGOs in Nairobi showed that support NGOs provided a wide range of services. Their emphasis on education (provided nine per cent of all secondary education in the city) followed by health and welfare. Some NGOs also provided housing, while a few provided recreation, water waste disposal, and environmental conservation services (Lee- Smith &Stren, 1991; 34).

Important NGOs include Foundation of Sustainable Development in Africa (FSDA), Uvumbuzi club and Undugu Society of Kenya. Other institutions offering assistance to CBOs in Nairobi Kenya include the National Council of churches of Kenya (NCCCK), the private

sector, Norwegian aid institutions, and the Japan International Cooperation Agency (JICA) who play a direct role and also indirect one, by funding the CBOs (King, 1996).

The informal sector often comprises of poor and lowly educated people who have migrated to the cities from rural areas in search of employment (Habitat, 1994). According to, (Jindal et al, 1998), Waste pickers take low self-esteem, long working hours, precarious conditions and health hazards within the informal recycling sector, waste pickers receive the lowest profit margins and are often vulnerable to exploitation by waste dealers. The contribution of waste pickers to waste recycling is often not appreciated by governments and residents who tend to view waste pickers as outcasts who are a nuisance and security threat (Chaturvedi, 1998).

In developing countries, a cultural transformation is needed to solve waste management problems. Cultural transformation can be measured in terms of change in perception regarding roles and responsibilities concerning waste and the environment in general and participation in formal and informal organizations (Figueroa, 1998). Education and public awareness are key elements of any strategy involving public participation and source separation and however it takes time to raise awareness and gain public support. The minds and behavior of the population need to be redirected towards the shared goal of maintaining beautiful and healthy environment (Thomas-Hope, 1993). Environmental awareness and the willingness of people to voluntarily participate in waste reduction and sorting programs are indicators of social capital in the environmental field. In response to solid waste management problems and growing environmental awareness, citizen groups have begun to participate in waste management projects in Asian cities. Community participation, incentives and legislation must be based on citizen understanding environmental issues e.g, resource use, waste production, waste management cost and being prepared to change their daily lives (Figueroa, 1998)

User engagement, participation and good communication are essential for the system to work. Users cooperate better if they understand why solid waste service are set in a particular way, and they are in good position to monitor effectiveness and serve as a source of information as to how the system is actually working. Feedback systems can include telephone lines for complains, continuous or community monitoring of satisfaction or payment rates and creating collaborative relationships between inspectors and the community. Compliance and payment behavior are also forms of communication. People communicate their satisfaction or discontent by obeying or violating the rules for disposal or recycling. They also show

approval by paying on time, and signal dissatisfaction of the system by withholding payment or paying too little too late (Furedy, 1997).

2.6 Effect of Politics on Solid Waste Management

According to department of Economic Affairs, GOI (2005), political commitment and support is critical for PPP. Since PPPs require buy-in from a wide range of stakeholders, political commitment helps engage with one another in a more effective manner. Further signaling policy clarity and continuity through an overarching PPP legislation or policy improves risk perception among potential bidders.

Political interference according to Massoud et al (2003), affects solid management in that the public sector or local government are motivated by political interests. Due to regular changes in the politicians in power, the public sector faces problems in implementing some solid waste projects. This means that if any politicians in power embark on a project it can be implemented when the same politicians are in power. However when a new political party comes in to power through an election, the new ruling political party does not usually continue to implement the same project embarked on by the previous political party.

Public sector actors sometimes try to fulfill their responsibility in waste management system due to their mandate and obligation or due to power and patronage conferred on the government or its representatives. However they cannot do it properly because of unclear objectives, poor institutional structure, lack of trained staffs, inflexible work schedules, inadequate supervision and strong worker's unions. So it is generally said that government is weak in management and operations. Anyhow, the public sector cannot make necessary changes in their work procedures and thus changes are necessary to work with private sector, (Klundert & Lardinois 1995).

The Mombasa Integrated Solid Waste Management build a recycling plant in Jomvu for example, funded by 18 million Kenya shillings grant by CDTF which begun in 2010 after two years the plant had been completed and fully equipped but due to lack of electricity cable, it was not operational. When questioned, the representatives blamed it on politics (Tan Yen Joe, 2012).

2.7 Conceptual Framework

The conceptual framework was developed through explaining and ascertaining the relationships and interconnectivity of the objectives of the study.

Independent Variables

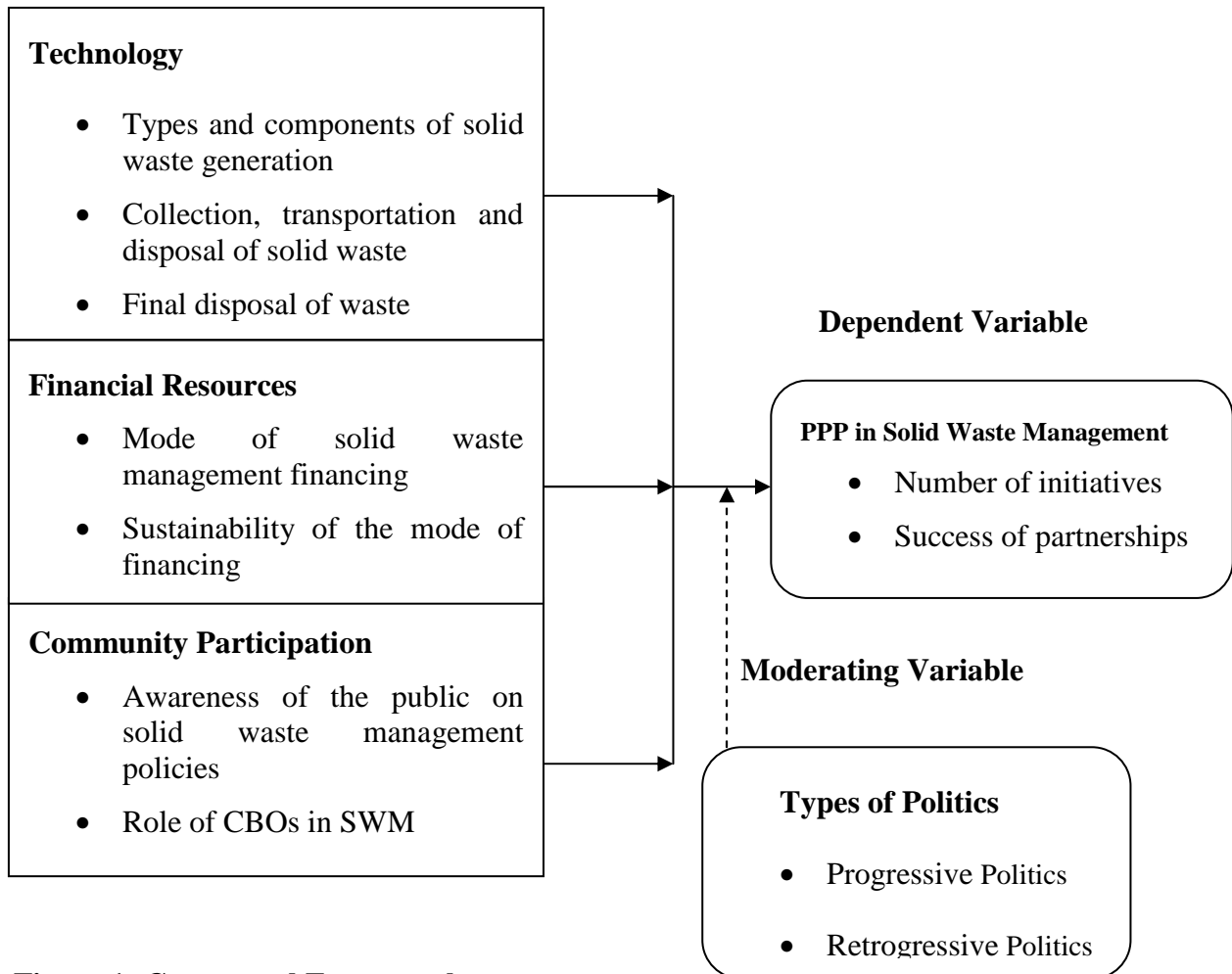


Figure 1: Conceptual Framework

In this study, financial resources, technology and community participation are the independent variables while solid waste management is the depended variable, they are moderated by the type of politics. The conceptual framework therefore is the nature of relationship between the variables of the study. According Mugenda and Mugenda (2003) conceptual or definition of a variable is a way of specifying precisely what we mean when we use a particular term or refer to a variable. In this study, the dependent, independent and moderating variables mean as described below;

Technology an independent variable in solid waste management is how types and components of solid waste generated will be collected, transported and finally disposed. Types and components of solid waste generated include; combustibles (paper, plastics, yard debris, food waste, wood, textiles, disposable diapers and other organics) and non-combustible materials (glass, metal, bones, leather and aluminum). Solid waste communally collected at neighborhoods is usually stored in plastic polythene bags, dustbins or open-bulk containers strategically positioned. It's then emptied in to hand-cart, wheel barrow, animal carts or small trucks this is referred to primary phase the waste is then brought to secondary collection phase or transfer stations for transfer to bigger vehicles (open-back trucks, side and rear compactors and trailers). Solid waste is transported and then disposed of in to landfill sites and open dumpsites.

Financial resource independent variable in this study is the mode of financing solid waste management used and its sustainability. It includes; user charges, fees, licenses, taxes, import duty waivers, deposit refund system and institutional reforms and regulations. For sustainability, a strong and transparent institutional resource framework is required. There should be efficiency, clear budgets and accountability in resource management. Also, the low income communities to be provided with services that are cost effective and of quality.

Community participation in the study means the community involvement in solid waste management. Community participants include; Residential associations, charitable organization, welfare societies and self-help groups who participate in collection or picking, transportation, storage, disposal and recycling of solid waste. Non-governmental Organization and International Organization support this community based organizations through training, financing, marketing and provision of tools and equipment hence developing their capacity to contribute to their communities and know their own situation better in order to solve their problems.

Public Private Partnership is used as a system in which a service or a project is funded and operated through a partnership between the government and private sector organization. Such partnerships mentioned in this study include; Build-Operate-Transfer partnership, Contracting partnership and Build-Finance-Operate partnership. Such partnerships are tasked to provide cost sharing mechanism, infrastructure or rather new technologies and effective public participation especially in decision making process on solid waste management. All these initiatives result to the following successes brought about by PPP; Increased efficiency

and flexibility in service delivery, cost efficiency in operation and management, access to advanced technology and availability of expertise.

The determinants are however affected by moderating variable which is politics. Competitive and transparent procurement process is by open tenders and where suppliers are given an equal chance of winning tenders when bidding. This study calls for depoliticizing this process of procurement and tendering by enabling laws that guarantee open and transparent tendering so as to remove grey areas for corruption.

2.8 Summary of Literature

A search for literature on the public private partnerships in solid waste management has revealed that there is need for partnerships between the authorities and the private sector in the collection, transportation and disposal of solid waste in order to ensure that the environment is kept clean. The review has also shown that various governments and various county governments have entered into such partnerships in order to improve service delivery. Studies on the determinants of this partnership in solid waste management, are however few and therefore the significance of this study.

The study has reviewed how technology influences the solid waste management. Of particular interest is that technological advancement has enabled waste management to be improved over time in a number of countries, including Kenya as equipment are purchased for purposes of waste management.

The study has also reviewed how financial resources affect waste management in organizations. It has been shown that the heavy machinery required for purposes of managing solid waste need heavy financial investments and therefore financial resources are very important in solid waste management.

Further, the study reviewed how community participation is instrumental in solid waste management. It showed that the involvement of the community in solid waste management enhances faster delivery of services and the synergy between the community and the county governments is important in ensuring success of solid waste management initiatives.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research design and research methodology that was employed in this study. This chapter is set out with the following subheadings; research design, target population, sample size and sampling procedures, data collection instruments, data collection procedure, instrument validity and viability, ethical considerations, data analysis techniques and finally, operational definition of variables.

3.2 Research Design

This study used a descriptive survey research design that enabled it to collect information about the determinants of public private partnerships in solid waste management as they exist within the population. Mugenda and Mugenda (1999) defined descriptive survey research as a systematic empirical inquiry in which the researcher does not have direct control of independent variables because they are inherently not manipulable. Inferences about relations among variables are made without direct intervention from concomitant variation of independent and dependent variables (Mugenda and Mugenda, 1999). As this design did not allow the researcher to manipulate either the independent variables or the research setting, it was apt, because of its higher external validity and less cost. This allowed the study to be completed within the constraints imposed by limited time and financial resources.

3.3 Target Population

The target population was the county government of Mombasa management. The Mombasa county government had around 550 employees, about 450 of which were workers on the ground including supervisors, truck drivers and helpers. The remaining 100 were in management positions.

3.4 Sample size and sampling Procedure

A sample of 38 respondents was selected randomly from the management of the Mombasa County Government and other stakeholders. Due to resources constraints, this sample was drawn from the department of Water, Environment and Natural Resources of Mombasa County Government. This department is tasked with waste management firms in Mombasa County. The County Executive in charge of the department was interviewed together with 3 other staff members from cleansing and transport units. Three respondents from Mombasa

cement, KeenKleeners and Prima bins private firms that deal with solid waste management were selected randomly. The study also randomly selected 28 respondents from the local community. This gave a total sample size of 38. This is shown in table 3.1

Table 3.1: Sample

	Specific respondent	Sample	Percentage
Private Firms	Mombasa Cement	1	
	KeenKleeners	1	
	Prima Bins	1	
	Sub total	3	16%
County Government	Director	1	
	Cleansing Unit	3	
	Transport Unit	3	
	Sub total	7	18%
Community Participants	Waste Pickers	10	
	CBOs	18	
	Sub total	28	74%
	Grand Total	38	100%

3.5 Data Collection Instruments

This study used primary data and it was collected by use of questionnaires, Observation schedule and interviews. The questionnaires contained both closed and open ended questions.

3.6 Data Collection Procedure

The questionnaires were personally administered by the researcher to the respondents in order to reduce incidences of missing data and dampen the low rate of return that could occur. The questionnaires were filled on the spot therefore no time was allocated for collection of the filled questionnaires at a later date. An interview was administered using questionnaires and only key informants; the county executive and staff members were interviewed. The interviews provided in-depth data and any clarification was made where necessary. Coolican, (1994), describes observation as a data collection method that may be seen as either a technique or as an overall design. As an overall design the researcher observed naturally occurring behavior and not to experiment with it. This study therefore used observation as an overall design applying an observation schedule.

3.7 Validity and Reliability of Research Instrument

The quality of the research study depends to a large extent on the accuracy of the data collection procedure used. In this study validity and reliability were used to measure this relevance and correctness of the data collected.

3.7.1 Pilot Survey

A pilot survey is a strategy used to test the questionnaires using a smaller sample compared to the planned sample size. The questionnaire is administered to a percentage of the total sample population, or in more informal cases just to a convenience sample. The pilot survey was checked on the appropriateness of the language used in the questionnaire and also to ascertain the time taken by the field procedure. This improved the level of the instrument validity.

3.7.2 Validity of Research Instruments

According to Cochran (1977), validity is the quality attributed to a proposition or a measure of the degree to which they conform to established knowledge or truth. An attitude scale is considered valid, for example, to the degree to which its results conform to other measures of possession of the attitude. Validity therefore refers to the extent to which an instrument can measure what it ought to measure. It therefore refers to the extent to which an instrument asks the right questions in terms of accuracy. Mugenda and Mugenda (1999) looked at validity as the accuracy and meaningfulness of inferences, based on research results.

The content validity of the instrument was determined in two ways. First, the researcher discussed the items in the instrument (questionnaire) with the supervisor, and lecturers from University of Nairobi. Since the determination of content validity is judgmental, all these people helped to refine the definition of the topic of concern, the items to be scaled and the scales to be used. Then, the instrument was pilot-tested in order to ensure more reliability from a sample of respondents who were not from the final sample respondents.

3.7.3 Reliability of Research Instruments

Reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. The method used in assessing reliability of data was test-retest administration of the same instrument. In pilot testing the research instrument was given twice to the same group of people to obtain consistent results hence ascertain reliability.

The coefficient of reliability was found to be 0.8 revealing a high degree of test-retest reliability of data.

3.8 Ethical Considerations

To address the ethical issues the study provided a covering letter that accompanied all the questionnaires. The letter stated that the information and data gathered were used solely for the research work and that no respondent was identifiable. All the questionnaires were allocated coded numbers instead of names for ease of analysis. Persons interviewed were also assured of confidentiality and that the information was purely for academic purposes.

3.9 Data Analysis Techniques

The questionnaires were first edited and coded before any analysis can commence. The data was analyzed using descriptive analysis and regression analysis. The data was both qualitative and quantitative to ensure objectivity; this assisted in ensuring the data was free from any selective perception that can dilute its validity and reliability. The descriptive statistics were the frequencies, mean, and standard deviation. The analysis was done using Statistical Package for Social Sciences (SPSS) version 20. The study used Pearson product –moment correlation statistical technique to test the hypothesis. According to Mugenda and Mugenda (2003), this type of correlation is used when both variables that the researcher wishes to study are measured at ratio or interval scales and are continuous. The results were presented in the form of tables.

3.9.1 Operational Definition of Variables

An operational definition describes the variables used and how they are measured in this particular study. This is shown in the table below.

Table3.2: Operational Definition of Variables

Variable	Indicators	Measurement	Scale
Independent Variable: Financial Resources	<ul style="list-style-type: none"> • Mode of financing • Sustainability of mode of financing 	Existing financial situation of Mombasa County	Nominal
Independent Variable: Technology	<ul style="list-style-type: none"> • Types and components of solid waste generation • Collection, transportation and disposal of solid waste • Final disposal of waste 	Planning and development involved in the selection of appropriate technologies	Nominal
Independent Variable: Community Participation	<ul style="list-style-type: none"> • Awareness of the public on solid waste management policies • Role of CBOs in SWM 	The public awareness and attitudes towards SWM	Nominal
Dependent Variable: PPP in Solid Waste Management	Success of public private partnerships in solid waste management	Establishing the factors influencing the success of PPPs in solid waste management	Ordinal

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents the data analysis results, presentation and interpretation of the results. The chapter begins with the response rate followed by the demographic results. The chapter then presents the results based on each of the objectives of the study.

4.2 The Questionnaire Response Rate

The sample for this study was 38 respondents. All the 38 respondents took part in the survey giving a response rate of 100%. This response was achieved because the respondents were easily accessible and willing to take part in the survey. Further, time was enough to reach all the 38 respondents as sampled.

4.3 Demographic Characteristics of Respondents

This section shows the results for the age of the respondents, gender of respondents, and how long they had worked for their organisations.

4.3.1 Gender of Respondents

The respondents were asked to state their gender. The results of the gender of respondents are shown in Table 4.1.

Table 4.1: Gender of Respondents

Category	Frequency	Percent
Male	28	74
Female	10	26
Total	38	100

As shown, the results reveal that 74% of the respondents were male and 26% were female. This distribution by gender is consistent with the sample as most of the workers in the waste management industry are mostly men.

4.3.2 Age of the Respondents

The respondents were asked to state the age brackets in which they belonged. The results are shown in Table 2.

Table 4.2: Age of Respondents

Category	Frequency	Percent
26 – 30 years	6	16
31 – 35 years	12	32
36 – 40 years	8	21
41 – 45 years	8	21
46 or above	4	11
Total	38	100

As shown, the study found that 16% were aged 26 – 30 years, 32% were aged 31 – 35 years, 21% were aged 36 – 40 years, 21% were aged 41 – 45 years and 10% were aged 46 years and above. These results suggest that most of the respondents were old (52% were older than 35 years) and slightly half of the respondents were young (48% were below 35 years). This can be attributed to the fact that the study focused on a diverse sample and therefore the age differences were to be expected.

4.3.3 Experience of the Respondents

The respondents were asked how long they had been working for the County government. The results are shown in Table 4.3 below.

Table 4.3: Experience of Respondents

Category	Frequency	Percent
2 – 4 years	4	10
5 – 7 years	16	42
8 – 10 years	12	32
Above 10 years	6	16
Total	38	100

The results show that 10% of the respondents had worked for 2-4 years, 42% for 5-7 years, 32% for 8-10 years and 16% for more than 10 years. Thus, most of the respondents had worked in the organization for a fairly long period of time (90% had worked for more than 4

years). This can be attributed to the fact that most council workers have security of tenure and therefore able to work for longer periods of time as compared to the other sectors.

4.4 Data Presentation and Analysis

This section presents the results on each of the objectives of the study. Specifically, this section presents the results on the influence of technology on PPP in waste management, the influence of financial resources on PPP in waste management, and the influence of community participation on PPP in waste management.

4.4.1 Influence of Technology on PPP in Waste Management

The study sought to determine the extent to which technology influences public private partnership in solid waste management in Mombasa. Table 4.4 shows the results.

Table 4.4: Descriptive Statistics on Influence of Technology on PPP

Technology	Agree (%)	Disagree (%)	Mean	Std. Dev
Technology development influences PPP in solid waste management	74	21	3.737	0.809
Technology has resulted in improved service in solid waste management	68	21	3.526	0.766
Technology development has resulted in advanced waste management systems	58	37	3.368	0.707
Overall			3.544	0.761

The study found that 74% of the respondents agreed that technology influences PPP in solid waste management and 21% disagreed; 68% agreed that technology had improved service in solid waste management while 21% disagreed; and 58% of the respondents agreed that technology had led to advanced waste management systems while 37% disagreed.

The study tested the hypothesis that technology influences public private partnership in solid waste management. From the mean scores, technology had a significant influence on PPP in solid waste management ($M = 3.544$; $SD = 0.761$). In Table 4.5 below, the correlation analysis shows a high correlation between technology and PPP ($r > 0.8$, $t = 3.214$). This means that technology has a high influence on PPP in waste management. The hypothesis is therefore accepted.

Table 4.5: Correlation Results for Influence of Technology on PPP

Technology	Public Private Partnership
Technology development influence PPP in Solid Waste Management.	0.896335
Technology has resulted to improved Service in Solid Waste Management.	0.877015
Technology development has resulted In advanced Waste Management systems.	0.811754

4.4.2 Influence of Financial Resources on PPP in Waste Management

The study sought to assess the extent to which financial resources influences public private partnership in solid waste management. Table 4.6 shows the results of descriptive analysis. As shown, 84% the agreed that financial resources influence PPP in waste management while 16% disagreed; 53% agreed that availability of financial resources has resulted in improved service in waste management while 32% disagreed; and only 37% of the respondents agreed that lack of financial resources had led to increased partnerships between the authorities and private enterprises while 47% disagreed.

Table 4.6: Descriptive Statistics on Influence of Financial Resources on PPP

Financial resources	Agree (%)	Disagree (%)	Mean	Std. Dev
Financial resources influence PPP in solid waste management	84	16	4.000	0.979
Availability of financial resources has resulted in improved service in solid waste management	53	32	3.316	0.479
Lack of financial resources have led to increased partnerships between the authorities and private enterprises in solid waste management	37	47	2.842	0.256
Overall			3.386	0.571

The study tested the hypothesis that financial resources availability influence private public partnership in solid waste management. The mean scores show that financial resources had a significant impact on the PPP in waste management (M = 3.386, SD = 0.571). The correlation results in Table 4.7 below reveal that there was a high correlation between financial resources and PPP in solid waste management ($r > 0.5$, $t = 4.563$). The hypothesis is therefore accepted.

Table 4.7: Correlation Results for Influence of Financial Resources on PPP

Financial Resources	Public Private Partnership
Financial resources influence PPP In solid waste management.	0.898977
Availability of financial resources has resulted in improved service in Solid waste Management	0.660378
Lack of Financial resources has led to Increased partnerships between the authorities and private enterprises in SWM	0.5752293

4.4.3 Influence of Community Participation on PPP in Waste Management

The study sought to examine how community participation influences publicprivate partnership in solid waste management. Table 4.8 shows the descriptive results. As shown, 58% of the respondents agreed that community participation influenced PPP while 37% disagreed; 63% agreed that participation had resulted in improved service in solid waste management while 11% disagreed; 47% agreed that increased participation led to more partnerships between authorities and private enterprises in solid waste management while 32% disagreed. The mean scores show that community participation had a significant effect on PPP in waste management ($M = 3.368$; $SD = 0.585$).

Table 4.8: Descriptive Statistics for Effect of Participation on PPP

Community participation	Agree (%)	Disagree (%)	Mean	Std. Dev
Community participation influences PPP in solid waste management	58	37	3.368	0.624
Community participation has resulted in improved service in solid waste management	63	11	3.684	0.675
Increased community participation has led into more partnerships between the authorities and private enterprises in solid waste management	47	32	3.053	0.457
Overall			3.368	0.585

The study tested the hypothesis that community participation influence public private participation in solid waste management. The correlation results in Table 4.9 below show that

there was a high correlation between community participation and PPP ($r > 0.7$, $t = 4.215$). This shows that community participation influences PPP in waste management. The hypothesis is therefore accepted.

Table 4.9: Correlation Results on Effect of Community Participation on PPP

Community Participation	Public Private Partnership
Community participation influences PPP in Solid waste management	0.92369
Community participation has resulted to Improved service in solid waste management	0.77062
Increased community participation has led to more partnerships between authorities and private enterprises in Solid waste management	0.85035

CHAPTER FIVE

SUMMARY, DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of findings, the discussion of findings, the conclusion, recommendations of the study, and suggestions for further research.

5.2 Summary of Findings

The study sought to determine the extent to which technology influences public private partnership in solid waste management in Mombasa. The study found that 74% of the respondents agreed that technology influences PPP in solid waste management and 21% disagreed; 68% agreed that technology had improved service in solid waste management while 21% disagreed; and 58% of the respondents agreed that technology had led to advanced waste management systems while 37% disagreed. From the mean scores, technology had a significant influence on PPP in solid waste management ($M = 3.544$; $SD = 0.761$). The study tested the alternative hypothesis that technology has influence on public private partnership in solid waste management. The correlation analysis showed a high correlation between technology and PPP ($r > 0.8$) which means that technology had a high influence on PPP in waste management. Thus, the hypothesis was accepted.

The study sought to assess the extent to which financial resources influences public private partnership in solid waste management. The results showed that 84% of the agreed that financial resources influence PPP in waste management while 16% disagreed; 53% agreed that availability of financial resources has resulted in improved service in waste management while 32% disagreed; and only 37% of the respondents agreed that lack of financial resources had led to increased partnerships between the authorities and private enterprises while 47% disagreed. The mean scores show that financial resources had a significant impact on the PPP in waste management ($M = 3.386$, $SD = 0.571$). The study tested the alternative hypothesis that financial resources availability has influence on private public partnership in solid waste management. The correlation results revealed that there was a high correlation between financial resources and PPP in solid waste management ($r > 0.5$). This means that financial resources have an influence on PPP in solid waste management. The hypothesis was therefore accepted.

The study sought to examine how community participation influences public private partnership in solid waste management. The study found that 58% of the respondents agreed that community participation influenced PPP while 37% disagreed; 63% agreed that participation had resulted in improved service in solid waste management while 11% disagreed; 47% agreed that increased participation led to more partnerships between authorities and private enterprises in solid waste management while 32% disagreed. The mean scores show that community participation had a significant effect on PPP in waste management ($M = 3.368$; $SD = 0.585$). The study tested the alternative hypothesis that community participation has influence on public private participation in solid waste management. The correlation results showed that there was a high correlation between community participation and PPP ($r > 0.7$). This shows that community participation influences PPP in waste management. The hypothesis was accepted.

5.3 Discussion of Findings

The study sought to determine the extent to which technology influences public private partnership in solid waste management in Mombasa. Both descriptive analysis and correlation analysis showed that technology had a high influence on PPP in waste management. This is consistent with Zuilen (2006) who noted that solid waste professionals recommend open trucks over compactor trucks, because cost is much lower, maintenance is cheaper and the wastes tend to be very dense with little compatibility. Since the waste collected in Kenya is mostly organic waste so the use of compactor truck implies large debts, more serving per length of time and a modern image. This study agrees with; Hazra and Goel, (2009), Moghadam et al, 2006 and Mrayyan and Hamdi, 2006 on technology influencing public private partnership in solid waste management since their findings indicated that, lack of technical skills among persons within municipalities and private companies, deficient infrastructure, poor roads and vehicles, insufficient technologies and reliable data were the major technical factors influencing solid waste management.

The study sought to assess the extent to which financial resources influences public private partnership in solid waste management. The results from both descriptive analysis and correlation analysis showed financial resources have an influence on PPP in solid waste management. The alternative hypothesis was therefore accepted. This mirrors the findings of

Obuya (2011) who carried out a study on the factors influencing solid waste management in Nakuru Municipality and established that the County government of Nakuru had limited financial resources and inadequate personnel which hampered waste collection.

The study sought to examine how community participation influences public private partnership in solid waste management. The results from descriptive and correlation analyses revealed that community participation influences PPP in waste management. The alternative hypothesis was accepted. This is consistent with Squires (2006) who carried out a study on public participation in solid waste management in Small Island developing states and presented information on the need of public consultation approaches and particularly on the best practices for successful public participation and consultation on SWM projects (SWMPs) in the Caribbean countries. Ikiara et al. (2004) also noted that there were a number of CBOs including charitable organization, ethnic association ,welfare societies, village committees, self-help groups and residential (or neighborhood)associations which were mostly engaged in waste composting although the main activity of about 44percent of them was neighborhood cleaning.

5.4 Conclusion

The study concludes that technology has a significant effect on PPP in solid waste management in Mombasa County. This is because both the descriptive and correlation analyses revealed that technology influenced PPP in solid waste management and therefore leading to accepting the alternative hypothesis on the same.

The study also concludes that financial resources have a significant effect on PPP in solid waste management in Mombasa County. This is attributed to the fact that both the descriptive and correlation analyses revealed that financial resources had an influence on PPP in solid waste management and therefore led to accepting the alternative hypothesis.

The study further concludes that community participation has a significant effect on PPP in solid waste management in Mombasa County. This is because both the descriptive and correlation analyses revealed that community participation influenced PPP in solid waste management and therefore led to accepting the alternative hypothesis on the same.

5.5 Recommendation

The study makes a number of recommendations. First, the study recommends that technology needs to be at the centre stage of all solid waste management programs of Mombasa County government as well as other counties in Kenya. Thus, technology needs to be adopted in solid waste management in the counties across the waste value chain.

The study also recommends that since financial resources are important in PPPs in solid waste management, counties must devote adequate financial resources in order to see through PPPs in solid waste management in Kenya. As much as the private sector can commit to run solid waste management projects, the financial backing of the county governments is also key.

Lastly, the study recommends that counties should inculcate the value of community participation in their PPPs in solid waste management. Thus, community members must be involved in the planning, execution and monitoring of PPPs in solid waste management in their counties if they are to be sustainable and successful in meeting their goals.

5.6 Suggested Areas of Further Research

The study suggests that more studies be carried out to ascertain the other factors that influence PPPs in solid waste management in other counties in Kenya. This study was only focusing on the role of technology, financial resources, and community participation in PPPs. Other factors therefore need to be examined.

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APPENDICES

Appendix 1: Research Questionnaire

Section 1: General information

- 1. What is your gender?
Male ()
Female ()

- 2. What age category do you belong in?
Below 25 years ()
26-30 years ()
31-35 years ()
36-40 years ()
41-45 years ()
46 or above ()

- 3. What is your designation?
.....

- 4. How long have you been working for the County government?
Less than 2 years ()
2-4 years ()
5-7 years ()
8-10 years ()
Over 10 years ()

- 5. What are the factors that influence public private partnerships in solid waste management?
.....
.....
.....

Section 2: Study Information

Use the key 1-5 for all sections as outlined in the questionnaire

1) Strongly disagree

2) Moderately disagree

3) Neutral

4) Moderately agree

5) Strongly agree

Technology

		1	2	3	4	5
6.	Technology development influences PPP in solid waste management					
7.	Technology has resulted in improved service in solid waste management					
8.	Technology development has resulted in advanced waste management systems					

9. Do you think technology affects public private partnerships in solid waste management? If yes explain

Yes.....

No.....

.....
.....

Financial resources

		1	2	3	4	5
10.	Financial resources influence PPP in solid waste management					
11.	Availability of financial resources has resulted in improved service in solid waste management					
12.	Lack of financial resources have led to increased partnerships between the authorities and private enterprises in solid waste management					

13. Do you think financial resources affect public private partnerships in solid waste management? If yes explain

Yes.....

No.....

.....
.....

Community participation

		1	2	3	4	5
14.	Community participation influences PPP in solid waste management					
15.	Community participation has resulted in improved service in solid waste management					
16.	Increased community participation has led into more partnerships between the authorities and private enterprises in solid waste management					

17. Do you think community participation affects public private partnerships in solid waste management? If yes explain

Yes.....

No.....

.....
.....

Thank you for your participation