

**ASSESSMENT OF PUBLIC-PRIVATE PARTNERSHIP FOR SOLID
WASTE MANAGEMENT IN WOTE TOWN, MAKUENI COUNTY
KENYA**

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of Master of Science in Environmental Management, South Eastern Kenya
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DECLARATION

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DEDICATION

I dedicate this research study to my loving husband Urbanus Kyalo Silvana and our two children Denilson Kioko and Elizabeth Nzisa.

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Foremost, I would like to thank the Almighty God for His untold blessings and for granting me success. I take this opportunity to convey my heartfelt gratitude and acknowledge, support and guidance of many individuals. I highly appreciate and acknowledge my supervisors, Professor Jacob Kibwage and Dr. Matheaus Kauti, for their rich insights and guidance as well as their positive criticisms that enabled me to complete this academic thesis successfully. My gratitude extends to all SEKU fraternity especially the Director Wote Town Campus, Dr. Patrick Kisangau who in one way or another, provided rich experiences on research thesis writing. I am grateful to my classmate Raphael Ndavi for the immeasurable support given. I acknowledge the great assistance given by the County technical team including the Governor of Makueni County, His Excellency, Professor Kivutha Kibwana, Mr. Stephen Kimutu and Mr. Permwell Simitu of National Environment Management Authority (NEMA) Makueni, Mr. Jacobus Kiilu Minister of Water Makueni County, Mr. Omwabia, Mr. Joseph Munyao, Dr. Mutava Mulwa, Dr. Maundu, Mr. Kefa Amos Mwanzia and all staff in the public health sector for the great assistance given during data collection period.

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ABSTRACT

Wote is a town in Eastern Kenya, Makueni County. Wote serves as the headquarter of Makueni County and has a population of 9,875. The town has been experiencing rapid population growth. An increase in solid waste is observed due to increase in urbanization, population density and income, changing food habits, taste and pattern. This study aimed at providing an alternative solution to the existing Solid Waste Management (SWM) systems. The study set out to investigate how Public-Private Partnership (PPP) approach in SWM system could be applied in Wote town by: (1) evaluating the operations, efficiency and effectiveness of the existing SWM systems in the Town, (2) establishing the roles and level of participation of all current stakeholders involved in SWM systems, (3) assessing PPP application towards improved SWM in Wote Town. The research methodology included observation, photography, interview and administration of questionnaires to the town residents and key informants. Secondary data sources were also used. Data collected was coded and entered into the computer for analysis using the Microsoft Excel and presented in form of charts, tables and graphs. Descriptive and inferential statistical methods were used to draw conclusions for the study. Results revealed that a mean of 87.5 of the respondents were female while 12.5 were male, 50% of residents produced above 2Kgs of solid waste per day. This huge amount of solid waste is not matched by sufficient resources and capacities to manage waste in an effective and environmentally sound manner since 90% of the residents indicated that they did not have access to the county waste collection services, the county government had provided 45 waste bins distributed in the town centre only, 57% of the residents indicated that waste generated was not collected for disposal, 40% indicated that collection is done on weekly basis, while only 3% had their waste being collected on daily basis, 85% of the residents dispose their waste directly in the pits and burning. The study revealed that stakeholders involved are few and limited. The alliances between them are completely weak and this has led to the poor SWM systems in the town. Their roles and responsibilities are not clearly defined. Conclusions drawn from the study indicates that the SWM systems in the town were unsatisfactory from the environmental, economic and financial points of view. The study recommends SWM stakeholders venture into PPP approach for improved services.

ACRONYMS

CIC	Commission for the Implementation of the Constitution
CBOs	Community Based Organizations
CIDP	County Integrated Development Plan
CoK	Constitution of Kenya
JNNURM	Jawaharlal Nehru National Urban Renewable Mission
ISWM	Integrated Solid Waste Management
Ksh	Kenya Shillings
KUD	Kenya Urban Development
KCCAP	Kenya Climate Change Action Plan
LASDAP	Local Authorities Service Delivery Action Plan
LRA	Long Rains Assessment
PP	Public Participation
PPP	Public-Private Partnership
MSWM	Municipal Solid Waste Management
MENR	Ministry of Environment and Natural Resources
NEMA	National Environment Management Authority
NGOs	Non Governmental Organizations
UNEP	United Nations Environmental Programme
USD	United States Dollar
UN	United Nations
SEKU	South Eastern Kenya University
SWM	Solid Waste Management

SW	Solid Waste
UNICEF	United Nation Children's Fund
WHO	World Health Organization

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CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study Problem

The generation of Solid Waste (SW) is inevitable in all sectors. Ever since, Solid Waste Management (SWM) has been of great concern to municipal authorities worldwide, (Bilitewski, B. *et al*, 1994). Approximately 590 to 880 million tons of methane (CH₄) are released into the atmosphere every year. Ninety percent of the gases generated are due to the decomposition of biomass as a result of indiscriminate waste management, among other causes. Consequently, the ozone layer and the ecosystem are continually being destroyed (Dorvil, 2007). According to World Bank (1998), the volume of solid wastes generated by urban centres in Eastern Africa has been increasing, mainly as a result of growing urban population, concentration of industries in the urban areas, consumption patterns of residents, and inadequate finances and facilities to manage waste collection and disposal.

Community development efforts led by local government are minimal and have little impact. Local government, within the new framework of devolved management in Kenya, has the capacity to re-invent itself so as to play a leading role in the development of living space for the country's citizens (Werner *et al*, 2011).

Wote town has experienced rapid growth both in terms of population and physical expansion, since it is headquarters of the Government of Makueni

County. Solid Waste Management (SWM) in the town has been a very poorly planned affair characterized by unplanned open pit disposal and burning, transportation of mixed waste by only one waste collection tractor and disposing it in an illegal dump site. Improper storage, collection and disposal of solid wastes lead to breeding of disease vectors such as rats and flies in open dumps, unsightly dumps and odours, environmental pollution. Due to rapid growth of urban population and economic growth of the town, there has been an immense increase in waste generation rates.

Policy failures in the past have contributed to poor waste collection and management because most urban authorities would not allow private sector involvement in waste management. Moreover, there is an overall lack of awareness and limited community participation in the management of solid wastes (Ngategize, 2000).

The promulgation of the Constitution of Kenya 2010 (CoK 2010) on 27 August 2010, paved way for realization of the “dream” system of governance. Chapter Eleven (Cap 11) of CoK 2010 – Devolved Government specifically provides for the setting up of the County Governments. The Kenya’s new political system gives power of self-governance to the local level in order to enhance the participation of the people in making decisions affecting them. Public Participation (PP) aims at bridging of the gap between the government, civil society, private sector and the general public, building a common understanding of the local situation, priorities and programs.

PP encourages openness, accountability and transparency, and is thus at the heart of inclusive decision-making. It is a democratic process of engaging people in identifying, deciding, planning and implementing and monitoring socio-economic development initiatives that affect their lives. Public-Private Partnership (PPP) is one of the tools for participation (Commission for the Implementation of the Constitution, 2012).

Progress towards achieving the sanitation targets of the Millennium Development Goals (reduce child mortality, improve maternal health, combat disease, ensure environmental sustainability and develop a global partnership for development etc) requires broad cooperation and consultation through public and private partnerships, community involvement, and public awareness, (Schubeler, 1996).

In its potential future forms, PPP will open up unprecedented avenues for co-design, co-production and co-creation of the County government services. It will bring citizens in as part of the innovation cycle of government services. It will provide the necessary grounds for a different relationship between government, citizens and society (Commission for the Implementation of the Constitution, 2012). Private sector participation in waste management systems of Wote Town will contribute to making those systems more responsive, more efficient, more economical, more equitable, or more environmentally responsible. Moreover, participation in environmental activities will enhance ownership, positive change of attitude and change of behavior. The public and private sector participation

provides an opportunity for involvement, ownership and partnerships in environmental management.

1.2. Problem Statement

Wote town for a long time has been experiencing problems in terms of reliable and viable SWM systems. Despite the rapid growth of the town's population, no concrete SWM system exists at the moment with exception of the normal garbage collection using a county government tractor and a truck. The current mode of waste collection has been in use for a long time without addition of waste collection vehicles, a situation not in tandem with the ever growing urban population and exponential growth of residential and commercial premises in the town.

The collected waste is dumped in an open space referred to as "Ndue Nguu Dumpsite". This site is very inappropriate site for waste disposal due to its proximity to the Ndue Nguu River which joins Kaiti River some miles away right from the dumpsite. This poses a health disaster to the town residents since they all depend on Kaiti River water as the main source of water for domestic use. The County NEMA director has as well declared the waste disposal site unsuitable for solid waste disposal, and advised the County Government to look for an alternative waste disposal site.

The ever-increasing amount of solid waste generation has created disposal problems for many developing countries, and Wote town is no exception. Refuse

generation with insufficient facilities continues to increase with population and economic growth rendering waste management as one of a host of challenging development-related issues that the County Government of Makueni is facing.

Population coverage of solid waste collection is very low. There is irregular street sweeping and transportation and disposal of solid waste. The solid waste is not collected due to financial, infrastructural and technical constraints. The accumulation of wastes in the street increases the threat of germs, insects, rats and other diseases vectors. Uncollected solid waste also causes the stagnation of water the breeding of mosquitoes. Children are especially vulnerable to the risks associated with solid wastes. The adverse effect of solid waste to soil, air, water and health of human being is much higher. During the rainy season, solid waste is not collected and transported efficiently.

1.3. The Purpose of the Study

The purpose of the research was to establish the effectiveness of SWM systems and waste collection services in Wote Town, Makueni County and how they can be improved through application of PPP approach. This will enhance employment opportunities and improved livelihoods while sustainably conserving natural resources and bio-diversity.

1.4. Research Objectives

The broad objective of this study was to assess how PPP approach in Solid Waste Management System and how it could be applied in Wote Town.

Specific Objectives

The specific objectives that constitute the broad objective were to:

1. Evaluate the operations, efficiency and effectiveness of the existing SWM systems in the Wote Town.
2. Establish the roles and level of participation of stakeholders involved in SWM systems in Wote Town.
3. Assess PPP application towards improved SWM in Wote Town.

1.5. Research Questions

1. What are the operations and how efficient and effective are the current SWM systems in Wote Town?
2. What are the roles and level of participation of the current stakeholders in SWM?
3. How can SWM systems in Wote Town be improved through PPP approach?

1.6. Significance of the Study

Rapid urbanization process and the resultant environmental challenges especially to the vulnerable urban dwellers calls for urgent need to enhance the capacity of County Governments and various stakeholders in urban environment to work together to manage the risks in a more sustainable manner. This realization motivates the design and justifies the choice of this study.

The findings will contribute academically to the less known area of application of PPP in SWM, hence help Wote town amicably deal with the current

environmental challenges arising from lack of concrete SWM systems in the face of the towns growing population and physical development.

It will help in development of policies and strategic plans for private sector participation in County SW services. These include but are not limited to: cost recovery, finance economies of scale, cost, efficiency and public accountability, institutional management, and legislation.

1.7. Assumptions of the Study

The assumptions of the study were:-

The information sourced from the respondents was true and the information from the Key informants was actual, and the sample size chosen was representative of the study area

1.8. Scope of the Study

The study focused on Wote Town inclusive of all stakeholders in SWM, the residential areas, town central business district, businesses and institutions. The four residential areas covered included Kunda Kindu, Kasarani, Westland and Shimo estates. The study concentrated on stakeholder's involvement on SWM and how it could be improved through assessment of PPP challenges and the existing opportunities.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Introduction

This chapter entails systematic identification and analysis of documents containing information related to the research problem being investigated. Following the major issues addressed by this study, the literature has been organized in sub-sections including the general overview of the situation analysis of SWM globally and locally, evaluation of SWM in terms of how time in history it has been handled and its place within the devolved government system, the existing environmental effects posed by improper SWM, the key stakeholders involved in SWM, the different SWM approaches applicable for better services, the existing legal frame work governing SWM systems in Kenya, the existing policies on PPP for SWM, the place of PPP in the development plan of Kenya as a country and finally the conceptual framework aimed at the achievement of the main research objective.

2.2 Situation Analysis of Solid Waste Management

Solid waste management is becoming a major public health and environmental concern in urban areas of many developing countries. The situation in Africa, particularly in the capital cities is severe. The public sector in many countries is unable to deliver services effectively, regulation of the private sector is limited and illegal dumping of domestic and industrial waste is a common practice. In general, solid waste management is given a very low priority in these countries. As a result, very limited funds are provided to the solid waste management sector

by the governments, and the levels of services required for protection of public health and the environment are not attained. The problem is acute at the local government level where the local taxation system is inadequately developed and, therefore, the financial basis for public services, including solid waste management, is weak (Situma, 1991).

Improper solid waste management leads to substantial negative environmental impacts (for example, pollution of air, soil and water and generation of greenhouse gases from landfills), and health and safety problems (such as diseases spread by insects and rodents attracted by garbage heaps, and diseases associated with different forms of pollution). Municipal (or local) authorities charged with responsibility of providing municipal solid waste management services (together with other municipal services) have found it increasingly difficult to play this role. This situation has been aggravated by lack of effective legislation, inadequate funds and services, and inability of municipal authorities to provide the services cost-efficiently (Otieno, 1991).

Solid Waste Management (SWM) is a local issue, entrusted to the local authority for management. However, especially, legal, economical and financial aspects of the subject bring forward the solid waste management issues in developing countries on the local, regional, national, international and supranational agendas. Local governments, municipalities, need to develop creative strategies, plans and programs dealing with solid wastes (Hamit, 2002). SWM in developing countries has received less attention from policy makers and academicians than that given

to other urban environment problems such as air pollution and waste water treatment (Medina, 1997). This realization by the Government of Kenya led to prioritization of solid waste management as a pressing issue and recognition of the value and importance of integrating environment and development objectives into decision-making process (UNEP 2005). However, the Municipal authorities charged with the responsibility of providing solid waste management and other services have found it increasingly difficult to play the role of collecting, transporting and disposing waste from their municipal boundaries (UNEP, 2005).

Today, indiscriminate waste management is one of the biggest threats to ecosystems in the world (Dorvil, 2007). Cities, often overwhelmed by the continuous influx of new arrivals, have frequently been unable to keep up with the provision of basic services. Between one third and two-thirds of the solid waste generated goes uncollected, piling up on streets and in drains, contributing to flooding and the spread of disease. In addition, urban and metropolitan domestic and industrial effluents are often released into waterways with little or no treatment (World Bank, 2000).

Doan (1998) observes that throughout history cities and towns have struggled with how to collect and dispose off, the refuse generated by their population. Obirih-Opareh (2002) states that SWM has poor cost recovery and most urban authorities in developing countries have failed to devise effective response mechanisms to mitigate the problem of low cost recovery.

The task of solid waste collection and disposal is far beyond the cost of municipal governments and the problem is likely to intensify unless alternative means to solving the problem are developed. SWM is a complex task which depends upon, organisation and cooperation between households, communities, private enterprises and government authorities in providing technical solutions for waste collection, transfer, recycling and disposal. According to Allison, *et al* (1998) and Kundu (2002) effective waste management, even when carried out informally can be an important facet of environmental protection and conservation.

Solid waste is a big challenge in the major towns in Kenya, it is very expensive and no good results since the towns despite spending a huge percentage of the towns' revenue they remain dirty. In 1997, the Government of Kenya thought of a direct link persons in the 5 big cities (Nairobi, Mombasa, Nakuru, Kisumu and Eldoret) to manage solid waste (KCCAP, 2012).

2.3 Evaluation of Solid Waste Management

Changing lifestyles such as use of canned soft drinks, mobile phones and disposable diapers (movement towards a “consumer society” in general), moreover, will pose special waste management challenges, as waste management systems in developing countries are incapable of frequent adjustment to match these lifestyle changes. Cities in both developed and developing countries generally do not spend more than 0.5% of their per capita Gross National Product (GNP) on urban waste services, which covers only about one-third of overall cost (World Bank, 1999).

Though Municipal Solid Waste Management (MSWM) is an essential and obligatory function of the urban local bodies, service levels in MSWM continues to fall short of desired levels. Historically, refuse collection and disposal has always been the responsibility of municipalities. The municipalities in particular are wasteful in their use of capital and labour, and this in turn leads to inefficient performance or even failure to meet the goals. They are generally characterized by operating deficits, causing a drain on public budgets, and overstaffing, in many cases with relatives and others who lack skills and have little concern and real incentives for efficient management. In addition to the lack of financial resources, many municipalities suffer from lack of a qualified and motivated human resource base that can efficiently implement local development projects and use modern municipal planning and management tools (JNNURM, 2011).

The responsibility over solid waste collection and disposal is thus well beyond the capacity of municipal governments. More than 80% of the total waste management costs in low-income countries are collection costs. In Latin America the cost of waste collection is about 46% of the total municipal solid waste management cost. Cost recovery in SWM service is difficult because, even though there is some willingness to pay for waste collection service, there is little such willingness for waste disposal (World Bank, 1999).

Traditionally, therefore, municipal authorities have financed the services through general revenues or attempted to charge for the service through inefficient

property tax. Owing to the existence of willingness to pay, however, private provision of waste collection has potential. In addition, limited economies of scale and ease of entry and exit in waste collection imply that competition can keep the price of the private service competitive. The community also expects some measure of popular participation, transparency and accountability in the manner the local councils of the local communities (Wanjohi, 2003).

The solid waste management systems are dependent on the planning of urban centres and cities and the provision of infrastructure and land filling facilities in suitable areas within the urban set up. This includes designated areas for waste disposal, collection and transport of the collected wastes and garbage. Planning includes adequate open spaces, streets and lanes able to accommodate the collection and transportation (Physical Planning Act, 1996).

The evolution of local government in Kenya has shown continuity in as much as it has preserved a narrow, traditional role for local authorities. This narrow role covers the issuance of permits, public sanitation and the control of physical development. The mean budget per capita of a municipal council stands at Ksh 2,800 or USD 30. A strategy to stem the decline of service delivery has been instigated by central government, while the legal and financial framework continues to pose challenges to realization of the objectives of this strategy (Kenya Urban Development in the 21st Century, 2011).

The new Constitution of Kenya (2010) calls for devolution of government. The implementation of this devolution principle will be a learning progress with built-in financial and human capital hurdles, not to mention legal challenges. Devolution will place local government afresh in a spot where it can prove itself as development agent at local community levels. A new style of local government will make it possible to overhaul traditional management within two areas of development, namely physical development and community development. It is likely that Kenyan towns and cities will be awakened to be more active players in the bid to improve the quality of life of their inhabitants and to attract investment, (Kenya Urban Development in the 21st Century, 2011).

The success record of managing these two development domains has been poor. The management of physical development has largely failed. Municipalities and cities make plans that are not followed through. Counties, as the rural local authorities, do not make plans at all and therefore physical development occurs without proper guidance. The local government role in community development has with the best of intentions, been marginal. The Local Authorities Service Delivery Action Plan (LASDAP) is a small mandatory kitty at each local authority that carries out residual development, projects that complete or complement existing government projects. A burgeoning new instrument on the scene is Public Private Partnership, already being tried out by a few local authorities. A new legal and regulatory framework is in the making (Kenya Urban Development in the 21st Century, 2011).

2.4 Environmental Effects of Solid Waste Management

Waste management is one major area in urban environment which has a major impact on urban livelihoods and people's health with disastrous consequences as exemplified by the rise of malaria which is responsible for the loss of about 1% Gross Domestic Product (GDP) in Africa (Obirih, 2002).

According to WHO (2012) open defecation was the only sanitation practice available to 33 percent of the population in East Africa in 2006. Lack of access to proper sanitation, including clean water, is a major cause of diarrhoea, the second biggest killer of children in developing countries, according to the UN Children's Fund (UNICEF, 2012). Many slum dwellers in East African cities pay five to seven times more per litre of water than the average North American, and it is children and women who suffer the most due to poor sanitation, one of the health risks women have is [with] reproductive health because they use public toilets that are not properly maintained. Some of them have suffered from urinary [tract] infections.

Solid Waste Management is a major problem world-over and in Kenya faces several challenges from clogged drainage and sewers, waterborne diseases like typhoid, cholera and diarrhoea, increased upper respiratory diseases from open burning of the garbage to malaria (Obirih, 2002).

2.5 Stakeholders Participation in Solid Waste Management

Various government ministries and agencies, as well as private sector players, are involved in the waste and wastewater treatment sector in Kenya. On the national level, the overall policy-making responsibility lies with the Ministry of Environment and Natural Resources (MEMR) for waste, and Ministry of Public Health and Sanitation for sanitation. National Environment Management Authority (NEMA) is responsible for the overall enforcement of water quality and waste regulations (KCCAP, 2012).

The primary responsibility for the practical implementation of waste collection, disposal and management systems and sewerage systems lies with City Councils. These responsibilities may change in the future, as under Kenya's new constitution the current system of local governance is eliminated and the new county governments are expected to create new local governance structures. The Kenya Investment Authority supports City Councils in encouraging private sector participation in the waste sector (KCCAP, 2012).

Different stakeholders have different roles in creating an integrated cradle-to-cradle solid waste/materials management system that recognizes and promotes mutual best outcomes. Different stakeholders focus on or impact parts of the waste system, including government, the solid waste industry, businesses and the general public. As the system evolves, new stakeholders are emerging. Existing stakeholders and emerging ones will need to establish roles that look at the entire system (Mwai, 2009).

Stakeholders can be divided into three categories (Snel, *et al*, 1999):

1) **Primary stakeholders:** These are the people directly affected, either positively or negatively, by the implementation of a solid waste management project and include households and citizens receiving waste management services.

2) **Secondary stakeholders:** These include urban government (municipalities) and their employees, other national/state government departments, Non Governmental Organizations, Community Based Organizations & Area Based Organisations, donor/lending agencies, waste pickers, private sweepers, small entrepreneurs and contractors working on area-based waste collection. They play some intermediary role and may have an important effect on the project/programme outcome.

3) **External stakeholders** are not directly involved but may nevertheless be affected by a specific project. In solid waste management this is an important group and there are many potential actors. For example, residents of nearby communities, itinerant waste buyers, middle-men in the waste recycling trade and waste re-processors.

Stakeholders will not always fall into the above categories. In particular, whether a group is classified as secondary or external clearly depends on the specific project objectives.

2.6 Solid Waste Management Approaches

2.6.1 Integrated Solid Waste Management

The concept of Integrated Solid Waste Management (ISWM) is widely recognised as an approach to reach better, more sustainable solutions to solid waste problems. ISWM involves four levels, source reduction, recycling, waste combustion and sanitary land filling (Kibwage, 2002). ISWM also called sustainable SWM is a new concept of dealing with waste which is gaining currency in Kenya (Obirih, 2002).

An effective ISWM system considers how to prevent, recycle, and manage solid waste in ways that most effectively protect human health and the environment. ISWM involves evaluating local needs and conditions, and then selecting and combining the most appropriate waste management activities for those conditions. These approaches increasingly focus on the recovery of the valuable resources that exist in waste. Each of these activities requires careful planning, financing, collection, and transport. Town residents should develop a long-standing tradition of informal recyclers recovering resources out of waste, a fact that will present a great opportunity for implementing sustainable waste management strategies (Tchobanogous *et al*, 1993).

The ministry of local government developed a national SWM policy. Many local authorities followed suit and have localised and incorporated the best practices in their various by-laws and other policy frameworks. These include the major towns of Nairobi, Mombasa, Kisumu and Nakuru (KCCAP, 2012).

2.6.2 Recycling (Plastics, Composting)

Kenya has embraced the 3R, Reduce, Recover and Recycle concept of solid waste management and several individuals and youth groups have started plastics recycling and composting projects that have won international accolades (UNEP, 2005).

Plastics Recycling - The consumption of plastics in the country has increased with 4,000 tonnes of polythene bags called flimsies. Together with hard plastics, these ends scattered in the environment creating an eyesore what is referred as plastics menace. Plastics recycling address the plastics menace in Kenya where the various plastics are collected by youth and women for sale to plastics recyclers. This has created employment for over 200,000 across the country (UNEP, 2005).

Composting - Some youth groups are carrying out composting of municipal waste in Nairobi, Mombasa and Nakuru helping address the management of waste in the towns and creating green jobs as advocated by UNEP. Windrows method is being applied but lack of suitable land for composting is a major hindrance. However, acceptance of composting by the towns and recognition of the Community Based Organizations (CBOs) is likely to turn their fortunes for the better (UNEP, 2005).

Factors influencing recycling of MSW in developing countries include government policy, government finances, waste characterization, waste collection and segregation, household education, household economics, MSWM administration, MSWM personnel education, MSWM plan, local recycled-material market, technological and human resources, and land availability (UNEP, 2005).

2.6.3 Public-Private Partnership Approach

There has been an increased interest in Public Private Partnerships (PPPs) which can be attributed to: (1) improved performance of the public sector by employing innovative operation and maintenance methods, (2) reduced and stabilized costs of providing services by ensuring that work activities are performed by the most productive and cost effective means, (3) improved environmental protection by dedicating highly skilled personnel to ensure efficient operation and compliance with environmental requirements and (4) access to private capital for infrastructure investment by broadening and deepening the supply of domestic and international capital (Walters, 1989; Van De Walle, 1989).

While municipalities are generally responsible for solid waste services, the private sector has been involved in the municipal solid waste sector through outsourcing arrangements and informally through waste picking. According to KCCAP (2012), recent trends in involvement of the private sector in the urban solid waste sector in developing countries, partly driven by more stringent environmental standards. The private sector can play a significant role in

improving environmental hygiene issues, around solid waste collection and disposal through the regularizing of waste picker initiatives as part of the PPPs solution, the introduction and promotion of more output focused contracts for street cleaning and solid waste collection, the involvement of the private sector in treatment and disposal projects to introduce technical innovation into through sanitary landfill technology, recycling and in waste to energy projects and the involvement of the private sector in financing capital investment.

The role of local authorities in development could be more clearly defined and greatly enhanced. It has been advanced that for a local authority; development is the management of informality, in terms of the built environment, land use, infrastructure and environmental services. At the moment, local authorities manage informality with repression as a starting point and then moving to tolerance followed by reform, and at times experiencing all these management styles at the same time. The concept of PPP for services and facilities is hardly ever on the agenda of local authorities in Kenya, although it may well be the most promising avenue for realizing development. In high-income countries, local authorities have per capita budgets that can be as much as two hundred times higher than those seen in Kenya. Therefore PPPs are the best options to pursue. Local Authorities are in a position to become pro-active in development and at the same time inspire the ongoing reform process. The evolution scenario in Kenya is a learning experience with relevance for other developing nations (Werner *et al*, 2011).

Due to budgetary deficiencies, town authorities find it difficult to address solid waste management in a sustainable manner. In addition, insufficient public awareness and enforcement of legislation is also a hindrance. In Nairobi, a large percentage of solid waste is managed by the private sector and NGOs due to PPPs (Werner *et al*, 2011).

The PPP could be used and executed at all levels of development in Urban Areas to ensure effective solid waste management systems, it could be used to create livelihood opportunities for the urban poor in the selected areas and improve the overall environmental conditions creating a better living environment (Weingaertner K., 2003).

2.7 Legal Frame Work in Solid Waste Management

The management of solid waste is dealt with under several laws, By-laws, regulations and Acts of Parliament, as well as policy documents. This is therefore aimed at assessing some of the existing policies and legislative framework, economic tools and enforcement mechanisms would affect the management of solid waste in Kenya.

2.7.1 Constitution of Kenya

In the Constitution of Kenya (CoK), Article 42 on “the Environment” provides that, “Every person has the right to a clean and healthy environment, which includes the right (a) to have the environment protected for the benefit of present and future generations through legislative and other measures, particularly those

contemplated in Article 69; and (b) to have obligations relating to the environment fulfilled under Article 70.”

Article 69 on “Obligations to the Environment”, the Constitution provides that, (1) The State shall (d) encourage public participation in the management, protection and conservation of the environment; (f) establish systems of environmental impact assessment, environmental audit and monitoring of the environment; (g) eliminate processes and activities that are likely to endanger the environment; and (h) utilize the environment and natural resources for the benefit of the people of Kenya.

(2) Every person has a duty to cooperate with State organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources. Part 2 of the fourth Schedule in the CoK also explicitly provides that the County Governments shall be responsible for, refuse removal, refuse dumps and solid waste disposal.

2.7.2 Vision 2030

In Vision 2030, one of the flagship projects is the SWM initiative which calls for relocation of the Dandora dumpsite and the development of SWM systems in five (5) leading municipalities and in the economic zones planned under vision 2030. The Vision 2030 recognizes that efficient and sustainable waste management systems are required as the country develop into a new industrialized state by 2030.

2.7.3 The Environmental Management and Coordination Act, 1999

Section 3 of Environmental Management and Coordination Act (EMCA), 1999 stipulates that - “Every person in Kenya is entitled to a clean and healthy environment and has a duty to safeguard and enhance the environment”. Section 9 of EMCA, 1999 further states that, “(1) The object and purpose for which the Authority is established is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment. (2) Without prejudice to the generality of the foregoing, the Authority shall - co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects with a view to ensuring the proper management and rational utilization of environmental resources on a sustainable yield basis for the improvement of the quality of human life in Kenya”.

Section 86 of EMCA, 1999 provides that – “The Standards and Enforcement Review Committee shall, in consultation with the relevant lead agencies, recommend to the Authority measures necessary to:- (2) prescribe standards for waste, their classification and analysis, and formulate and advise on standards of disposal methods and means for such wastes; or (3) issue regulations for the handling, storage, transportation, segregation and destruction of any waste.”

Section 87 of EMCA 1999 states that – “(1) No person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such manner as to cause pollution to the environment or ill health to any person. (2) No person shall transport any waste other than – (a) in accordance with a valid license to transport wastes issued by the Authority; and (b) to a wastes disposal site established in accordance with a license issue by the Authority. (4) No person shall operate a wastes disposal site or plant without a license issued by the Authority. (5) Every person whose activities generate wastes shall employ measures essential to minimize wastes through treatment, reclamation and recycling.

2.7.4 Environmental Management and Coordination (Waste Management)

Regulations of 2006

In the Responsibility of the Generator, Regulation 2 states that – “Any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed off such waste in the manner provided for under these Regulations”. Regulation 5 on the Segregation of waste by a generator states that – “(1) any person whose activities generate waste, shall segregate such waste by separating hazardous waste from nonhazardous waste and shall dispose of such wastes in such facility as is provided for by the relevant Local Authority.”

2.7.5 The Occupational Safety and Health Act of 2007

Part V11 section 55 of the occupational safety and health act, 2007 requires that all plant machinery and equipment whether fixed or mobile for use either or as a workplace shall only be used for work which they are designed for and be

operated by a competent person. This section is therefore a legal provision for regulating the operation of incinerators. This applies to the fencing and safeguarding of incineration machines. Section 60 states that all fencing or other safeguards provided in pursuance of the provisions of this part shall be of substantial construction constantly maintained and kept in a position while part required to be fenced.

2.7.6 The Building Code of 1987

Construction and demolition waste is not provided for in most of the Kenyan acts but the building code does provide for its handling. Section 239(1) provides that any person who except either the prior consent of the council deposits or causes or permits to be deposited any builder's debris upon any street shall be guilty of an offence. Sub-section (2) has it that if any building materials etc are deposited on a street in contravention of subsection of this by-law, the council without prejudice to its right to take proceedings in repeat of such contravention shall have power to remove the same and may if it thinks fit to sell such material, plants and debris.

2.7.7 The Radiation Protection Act (Cap 243)

Section 7(d) of the Act gives the power to the board to keep a register of owners of radioactive material and to license disposal of radioactive waste. Section 2(1) describes the duty of a license i.e., he shall be responsible for ensuring exposure to radiation from transport, storage and disposal shall be kept reasonably low. Section 18(b) requires the minister in consultation with the board to make

regulation for/and methods for disposing radioactive waste products from any source.

2.7.8 The Public Private Partnership Act, 2013

Section 4.(1) There is established a Committee to be known as the Public Private Partnership Committee which will, (i) ensure that all projects are consistent with the national priorities specified in the relevant policy on PPPs, (ii) review the legal, institutional and regulatory framework of PPPs.

In section 11, there is established, within the State department responsible for matters relating to finance, a unit to be known as the public private partnerships unit. In the performance of its functions under subsection (1), the unit shall—(a) serve as a resource centre on matters relating to public private partnerships; (b) conduct civic education to promote the awareness and understanding of the public private partnerships process amongst stakeholders; (c) provide capacity building to, and advise contracting authorities or other parties involved in the planning, co-ordinating, undertaking or monitoring of projects under this Act; (d) rate, compile and maintain an inventory of public private partnership projects that are highly rated and which are likely to attract private sector investment; (e) develop an open, transparent, efficient and equitable process for managing the identification, screening, prioritization, development, procurement, implementation and monitoring of projects, and ensure that the process is applied consistently to all projects; (f) conduct research and gap analysis to ensure

continuous performance improvement in the implementation of public private partnerships.

2.8 Existing Policy on Public-Private Partnership

The Ministry of Finance has prepared a PPP policy to open the way: “the government intends to engage the private sector through PPP arrangements, to close the gap in investment capital, technology and know-how needed to improve the efficiency and delivery of public services”. In Kenya, legislation has been passed that specifically allows private sector participation in provision of public services in the transport, water, sanitation, housing and environment sectors (KUD in the 21st Century, 2011).

The waste sector is regulated at the national level by the “Environmental Management and Co-ordination (Waste Management) Regulations” of 2006. Local authorities planning documents play a central role in the planning and implementation of waste and wastewater management systems. The City of Nairobi, with support of United Nations Environment Programme (UNEP), has been working on an Integrated Waste Management Plan. There is little or no experience with low-carbon (or in this case low-methane) technologies in the waste sector within the current regulatory and policy framework. The promotion of such technologies requires consideration of how to best manage the rights to collect and utilise gas from landfill or wastewater (KCCAP, 2012).

Cities and municipalities will be a body corporate with a board running their own affairs but operating under the direct supervision of the county executive committee. Efficient governance of urban areas and cities requires that they be classified and clear assignment of functions delegated to them by the county governments. In classifying areas as cities, municipalities or towns, a number of certain things including population must be considered. Three types of urban areas, namely cities, municipalities and towns are recommended. Cities will have populations in excess of 250,000 persons, municipalities populations of 75,000 to 249,999, while towns are defined as areas of population concentration ranging from 10,000 to 74,999. Other variables for classifying urban areas and determine. The Boards must include competitively recruited individuals and members elected by various urban interest groups. The Boards will oversee the delivery of services by City and Municipal managers working with technical teams, and ensuring efficient delivery of services to urban residents (KCCAP, 2012).

Section 22 of the urban areas and cities Act of 2011 provides a beautiful framework for county residents' participation in decision making process through Citizen Forums. The forums will provide an opportunity particularly for the residents of a city, municipality or town to deliberate and make proposals to the relevant bodies or institutions on a range of issues including the following: the provision of services and goods; proposed issues for inclusion in county policies and county legislation; proposed national policies and national legislation; the proposed annual budget estimates of the county and of the national government;

the proposed development plans of the county and of the national government; and any other matter of concern to the Citizens.

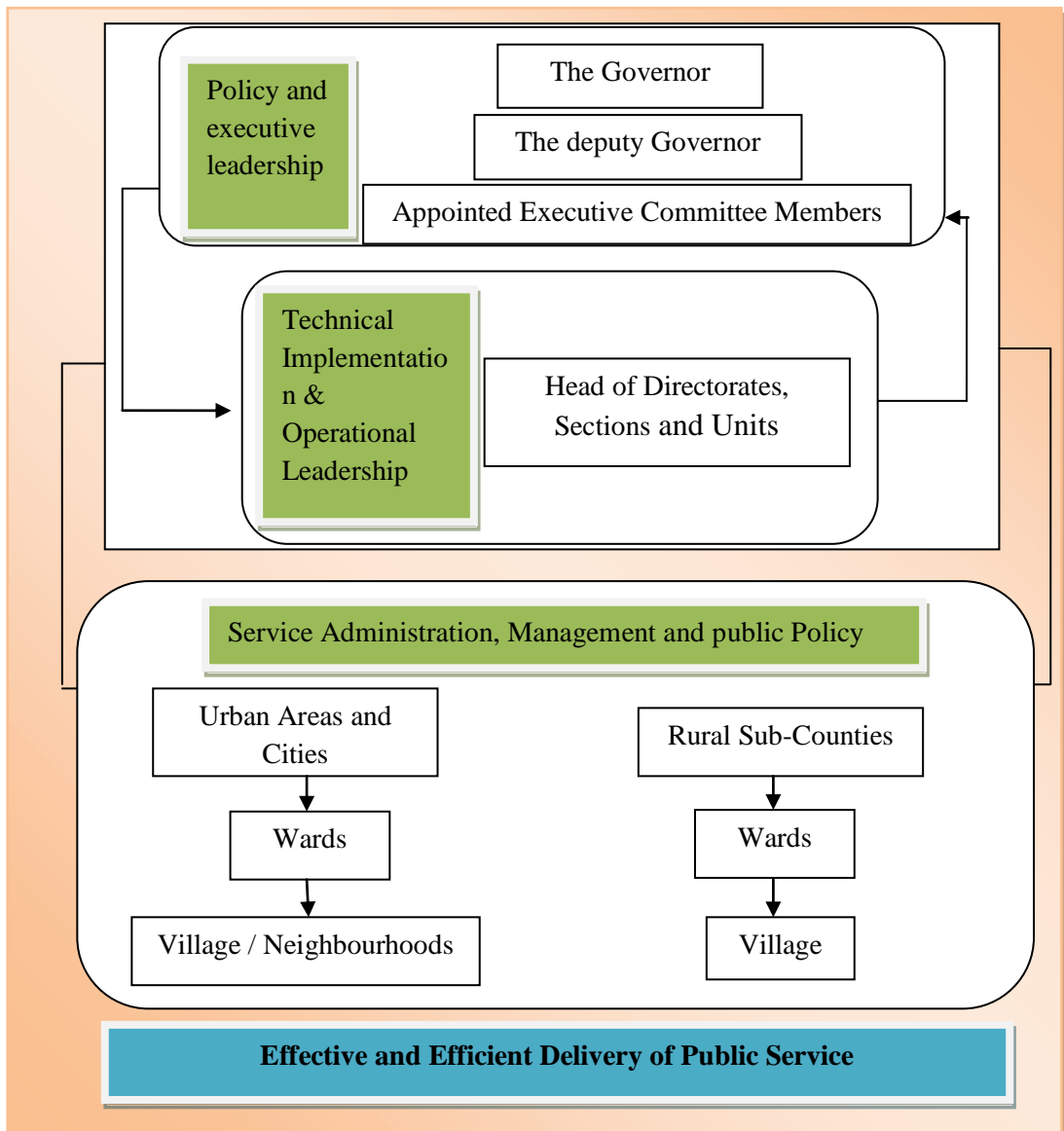


Figure 2.1: Indicative Structure of the County Executive in Kenya

Source; the Draft Sessional Paper on Devolved Government, 2011

The proposed hybrid system of governance in urban areas and cities is expected to enhance governance by allowing stakeholders to participate in the governance of urban areas and cities, with high potential for effective and efficient service

delivery. Under the current situation, most citizens are unable to hold their leaders to account and are hardly engaged in local development. The proposed units of governance are expected to empower the citizens to engage in local development, to facilitate growth and ensure effective service delivery (KCCAP, 2012).

2.9 Public Private Partnership as a Development Priority in Kenya

Vision 2030 recognizes that development will affect pollution levels and generate larger quantities of waste with a different composition than at present. Waste management forms part of the short-term “strategic thrusts” in the environment pillar of Vision 2030, and specific strategies and projects focus on industrial and municipal waste management. Solid waste management systems are planned for at least five municipalities and in the proposed economic zones to ensure a clean, healthy and secure environment. Regulations on the use of plastic bags and other hazardous products also form another goal under this strategic thrust.

Several pollution and SWM strategies have been identified to deliver on short- and long-term goals:

1. Develop and enforce mechanisms targeting pollution and solid waste management regulations;
2. Public-private partnerships for municipal waste;
3. Establish a national air quality monitoring system; and
4. Apply market-oriented instruments to regulate the use of plastic bags.

The development of a national waste management system is Vision 2030 flagship project, which includes relocation of the Dandora landfill site and the establishment of a SWM system for the City of Nairobi on a PPP basis (KCCAP, 2012). The International Labour Organization(ILO) has proved that engagement of Public

2.9.1 Background to the Public-Private Partnership Programme in Kenya

According to Kenya PPP Pipeline, 2015 progress report, the National Treasury, through the PPP Unit, is responsible for overall coordination, promotion, and oversight of the implementation of the PPP Program in the country. For the last three (3) years, the National Treasury has been committed to improving and strengthening the environment for private sector participation in the country. The following deliberate initiatives have been undertaken by the government:

- a) In December 2011, a PPP Policy was adopted with the objective of articulating the government's commitment to PPPs and to provide a basis for the enactment of a PPP Law;
- b) On 5th December 2012, the government received a credit from the World Bank for the infrastructure finance and PPPs Project. The overall objective of the project is to increase private sector investment in the Kenyan infrastructure market and to improve the enabling environment so as to generate a pipeline of bankable PPP projects;
- c) In December 2012, the PPP Act was enacted into law and became effective on 8th February 2013;

- d) Most recently, the gazettelement of the National PPP Regulations on 24th December 2014 and the development of draft PPP Regulations for the County governments; and
- e) On-going: Development of a PPP manual to provide standard bidding documents, templates, toolkit/user guidelines.

The PPP Committee has approved a pipeline of 68 proposed PPP Projects. The PPP National Priority List contains all the projects that have been identified and cleared by the Cabinet, to be implemented under the PPP framework, including:

1. **Nairobi Solid Waste Management:** Collection, transporting, recycling, sorting, landfill and generation of power for the solid waste management for Nairobi by the private party.
2. **Mombasa Solid Waste Management:** Construction of sanitary land fill in South and North Coast and transfer stations, access roads and commissioning of existing land fill at Kibarani with processing capacity of 600 metric tons/day.
3. **Nakuru Solid Waste Management:** Implementation of an Integrated Solid Waste Management by enhancing the Solid Waste Re-use, Recycle and Reduction (3Rs) principles in the following urban areas: Nakuru, Naivasha, Molo, Njoro, Mai Mahiu, Mau Narok, Gilgil, and Kabazi.

Private Partnerships (PPPs) approach can lead to both the generation of decent jobs and improved service delivery under the right conditions particularly when these partnerships are pro-poor through the involvement of local communities and enterprises (the informal economy). However, enabling environment such as political willingness and support, community participation and effective monitoring and evaluation system are crucial for successful PPP, therefore improved service delivery and employment creation that can lead to reduced poverty. Therefore the outlined conceptual framework below forms the basis of the study, as to how PPP approach application will be achieved for better and improved SWM systems in Wote Town.

2.9.2 Conceptual Framework

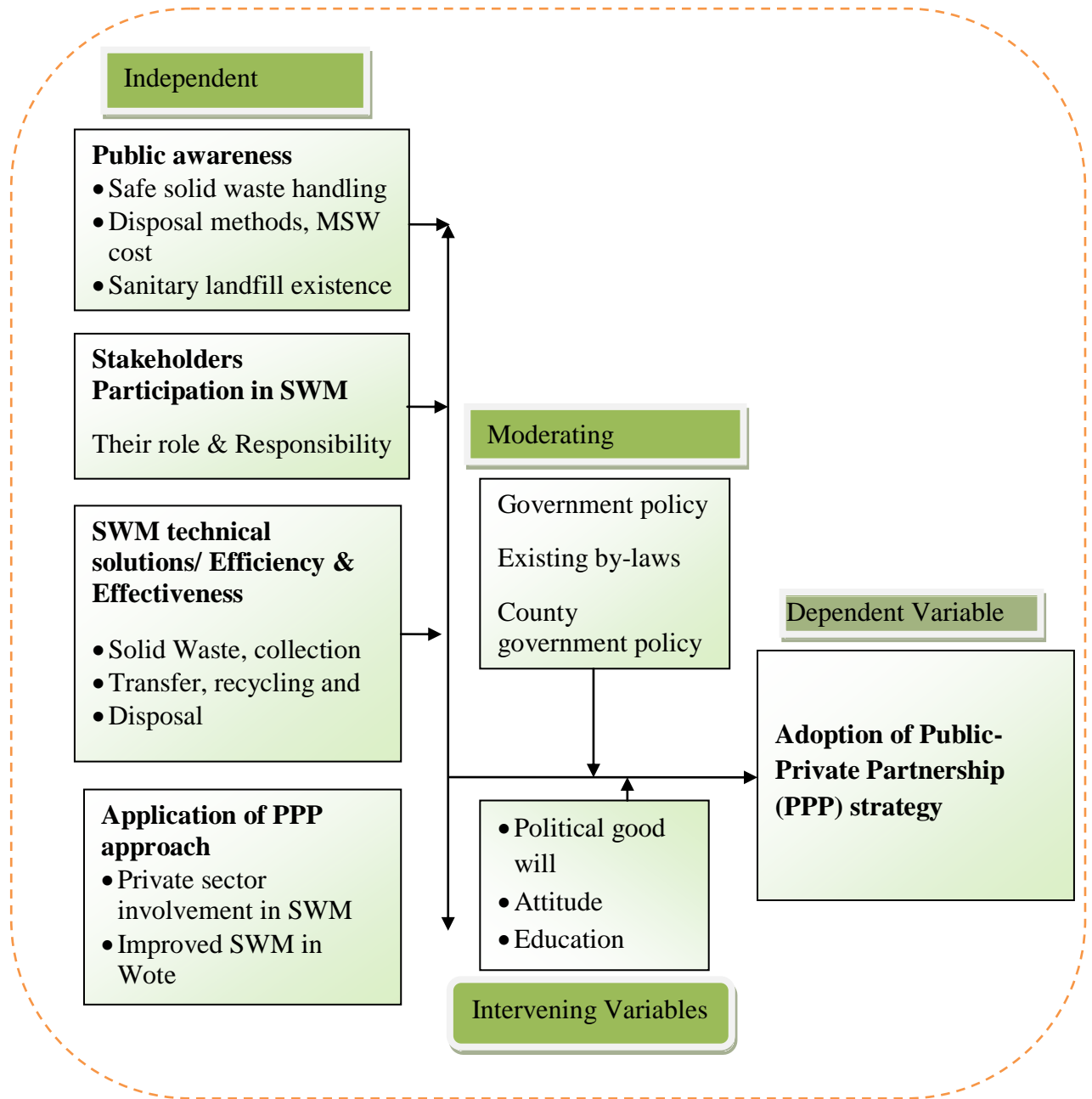


Figure 2.2: Conceptual Framework on Public Private Partnership approach in Solid Waste Management in Wote Town

CHAPTER THREE

3. METHODOLOGY

3.1 Introduction

This chapter is devoted to a description of the study area and the research design used in the study. It also highlights the key parameters studied, data collection and analysis methods, as well as the research instruments which were employed.

3.2 Study Area

The study area is Wote town, the headquarters of Makueni County, situated along the Machakos-Wote (Makueni)-Makindu road and covers an area of 275 Ha, a population of 9,875, with 2,305 households and illiteracy rate is 22.41 % (KNBS, 2009). The residents live within four demarcated estates of the town as shown in Figure 3.1 below

The area is generally arid and semi arid with annual temperatures ranging between 27-34°C. The area has two rain seasons, the long rains season is between March to April and the short rains between November to December. The rainfall pattern is erratic and ranges between 400-1000 mm per year. The altitude of the area range between 400-1900 metres above sea level. It is characterized by low lying grasslands with scattered acacia trees and scrubs.

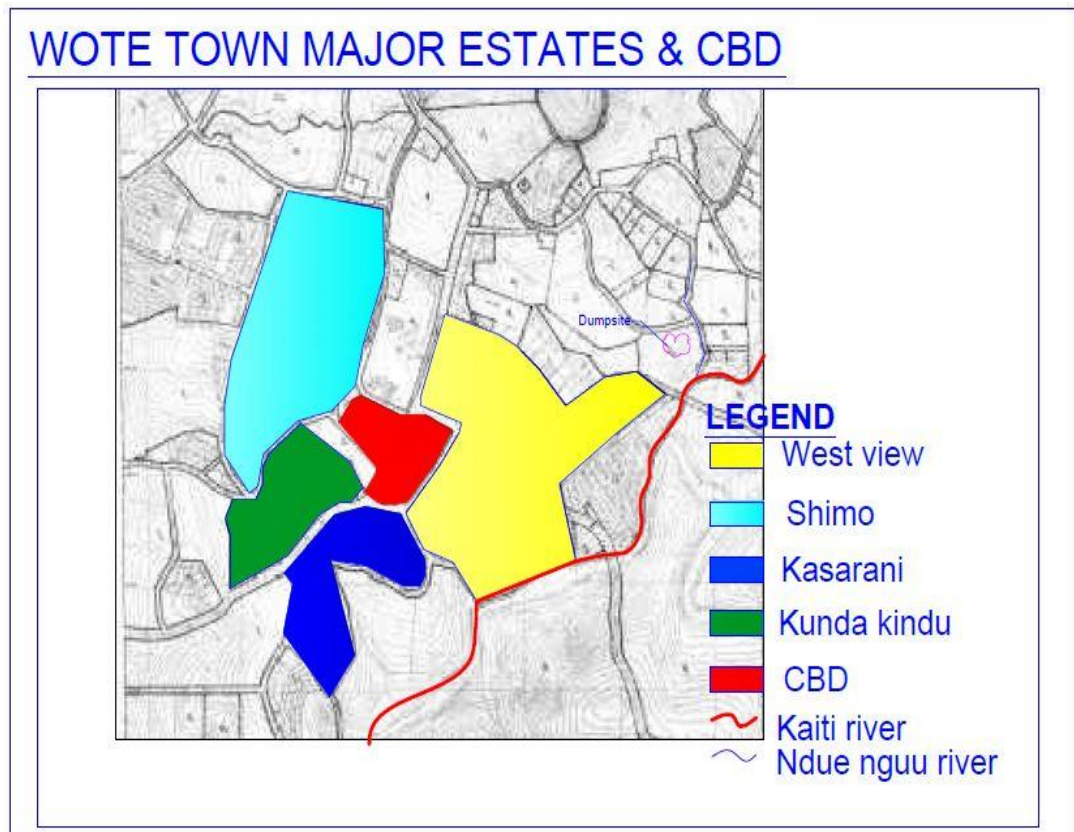


Figure 3.1: Map Showing the Study Area

(Source: County government of Makueni, Urban and Physical planning (Modified on 30th October, 2015).

3.2.1 Urban Population

The two major towns in Makueni County are Wote and Mtito-Andei whose total projected population in 2012 stands at 37,329, which is 4.05 per cent of the total population. Mtito Andei town whose 2012 projected total population in 27,031 is the biggest and account for 72 per cent of the urban population while Wote with a population of 10,299 accounts for 28 per cent of the total urban population as shown in Table 3.1 below (Makueni CIDP, 2013).

Table 3.1: Population Projections by Urban Centres

Urban Centre	2009 Census			2012 Projections			2015 Projections			2017 Projections		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
Wote	4887	4988	9875	5097	5202	10299	5315	5425	10740	5466	5579	11045
Mtito Andei	13086	12833	25919	13647	13383	27031	14233	13958	28190	14637	14354	28991
TOTAL	17973	17821	35794	18744	18585	37329	19548	19383	38931	20103	19933	40036

Source: Kenya National Bureau of Statistics, 2013

Though Mtito Andei has the highest population, Wote Town was preferred for the study because of the following reasons. First, the town is the host of the County headquarter, thus it is the busiest town. Secondly Makueni County had not yet developed proper solid waste management systems in any of its towns, thus Wote being the biggest town within the County, waste management suggested in this study could be applied in the other towns and market centres. The highly projected population growth implicates increased waste generation, thus proper mechanism has to be in place. The high population in Mtito Andei is attributed to the fact that the town is a major transit centre for long distance trucks and buses on Mombasa-Nairobi highway and is a gate way to Tsavo National Park.

3.3 Research Design

The study employed a survey research design (Orodho, 2005). The survey design was relevant to this study as the researcher reports on stakeholder's involvement

and their roles, the operations, effectiveness and efficiency of the current SWM systems and if the systems could be improved through application of PPP approach in enhancing sustainable solid waste management.

The survey was designed to collect views from respondents as follows; Local Wote town residents- these involved 40 household questionnaires. Both short term and long term residents were interviewed. Institutional managers of institutions and business operators within Wote town- 10 institutional questionnaires i.e. Revelation Hotel, Jimeli supermarket, Department of Environment Makueni, Unoa Primary School, NEMA Makueni, Marikiti representative, Kusyombunguo Hotel, Makueni Ginnery, SEKU and Maxchoice Service Kenya were administered with an institutional questionnaire.

Key informants category entailed; Makueni County Public Health officers, County Solid Waste Coordinators, Makueni County Physical Planner, County Environment Officer, Wote Town Engineer and Makueni District Hospital Officer.

3.4 Sampling Design

Wote Town comprises of four estates, Westland, Kasarani, Kunda Kindu and Shimo, businesses, institutions and the relevant government authorities were the target population. In order to meet the stated study objectives, two data sets were collected through a household survey and institution survey as stipulated in Table 3.2 below.

Table 3.2: Data Collection Strategy

SN	Survey Type	Data Set and Focus of Activity	Methodology
1	Household survey	Administration of household survey questionnaire on various modules namely: 1. Solid Waste Management 2. Stakeholders involvement 3. Effectiveness of the current systems (40)	Systematic sampling methods were used to categorize town into 4 residential areas. In the selected direction, the 10th plot was interviewed. 1. Kundakindu, 2. Kasarani, 3. Westland and 4. Shimo
2	Institution survey	Administration of institution survey questionnaire on various modules namely: 1. Solid Waste 2. Stakeholder involvement 3. Effectiveness of the current systems (10)	Stratified sampling and Judgemental sampling was used. The institutions were first grouped into categories which included: 1. Schools, 2. Hotels/Shops, 3. Hospitals, 4. Industries
3	Key Informants	Administration of Key Informants survey questionnaire on various modules namely: 1) Solid Waste 2) Stakeholder involvement 3) Effectiveness of the current systems 4) Applicability of PPP approach (8)	Purposive sampling was used in choosing the key informants from the relevant authorities and ministries (Public Health, NEMA, Ministry of Lands & Urban planning, County Environmental Minister, various County Council officers etc) gave the needed information.

3.5 Data Sources and Collection Methods

The costs and benefits of application of PPP in Wote town for better solid waste management cannot be quantified or analysed qualitatively until comprehensive

and locally based information is obtained. Both primary and secondary data were therefore collected in order to gain an understanding of the following aspects:

- i. Socio-economic status and characteristics data.
- ii. Types of waste, collection, separation and disposal methods practiced by the residents and accessibility to County Government services;
- iii. The current stakeholders in SWM, their roles, responsibilities and level of participation.
- iv. Availability/viability of PP within Wote town.
- v. Views/comments on the current SWM systems, and recommendations on ways of improvement.

The following data collection instruments were applied to acquire relevant data to the study:-

(a) Standard Questionnaires

This was the major research instrument used in the research survey. Structured standard questionnaires, with both open-ended and closed questions, were utilised at all levels of data collection. The questionnaires not only helped to maintain a focus on the main topics of relevancy, but also allowed the interviewee to elaborate on points of interest. The use of structured questionnaires was aimed at obtaining comprehensive primary-data from the sample populations and other respondents. This instrument proved to be useful in carrying out in-depth interviews with the respondents. Two questionnaires were used to obtain primary data from the households, institutions, town managers, administrative leaders and private businesses within the town on their SWM systems see Appendix I and II.

(b) Key-Informant Interviewing

This method was mainly used on key people who were particularly knowledgeable about the SWM activities and work in line with the waste management sector in Wote town. The views of the stakeholders on the usefulness and possible ways of nurturing partnerships in service provision and delivery in Wote town were captured in this way. Interviews were conducted targeting different personnel which served the researcher with relevant information towards the research topic.

(c) Participant Observation and Photography

To fully understand the waste management system operations, site visits, direct observations, participant and taking of photographs were also used in the study. Observation and recording of the activities and events of daily life related to solid waste management within the town was undertaken to understand the general waste handling operations and challenges faced. Direct observation of waste handling activities was a good way of cross checking the respondents' answers. Photographs were also taken to represent some salient features relevant to the study. This involved capturing the salient features throughout the study period by use of a digital camera. Pictures on the solid waste aspect were captured as evidenced later on in this report. In other words, photographs depicting some actual activities and the existing constraints to the waste management sector in the town formed an important ingredient of the whole study.

(d) Secondary Sources of Data

Secondary data was generated by making a critical review of relevant literature in various libraries, institutions like South Eastern Kenya University and University of Nairobi library, the Makueni County Offices Archived Records kept on the relevant county government offices like the Physical Planning Office, Public Health Office and NEMA offices.

3.6 Data Analysis and Presentation

The questionnaires and field notes were edited to validate the data and make them tidy and complete. Data processing and analysis began as soon as the execution of each step of the study was complete. However, the processing and analysis took longer than anticipated due to an under-estimation of the volume and complexity of the data being handled.

Both descriptive and quantitative techniques were utilised in the processing, analysis and presentation of data. This is because descriptive or qualitative methods tend to be strong in validity but weak in reliability while quantitative techniques tend to be strong in reliability but weak in validity. Data collected from the field was coded and entered into the computer for analysis using the Microsoft Excel package. On qualitative data, analysis was done derived from the open-ended items and photographs. The main themes and patterns in the responses was identified and analysed to determine the adequacy, usefulness and consistency of the information.

Quantitative data was analyzed using descriptive statistical tools such as frequencies, percentages and means (Mugenda & Mugenda, 2003). Statistical analysis was conducted using descriptive statistics including frequency distributions, means and percentages. The results of data analysis were then presented in tables, bar graphs, and pie charts.

3.7 Methodology Constraints

Lack of proper records on waste management activities was encountered with many of the targeted respondents, especially in the County waste management sector. Initially the waste was handled by the County Council and little of record keeping was done. The County Government after taking over faced a major challenge in tracking the former records. This created a big anomaly since there is a gap of information big on how to link the service delivery from the former operations to the current one. The challenge was overcome by maximising on reach out of all information avenues available in relation to the town's SWM system operations.

It was noted that the waste management sector had been moved through several departments within the County Government. First within the Ministry of Lands and Urban Planning, shifted to the Ministry of Water, Irrigation and Environment and again to the Ministry of Health under the Department of Public Health. It can be noted that there was frequent change of Ministries within a short time, this was because of change of governance systems and the county government was trying to see where waste management can best fit. This short transition made the

researcher strain on where to get real information. However the challenge was overcome since the transition within the involved departments was officially done and documented with justifications.

Some key-informants, especially from the County Government claimed to be too busy and were unable to spare some time for the researcher. Hence several visits had to be done so as to get the required information. Some respondents were also unable to understand the English language, especially at the household level hence, questions were translated into Swahili and answers were recorded in the former language. This was generally due to a high illiteracy level among some of the respondents.

CHAPTER FOUR

4. OPERATIONS, EFFICIENCY AND EFFECTIVENESS OF THE SOLID WASTEMANAGEMENT SYSTEMS IN WOTE TOWN

4.1 Introduction

This chapter is devoted to presentation of findings and discussion of the operations, efficiency and effectiveness of the solid waste management systems in Wote Town. It first looks at socio-economic characteristics of the respondents hence the study area. This is deemed important in understanding the issues under investigation. Secondly, the issue of solid waste management and waste handling in Wote Town is examined to act as a foundation upon which PPP approach rests. Thirdly, the study looks at the level of public awareness on the existence of county government SWM services and resident's accessibility or availability to these services.

4.2 Socio-Economic Characteristics of Respondents in the Study Area

Socio-economic characteristics influence people's perceptions and attitude, therefore, have strong explanatory power in understanding public awareness on SWM and safe waste handling disposal methods.

Once the influential social-economic factors leading to increased waste generation are identified, it will be helpful for the environmental and waste management planners in their decision making for managing waste and environmental pollution. The socio-economic aspects in this study were captured

in various ways specifically the gender variance of the household heads, their age distribution and their education level.

Table 4.1: Socio-Economic Characteristics of Household Heads and respondents in the Study Area (N=40)

Socio economic variable		Kasarani (%)	Kunda Kindu(%)	Westlands (%)	Shimo (%)	Mean
Gender of Respondent	Male	10	10	20	10	12.5
	Female	90	90	80	90	87.5
House Hold Size	Below 2	0	20	10	10	10
	3 to 5	60	50	60	60	57.5
	6 to 10	30	20	20	30	25
	Above 10	10	10	10	0	7.5
Level of Education of H.H	Primary	50	40	20	60	42.5
	Secondary	20	20	10	20	17.5
	Middle-level colleges	10	30	20	10	17.5
	University	20	10	50	10	22.5
Estimated Waste Generation	Below 1Kg	20	20	60	20	30
	2-3 kgs	50	60	30	60	50
	4-5 kgs	20	10	10	10	12.5
	Above 5 Kgs	10	10	0	30	12.5

As shown in Table 4.1 above, 80% of the 40 households interviewed emerged to be male headed while 20% were female headed. On the other hand a mean of

12.5 of the respondents were men and 87.5 were women. This is a clear indication that though many households are headed by men, only a few of them were found at home during the time of data collection. This has an implication that most of men stay away from home during the day, may be because they are working class or they are looking for means of survival for their families, the trend was observed in all the four estates.

Majority of the households with a mean of 45years were aged between 30-35 years, while households aged below 25 years formed the minority with a mean of 7.5 years, an implication that most of the town residents are youths.

62.5% of the household heads are formally employed and 37.5% are engaged in informal employment. This is a clear indication that all the town dwellers are residing with a sole purpose of searching for survival means. However, it was noted that residents from Westland estate were all formally employed, while majority of the residents residing within Shimo estate were self employed.

This is also compares with the education level within the estates, with Westland having majority of its residents (50%) being university graduates, while in Shimo estate majority of the residents (60%) have attained primary school level of education.

In general, the literacy level within the town residents is not badly off, though those who had only attained Primary school education formed the majority with a

mean of 42.5 people. It was also noted that a mean of 22.2 people had attained University education, while 17.5 people of the respondents had attained middle level colleges, this is a clear indication that the town dwellers have basic education, hence all are in one way or the other capable of contributing to the economic growth of the town. The level of education for the key informants was found to be higher with all having attained post secondary education.

4.2.1 Analysis of Waste Generation in Comparison to Social-Economic Factors

An understanding of how social economic factors determined SWM in the town was deemed necessary. From Table 4.1 more female respondents were sampled than their male counterparts. Within three of the four estates, women respondents were 90%. However, this was not purposively done, but for different reasons, female respondents were more accessible and willing to give information as compared to the male who always seemed to be busy doing their own work. In most cases, women are perceived to be the “Waste Handlers” at the household level, therefore they carry most of the information concerning waste handling matters compared to their male counterparts. During the interviews, the few male respondents had a feeling that they had little to give. Others even denied responding simply because they had no information on whereabouts of waste handling matters in their own houses.

An attempt was made to relate household size with the amount of waste generated. Majority of the households had between 3-5 members and in return

generated an estimated waste of 2-3 Kgs of waste per day. A significant difference was also noted in terms of employment and waste generation. For instance in Westland estate, which recorded all the respondents being formally employed, in return majority of the respondents (60%) from the same estate produced less waste (below 1Kg), as compared to their counterparts from Shimo estate which had 70% representation of self employment and in return 30% of the respondents generating above 5Kgs and 60% generating 2-3Kgs of waste respectively.

The level of education of the respondents from the four estates also compared positively with the amount of waste generated. The highly learned produced less waste compared to the respondents who had attained lower levels of education. For instance in Westland where 50% of the respondents had attained university level of education, 60% of the population were producing below 1Kg estimated waste while on contrary in Shimo estate where 60% of the population were primary school leavers, 30% produced an estimated waste of above 10Kgs on daily basis. The accumulation of the waste per week and considering the high population and congestion in the town, the average waste generated by the households per day is quite high and calling for an urgent and proper constituted waste management system in place.

4.3 Solid Waste Management and Waste Handling Methods in Wote Town

The cornerstone of successful planning and implementation of any form of SWM approach will be purely reliable on information about the quantity, type of waste

material being generated and how much of that waste material collection SWM system managers can expect to prevent or capture. Without a good idea of the quantities of solid waste being generated, decisions about equipment and space needs, facilities, markets, and personnel will never be reliably made. The following subsections present waste handling methods in Wote town in effort to determine the efficiency and effectiveness of the already existing SWM systems, gaps and areas of improvement.

4.3.1 Kinds of Waste and Quantity Produced

The rate at which waste is generated and its composition, are the principal parameters which are essential for the planning of any refuse management service. Knowledge on types and the components of solid waste generated will inform management to use the appropriate method to effectively deal with the various components in solid waste. Methods such as source separation, recycling, composting can be used depending on the component of waste in the waste stream.

Composition analysis was, therefore, undertaken to establish the percentage of different kinds of waste generated by the town residents (Figure 4.1). The leading solid wastes generated by households in Wote town are majorly food remains (80 %) and paper wastes (17 %) with wooden remains accounting for only 3%. Mostly the food remains are biodegradable substances such as fruit seeds, bones from animal meat, vegetable remains among other forms of solid wastes arising from edible things. The paper waste include both the biodegradable and non-

biodegradable (polythene) paper. Wooden wastes include ash from burnt charcoal or firewood and broken furniture.

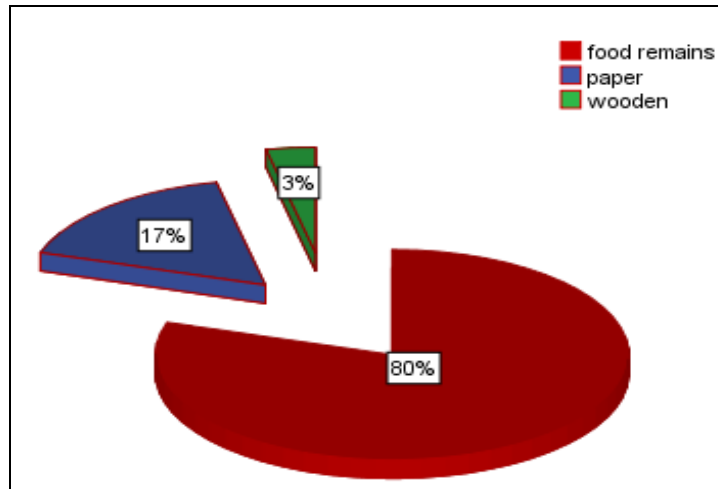


Figure 4.1: Waste Generated by the Residents of Wote Town

4.3.2 Waste Separation

Waste separation means dividing waste into dry and wet. Dry waste includes wood and related products, metals and glass. Wet waste, typically refers to organic waste usually generated by eating establishments and are heavy in weight due to dampness. Waste can also be segregated on basis of biodegradable or non-biodegradable waste. Majority of the households do not separate their wastes. However, plastic bottles are recovered by scavengers and collected at a common point identified at Kasarani estate for a particular dealer, as shown in Plate 4.1.

According to the survey, among the four estates, three estates recorded high percentages of residents not separating their waste, (Figure 4.2). Shimo estate was leading with 90%, in contrary residents form Westlands estate had a higher population separating their waste (60%). This compares with the levels of

awareness on waste separation where by the residents that were not separating waste had low levels of awareness on waste separation. Shimo estate recorded the highest number of residents with low know how on separation issues (90%) while Westland estate had the highest residents who were informed on waste separation issues (50%). This was also as a result of absence of waste recycling industries within Wote Town, and limitation of waste storage facilities in all estates.

The level of education as a key social economic characteristic also positively compares with waste separation and awareness. As indicated in Table 4.1, estates with the highly educated are the same estates with high levels of awareness on waste separation. Therefore, there is a need of creating awareness and increasing sensitization to the general public on the importance of waste separation.

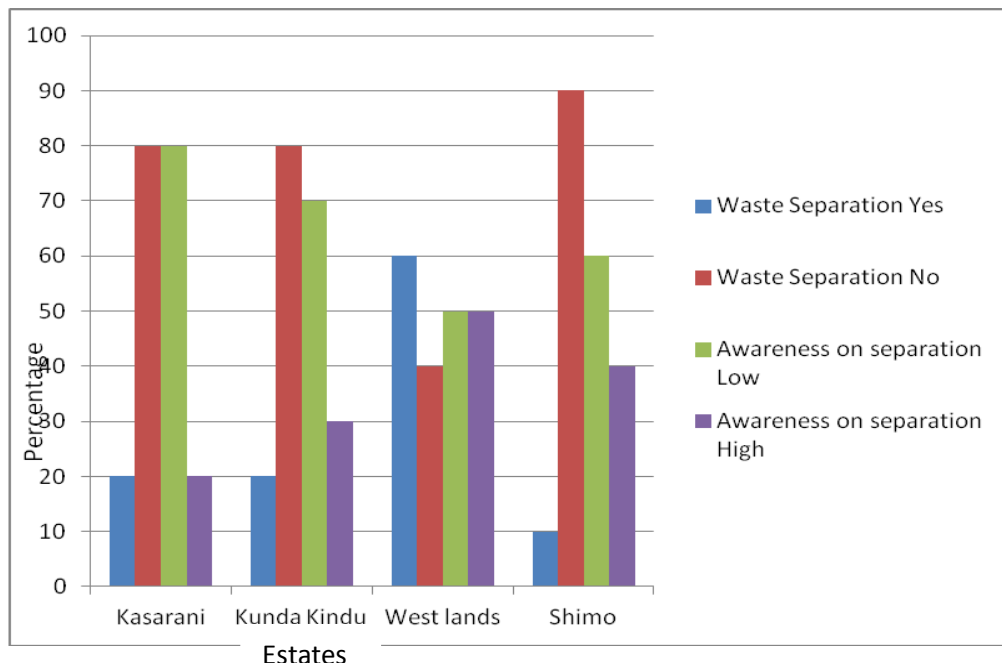


Figure 4.2: Comparison of Waste Separation with Awareness



Plate 4.1: Plastics Separated and Collected at Wote Town

For safety in waste separation the separator should wear a protective cloth or gloves as a precautionary measure for waste handling since some wastes are harmful and hazardous. Just as the number of people separating their waste before disposal was low, the same is replicated on the use of protective clothing where only 27% of the few who separate their waste use protective clothing while handling solid waste while 73% do not use gloves or any other safe waste handling clothing while managing their waste. This is because majority of the residents don't consider waste generated within their areas as harmful. However, data collected from the county government solid waste management sector indicated that waste handlers are provided with heavy duty gloves, gumboots and nose masks as depicted in Plate 4.2.



Plate 4.2: Waste Collection Staff Equipped with Protective Equipments

4.3.3 Management of Separated Waste

An understanding of what happens with the separated waste was prudent. The findings showed that 77.5% of the respondents managed their separated waste by reusing; most of this waste was noted to be plastics and paper bags. 10% of the respondents manage the collected waste through resale; only 7.5% manage their waste through safe disposal, while 5% recycle their waste (Figure 4.3).

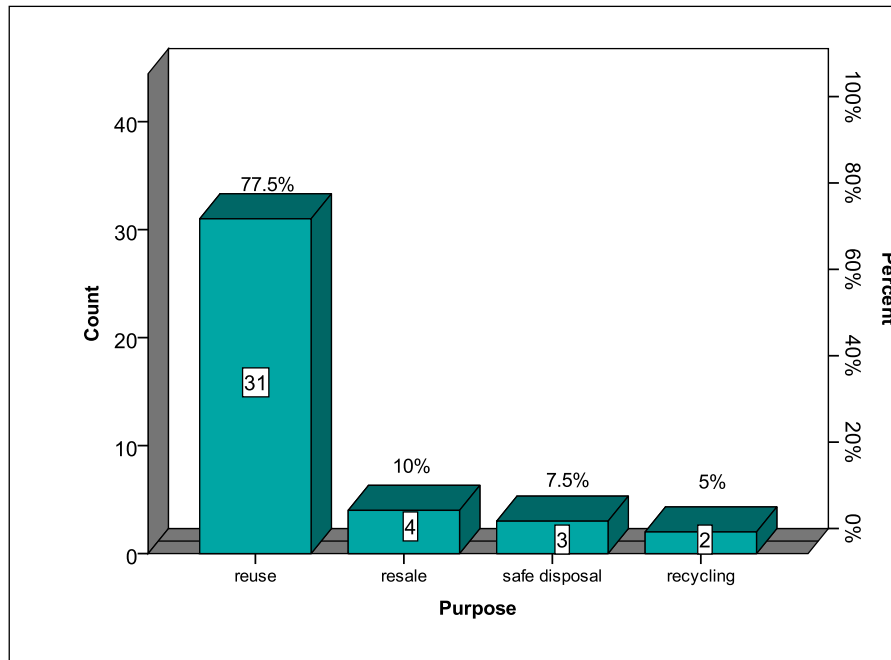


Figure 4.3: Management of Waste After Disposal

4.3.4 Waste Storage Facilities Utilized by the Residents

The major function of storage facilities is to keep the refuse temporarily under hygienic and aesthetically satisfactory conditions until it is collected for disposal purposes. A good storage facility prevents the breeding and spreading of flies and should control leachate (liquid emanating from solid waste containing dissolved, suspended and/or microbial contaminants). Besides that, the storage volume required for household wastes is a function of the number of premises served, rate of waste generation, household size and frequency of collection.

Waste storage facilities used by Wote town residents are standard containers (Plate 4.3) and unstandardized containers. Standard containers used are plastic or galvanized bins while unstandardized containers used included carton-boxes, plastic bags and back yard pits. This is because they are easy and non costly

methods. As indicated in Figure 4.4, 30% use dustbins, 23% use backyard pit, meaning they lack indoor waste storage receptacles hence forced to throw away the waste immediately after generation, while 48% use paper bags as their solid waste storage facility, however the interviewees indicated the kind of paper bags used were not the standard waste bags made purposely for waste collection, but rather were the common type paper bags being reused.

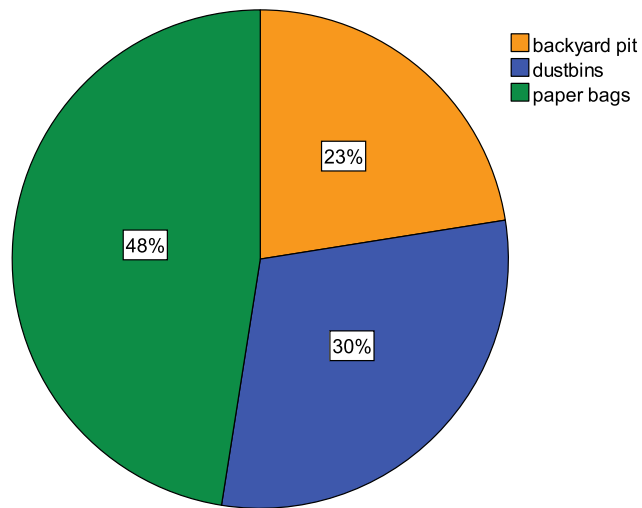


Figure 4.4: Waste Storage Facilities Utilized by the Households



Plate 4.3: Different types of Dustbins Identified Among the Residents

The town does not have adequate litter collection bins with exception of the District Commercial Centre and in the Public Vehicle Park where a few exists which have been donated by the county government, different institutions and banks. Data collected indicated that the County Government through the Ministry of Health has distributed a total of 45 waste bins of the same size (Plate 4.4). However there were no set criteria on which the bins were distributed but rather the high and medium-income areas received the first priority. The waste bins are randomly issued to individual business owners who take the responsibility of taking them outside in the morning and keeping them inside their premises at night to avoid theft because they are shared.



Plate 4.4: A waste Bin Provided by the County Government and Another by the Bank

All collected waste is transported by the County Government to the current temporal waste disposal site “Ndue Nguu dump site” (Plate 4.5). There is no sanitary landfilling and of concern is that the Public Health revealed that they did not have plans to start working towards that. In sanitary landfilling, waste is supposed to be spread in thin layers, compacted and covered with fresh layer of

soil each day to minimize pest, aesthetic, disease, air and water pollution problems (Kibwage, 2002). Since none of these environmental considerations had been incorporated into the siting, operation and planning process of this dumping site, the site's conditions were observed to be rather pathetic and unsatisfactory as can be outlined here;

- a. The waste was not covered with any layer of soil since there was no bulldozer to compact and cover the waste with a fresh layer of soil.
- b. Due to lack of proper screening, papers and plastics were blown away by wind from the dumping site towards the residential quarters with the possibility of spreading diseases and other environmental hazards.
- c. There was no litter and dust control. The site was generally untidy and dusty.
- d. The area has no gate and was accessible to human beings and animals like dogs.
- e. The road to the dumping site was not tarmacked and accessibility was a problem for the vehicles transporting waste. Access was particularly difficult during the rainy season. There were no special arrangements for bad-weather conditions.
- f. There was ground water pollution at the disposal site in cases where it rained due to leachate generation.
- g. There were no pest control measures. Hence the dumping site served as a breeding ground for flies, mosquitoes; and other types of insects. There was no application of insecticides because of financial constraints.

- h. There was no control of gas-movements and fire on the site. Such gases could cause explosions outbreaks of fires in the dumping site. Infrequent explosions from gas-pockets within the dump were also reported.
- i. The site had no essential amenities like water, fire fighting points, and communication facilities (e.g. telephone).
- j. There were no permanent employees at the disposal site therefore there was no one to ensure security, record-keeping on waste deliveries and other duties.



Plate 4.5: The current temporal waste disposal site “Ndue Nguu dump site”

4.3.5 Waste Collection

The collection process involves the transfer of the waste from the storage facilities to the vehicle for transportation to disposal. A good collection system would be one that minimizes the contact of the waste with people to prevent the

spreading of pollutants. In addition, it should be convenient and frequent such that solid waste are not kept at the households for too long a period to allow the attraction of pests and disease vectors and the generation of leachate. The two main types of collection system observed in Wote Town are Communal collection and Door-To-Door collection as shown in Figure 4.5.

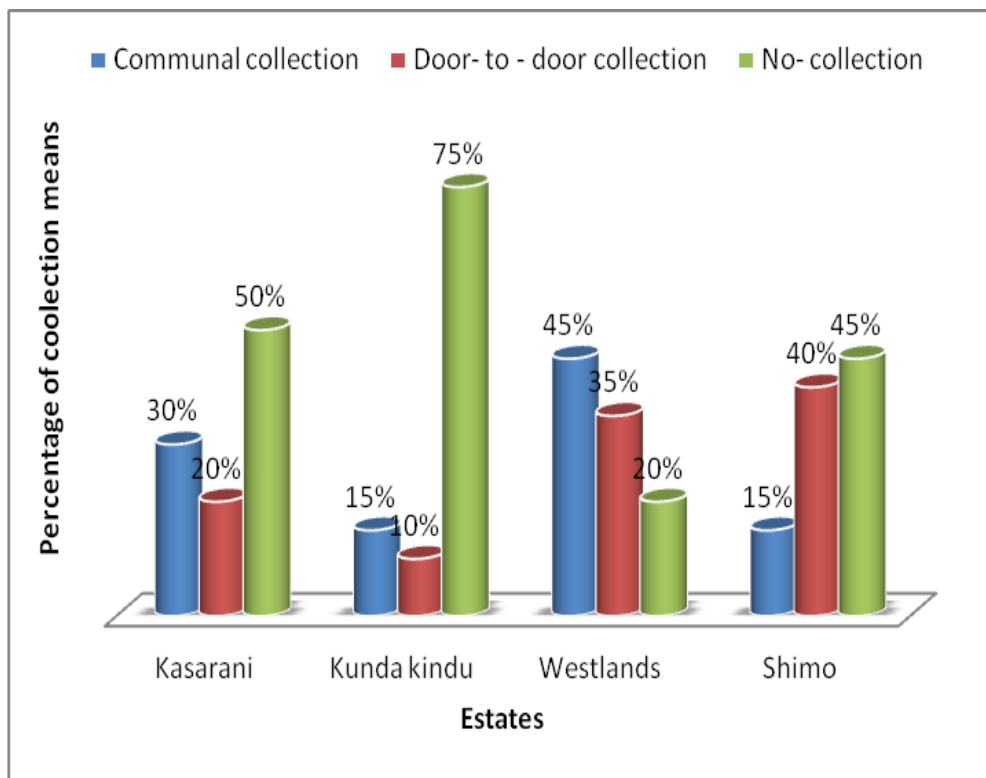


Figure 4.5: Waste Collection Methods

i) Communal Collection

Communal collection and/or use of transfer stations involved the town residents discharging their wastes at predetermined locations or sites and refuse collection vehicles visit those sites at infrequent intervals. Wote Town communal sites do not have secondary storage facilities, but rather waste is collected in the open

sites designated by the County SWM sector. There are several collection sites within the town centre, besides the Bus-Park, Marikiti, Soko ya nguo, and at different sites within the four residential estates of the town, with 45% of the respondents within Westland Estate accessing Communal collection services, 30% in Kasarani, 15% in Kunda Kindu and 15% in Shimo Estates, (Figure 4.5). It was observed that waste was not well maintained within the sites, refuse was thrown carelessly and scattered around the sites (Plate 4.6). The sites are exposed to all types of scavengers (birds, goats, cattle, dogs, as well as human beings who searched for both saleable materials and food remains). Such sites are also a nuisance to the waste-generators themselves because of the odour and smoke from the burning.



Plate 4.6: A Collection Site in Westland Estate and Animals Scavenging on Waste

ii) Door-to-Door Collection

With this method, the solid waste collectors employed by the County Government walk around the neighborhood with a drum or a cart collecting trash from each household. There are others who also simply carry the trash in the plastic bags and sacks provided by the households. After the collection, the trash is brought to the nearest collection point. The collector then either takes the container back or throws it on the ground for the householder to collect it. As

shown in Figure 4.5, Shimo Estate was leading in this mode of collection with 40%, Westland with 35%, Kasarani with 20% while Kunda Kindu least accessed Door-to-Door services (10%). Waste management in the estates have been so poor for many years, with no formal waste collection mechanisms in place.

The residents are being sensitized by the Market Superintendents on proper waste management and participation, in this case the landlords/landladies are supposed to provide the tenants with bigger waste bins for waste collection, the waste collection workers will then pick the bins to empty the waste at the collection/transfer sites. As indicated in the Plate 4.7 below, the rate of waste production is high and even the available collection bins are small, thus there is over spillage and in most cases, the residents would prefer throwing the waste in the backyard pits. This could be also as a result of failure of the waste collectors who take long before emptying the filled bins.



Plate 4.7: A Waste Collection Bin in a Plot at Westland Estate

Once the Door-Door Collection programme by the County Government rolls out in all estates, waste management in the estates will improve, hence improving the current environmental status as this method makes it more convenient for households to dispose of their waste.

iii) No Collection

From the interviews and questionnaire response, some residential areas within the estates are neglected and do not receive any collection services from the County SWM sector. As indicated in Figure 4.5, Kunda Kindu was leading with 75% of waste not being collected, Kasarani 50% and Shimo with 45%. In some instances, illegal dumping sites have arose where the residents accumulate their waste at a particular spot before setting them on fire after a few days or weeks (mainly observed in the low class residential areas). Through observations, most of these disposal points were left unattended to, the pits were almost inexistent and waste scattered in open spaces in the fields (Plate 4.8).



Plate 4.8: Scattered Waste as a Result of ‘No Collection’

4.3.6 Collection Crew Size

The Town has only one operational waste collection tractor. The vehicle was manned by 1 driver, 1 supervisor and 3 loaders, thus, a maximum crew size of 5 workers for the waste collection vehicle. The tractor has a load capacity of 5 tonnes and it makes an average of 6 trips per day. The operations of waste collection and transportation start as early as 6.00 am and ends at 5.00pm on daily basis, from Monday to Saturday as scheduled. However the waste operators were not in position to state the time taken per trip, this was because there was no specific route to be followed but rather the waste collection is done randomly. In addition to the vehicle there are 4 hand carts (Plate 4.9) and several wheel barrows.



Plate 4.9: A Hand Cart used to Transport Waste to a Waste Collection Site

The Public Health Department reported that there was a casual worker permanently at the waste disposal site to man the site, as well as assist in reloading of the waste. However, the crew size should depend on the type of vehicle used, distance between collection-points and the types and/or amount of

waste to be collected from any given point each working day. It was observed that none of these factors was taken into consideration into the decision-making process.

Lack of more waste collection vehicles has led to failure and lack of efficiency of waste collection services being provided to the town residents. The interviewed market superintendents reported that the available vehicle could only afford to collect waste around the town centre daily once a day, while at the estates, the vehicle could only afford to collect the waste once in a week from the transfer sites.

4.3.7 Frequency of Collection

As indicated in Figure 4.6, the greatest percentage (57%) of the people claimed that the County Government does not collect the waste at all, this was a representative of the respondents from the estates who manages their own waste, included in the “No Collection” bracket as indicated earlier. Forty Percent (40%) said that their waste was collected weekly and 3% daily, this is the representative of the residents at different estates served by the County Government through Communal Collection and Door- to -Door waste collection services.

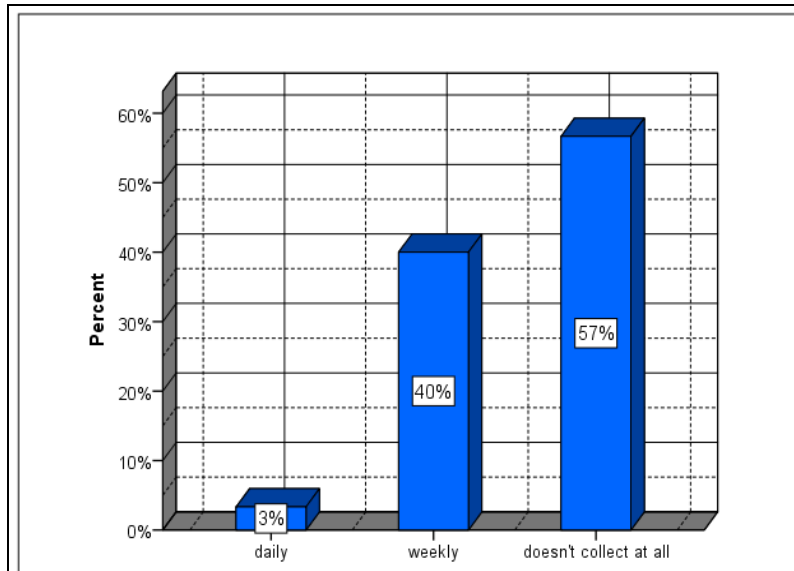


Figure 4.6: Frequency of Waste Collection by the County Government

Even after the waste disposal into temporary waste pits and sites, 65% of the respondents indicated that the waste stays there, meaning no further waste handling is done, this practice is the major cause of waste scattering, severely affecting the environmental aesthetic. 28% of the respondents said that the waste is burnt after disposal, which is not a recommendable way of waste disposal though preferred by many as also indicated earlier. This might lead to issues of air pollution and also rise in effects of climate change due to release of carbon monoxide gas into the atmosphere. Only 5% of the waste is collected by the County Government, in comparison this is quite poor service to the residents while 3% of the remaining waste is collected by scavenges (Figure 4.7). It was noted that most of the scavenged materials were plastic bottles for reuse and reuse purposes.

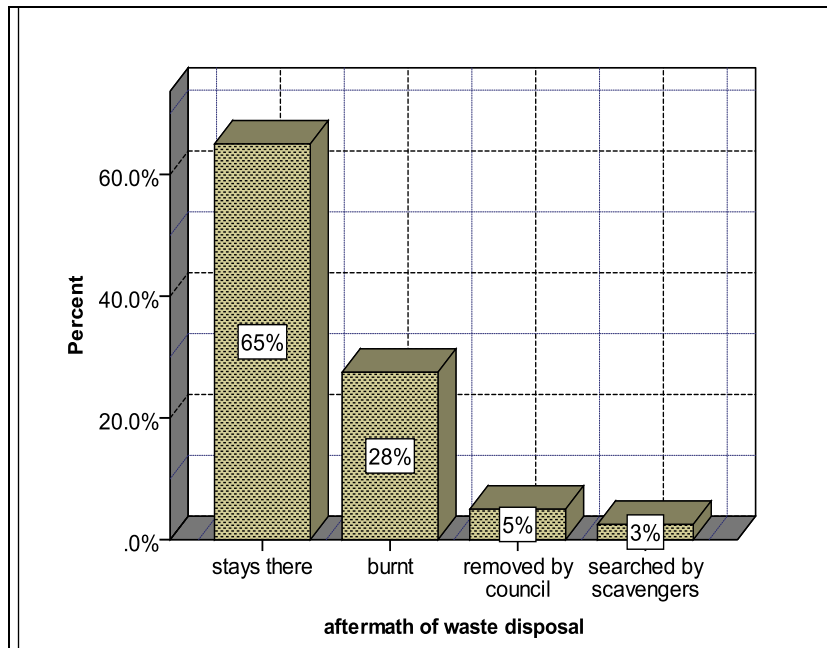


Figure 4.7: Aftermath of Waste Disposal

Eighty percent (80%) of the respondents stated presence of scavengers and bad smell in the town as the major problems they face while 20% reported diseases and loss of aesthetic beauty in the town (Plate 4.10), as the major concerns arising from the poorly managed waste.

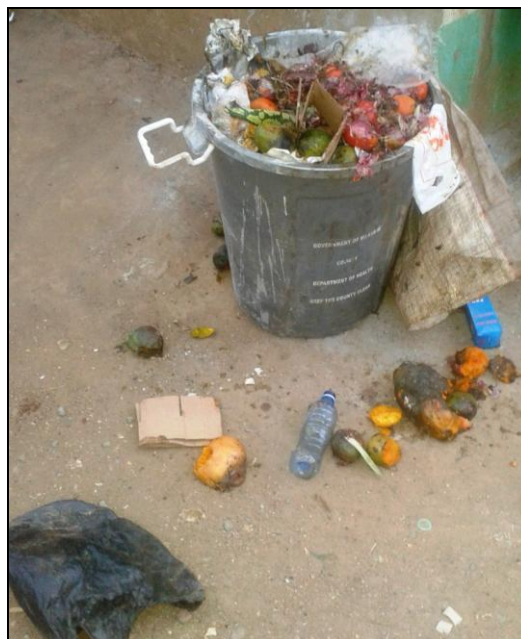


Plate 4.10: A Poorly Kept Waste Bin Located in Marikiti

CHAPTER FIVE

5. ROLES AND LEVELS OF STAKEHOLDER PARTICIPATION IN SOLID WASTE MANAGEMENT SYSTEMS

5.1 Introduction

This chapter entails the different stakeholders actively involved in the management of solid waste in Wote Town, their roles and levels of participation have been discussed. Involvement of stakeholders is important to achieve any meaningful and sustainable SWM system which is a complex task requiring a lot of attention from the county government and cooperation between households, communities, private enterprises and waste managing departments. For success to be realized in the SWM sector, the involved ministries, departments, sections and personalities must be able to fully understand their mandates, play their roles and responsibilities as per expectation for effective service delivery.

5.2 Types, Levels and Roles of Stakeholders in Solid Waste Management

As discussed in Chapter four, it is clear that several stakeholders are responsible for handling and management of solid waste for the town. The study identified four key stakeholders who are directly mandated with the duty of SWM in the town. These are; (1) County Government of Makueni, (2) National Environment Management Authority (NEMA), (3) Ministry of Health, (4) Residents of Wote Town who are the main waste generators. Their roles/responsibilities and level of participation are highlighted in the Table 5.1 below and thereafter explained.

Table 5.1: Solid Waste Management stakeholders

Stakeholders	Roles/ Responsibilities	Level of participation
County Government	1) Financing waste collection procedures 2) Purchase of relevant infrastructure	Implementation at County level
1) Market Superintendents	1) Supervision of casuals 2) Ensuring and maintaining cleanness in the town	Wote town – within estates and town centre
2) Casuals cleaners	1) Cleaning/sweeping and collection of solid waste	Wote town – within estates and town centre
NEMA	1) Monitoring and imposing the EMCA, 1999 laws and regulations	Ensuring Compliance
Ministry of Health 1) Public Health officers	1) Employment of waste collection/handling staff 2) Oversee SWM at the sub-county level. 3) Policy making 4) Supervision of solid waste in the divisions and in the markets	Implementation at County, Sub-county and Division Wote town – within estates and town centre
Town Residents	1) Waste management	Household level- waste generation point

5.2.1 County Government Involvement in Solid Waste Management

The task of solid waste management rests with the County Government Solid Waste Management Sector in the town, rapid urbanization and the growing population against stagnant collection system overwhelms the task of waste and garbage collection. Inappropriate dumping and disposal in open spaces and on the edges of streets and lanes/alleys in between residential and commercial houses are the cases evident in Wote town. Liquid and solid wastes are disposed of in back streets especially by hotels and other eatery businesses.

Data collected indicated that the SWM sector usually engage 30 casual waste cleaners per week, and in addition in 3 days per week they engage an extra 14 casual workers to help in cleaning services. The cleaners are well distributed within the town centre, in the markets and within the different estates. The waste collection exercise is manned by 4 Market Superintendents who are the immediate supervisors to the casual cleaners, in the 4 respective areas of work; Westland estate and Marikiti, Bus Park and Kasarani, Kunda kindu estate and Shimo estate. Each of these areas has been allocated 7 casual cleaners and a hand cart for waste transportation to the collection sites, operated by the cleaners. The organizational structure of the waste management system is presented in Figure 5.1.

Waste management being one of the devolved functions, (Constitution of Kenya, 2010). The County Government of Makueni bears full responsibility for healthy management of waste generated by its residents. From Table 5.1 above, the County Government is liable for financing the SWM systems at all levels. Data collected indicated that the budget provision for SWM in the county amounts to Kshs. 14 Million monthly, which supports waste management for all towns within the county. Wote town being the county headquarters is allocated the huge share of the budget which is estimated at Kshs. 800,000 monthly. This money is allocated both for payment of waste management workers and for running other relevant activities concerning waste management such as workshops, seminars,

awareness creation and sensitization issues. It should be noted that budget for purchase of infrastructure and operational facilities is done separately.

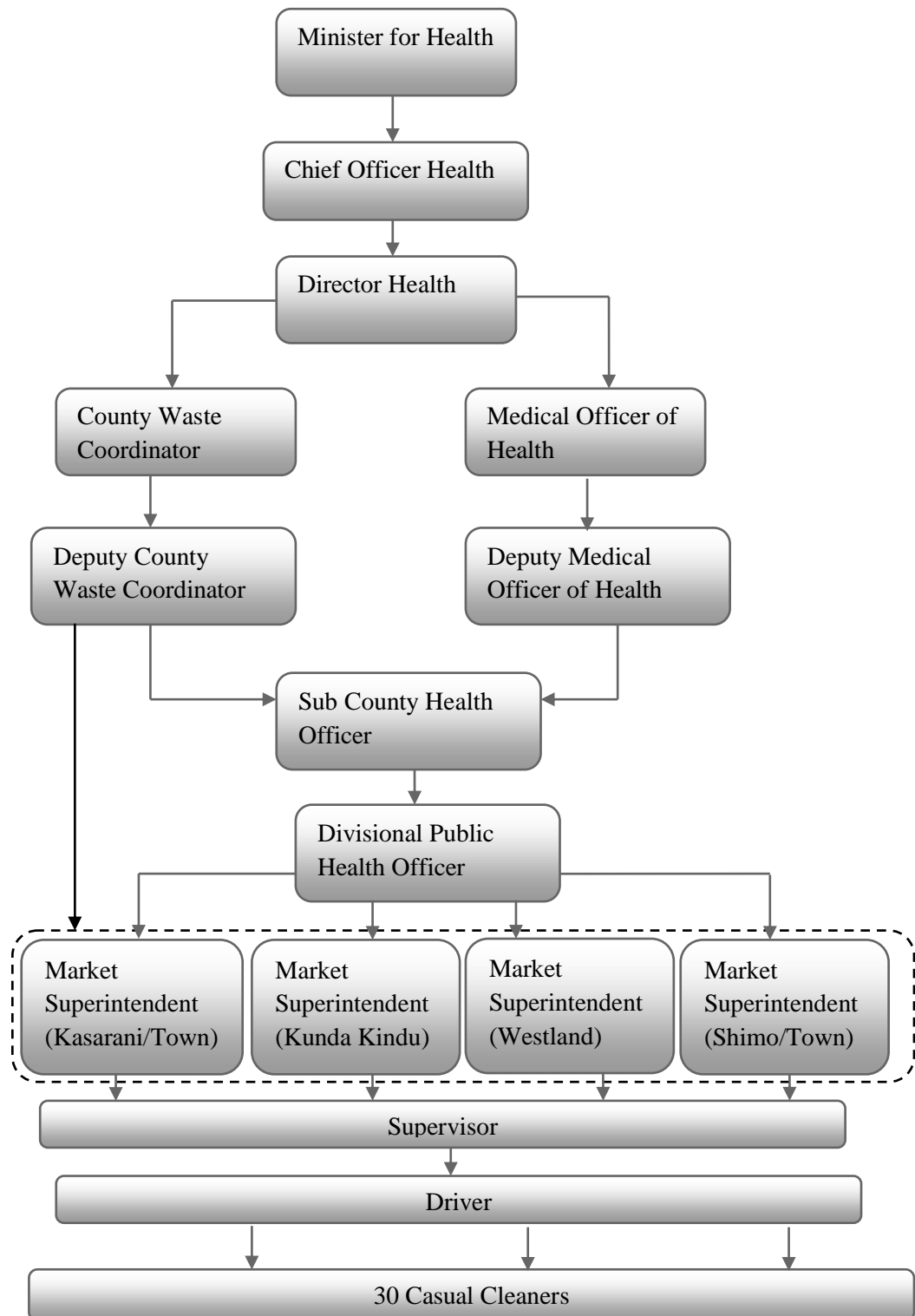


Figure 5.1: The organizational structure for Solid Waste Management in Wote town

During the time of interview, it was noted that the Market Superintendents were being supervised by the County Solid Waste Coordinators and the Divisional Public Health Officers, an issue which raised a lot of concern among the workers. Another area of interest was presented by the fact that the Department Public Health being the one responsible for employment of casual cleaners, yet the Market Superintendents were being appointed by the County Government. Issues leading to the rampant change and movement of the waste management sector across chain of ministries, in effort of search for effectiveness and efficiency in service delivery also raise a lot of concern and uncertainty on the sustainability of the waste management sector.

The following are the roles of County Government concerning SWM:

1. Responsible for drawing up action plans for implementation of applicable solid waste management systems within their county;
2. Source adequate funding for development of sustainable waste management initiatives e.g. in terms of collection, transportation, disposal sites and technologies suitable for waste disposal;
3. Benchmarking on best practices of appropriate technologies;
4. Undertake periodic clean-up activities within their counties;
5. Provision of equipments for waste segregation and segregated wastes transport systems;
6. Zone the waste operational areas;
7. Continuous management of activities/facilities such as curbside/door to door collection,

8. Skips/ bulk containers and waste cubicles and ensure all the waste is transported to the designated waste disposal sites in a timely manner;
9. Improve collection methods and facilities and further ensuring that they are adequate, effective and there is no waste in the streets/towns;

Other roles as it relates to the management of the existing County waste disposal sites

1. Designate the official County disposal site(s);
2. Secure the site with a fence and a gate manned by a council official to control dumping and spread of waste outside disposal site;
3. Weigh or estimate and record the amount of incoming waste in tonnes;
4. Develop motorable roads inside the site to ensure vehicles do not get stuck as they go to the tipping phase;
5. Spread the waste at regular intervals, compact and cover
6. Develop and install proper control system for dumpsite fires and extinguish all fires at site
7. Enhance security and control of the disposal sites so that illegal activities are contained.

5.2.2 National Environment Management Authority

The wide environmental management in Kenya is in the hands of NEMA, a parastatal within the Ministry of Environment and Mineral Resources. Waste management is a major challenge for all urban areas. The mandate of NEMA on SWM is to:

1. To formulate policies, legislations and economic instruments relevant to achieving sustainable waste management;
2. Disseminating public information on the regulatory requirements for waste management in Kenya and within the Counties;
3. Enhancing the capacity of the county governments, especially those dealing with waste management on systems and approaches applicable in their respective counties;
4. Employing social media to attract wider stakeholder participation and change attitudes towards waste management at a national level;
5. Holding engagement session (for example, school workshops, public consultation exhibitions and public events) to ensure that targeted messages are disseminated to specific stakeholder groups. This technique will allow for general public awareness to be coordinated through nationwide public waste management events;
6. Supporting community liaison groups for the dissemination of waste management findings obtained from research and development activities coordinated by members of the government, policy makers and academia, among others.
7. Involving mass media dissemination techniques, such as the publication of news articles and press releases, in addition to ensure coverage in both print and media outlets.
8. Undertake enforcement activities of the laws developed on solid waste management and surveillance exercises on illegal waste related activities.

5.2.3 Ministry of Health

As discussed earlier, the SWM Department had been moved and operated within several other ministries before it was finally dedicated to be domiciled at Ministry of Health, in the Public Health Department. Interviews conducted with the Public Health Officers indicated that it was only the Public Health Department that was able to handle matters of Solid Waste to the required expectations.

Before devolution, the county and town councils were the main operators and shouldered the responsibility of SWM, while the Department of Public Health would oversee cleanness and health matters within the towns and markets. It was observed that the situation of waste management within the town had really improved. The roles of the Public Health Department include;

1. Engaging in the process of employment of the relevant SWM personnel;
2. Ensuring cleanness is practised and maintained in all markets and towns;
3. Formulate policies, legislations and economic instruments relevant to achieving better waste management;
4. Ensure proper and acceptable solid waste disposal methods are in place;
5. Disseminating public information on the regulatory requirements for waste management at all county levels;
6. Provision of Personal Protective Tools to the waste handles at all levels;
7. Supervision of waste collection, transportation and waste disposal processes.

5.2.4 The Waste Generators (Residents)

Waste generators are major stakeholders taking part in SWM in Wote town. Their roles in the management of SW range from on- site collection at the point of generation and storage by use of dust bins, cartons and polythene bags to the time of collection to the transfer stations or for disposal in waste pits. However, carrying out their roles clearly is interfered by a number of challenges as mentioned in the discussion. Many of them take responsibility of managing their waste because they do not receive the County waste management services. These are the people who are directly affected by the ineffective management of waste by all the stakeholders because they are people located at the ground where these wastes are placed either legally or illegally.

Despite all the challenges faced by the waste generators, following are some of issues they are mandated in order to achieve better management of SW in the town.

1. Change in attitude and embrace the concept of a waste generator's responsibility by ensuring waste is appropriately managed at source and/or in all phases of the waste management cycle;
2. Adopt a 3R and/or an integrated solid waste management approach in the management of all waste streams;
3. Collaborate with other government entities, CSOs, NGOs and other informal groups in waste management through a PPP approach.

5.3 Challenges in the Current Waste Management Practices

Waste management systems in Wote Town tend to follow one main stream “open dumping”. This is very limiting considering the complex nature of solid wastes. It also contravenes the internationally recognized principle of ISWM: waste minimization, reuse, recycling, composting and land filling (Kibwage, 2002). Therefore, the responsibility over solid waste collection and disposal is thus well beyond the capacity of the County government alone. A number of reasons can be attributed to it as shown in Figure 5.2 below. Lack of awareness, poor siting of the dump site, lack of policies and mixing of waste impacts were highly felt in the four estates.

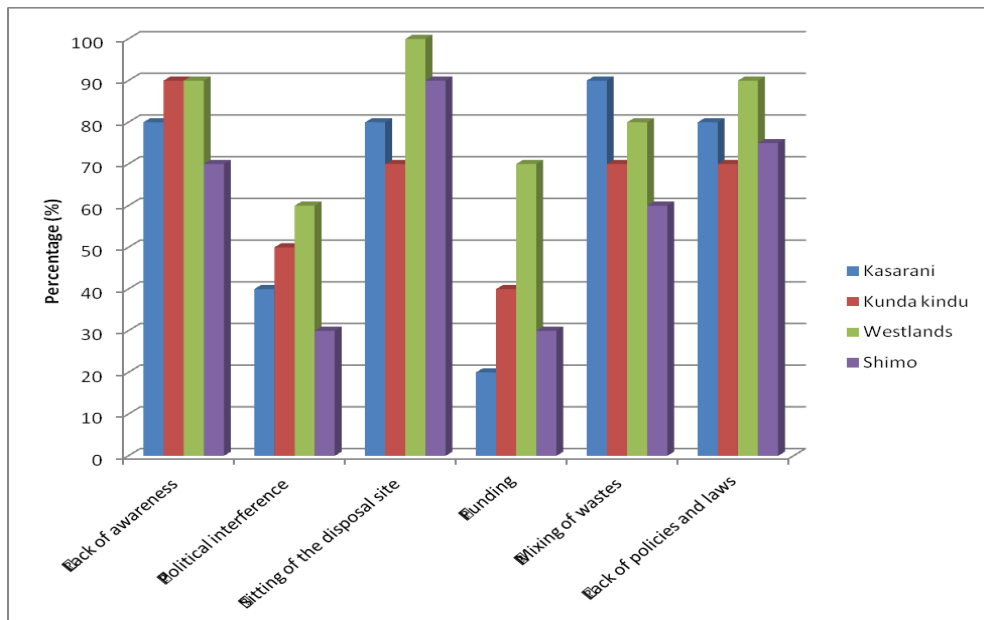


Figure 5.2: Challenges Experienced in Waste Management System

1. Lack of awareness and knowledge

Awareness and knowledge on sustainable waste management practices is key in achieving a zero waste principle in the Country. Lack of awareness on proper

SWM systems within the town residents was highly recorded at 90% and lowest at 69%, an indicator that majority of the town residents lack knowledge on proper waste management methods. The principle of 3R's – Reduce, Reuse and Recycle is rarely practiced at the individual household or commercial establishment level. Residents are not aware of the merits of waste segregation and scientific disposal of wastes. This has led to poor waste segregation from the source to, transportation and final disposal as shown in Plate 5.1 below.



Plate 5.1: Poorly Disposed Solid Waste in the Residential Areas

2. Political Interference and Lack of Good will

Political good will is key to the ultimate success in the implementation of the various waste management initiatives within the town. Fifty Nine percent(59%) of the respondents from Westland Estate indicated that Lack of interference was a key factor and considered low at Shimo Estate (29%). The Waste management agenda in the County is still not awarded the priority or importance it deserves. The chain of command in the SWM sector is not clearly defined, characterised with a lot of conflict of interest from the County Government to the Public Health Department, especially when it comes to employment of waste management

personnel, thus Wote town is still a long way in achieving sustainability in the management of their waste.

3. Siting of the Disposal Site

The County Government of Makueni has designated waste disposal site/facility within Wote town area of jurisdiction, within the County Development plan. Poor sitting of disposal site recorded a high percentage (99%) as major challenge. The existing disposal site “Ndue Nguu Dump site” falls in an area which does not meet the zoning requirements of the specific areas in which waste disposal dump sites are supposed to be located. Human settlements such as residential estates and commercial developments have mushroomed near the disposal site causing serious environmental and health risks to the inhabitants. The proximity of the site to a nearby main water source for the town residents is major disaster.

4. Funding

Limited financial capacity to manage waste in the county is currently a key issue. This was evident from the interviews with the County Waste Management sector officers; a limited budget for management of the existing waste management facilities exists. As a result the whole process of waste management from cleaning, collection, transportation to disposal site does not conform to the minimum requirements set for their management. Funds to purchase the relevant equipments for compacting and spreading of the waste at the disposal sites and purchase of other new compliant waste disposal receptacles are either not there or there is limited budgetary allocation on the same. The budget on the employment

of the casual cleaners is also limited forcing the cleaners to have wider area to take care of hence the efficiency to deliver becomes low.

The County is also faced by limited technical and financial capacity to deal with challenges of solid wastes. This creates a lot of uncertainties on the side of waste management practitioners, which encourages the culture of littering and open dumping. This is aggravated by the fact that the county government has poor solid waste management services having only one collection truck which cannot adequately serve the whole town.

5. Mixing of wastes

There is persistent culture of mixing the wet (food waste, grey water) and dry wastes (paper, plastics, etc) at the household level, institutions and in the markets. Further mixing of the waste components is done during collection by the solid waste management collection team. This limits the capacity of the recycling, mainly because of the cleaning process, or even composting of the organic waste.

6. Inconsistencies in the existing policies and laws on waste management

County Government Act and by extension most of the County By-Laws are traditional in nature and therefore not consistent with Waste Management regulations 2006. Most of council By-laws are disposal oriented, while the Environmental Management and Coordination (Waste Management) regulations 2006 are prevention oriented. These inconsistencies make it difficult for enforcement. The County Government of Makueni does not have any law or

legislation on waste management, but rather draft by-laws which are not yet passed, hence unofficial for enforcement. The Public Health Department reported that they use the statutes in Public Health Act, in managing Solid Waste in the town.

CHAPTER SIX

6 APPLICATION OF PUBLIC PRIVATE PARTNERSHIP: TOWARDS IMPROVEMENT OF SWM PERFORMANCE

6.1 Introduction

This chapter gives the road map towards achieving improved and better SWM systems in Wote town through application of PPP approach in SW. The results gives us a clear position on presence of private partners in the town, the specific partners available, residents perception on PPP approach, benefits of PPP and finally the challenges of PPP in SWM for Wote Town.

6.2 Public Private Partnership and Solid Waste Management

6.2.1 Presence of Private Partners in Wote town

Results from the study indicated that currently there was not even a single private partner dealing with SWM in the town. The reasons for lack of private partners varied from one respondent to another (Figure 6.1) with lack of awareness on PPP operations being the major reason, (50%), 22% of the respondents felt that the concept of PPP in SWM was a new idea to the general public, with 17% of the respondents thought that the County Government was the only institution mandated to deal with the matters of solid management and thus they perceived that PPP had not been legalised in Kenya, while 11% perceived that lack of private partners was the reason as to why PPP was not being practised.

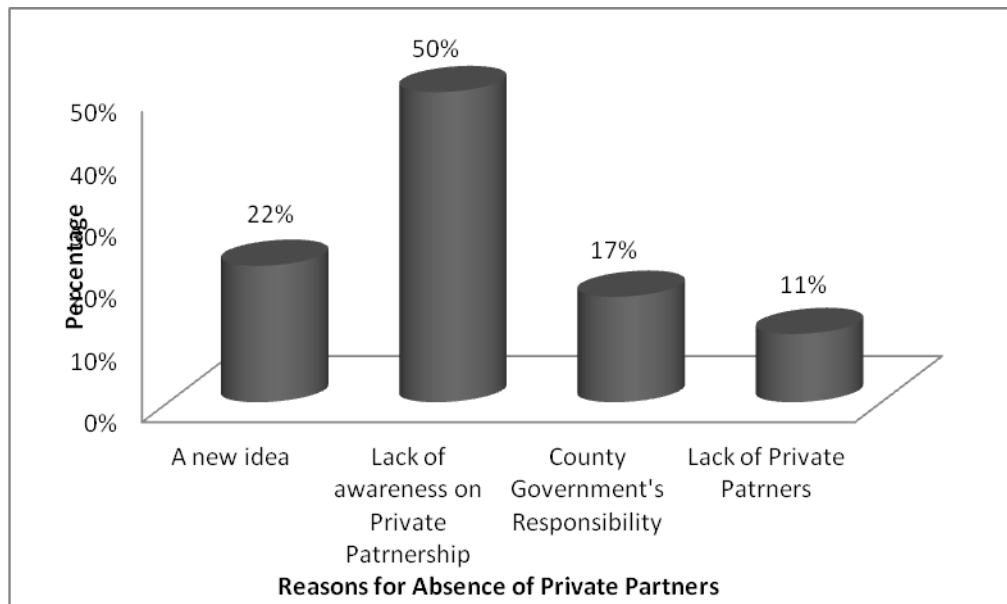


Figure 6.1: Public opinion for absence of Private Partnerships

Despite the above reasons leading to absence of Private Partners in SWM of the town, qualitative data by respondents gave their opinion on how application of PPP approach for the town SWM would improve service delivery in the following manner;

- It will lead to more efficient and effective waste collection and transportation.
- Through PPP approach, waste segregation will be effected, by encouraging reuse, recycling and even composting of the organic waste and in return reduce the amount of waste that is accumulated for final disposal.
- The private partners would work more aggressively, thus improving the current status of poor waste management within the town.
- Private partners will employ sufficient man power and this will in turn improve service delivery, because the residents pay for the service.

Private sector participation in providing SWM services could be a better way to solve the current waste problems in Wote Town and in particular PPP is seen as a potential alternative to the traditional service delivery system fully controlled by the County Government through the Public Health Department, more importantly PPP would provide the services that the public sector neither have the resources nor the expertise to supply alone. PPP approach for better service delivery implementation is a mechanism for a desired solution option. PPP arrangements will pave the way to both the public and private sectors to share the responsibilities in providing the SWM services within the town.

The residents (public) will contribute significantly to service delivery by supporting the private sector participation with payment of service charges and also they will play an active role in accountability improvement and service quality of both public and private sector. These kinds of arrangements will turn the waste generators role from passive service receivers to active service partners that in return will lead to high quality and efficiency of work.

6.3 Potential Advantages of Public Private Partnership

Application of PPP approach would benefit the community because it will create a means to achieve the general improvement of waste management systems operating or being planned in Wote town. Private sector participation in waste management systems shall contribute to making those systems more responsive, more efficient, more economical, more equitable and more environmentally

responsible. The following were the reasons why the collaboration between private and public sector was considered to be important as shown in Figure 6.2 below.

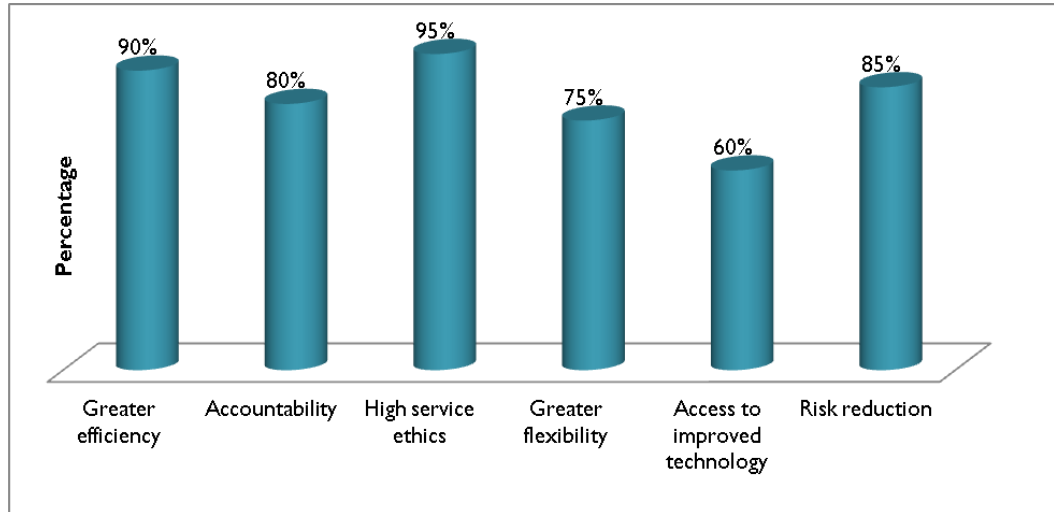


Figure 6.2: Advantages of Public Private Partnerships

1. Greater efficiency (90%) and enhanced performance, due to leaner private-sector organization and more flexible employee compensation procedures, and it will also introduce competition in waste management operations. Faster response, associated with the ability of private business people to raise capital, as opposed to the relatively long lead times involved in the county government decision making and/or the donor grant process, or with government procurement procedures.
2. Better management and accountability (80%), due to the fact that the private business functions as a contractor, and could lose the contract, hence they must deliver.

3. Private partners practice high service ethics (95%), associated with the business's image and they have the ability to attract new clients.
4. Greater flexibility in terms of purchase of land and siting of facilities (75%).
5. Greater access to experience and technology (60%), due to the potential to create partnerships with experienced private businesses in other countries and regions as opposed to the county government.
6. Risk reduction (85%), by transferring unpredictable costs or unreliable revenues onto the private operator.

Potential benefits to the local economy will include:

1. Creation of a more robust commercial sector in Makueni County.
2. Generation of sustainable employment in the private sector once the programme rolls.
3. The recovery of valuable materials from recycling activities, which can be locally used or even sold to the relevant waste recycling industries hence a source of income.

Social and environmental benefits include:

1. The insulating of waste management activities from political patronage of civil service systems.
2. Conservation of resources when materials are recovered
3. Reduction in environmental damage from exploiting primary resources, including mining and deforestation.

Participation of the private sector will ensure that solid waste management systems within the town are subject to commercial discipline and sound financial due diligence. Furthermore, the private sector will often manage more efficiently the entire supply chain needed to provide and distribute goods and services more effectively than will government agencies. Public-private partnerships will bring new ideas for designing waste management procedures, and greater synergy between design and operation of the required facilities.

By working in partnership with the private sector, the County Government of Makeni 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 county governments, and they can experiment with new technology and procedures. PPPs will allow the county government to extend waste management services without increasing the number of public employees and without making large capital investments in facilities and equipment required for proper and standardised Waste management procedures.

Private sector can often obtain a higher level of productivity from their work forces than can civil service systems, for instance they can use part-time labour where appropriate. Partnering with the private sector will give the county government the ability to take advantage of economies of scale. By contracting with several suppliers, the County Government can assure continuity of waste management 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 the County Governments' failure in providing good SWM services for its population, and the attraction towards PPP in management of solid waste within Wote Town.

6.4 Possible Limitations of Public Private Partnership

PPPs could have significant limitations if so many important aspects such as economical, social, political, legal, and administrative which need to be studied carefully before approval of the contract, are not properly taken into account. Possible limitations cited by the respondents were qualitatively presented as follows:

1. All projects are not feasible for different reasons such as political, legal, commercial viability, etc.).
2. 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.
3. 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.
4. Encouragement of municipalities for making public private partnership is hardly possible by private sector, NGOs or community based organizations (CBOs) due to lack of access, skills and in most cases funds.

There are besides benefits also risks associated with public private partnerships. Some possible implications or constraints of public private partnership in solid waste management in Wote Town are as in Figure 6.3 below:

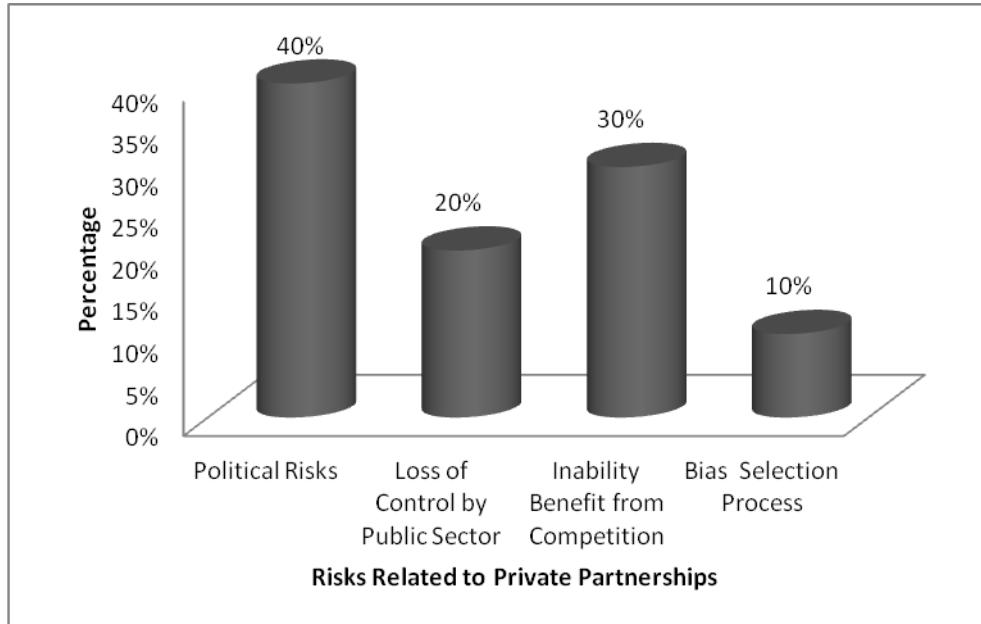


Figure 6.3: Risks Related to Private Partnerships

Political Risks:

The County Government of Makeni have less or no experience with PPP. The combination of inexperience by County Government and stakeholder unfamiliarity with PPPs may result in higher political risks (40%).

Loss of Control by Public Sector

PPP is about sharing of risks, benefits and decision making between the partners. PPP where private sector does big investments often provide for greater involvement of the private partner in decision making. This may often lead to

concerns about who controls the delivery of services as far as best practices of SWM are concerned (20%).

Inability to Benefit from Competition

Competition between the private companies to get the contract is an important benefit for the public sector. Competition the key for innovation, efficiency and cost efficiency, so if there will be only a limited number of private partners with the required expertise or ability to handle waste management for the town (30%), then the residents may not benefit from this partnership.

Bias in the Selection Process

There is always the possibility for the public sector to be accused of being bias in the selection of partners (10%). Political interference and stakeholders' conflict of interest could be on the lead, hence hindering democracy.

CHAPTER SEVEN

7. SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This chapter presents the summary of the findings and conclusive statements drawn from the discussion of the findings and then some recommendations to the County Government of Makueni, Ministry, department and sectors handling solid waste in Wote Town on the way forward with regard to PPP in waste management towards achieving improved SWM systems.

7.2 Summary of Findings

- Generation and management of waste is highly influenced by Social economic factors
- Most of waste generated is bio-degradable
- Level of awareness on separation to the residents is a real determinant on waste production and management
- Waste storage facilities are in adequate and lacking in majority of the residents, and also at the transfer stations, resolving to use of unstandardized waste storage facilities.
- Open dumping is commonly practiced leading to scattering of solid wastes haphazardly.
- Collection, transportation and disposal of garbage are inadequate or non-existent in some areas posing a great challenge to the town residents.
- Waste collection by the county government was very minimal in the estates, also majority of the residents are unaware of the presence of waste disposal site

- Only 4 key stakeholders are involved in managing Waste, as a result of low knowledge on PPs approach hence posing challenges to the current system
- Currently no private partner was present in the Town though if adopted PPP would lead to high levels of service delivery.

7.3 Conclusion

The study results presented poor community attitudes towards environmental cleanliness by taking care of their own solid wastes. This is a result of lack or low awareness on proper solid waste handling and management procedures among the town residents. Having no alternative means, the town residents often dump their refuse on roadsides, open pits and open drains which were washed by run-off into nearby River Kaiti thus contributing to poor environmental health, and low quality life.

Adequate storage, collection, transportation, disposal and recovery activities and services are beyond the resources of the existing county waste management sector, while in some areas these services are non-existing, leading to poor SWM service within the town.

The frequency of waste collection was reported to be inefficient. Only areas within the town centre had their waste being collected on daily basis, while in the estates the programme and frequency of collection was very poor and unpredictable or even complete absence of waste collection services within some

areas. This is due to the fact that the county government owns only one track, and was unable to reach to all town estates for service delivery.

The current dumpsite within the town was reported to be illegal and thus unfit for waste dumping. However the county government was in the process of looking for a suitable land within the vicinity of the town to relocate the dump site. Use of protective clothing during waste handling processed was very poor. It was reported that even though the protective gears were made available to the waste handlers, majority of them do not utilize them, hence exposing themselves into health hazards.

Lack of political and institutional support (weak by-laws) was a key contributor to the current situation. The County Government had not impacted any law or regulation on proper waste management to its town/urban dwellers. This has also led to the absence of a systematic approach for SWM in Wote town.

PPP for solid waste management has been studied with the aim of exploring its efficiency as a possible better alternative model for the public sector controlled system. SWM is not only the responsibility of public sector because everybody who generates waste is a stakeholder and needs to bear some responsibility. On the other hand it has repeatedly been pointed out by most influential organizations such as World Bank and from studies by other researchers that there is a need for a change and different approach in order to overcome the

increasing problem of solid waste management in most of cities and towns in developing countries, and Wote Town is not an exception.

From social point of view, community and private sector participation in the form of partnerships has been emphasized on. This participation and partnership stems for the following situation: Firstly, the growing deterioration in the environment due to population growth, uncontrolled rapid urbanization and economical growth has challenged the capacity of public sector to work up to the expectation of the people. Secondly, private sector is believed to have the resources, technologies, capacities, efficiency and expertise needed for more effective management of solid waste, while public sector can play a significant role in make the regulations and retain the authority of monitoring over the private sector contractors. Such distribution of responsibilities can be arranged in the form of public private partnership.

Since PPP combines the skills of both public and private sectors it improves the SWM situation, thus is a better alternative model for solid waste management. This argument has been proven in practice in other towns and cities like Nairobi, Nakuru and Mombasa and has greatly improved the solid waste management situation in the cities. After partnership collection, transportation, segregation and recycling practices significantly improves and leads to huge reduction in the amount of waste going to landfills.

The segregated organic waste will be transported to a composting facility for production of sustainable compost products. Since the organic waste fraction is responsible for leachate and methane gas generation, removal of biodegradable waste from the waste stream to be disposed of reduces the methane emissions at the landfills which are one of the responsible gases for global warming. By conducting public awareness campaigns, training and educational programs, the waste managers will greatly increase the level of people's information and knowledge regarding solid waste management.

In general it is concluded that until all stakeholders Such as public and private sectors (both formal and informal), NGOs and communities are involved in the solid waste management process of the town, a durable and sustainable solid waste management system is not possible. Public private partnership is a good alternative model for solid waste management in Wote Town, but at the same time one important issue worth mentioning is that capacity building in the public sector is also very important for having a successful partnership with private sector. Without legal framework and institutional capacities at the county level public sector cannot be a strong partner to properly manage the contract and monitor the quality of services provided by the private sector.

7.4 Recommendation

The recommendations arising from this study are discussed in the sections below, with emphasis made to the third objective which was aimed at assessing PPP application towards improved SWM in Wote Town, if adopted by the County

Government of Makueni, will go a long way in ensuring sustainable, effective and efficient management of SWM system in the Town.

7.4.1 Creation of Environmental Awareness Among the Residents of the Town

Public education and awareness on environmental issues arising from poor SWM should be emphasized among the town residents. For sustainable waste management to be realized there should be greater public involvement through intolerance to waste mismanagement. This is important since it will discourage poor waste management techniques such as burning of waste at the household level. Establishment of local urban quorum to create space for knowledge sharing amongst private, public and community stakeholders should be encouraged.

Awareness on the health risks associated with careless handling of waste will also be important in inculcating good waste handling behaviors among the residents. Creation of awareness will also help improve the perception of the residents concerning SW which will help them view SW not as a problem but as an important resource which can provide employment opportunities. This can be done through integration between the County Waste management sector, environmental NGOs and Universities to foster awareness among the residents. Organized workshops and meetings can be a good way of educating the public on environmental conservation issues, such as reduced littering at source through Recycle/ Reuse/ Reduce practices and emphasizing salvaging e.g. waste scavenging & sorting.

7.4.2 Provision of Adequate Waste Storage Equipment

The County Government of Makueni should provide the town residents with adequate/sufficient waste storage equipment both at the household level and at the common waste collection points/transfer sites. This is because one of the problems that have resulted to illegal dumping of waste in various part of the town is lack of adequate equipment for waste storage.

The waste receptacles should be standard, need to be increased in number and the distribution criteria should be fair and located at sites convenient for both the householders and the refuse collectors. One of the issue that arose as to why there was rampant disposal of SW illegal site was because the distance to the bulk containers were too long for majority of the respondents. Increasing the number of this equipment will curb the problem of illegal dumping within the town.

All waste storage receptacles should have top covers in order to prevent the accessibility of pests (like flies, rodents, dogs) which are disease carriers and human scavengers. The covers will also help reduce the possibility of the waste being blown by wind or carried by moving water. This will also be important in preventing domestic animals from feeding of SW such as polythene papers which are harmful to their health. The bottom of such receptacles should be sealed completely by non-corrosive material in order to avoid the penetration of toxic liquids (leachate) to the ground. The containers should also be portable and be easily emptied without spillage or scattering.

7.4.3 Regular Collection of Waste

The Waste collection schedule should be well planned and strictly followed for effective and efficient waste management. However, the effective regular collection of waste is determined by many other factors such as type and size of the waste receptacles, accessibility of the area, the number of available of waste collection vehicles, compatibility of the waste storage facilities, and the rate of waste generation in the area. Clear operational route for the waste collection and transportation vehicles, house location, and turning points are vital in facilitating easier planning for collection process. Establishment of transfer stations is essential in reducing the collection costs and increasing efficiency.

7.4.4 Waste Transportation

For adequate waste transportation services to be achieved waste transportation vehicles should be increased in number from one to a reasonable number since this has been proved a great challenge in the SWM sector, in return this will ensure the transportation of waste from all collection sites on a regular basis. The use of open vehicles with uncovered waste should be banned and rather encourage the covering of the waste with a mesh or a polythene bag. This will avoid the incidences of the waste being blown by the wind to the streets, shops and households around as the vehicle moves. The vehicles should be fueled and serviced as expected and taken for repair and maintenance at time of need to enable smooth running of waste transportation services. In case of Makueni County, the grounded vehicles should be repaired and serviced first. The roads to

the collection sites and to the final dumping site should also be always maintained and kept in good condition so as ensure easy accessibility of the areas and smooth transportation of the waste to the final dumping site.

7.4.5 Final Disposal of Solid Waste

The County Government of Makueni currently lacks a legal solid waste disposal site for Wote town. As reported current dumping site (Ndue Nguu) had been banned by NEMA due to the major negative environmental impacts being anticipated and experienced, hence the county government is disposing the town waste at an illegal site and the method used is open dumping. It is thus recommended that the ministry of lands and urban planning of Makueni county assist in allocation of an appropriate, suitable and acceptable dump site, with consideration made to the necessary factors and requirements for a good dump site.

Waste management at final disposal site should also divert completely from the practice of open dumping to more environmentally friendly practices of waste disposal such as sanitary land filling and compaction and covering of waste at the dumpsite. It is also important to put forth measures for control of pests, dust, litter and gas-movements, fencing of the disposal site in order to avoid illegal and unsanitary salvaging activities and treatment of hazardous solid waste before disposal.

7.4.6 Encourage use of Personal Protective Gears

Use of PPTs should be encouraged at all levels, from the waste generators to the employed solid handlers and managers. This can be done through provision of protective gear to for waste handling to the residents at the grass root, while at the management level protective gear should be provided to them in a way that workers will ensure responsibility for the items. For instance, collection of the gumboots, gloves and facial mask from a centralized office on daily basis and returning them once they are done with their activity of the day. This will ensure responsibility and careful use of the items especially when there is some penalty for not using destroying or losing the items.

7.4.7 Enforcement of More Strict Laws on Environmental Protection by the County Government

The study established that the County Government of Makueni had not yet set the necessary legislation on waste management, though they had formulated some bills on the same, waiting for approval. The existing laws on environmental protection should be enforced and even new laws that are more strict be enacted to ensure the environment is fully protected.

Certain monitoring processes should be put in place and empower NEMA and the relevant institutions, improve access to information and auditing processes, systems and records also should be developed. Failure to adhere to the laws should be met with strict penalties and fines. This will inculcate effective

management of waste among the residents so as to avoid becoming victims of the penalties.

7.4.8 Adoption of Public – Private partnership Approach for Solid Waste Management

As it has been discussed in Chapter Six, the County Government of Makueni should adopt and Practice PPP in SWM of the town, for better and improved service delivery. Public Private Partnerships are characterized by the sharing of risks, responsibilities and reward between the partners. The reason for making such partnerships in Wote Town in the solid waste management will involve the provision of better solid waste management services and sustainability of the solid waste management services.

7.5 Areas for Future Research

A comprehensive study should be under taken to explore the potential of recycling biodegradable waste from town residents which constitute the highest percentage of solid waste generated in Wote town.

Impacts of poor waste management in relation to climate change and human health

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APPENDIX A

QUESTIONNAIRE FOR THE HOUSEHOLDS

PUBLIC-PRIVATE PARTNERSHIP FOR SOLID WASTE

MANAGEMENT IN WOTE TOWN, MAKUENI COUNTY

The Information Collected from this Survey is strictly Confidential and is to be used for Academic Purposes Only

Informed Consent Form

Wote Town for a long time has been experiencing problems in terms of reliable and viable SWM systems. A research is being undertaken to establish the effectiveness of SWM systems and waste collection services in Wote Town, Makueni County and how they could be improved through application of PPP approach, by a student from South Eastern Kenya University. You have been identified as a key stakeholder in this research and therefore a respondent to a few questions.

SECTION A: HOUSEHOLD IDENTIFICATION

DATE OF INTERVIEW

Day:	Month:	Year:
Name:		Gender:
Name:	Relation:	Gender
QUESTIONNAIRE SERIAL NO.		

NAME AND GENDER OF
HOUSEHOLD HEAD

NAME OF RESPONDENT/RELATION
WITH HHD

QUESTIONNAIRE SERIAL NO.

SECTION B: HOUSEHOLD GENERAL INFORMATION

B1. Residential Estate

B2. Occupation of Household head

B3. Level of Education _____

B4. How many persons reside in this house? ____ adults, ____ children below the age of 10 years.

SECTION C: SOLID WASTE MANAGEMENT AND WASTE

HANDLING DISPOSAL METHODS

C1. What kind of waste do you generate in your house?

1. Paper 2. Glass 3. Wooden 4. Food remains 5. Hazardous wastes

C2. How do you collect the waste?

1. Dustbins 2. Paper bags 3. Backyard pit 4. None 5. Others

(specify) _____

C3. How do you dispose off the waste?

1. In pits 2. Burning 3. Collected by County Government 4. Others (specify) __

C4. Do you separately store solid wastes that are produced in your house?

1. Yes 2. No

C5. If yes, which of the following items do you separate?

1. Plastics 2. Paper 3. Metals 4. Bottles, can etc. 5. Organic wastes
6. Electronic wastes 7. Textile and old shoes 8. Others (specify) ____

C6. What do you do with separated waste?

Waste	Reuse	Resale	Safe Disposal	Recycling
Plastics				
Paper				
Metals,				
Bottles, can etc				
Electronic wastes				
Organic wastes				
Others (specify)				

C7. How often do you sell the above-mentioned quantities?

Waste	Daily	Weekly	Monthly	Others (specify)
Plastics				
Paper				
Metals,				
Bottles, can etc				
Electronic wastes				
Organic wastes				
Others (specify)				

C8. On average how many kilograms of waste do you generate per day? _____

C9. How often is the waste from your house removed for disposal?

1. Once a day 2. Once In two days 3. Once in four days 4. Once a week

5. Other (specify) _____

C10. What happens to the waste after disposal?

1. Stays there 2. Removed by council 3. Burnt 4. Searched by scavengers

5. Other(specify)_____

SECTION D: COUNTY GOVERNMENT/STAKEHOLDERS INVOLVEMENT

D1. Do you have access to door to door solid waste collection service delivered from the County Government? 1. Yes 2. No

D2. If Yes, how often do they collect the waste?

1 Daily 2. Once per week 3. Twice per week 4. Fortnightly 5.

Others(Specify)_____

D3. Do you pay for the service render per month? 1. Yes 2. No If Yes, how much?_____

D4. What mode of transport do they use?

Hand carts 2. Wheelbarrow 3. Tractors/Trucks 4. Others (specify)

D5. Are you aware of designated sites for disposal of solid waste by the County Government? 1. Yes 2. No If Yes, Where? _____

D6. Apart from the County Government what are other means you frequently use to dispose the solid waste of your household?

1. At the road sides and open fields
2. Collected by Private firm
3. Burn in my compound
4. Simply dispose in my compound
5. Taken care of by the landlord
6. If other please specify _____

SECTION E: LEGISLATION

E1. Do you know the rules and regulations of solid waste management of the town? 1. Yes 2. No If Yes, mention them _____

E2. What is the legal position of SWM in the County Government and Public Health Acts?

E2. Have you ever seen the sanitation agent making supervision and control on illegal dumping of SW on the streets, open areas, river side's and other areas?

1. Yes
2. No
- If yes, which one? _____

SECTION F: CHALLENGES/WAYS OF IMPROVEMENT

F1. Are you satisfied with the current solid waste management systems in Wote Town?

- Very satisfactory
2. Satisfactory
3. Fair
4. Unsatisfactory
5. Very unsatisfactory

F2. What problems do you face derived from SWM systems?

1.Scavengers 2. Diseases 3. Odours 4. Aesthetic 5. Domestic animal
menace

F3. What would you suggest for the Environment and Sanitation, do in order to
overcome the constraints and improve the SWM services?

.....

APPENDIX B

**QUESTIONNAIRE FOR COMMERCIAL INSTITUTIONS/SOME
GOVERNMENT DEPARTMENTS**

PUBLIC-PRIVATE PARTNERSHIP FOR SOLID WASTE

MANAGEMENT IN WOTE TOWN, MAKUENI COUNTY

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Informed Consent Form

Wote Town for a long time has been experiencing problems in terms of reliable and viable SWM systems. A research is being undertaken to establish the effectiveness of SWM systems and waste collection services in Wote Town, Makueni County and how they could be improved through application of PPP approach, by a student from South Eastern Kenya University. You have been identified as a key stakeholder in this research and therefore a respondent to a few questions.

KEY INFORMANTS- RESPONDENTS FROM DIFFERENT SECTORS

Respondent's name (Optional):

Institution:

Designation:

Age:

Gender:

Level of Education:

SECTION A: SOLID WASTE MANAGEMENT AND WASTE

HANDLING DISPOSAL METHODS

A1. Does Wote town have Solid Waste Management system in place?
.....

A2. What are the current methods of solid waste disposal in place?
.....

A3. Are there designated sites for safe solid waste disposal? 1. Yes 2. No
If yes, where?

A4. What environmental conservation measures exist for solid waste management?

SECTION B: STAKEHOLDERS/COUNTY GOVERNMENT

INVOLVEMENT

B1. Do you know the stakeholders to SWM systems in Wote town? 1. Yes 2. No
If Yes, who are the current stakeholders to Solid Waste Management (SWM) in Wote town, their roles responsibilities and level of participation?

Stakeholders	Roles/ Responsibilities	Level of participation

B2. What are the major sources of finance for SWM Systems in the town?

.....

B3. Has the County Government compared their SWM systems with other towns? 1. Yes 2. No

If yes, what can they borrow from them for better operations?

B4. Has the County government done any comparative studies on the performance between their service and the private sector service? 1. Yes 2. No

If yes, how are they different?

B5. Does the County Government have a monitoring system on SWM systems?

1. Yes 2. No If yes, how efficient are they.....

B6. Is the SWM management team able to meet their targets efficiently? 1. Yes

2. No If No, why.....

SECTION C: PRIVATE SECTOR INVOLVEMENT

C1. Is the County Government working with any voluntary groups/Private companies in SWM services? 1. Yes 2. No If Yes, give details.....

If No, Give reasons.....

C2. Are you aware of the PPP approach in SWM? 1. Yes 2. No

If yes, state how it will improve on service delivery in Wote town if applied?

And what are the advantages of PPP approach?

.....
.....

C3. What are the challenges for PPP strategies in solid waste management?

.....
.....

C4. What is your general perception on Private sector participation on SWM?

.....
.....

SECTION D: LEGISLATION

D1. Is there legislation (County By-laws) and policy framed to regulate the storage, collection, transportation and disposal of solid waste within the town? 1.

Yes 2.No If yes, how are they being implemented.....

D2. What is the legal position of SWM in the County Government and Public Health Acts?.....

D3. Does the legislation/policy provide a room for residents/stakeholders participation in solid waste management in the town? 1. Yes 2. No

If yes, in which areas.....

D4. Does the County Government policies provide for Private sector participation in SWM? Yes 2.No If yes, give

details.....

D5. Is human scavenging legally allowed at the open dumps or disposal sites?

1. Yes 2.No If yes, give details.....

D6. What legal constraints are currently hindering SWM services in the town?

.....

SECTION E: CHALLENGES/WAYS OF IMPROVEMENT

D7. What are the challenges of the current solid waste management practises in

Wote town?.....

D8. What factors do you think are hindering the operation, siting and planning of disposal sites in the town?

.....

.....

D9. What future plans does the County Government have in improving the current collection systems in the town?.....

.....

D10. What recommendations can you give for improved solid waste management strategies in Wote town?

.....

.....

APPENDIX C

QUESTIONNAIRE FOR COUNTY GOVERNMENT WASTE

MANAGEMENT DEPARTMENTS

PUBLIC-PRIVATE PARTNERSHIP FOR SOLID WASTE

MANAGEMENT IN WOTE TOWN, MAKUENI COUNTY

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Informed Consent Form

Wote Town for a long time has been experiencing problems in terms of reliable and viable SWM systems. A research is being undertaken to establish the effectiveness of SWM systems and waste collection services in Wote Town, Makueni County and how they could be improved through application of PPP approach, by a student from South Eastern Kenya University. You have been identified as a key stakeholder in this research and therefore a respondent to a few questions.

KEY INFORMANTS- COUNTY WASTE MANAGEMENT SECTOR

Respondent's name (Optional):
Institution:
Designation:
Age:
Gender:
Level of Education:

SECTION A: SOLID WASTE MANAGEMENT AND WASTE

HANDLING DISPOSAL METHODS

A1. Does Wote town have Solid Waste Management system in place?
.....

A2. What are the current methods of solid waste disposal in place?
.....

A3. How many waste collection vehicles does the county government have?.....

A4. How many staff mans each collection trip in a single vehicle? Drivers.... Supervisors..... Loaders....

(a) What protective equipment is provided to SWM staff?

(b) Are the staff vaccinated against diseases that can be transmitted by waste? 1. Yes 2. No If yes, how regularly is it done? Where?

A5. Are there planned collection-vehicle-routes? 1. Yes 2. No If yes, are they followed?.....

A6. Are the routes and collection sites demarcated? 1. Yes 2. No If No, why...

A7. Are there designated sites for safe solid waste disposal? 1. Yes 2. No If yes, where?

A8. What environmental conservation measures exist for solid waste management?.....

SECTION B: STAKEHOLDERS /COUNTY GOVERNMENT

INVOLVEMENT

B1. Who are the current stakeholders to Solid Waste Management (SWM) in Wote town, their roles responsibilities and level of participation?

Stakeholders	Roles/ Responsibilities	Level of participation

B2. What are the major sources of finance for SWM Systems in the town?

.....

B3. Has the County Government compared their SWM systems with other towns? 1. Yes 2. No If yes, what can they borrow from them for better operations?

B4. Has the County government done any comparative studies on the performance between their service and the private sector service? 1. Yes 2. No If yes, how are they different?

B5. Does the County Government have a monitoring system on SWM systems? 1. Yes 2. No If yes, how efficient are they.....

B6. Is the SWM management team able to meet their targets efficiently? 1. Yes 2. No If No, why.....

SECTION C: PRIVATE SECTOR INVOLVEMENT

C1. Is the County Government working with any voluntary groups/Private companies in SWM services? 1. Yes 2. No If Yes, give details.....

If No, Give reasons.....

C2. Are you aware of the PPP approach in SWM? 1. Yes 2. No

If yes, state how it will improve on service delivery in Wote town if applied?

C3. And what are the advantages of PPP approach?

.....
.....

C4. What are the challenges for PPP strategies in solid waste management?

.....
.....

C5. What is your general perception on Private sector participation on SWM?

.....
.....

SECTION D: LEGISLATION

D1. Is there legislation (County By-laws) and policy framed to regulate the storage, collection, transportation and disposal of solid waste within the town? 1. Yes 2.No If yes, how are they being implemented.....

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D3. Does the legislation/policy provide a room for residents/stakeholders participation in solid waste management in the town? 1. Yes 2. No If yes, in which areas.....

D4. Does the County Government policies provide for Private sector participation in SWM? 1.Yes 2.No If yes, give details.....

D5. Is human scavenging legally allowed at the open dumps or disposal sites?
1. Yes 2.No If yes, give details.....

D6. What legal constraints are currently hindering SWM services in the town?
.....

SECTION E: CHALLENGES/WAYS OF IMPROVEMENT

E1. What are the challenges of the current solid waste management practises in Wote town?

E2. What factors do you think are hindering the operation, siting and planning of disposal sites in the town?
.....
.....

E3. What future plans does the County Government have in improving the current collection systems in the town?.....

E4. What recommendations can you give for improved solid waste management strategies in Wote town?
.....
.....