

**MANAGING URBAN SOLID WASTES IN URBAN AREAS: A
CASE OF KAHAMA TOWN COUNCIL, SHINYANGA REGION**

By

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Dissertation Submitted in Partial Fulfillments of the Requirements for the degree of
Master of Science in Natural Resources Management of the University of Dodoma

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CERTIFICATION

The undersigned certify that he has read and hereby recommends for acceptance by the University of Dodoma dissertation entitled: **“Managing Urban Solid Wastes in Urban Areas: A case of Kahama Town Council, Shinyanga Region”** in fulfillment of the requirements for the degree of Master of Science in Natural Resources Management of the University of Dodoma.

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DECLARATION

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This work is my, own work and therefore, all errors omission and other shortcomings should be attributed to me.

DEDICATION

This dissertation dedicated to Emmanuel, David, Daligo, Daniel, Diana Masele and my parent Mr. and Mrs Masele Seni.

ABSTRACT

The aim of the study was to investigate the way of Managing Urban Solid Wastes in Kahama Town Council, where three Wards were involved including Kahama Mjini, Majengo and Nyasubi. The study was based on the following objectives: to assess the SWM stakeholder participation in the study area; to assess factors that affected the success of stakeholders on solid SWM in the study area; and in the Public and Private Partnership in SWM Framework.

The study has involved both qualitative and quantitative data collection methods. The household questionnaires survey, focus group discussion (FGD), personal observation, and secondary data review. Data were analyzed by using Statistical Package for Social Sciences (SPSS) version 20 and Microsoft excel software and qualitative data were analyzed using content analysis.

Results from Stakeholders involved in SWM include the households, politician, NGOs/CBOs and government officials. Findings indicated that, the most frequently mentioned factor that influenced the success of stakeholders on SWM in KTC, was the community participation (47.2%), skills, knowledge and equipment (16.4%), management factors (15%), law enforcement (12.1%) and availability of fund (9.3%).

Findings also have revealed that, Public Private Partnership was the important approach in SWM which could be implemented as operational framework, that was organized into stages as (i) The full council, (ii) Town Director, (iii) Department of the Environment and Sanitation (iv) WDCs and VDCs, (v) CBOs/NGOs/FBOs/Trading and Private, and (vi) Communities and business premises.

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LIST OF ABBREVIATIONS

AEHO	Assistant Environmental Health Officer
AS	Above secondary
CBO	Community Based Organization
EMS	Environmental Management System
FBO	Faith Based Organization
FGD	Focus Group Discussion
INF	Informal
JICA	Japan International Cooperation Agency
KTC	Kahama Town Council
NBS	National Bureau of Statistics
NGO	Non-Government Organization
NGOs	Nongovernmental Organizations
NHC	National Housing Corporation
PE	Primary education
PP	People
PPP	Public-Private Partnership
SEC	Secondary education
SHGs	Self-Help Groups
SPSS	Statistical Package for Social Sciences
SW	Solid Waste
SWM	Solid Waste Management
TACEW	Taskforce on City Environment and Waste
TC	Town Council

TD	Town Director
TEHO	Town Environmental Health Officer
TEMO	Town Environmental Management Officer
UN	United National
URT	United Republic of Tanzania
VEO	Village Executive Officers
WEO	Ward Executive Officers
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

According to UNEP (2015), Solid Waste is a global issue, which if not properly dealt with; it might pose a threat to public health and the environment. The consequences of doing a little or even nothing to address waste management unfortunately can be very costly to the society and to the economy overall. In many cases, urban wastes are not well managed in developing countries, as cities and municipalities cannot cope with the accelerated pace of waste production.

Rapid urban development, facing developing countries including Asian and African countries, with serious environmental challenges concerning solid waste management, solid waste arising from domestic, social and industrial activities is increasing in quantity and variety as a result of growing population, rising standards of living in those countries and the development of technology (Ndum, 2013).

According to Ndum (2013), Solid waste management (SWM) is the term that encompasses a wide variety of activities and practices that describes unwanted residues of any given culture. All forms of human activity result in the generation of waste which can cause changes in the environment and harm to animals, plants and ecosystems.

Urban Solid Waste Management (SWM) is one of the essential components of environment management with regard to the protection of human health and natural environment. Solid Waste generated in urban areas, possess great risks to both human and the surroundings such as diseases and environmental pollution if not well

managed. Lu *et al.* (2015) argued that due to increasing generated amount of urban solid wastes as well as decreasing capacity of waste treatment facilities, SWM has already attracted attention as an acute issue both domestically and internationally. For example SWM has been the focus of the environmental policies of the European Union since 1970s, and their objectives, have been increasing each year (Pires *et al.*, 2011). In Asian countries SWM is an increasingly pressing matter due to the growing volume of the waste and its associated impacts; therefore, they are seeking practical solutions to tackle the crisis (Hoornweg, 2012).

In Africa, SWM constitutes one of the most crucial health and environmental problem whereby most cities spend 20-50% of their annual budgets on SWM, but only 20-40% of the waste is collected (Kadafa, 2014). In Sub Saharan African cities, Osbay (2014) observed that residents cope with refuse heaps; finally they are burned under uncontrolled conditions or dumped in streams and stagnant gutters leading to environmental and health related hazards.

In Tanzania, since the Colonial era, Solid Waste Management in Urban areas has been regarded as a public goods or service whereby, the Government had the duty to provide the Solid Waste Management Services, and the public has to pay for that service. Urban Local Authorities, as it is in other countries of Sub-Saharan Africa are facing the same problem of SWM and they still operate either open dumps or uncontrolled dumps, for the final disposal of solid waste. On the other hand, the few cities that have a form of controlled dumps operate with some form of inspection and recording of incoming waste, practice compaction of waste and application of soil cover materials.

However, due to the rapid urban growth, coupled with scarcity of funds many urban authorities are facing, and the reluctance of the urban dwellers to pay for the services, represents phenomenal challenge.

While cities and towns are generating an ever- increasing volume of waste, the effectiveness of their solid waste collection, transportation and disposal systems are declining. Urban local authorities' problems are often considered as problems that needed long-term solutions, which Tanzanian cities and towns cannot explicitly afford.

1.2 Statement of the Problem

Inadequate solid waste management, is considered as one of the problems posing potential risk to public health and the environment in Tanzania particularly in urban areas, with proportionately significant population residing in unplanned areas and where 70-80% of the population resides (URT, 2006; Mwandilawa, 2011). Consequently, over 70% of the diseases attended in health facilities are water and sanitation related (UN, 2011).

Kahama Town Council (KTC) like other urban areas in Tanzania is facing the SWM problems; rapid population growth, population increase due to immigration, and limited human and financial resources, is currently confronting the Town Council. For example, in 2012 the population of KTC stood at 242,208 (URT, 2012) and in 2014 the population rose to 260,463 an increase of 7.5% (KTC, 2014).

The increase of population has failed to match with the SWM infrastructure capacity leading to an ineffective solid wastes collection and disposal (KTC, 2014). Efforts done by the KTC to mitigate SWM problems such as collection and disposal of solid

wastes in its streets, seems to be ineffective and the situation continues to be alarming thus, requiring a detailed study to investigate the problem.

1.3. Research Objective

To mitigate solid waste management in Kahama Town Council

1.3.1 Specific Objectives:

- i. To assess the SWM stakeholder participation in the study area
- ii. To assess factors that influence the success of stakeholders on SWM in the study area
- iii. To develop an Public and Private Partnership SWM Framework

1.4 Research Questions

- (i) How can stakeholder's participation in SWM be assessed?
- (ii) What are factors, that influence the success of stakeholders on SWM ?
- (iii) What need, to be considered in developing a sustainable SWM Framework?

1.5. Significance of the Study

These study findings, will contribute to a sustainable Solid Waste Management in Kahama Town Council and reduce environmental as well as health hazards associated with poor Solid Waste Management. The study, will also assist in identifying critical gaps in Solid Waste Management to be addressed such as awareness; technology, finance and strategy gaps and will also, add knowledge to the existing body of knowledge on Solid Waste Management. The applicability of new knowledge obtained in this study will not only be limited to the urban areas of

Tanzania but also will be applied to other municipals and cities of the developing countries with a similar socio-economic and environmental setting.

1.6 Organization of dissertation

This dissertation is organized into six chapters. The second chapter provides a review of relevant literature pertinent to contribution of SWM in Kahama TC. The third covers the research methodology, fourth presents and discusses the findings obtained from the study. Fifth presents a summary of findings, conclusion and recommendation, and chapter six presents the framework for the implementation of PPP in the study area.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

Granello, (2001) explained that, the literature review is a text of a scholarly paper, which includes the current knowledge including substantive findings, as well as theoretical and methodological contributions to a particular topic. Literature reviews are secondary sources, and do not report new or original experimental work. Most often associated with academic oriented literature. Such reviews are found in academic journals, and are not to be confused with book reviews that may also appear in the same publication. This chapter is organized into eleven sections. The first section gives definitions of key terms, the second covers an overview on Solid Waste Management, the third comprises solid waste recycling, and the last section involves the roles informal and formal sectors.

2.1 Definitions of key terms.

2.1.1 Solid Waste

Solid Waste, can be defined as all the waste arising from human and animal activities that are normally solid and that, are discarded as useless or unwanted (Tchbanoglous *et al*, 1993).

2.1.2 Solid Waste Management

Solid Waste Management is the methodology used to achieve solid waste reduction, primarily through reduction at source, but also including recycling and re-use of materials. Solid waste management refers to the storage, collection, transfer,

recycling, and final disposal of waste. This service is nonexclusive, meaning that upon provision it benefits the community as an overall public welfare. The service is also non-rivalled, meaning that, any resident can enjoy the benefit of the service without diminishing the benefit to anyone else (Cointreau – Levine, 1994).

2.1.3 Solid wastes recycling

Solid wastes recycling can be defined as reclamation of materials and its re-use. This could include repair, re-manufacture and conversion of materials, parts and products (Kaseva *et al.*, 1996).

2.1.4 Informal private sector

The term 'informal private sector' refers to unregistered, unregulated, or casual activities carried out by individuals and/or family or community enterprises, that engage in value-adding activities on a small-scale with minimal capital input by using local materials and labour-intensive techniques (Furedy, 1990).

2.1.5 Formal private sector

The 'formal private sector, is here understood to refer to private sector corporations, institutions, firms and individuals, operating registered and/or incorporated businesses with official business licenses, an organized labour force governed by labour laws, some degree of capital investment, and generally modern technology (Furedy, 1990).

2.1.6 A Community Based Organization

A Community Based Organization (CBO) is defined as non-profit and service-oriented organization that provides social services at the local level (Geyer *et al.*, 2006). Its activities are based primarily on volunteer efforts thus CBO depends

heavily on voluntary contributions for labour, material and financial support (Geyer *et al*, 2006).

2.1.7 Public Private Partnership

Public Private Partnership refers to arrangements that involve coordination of various stakeholders and can be adopted as a new framework of governance to operate waste management in urban centers. This framework has been successfully experienced in Greece and Taiwan (Lekkas *et al.*, 1997; Andrews *et al.*, 1999; Hague *et al.*, 2000).

2.2 Solid waste management overview

The basic economic processes are production and consumption; that is the conversion of natural resources by firms into the commodities demanded by consumers. In physical terms, this conversion is never perfectly efficient as by products (residuals) are produced. When residuals have no economic value, then it can be thought of as waste (Gareth *et al*, 2000). Waste generally means ‘something unwanted’. Its precise definition and scope however, differs from one country to another.

There are numerous reasons why we need to be concerned with waste. It is costly to dispose of, and the generation of large amounts of wastes impacts the environment (Muniafu *et al*, 2010). Large numbers of people make a living through scavenging, waste collection and recycling (Baudouin *et al*, 2010). Solid wastes, include refuse from households, no hazardous solid (not sludge or semisolid) waste from industrial and commercial establishments, and refuse from institutions (including nonpathogenic waste from hospitals), market waste, yard waste, and street sweepings (Furedy, 1990).

One of the basic services that are currently receiving a wide attention in the urban agenda of many developed and developing countries is the Solid Waste Management. Lack of effective Solid Waste Management can result in environmental health hazards and has negative impact on the environment, which may extend beyond the geographical boundaries of the town or municipality (Seik, 1997). In most cities, municipalities and towns in developing countries, Solid waste management (SWM) costs consume between 20% and 50% of municipal revenues (Mwandilawa, 2010; Shayo, 2010).

However, the waste collection services levels remain low with only between 50% and 70% of the residents, receiving services and most of the disposal being unsafe (Anjum *et al.*, 1996). In developing countries, informal solid waste handling is frequently done by disadvantaged social groups. This is because the fast growing low-income residential community, is comprised of diversity of social and ethnic groups (Schubeler, 1996).

The recognition of people doing this work runs into cultural attitudes and taboos surrounding filth and dirt, because the urban population regards waste handling as dirty and low-status job (Kettl, 1994; Schubeler, 1996; Medina, 2000). In some cases, informal waste workers belong to religious, caste, or ethnic minorities. Social discrimination is the factor that obliges them to work under completely unhygienic conditions as waste collectors or sweepers (Schubeler, 1996). Medina (2000) reports that, up to 2% of the population in Asian and Latin American cities that depend on waste picking to earn their livelihood are often from discrete social groups or belong to minorities.

In Africa, rapid urban growth since the 1960s has put pressure on the land resources, within the area surrounding the cities, and has led to the increased generation of waste. A large part of the problem is the inadequate financial and data resources for site selection and management; but the problem persists even in African countries like Kenya where the Nairobi City Council, had provision for public collection to only 10% of residents (Mwanthi *et al.*, 1997).

In Accra, Ghana, public administration of waste collection was also inadequate for a variety of reasons, which led the administration to privatize the system, where private cost recovery seemed to indicate a better solution (Obirih-Opareh and Post, 2002). These problems have resulted in 2004 serious environmental and social complications (Mutatkar, 1995; Arinola and Arinola, 1995; Moore *et al.*, 2003).

The problem is aggravated by the open dump nature of disposing waste especially in the slum areas of most African cities. An example of this is found in the waste management practices in Tanzanian, Dar es Salaam municipalities. Traditionally, their administrations permitted uncontrolled dumping in abandoned quarry sites, with no provision for sanitary landfill, causing huge health problems (Mato, 1999; Hammer, 2003).

Waste picking, is taken as adaptive response to scarcity by these disadvantaged populations. In East African cities, there are general negative attitudes or cultural barriers towards compost made by the Community Based Organizations. Surveys showed that a minority (5%) of farmers in Dar es Salaam, Tanzania rejected compost derived from waste because they associated it with diseases and dirt that may be in the waste stream (JICA, 1997). The social marginalization and culture perceptions,

do not regard solid waste management activities to be just like any other employment opportunities, so ultimately discourages those who were engaged in it.

2.3 Recycling

Recycling, is usually the most environmentally consciousness and cost - effective method of waste disposal (Nas and Jaffe, 2004). Recycling of waste at generation level, can subsequently reduce waste reaching dumpsite and landfills. Recycling not only improve waste management process but also brings economic benefit, to those involved in it. In developing countries waste recycling, is done by informal sector by the urban poor as means of employment (Cointreau – Levine, 1994; Van de Klundert *et al*, 2001).

According to Wilson *et al*, 2006), the informal sector in recycling is characterized by small-scale; labour-intensive; largely unregulated and unregistered; and low recycling technology. The key factors that affect the potential for material recycling include, cost of separating recyclable material, purity and quantity of materials, existence of local and national markets, the need for secondary raw materials, level regulatory governmental intervention and prices of virgin materials (Van de Klundert *et al*, 2001; Wilson *et al*, 2006).

Tremendous scholarly attention has been directed to the adoption and performance of local government waste recycling programs. One question that has generated considerable debate is: What factors account for the success of local programs in collecting recyclables? Much of this debate, centers on the extent to which the characteristics of local recycling programs, as opposed to exogenous forces, such as state policies, economic conditions, and popular support for environmentalism,

account for the effectiveness of programs in some communities and not others (Folz *et al.*, 1991; Feiock *et al.*, 1996; Folz, 1999;). Individual-level studies of recycling behavior consistently report that environmental concern is the best predictor of recycling behavior (Mitchell, 1989). Several factors internal to the organization of recycling programs in local government that reflect the level of commitment to recycling have also been linked to program outcomes. One of the most important of these is the presence of a full-time county recycling coordinator (Folz, 1999).

In recent years, a large literature has examined how national-level goals have affected state-level efforts in environmental regulation (Chubb, 1985; Scicchitano, *et al.*, 1991). Public support for environmental protection, as well as economic and social contexts, may influence recycling. Everett (1989) asserts that “voluntary participation recycling programs are initiated when environmental awareness is the driving force” (Folz *et al.*, 1991).

Some studies on recycling include those carried out in Tanzania (Kaseva and Gupta, 1996; Mbuligwe and Kasenga, 1998 Kaseva and Mbuligwe, 2000) in Pakistan (Anjum and Deshazo, 1996); in India (Sudhir *et al.*, 1996; Patra *et al.*, 2000; Hague *et al.*, (2000); in Singapore (Seik, 1997) and in Taiwan (Lee *et al.*, .1998).

In all these studies, solid waste recycling has been found to be currently acceptable as a sustainable approach towards solid waste management, desirable from environmental, economic and social point of view. Kaseva *et al* (2002) recommended an enhanced solid waste recycling as a sustainable approach towards solid waste management in developing countries. Recycling is not only the best

solution but also has a positive net environmental benefits associated with it (Gareth *et al* 2000).

2.4 Roles of formal and informal sectors

The main reason for the inability to manage solid wastes was poor governance (Choguill, 1996, Kironde, *et al* 1997; Bolaane and Ali, 2004). The traditional hierarchical of top down management approach of the government authorities to monopolize waste management, ignore other stakeholders, use command and rule strategies, and ill-adapted imported technology (Achankeng, 2003; Backstrand, 2006).

Lack of an adequate arrangement on direct coordination between public and private actors can be institutional barriers in solid waste management. The fundamental barriers lie in weak regulation, poor public participation and fragmentary (gaps) decision making processes (Petts, 2004). These gaps include the difference between government's hierarchy mode of ruling against private's nonhierarchical mode of governance (Osborne, 2000; Petts, 2004).

The difference is caused by the nature of the governments in developing countries being less democratic with the long vast ideas of top down management (ordering and commanding) whereas private firms believe in power sharing and accountability.

Public Private Partnership's arrangements that involve coordination of various stakeholders can be adopted as the new framework of governance to operate waste management in urban centers. This framework has been successfully experienced in Greece and Taiwan (Lekkas *et al.*, 1997; Andrews *et al.*, 1999; Hague *et al.*, 2000). They have been reported to have created employment and generated income, through

waste collection and recycling. For example, after privatization of the SW service nearly 40% of the total quantity of solid waste generated in Dar es Salaam City is collected as opposed to only 5% that was being collected before privatization (IMC, 2001). Rosenau (2000) argues that, private sectors are better at performing economic tasks, innovating and replicating successful experiments, adapting to rapid change, abandoning unsuccessful or obsolete activities and performing complex or technical tasks.

Partnership frameworks have become the cooperative mechanism of choice for pooling capabilities and resources to address problem effectively. Partnership is also said to increase the responsiveness of policies and create accountability, to new stakeholder group by including them into policy-making processes (Steets, 2004).

The evaluation of solid waste management projects funded by the World Bank worldwide, confirms that the most successful projects are those that adopt integrated partnership frameworks and incorporate different aspects, to improve their waste management system (Bartone, 2000).

The efficiency of collection of solid waste in urban areas of developing countries, vary from 59% to 82% suggesting that, a substantial amount of solid waste remain uncollected. Poor solid waste collection and disposal is a threat to public health and reduces the quality of life for urban residents (Bhatia *et al*, 1996).

Common methods of solid waste disposal in developing countries are observed to be open dumping, burying and burning of waste in open spaces, landfill, recycling and composting (Wilson *et al*, 2006). The dumpsites are usually not provided with liners, fences, compactors or soil cover (Achanekeng, 2003). The states of the dumps are

seen with heaps of wastes, open burning and exposed to disease vectors and scavengers (Visvanathan *et al*, 2005). It can be argued that, Solid Waste collection is inadequate, in which a large percentage about 60% remains either in the places where it originates or stay longer in the collection points, leading to a number of environmental and health hazards e.g. dust, smell, smokes from burning. Furthermore, the mounds of waste stored become breeding grounds for disease carrying flies, cockroaches, mosquitoes and rats and thus creating health risks (Halla *et al* 1999). In this situation, SW collection trucks make one trip or two instead of three times a week as per Municipal contracts. Thus, much waste remains uncollected (Kasava, 2003).

In Tanzania, City Councils have become more dependent on private sector to deliver basic waste management services to the community (Kibonde, 2014). Since 1994 Dar-es Salaam City Council (DCC), became more dependent on private sector to deliver basic waste management services to the community (Kibonde, 2014). Public-Private Partnership involves cooperative ventures between the government authorities and private sector to maintain improved the cleanliness of large part of the city (GTZ, 2005; Kassim and Ali, 2006).

2.5 Waste generation

The rising demands of increasing urban population coupled with urban management deficits in cities, the quality of infrastructure services has deteriorated including solid waste management which often receives the lowest priority (Balooone, 2004).

Wastes from industrialized countries kept the prices of recyclables low, according to the Indonesian government. A persisting problem, however, has been the smuggling

of waste materials from industrialized countries into Indonesia (Medina, 1997). In order to raise the prices of recyclables, the Indonesian government enacted laws restricting the import of waste materials (Medina, 1997). Throughout the world, thefts of materials particularly paper and aluminum cans from recycling programs have increased dramatically (Verhoevek, 1995; Mason, 1995). Those 'paper poachers' steal the paper placed curbside by residents, before the city crews collect it (Anon., 1995).

In the early 1990s, some Jewish immigrants from the former Soviet Union survived in Israel by recovering food from waste (Anon., 1993). A survey carried out in 1993 (Ame 1993) concluded that, waste generation in Dar es Salaam differed according to income groups, as follows: high-income households, 0.45 kg/day per person; medium-income households, 0.38 kg/day per person; and low-income households, 0.34 kg/day per person, with an average generation of 0.39 kg/day per person. On the other hand, Haskoning and M-Konsult, (1988) found that, waste generation was lowest in the high-income Ward of Mchafukoge.

2.6 Scavenger studies

Scavenging is a widespread occurrence: one can find on the streets or in garbage dumps of Third World cities people collecting all kinds of materials for reuse or recycling. It has been estimated that up to 2 % of the population in Third World countries survives by recovering materials from waste (Bartone, 1988). In the beginning of the 1990s in Nairobi, a broad initiative called 'The Nairobi We Want' was initiated. A task Force on City Environment and Waste (TACEW), was established to tackle the waste problem as a joint effort of municipal departments, private formal and informal sector, NGOs, and technical institutes. These initiatives

were aborted in 1994, however, due to a new political order (Karuga, 1993). Available data reveal that the Nigeria's urban population has been growing at an alarming rate. Nigerian towns and cities are exploding- growing in leaps and bounds.

A little more than 50 years ago, fewer than 7% of Nigerians lived in urban centres (that is, settlements with populations of 20,000 or more). This proportion rose to 10% in 1952 and 19.2% in 1963. It is now estimated at about 40% and is expected to be as high as 45% by 2000. In fact, Nigerian cities are among the fastest growing in the world. Nigeria now has 7 cities with populations at 1 million; 18 cities, at more than 500 000; 36, at more than 200 000; and 78, at more than 100 000. As well, there were 5 050 towns with more than 20 000 people (Onibokun *et al.*, 1996).

Studies carried in Dar es Salaam (Kaseva *et al.*, 1996) indicated that, although 14.7% of the total waste generated in the city was recyclable material, which can be recovered from the waste stream, only 11% is collected and recycled for different uses. In general the problem of managing solid waste is caused by poor waste collection, storage and disposal leading to subsequent pollution and environmental degradation (Thomas, 1998; Ramachandra and Shruthi, 2007).

Many studies have found scavengers' earnings to fall below the minimum wage. There are exceptions, however: in Cairo, the 'zabbaleen' make as much as three times the median income in the city, by combining garbage pickup, recycling operations and raising pigs (Bartone, 1988).

The situation in Nairobi Kenya, aptly illustrates that, although between 1977 and 1983 the population of this city was increasing at an estimated annual rate of at least 6%, the amount of refuse collected fell from 202, 229 t in 1977 to 159, 974 t in 1983-

a decline of 21% over 6 years (Stren and White 1989). Thus, over the late 1970s and early 1980s, the municipal authority in charge of waste, was collecting on average, almost 10% less refuse per capita every year (ibid). Scavengers in Mexico City retrieve over 20 different materials and articles, including old mattresses, organic matter, milk cartons, rubber, leather, animal bones and so forth (Castillo, 1990).

In India, human bones and skeletons from dead individuals who were not cremated are recovered from the Hoogly River to be sold to medical schools abroad or crushed and turned into glue (Lapierre, 1985).

2.7. Urbanization Challenges, Waste Management, and Development

The Sub-Saharan Africa today, is in the midst of a dramatic urban transition that will persist well into the 21st century. Between 2010 and 2035, the urban population is expected to more than double from approximately 298 million to 697 million (United Nations 2013).

Changing human consumption patterns and the changing structure of economic activity, generate various types of waste that must be appropriately managed to ensure a sustainable development and a decent standard of living for all urban residents (NHC 2001).

Furthermore, inappropriate policies have contributed to the growth of life- and health threatening slums, where urban waste management services are often woefully inadequate WHO, (1999). As a result, 62% of urban populations in Sub-Saharan Africa live in slum areas dominated by uncontrolled informal spatial developments, most often located in environmentally fragile areas, and without waste management systems, (Scheinberg, 2011).

2.8 Hazards and problems

Scavengers, face multiple hazards and problems. Due to their daily contact with garbage, scavengers are usually associated with dirt, disease, squalor and perceived as a nuisance, a symbol of backwardness or even as criminals. They survive in a hostile physical and social environment. Even though scavengers are not always the poorest of the poor, their occupation is generally ascribed the lowest status. There is high health risks associated with this type of labor, according to Castillo (1990). The prevalence of enteric and parasitic diseases among the zabbaleen is, according to Semb, "much higher" than the one for the region. However, he did not provide any figures. And in Cairo, one in four babies born in the scavenger communities dies before reaching their first year (Meyer, 1987).

In Manila, more than 35 diseases have been identified on scavenger communities and slums, including diarrhea, typhoid fever, cholera, dysentery, tuberculosis, anthrax, poliomyelitis, skin disorders, pneumonia and malaria (Adan *et al.*, 1982). The health effects of practicing this activity on scavengers deserve careful study. Most urban authorities in both industrialized and developing countries, receive their powers and obligations from a central government authority, with allocation of powers and responsibilities to protect the rights of the citizens, to provide services, and to serve the common good (Gidman *et al.*, 1995).

In Nairobi, private garbage collection (from middle- and high-income areas, industries and offices) disposal, (industry, offices) and recycling have gone on for a long time, operating without official approval until March 1991. BINS Ltd, which mainly collects waste in high-income areas and is involved in salvaging paper, metal, glass and plastics, is relatively typical.

In 1992 they were charging customers a paper pickup fee of Kshs 225 (US \$4) per month (Karuga, 1991). The picture of scavenging that emerges from reviewing the literature is that of an occupation that provides a livelihood to the poor. Scavenging is an important survival strategy in which impoverished individuals cope with scarcity.

In Cairo, for instance, most zabbaleen are descendants from individuals who migrated from northern Egypt in the 1880s. That was also the case in the United States, where Jewish immigrants at the turn of the century made a living and prospered by collecting metal scrap for recycling using horse carts (Meyer, 1987; Katzman, 1988).

The municipal service that has seemed to fail most strikingly is waste collection and disposal. The service is frequently inadequate, with a preponderant proportion of the refuse generated remaining uncollected and with large parts of cities, particularly the low-income areas, receiving a little or no attention. In most towns, the service is unreliable, irregular, and inefficient (Olowu 1981; Koehn 1992; Stren *et al.* 1994).

Similar waste generation rates have been reported for developing countries of other regions of the world (Achankeng, 2003). Household wastes are stored in bins by the affluent and in sacks, plastic bags, cut jerry cans, cardboard boxes by the low-income households, and a large percentage of domestic waste storage containers (e.g. sacks, polythene bags and boxes) used by the poorer urban community are dumped with the wastes, (Passarini *et al.*, 2011).

On other side, the frequencies of household waste collection vary between low-income and high income groups. The high-income groups dispose waste often 3 times a week that is determined by the frequency of collection by most contractors of 2-3 times a week similar (Okot-Okumu and Nyenje 2011). Much time is spent collection as on waste is manually loaded onto trucks by urban council workers (Vidanaarachchi *et al.*, 2006).

Institutions like universities, schools, hospitals and business complexes are often served by the private companies, while those not served transport their wastes individually to community collection points. The urban poor receive very low to no waste collection services due to inaccessible roads, unplanned facilities and neglect by the urban councils. Waste collection in East African urban centres is not based on the total amount of waste generated but rather on the level of income of the service area (Kaseva and Mbuligwe 2005). Satisfaction level for waste collection is higher for private operators compared with the urban councils. This can be attributed to the low waste collection frequency causing nuisance to communities. In most urban areas only a small fraction of the wastes generated daily is collected and safely disposed, (Rotich *et al.*, 2006).

Almost all waste disposal sites in EAC urban councils, are in what are considered wasteland like old quarry sites or valleys close to wetlands, that are not prioritized for other uses as is often the case in developing countries (Johannessen and Boyer 1999). The disposal sites are therefore in most cases located in environmentally sensitive areas in lowlands areas such as wetlands, forest edge or adjacent to water bodies. The waste dumps pose real hazard to workers, waste pickers and stray animals that visit the sites, (Skoog 2004). Most of the waste workers do not wear

proper protective gears, (Achankeng 2003). Major problems from wastes disposal sites include pollution from leachate, odour, vermin, and attraction of scavengers.

2.9 Policy statement

The policy statement refers to the statement of the government corporate; and organizations commitment to the environmental aspects through identification of environmental attributes of the products, activities, and services and there effects on the environment; the legal and other requirements. The organization should identify and ensure access to relevant environment law, regulations, and By-laws, objective and targets and environment management program (Burden, 2010)

Many Tanzania parts and Kahama Town Council in particular, could be associated with poor implementation of legislation and regulations which governing environmental management and Solid Waste Management in particularly as pointed by (Mkuula and Mpendazoe 1991); which represents a common characteristics in many developing countries, including Tanzania. The ongoing on spread and accumulation of solid waste in Kahama could be associated to poor implementation of policy, and By-laws which governing SWM in KTC

2.10 Monitoring

According to (Burden, 2010), monitoring refer to measuring activities and track performance including periodic, compliance evaluation; evaluation of compliance (for example development procedure to periodically evaluate environmental compliance with legal and other requirements); corrective and preventive action; the latter author pointed out other roles of environmental monitoring to include to identify and correct problems and prevention recurrences; records keeping of

Environmental Management System (EMS) performance (Delmas 2000) reported that low monitoring on waste management due to lack of EMS implementation.

2.11 Auditing

Environmental Management System, including the Solid Waste Management and audit refers to periodic verification on adherence that the EMS and SWM was being abide to, effective and achieving objectives and targets as stated by the corporate/ organization (Hughes, 1996, Bernard *et al*, 2005). According to Pfliegner (1996), stated that lack of evaluation and auditing on SMW is an obstacle in implementation of SWM in fewer developing countries. The SWM auditing, acts as important part on SWM review in line to environmental policy statement (Bernard *et al* 2005)

2.12 The conceptual framework

Conceptual framework (Figure 1) shows the relationship between dependent variables, independent variables, and intermediate variables. Independent variable predicts the existing situation, while dependent variables describe the effects, outcomes, outputs or results. Rapid Population Increase, Settlement, and Socioeconomic activities are the independent variables, which resulting into the Urbanization and Quantities of Solid Waste generated.

Poor Policy, Legislation, Regulation, lack of solid waste collection equipment and supplies, shortage of solid waste collection stakeholders, poor planning, and auditing, Monitoring and evaluation, are the intermediate variables which can accelerate unsafe disposal methods hence, result in accumulation of solid wastes that can deteriorate the urban environment and destruction of flora and fauna habitats.

However, the success of the Policy, Legislation, Regulation, improvement in solid waste collection equipment and supplies, availability of solid waste collection stakeholders, proper planning, and auditing, monitoring and evaluation, could be result to the prevention of communicable disease, protection of nature resource environment from the environment pollution and solid waste, was collected and managed and safely disposed. The conceptual framework analysis was also based on available literature on the subject. The literature helps to indicate that several factors were contributing to failure of managing Solid Wastes in Urban areas.

Conceptual framework analysis

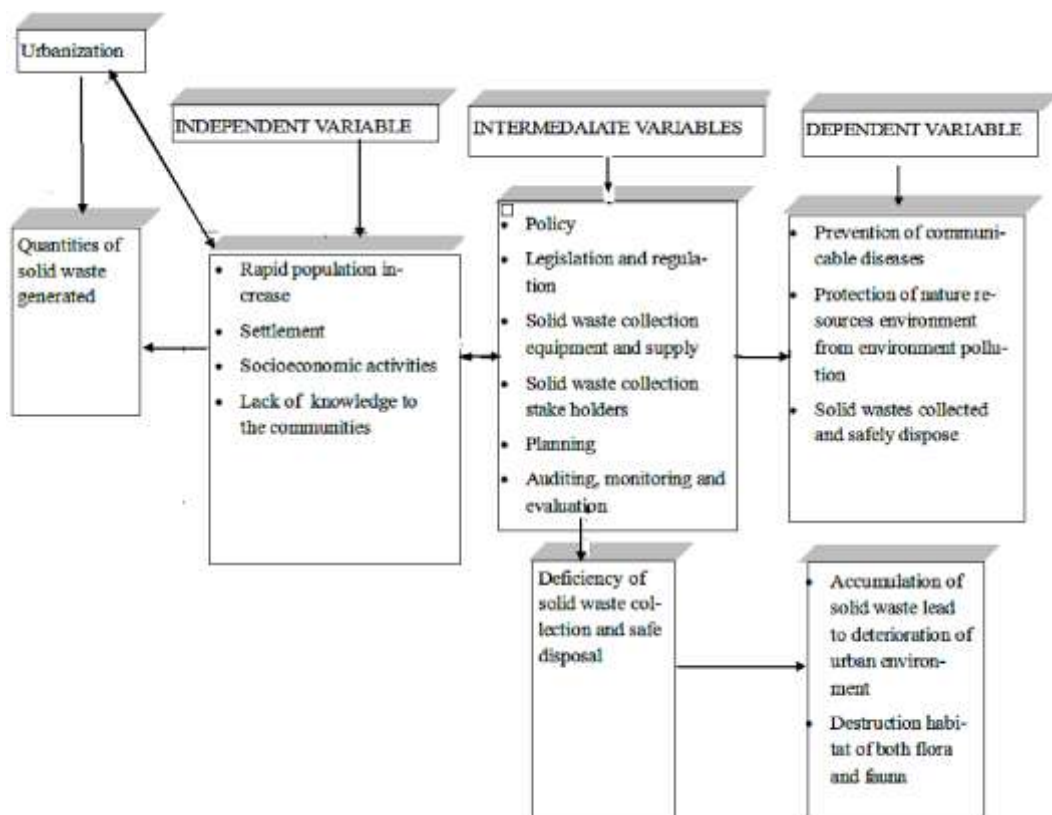


Figure 1: Conceptual framework analysis

Source: Researcher

CHAPTER THREE

METHODOLOGY

3.1 Study Area Selection and Criteria

Kahama Town Council, which is administratively in Kahama District, was selected for this study based on two reasons. First, it is one of the towns with fast growing population, Secondly, the Town Council is faced with solid waste management challenges, which have been affecting the society including outbreak of communicable diseases. Three Wards viz: Kahama Mjini, Majengo and Nyasubi were involved in the study. Within these wards, seven streets namely Igalilimi, Namanga, Majengo, Sokola, Nyasubi, Nyakato and Sango (Figure 2 below) were picked after the pilot study which was conducted before data collection.

These three Wards, were selected because they were fast growing areas, located at the town center with high ratio of average household size in KTC (Kahama Mjini 4.6, Nyasubi 4.5 and Majengo 4.2). The pilot study to select the study sites was done in collaboration of the Town Council Officers and community leaders.

3.2 Description of the study area

3.2.1 Location

Kahama Town council is located 3°50'15"S, 32°36 'E, situated in Kahama District, which is one of the three (3) Districts in Shinyanga Region namely Kishapu, Shinyanga and Kahama. The town council is located along Shinyanga-Isaka-Rwanda trunk road, 1,050 Km from Dar es Salaam, 267 Km from Mwanza, 102 Km from

3.2.3 Population Size

According to 2002 National Population and Housing Census, Kahama TC by then had a population size of 128,312 residents; currently (2012), the population is estimated to be 242,038 residents with a growth rate of 3.7% annually (NBS, 2012). The population density is estimated at 160 Persons per/km².

The high growth rate is attributed to immigration rather than to human multiplication. However there are other factors, which have attributed this high growth rate, these are:-Fairly adequate rainfall and availability of relatively fertile soils, that attracts farming practices as compared to other districts in the region and the Town Council is endowed with mineral resources especially gold. The Town Council is a big trading centre in the region.

Table 1: Population statistics for Kahama Town Council

Ward	Population 2012			
	Households	Males	Females	Total
Kahama Mjini	1348	3490	3136	6626
Mhongolo	3299	7514	7860	15374
Malunga	2360	4784	5301	10085
Nyihogo	3515	6558	7151	13709
Zongomera	1869	5208	5054	10262
Mwendakulima	2611	6612	6971	13583
Nyahanga	3585	7469	8303	15772
Majengo	3861	7576	8374	15950
Mhungula	2396	5010	5405	10415
Busoka	1002	2596	2696	5292
Nyasubi	4502	9572	10334	19906
Nyandekwa	2098	5582	6039	11621
Ngogwa	1397	4183	4129	8312
Wendele	1296	3722	3806	7528
Kinaga	2453	7129	7601	14730
Isagehe	1923	5181	5591	10772
Mondo	1859	5484	5898	11382
Kagongwa	4814	10193	11267	21460
Kilago	2072	5260	6057	11317
Iyenze	1176	3627	4305	7932
Total	49,436	116,750	125,278	242,028

Source: NBS, 2012

3.2.4 Administrative Divisions

Kahama TC is divided into three Divisions namely Msalala, Isagehe and Kahama Mjini. The Kahama Mjini Division comprises Kahama Mjini, Majengo, Nyihogo, Mhongolo, Mwendakulima, Nyasubi, Nyahanga, Busoka, Zongomela and Nyandekwa Wards. Msalala Division consists of Ngogwa, Iyenze and Kinaga Wards, and the Isagehe Division has Isagehe, Kagongwa and Mondo Wards.

3.2.5 Topography/Drainage

The Town Council is located on the inter-rift plateau at altitudes ranging from 1,050 to 1,500 m. above sea level. The land surface can best be described as an almost flat to undulating plains. Residual hills of low relief are common; the highest hills are not much higher than 300m above their surrounding plains.

Kahama Town Council is a landlocked and has no perennial streams, all streams have very low gradients and over 80% of their annual flows, which can be expected to occur in the period of December to May.

3.2.6 Land usage in Kahama Town Council

The occupational characteristics, are reflected in the land uses in Kahama Town Council, with most land being for agricultural (55.5%), livestock (23.8%), (15%) used for residential, industrial, commercial, mining areas and recreational. 5.7% is used for woodlots and forestry reserve. Hence, Kahama Town Council is mindful of the sectorial diversity and changes, in the economy and has earmarked specific areas in its current and future land use planning to support industrial, commercial, institutional, infrastructural, and other socioeconomic development and conservation activities

3.2.6.1 Land/Real Estate.

There are two areas in KTC which have been allocated for government quarters, one area which is within the Town center. There are old NHC buildings used as staff quarters. The other area is within Mwime area which is not developed yet, but is being reserved for the new NHC housing scheme. It covers an area of about 10 acres.

3.3 Research Design

Research design, refers to a plan which shows the approach and strategy of an investigation conceived by the researcher (Kothari, 2004). Designing a study, involves specifying exactly who or what is to be studied, when, how and for what purpose (Babbie, 2001). The research design helps the researcher to obtain the relevant data to fulfill the objective of the study.

This study, employed non experimental research design where close sectional research techniques were used. Household's respondents and key informants such as the Town Director (TD), Town Environmental Management Officer (TEMO), Town Environmental Health Officer (TEHO), Assistant Environmental Health Officer (AEHO), Ward Executive Officers (WEO) and Village Executive Officers (VEO) were considered in the study respectively.

3.4 Sampling techniques and Sample size

3.4.1. Sampling techniques

A two-stage sampling techniques, was adopted whereby the first stage involved non probability sampling in the study area and the identification of respondents for focus group discussion and key informants. The second stage involved the probability sampling to identify various respondents of the questionnaire survey. The key

informants were selected based on various criteria such as employment position, experiences and knowledge on SWM.

3.4.2. Sample size

To obtain the representative sample, the minimum sample size required was calculated by using the formula for large samples given by Israel (2013).

$$n = \frac{z^2 \delta^2}{e^2}$$

Where:

n= the minimum sample size required

z=1.96 the value of z at the 95% confidence interval

δ = the variation within a population= 0.5

e= the expected level of accuracy (precision) = 8%.

$$n = \frac{1.96^2 \times 0.5^2}{0.08^2}$$

The sample size (n) = 150

According to Israel (2013), a properly drawn sample has 95% chance of producing a statistic with the value, which is within two standard errors of the true population value, so conversely there is a 95% chance that, the true population value lays within two standard error of the sample value. There are 95% chance of being approximately right and the 5% chance of being wrong. This two standard error range is referred to as the 95% confidence interval of a statistics (Veal, 1997).

3.5. Data collection methods

A variety of methods and tools, were used in this study as a means of data validation. Types of data collected, included primary data which involved interviews and

household questionnaires, FGD, observation and secondary reviews were used. The methods are as detailed below.

3.5.1 Questionnaire survey

Household questionnaire (Appendix 1-3), was used to capture data from respondents. The main purpose of this questionnaire was to obtain issues and problems on the solid waste management services, i.e that is the general information, situation SWM at in KTC and challenges of SWM. Questionnaires comprised both open and closed-ended questions. The advantage of having open-ended questions was that respondents were free to give their views unlike the closed questions. The usage of closed questions on the other hand had the advantage of easy coding. The target population was households and KTC officials.

3.5.1.1 Training of research assistants

Two research assistants were trained to assist data collection exercise. The recruitment was done in collaboration with wards and streets leaders. This had an advantage that, people were willing to give information to people they knew instead of strangers. They were trained on the aspects of questionnaire administration, probing techniques, and on ethical issues.

3.5.1.2 Questionnaire pretesting

The reconnaissance survey was conducted prior to the full-scale implementation to ensure that, the questionnaire would function as it was intended. The components of the questionnaire tested and observed included questionnaire design (length, language, question order, and responses), data collection, and data processing. According to Post (2007) who discussed that, field tests are attempted to reflect the

conditions that would exist during the full-scale implementation, so the pilot was performed in the study area and at the same time of day, that the full-scale survey would be conducted.

3.5.1.3 Questionnaire administration

Questionnaires were administered by the researcher and the trained enumerator, who were responsible to fill in the questionnaires in accordance to the respondents' responses. The reason for adopting this was to enable the researchers to visit individuals in their households.

3.5.2 Interviews

Interviews were administered to select government officials such as (TD, TEMO, TEHO, AEHO, WEO, and VEO). The total numbers of government officials were ten (10). At the street level there were youth representatives, women representatives, men representatives, politicians (Councilor and Street chairpersons) and business group representatives. Issues for discussion during interviews were social demographic characteristics, solid waste storage, collection points, main challenges in SMW, and overcoming challenges.

3.5.3 Focused Group Discussion

According to Patton (1990), a focus group discussion is an interaction with a small group of people (six to eight) on a specific topic. The Focus Group Discussion (FGD) were conducted to households of Namanga, Igalilimi, Majengo, Sokola, Nyasubi Kati, Sango and Nyakato streets. Three groups (women, men and youth) each group comprising eight people were involved in the study. The aim of having different groups were to capture different views on the subject matter taking into

account the fact that, these groups had different needs and therefore, had different views on Solid waste Management issues. A checklist was used in during this exercise (see appendix 3). During FGD the researcher acted as the facilitator and this gave respondents freedom to air their views. Note taking was used in recording information during discussions.

3.5.4 Key informants interview

A semi structured dialogue, was conducted by involving individuals with unique knowledge or personal experience, on the impacts of SWM in the study area. The key issues for discussions were problems of SW achievement of KTC in SWM, and challenges of KTC in improving SWM services. The total number of key informants was ten (10) and all were officers of Kahama TC (Appendix 3).

3.5.5 Direct Field Observation

Physical field visit was done in the study area. The usage of field observation is an effective method that can generate descriptive data in qualitative research (Nicholas, 2002). Direct field observation, was used to observe the real situation of Solid Waste disposal. This exercise was done in collaboration with street leaders.

3.5.6. Development of PPP

The development of PPP was based in the assumption that the private sector played a pivotal role in SWM improvement, both on its own and through public-private partnership (PPP) arrangements. This assertion assumption is supported by the fact that in the surveyed areas, the private sector did not play a very active role in SWM. Lack of financial resources in SWM services was also most important influencing factor for poor SWM in the surveyed towns, which means cost recovery, must be

incorporated in the planned SWM improvement efforts. The existing legal, regulatory and political regimes were also considered in development of PPP.

3.6 Data Analysis

According to Bogdan *et al.*, (1992), data analysis is a process of systematically working with data or applying statistical and logical techniques to describe, organize, summarize and compare data collected and divide them into manageable portions. All quantitative data were analyzed using Statistical Package for Social Sciences (SPSS) software version 20 and Microsoft excel. Data from the questionnaires which were mostly qualitative were coded, summarized and analyzed. Descriptive statistics was used to obtain frequency counts of various coded responses and to compare means of quantitative responses of variables. Qualitative data from the key informants, FGD were subjected to content analysis.

3.7 Validity and reliability

3.7.1. Validity

Validity is the extent to the finding of the study which made sense, credible or represent an authentic portrait of what the study was looking at (Miles and Hubermann1994). During the study pre testing was conducted to test data collection tools (Questionnaire pre testing).

3.7.2 Reliability

Reliability of the research instrument, concerns the extent to which the instrument yields the same results on a prepared trial (Golafshnan, 2003). The extent to which results are consistent over time and an accurate representation of the total population under study, is referred to as the reliability and if the results of the study can be

reproduced under a similar methodology, then the research instrument, is considered to be reliable. In this study, reliability was achieved through the selection of the light sampling unit, sample size and measuring instrument to avoid systematic and random errors.

3.8 Ethical Considerations

The researcher adhered to all ethical aspects of conducting research such as seeking permission, from the respective authorities before collecting data to the field, informing participants in advance about the purpose of the study, ensuring confidentiality to the respondents, being honest in the process of collecting data as well as avoiding plagiarism. Data collected in this study were used exclusively for the purpose of this study.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Socio-demographic characteristics

Results on the socio-demographic characteristics are presented on Table 2 below. On gender, the largest proportion was males (51%). This could have happened by chance. On age, the majority (83%) were youth aged between 18-50 years. This implied that majority were economically active population. On the household size, the majority (80%) had above 3 people. With regard to the education level (67 %) had secondary school and above. This could be attributed to the presence of an adequate number of secondary schools in the study area and presence of a large number of business men, government employees who were in one way or another able to send their children to school.

Table 2: Socio-demographic characteristics

Wards	Sex (%)			Age (%)			Household size (% of people)			Level of education (%)			
	N	F	M	18-35	36-50	>=51	0-2	3-4	>=5	INF	PE	SEC	ASEC
Igalilimi	20	50	50	55	30	15	15	45	40	10	15	45	30
Namanga	20	55	45	35	40	25	30	40	30	15	30	35	20
Sokola	20	50	50	40	35	25	15	45	40	5	20	45	30
Majengo	20	50	50	45	35	20	20	45	35	10	20	40	30
Nyasubi kati	20	40	60	60	30	10	20	35	45	15	30	45	10
Nyakato	20	50	50	40	40	20	25	40	35	10	20	40	30
Sango	20	45	55	60	35	5	15	45	40	5	25	45	25
Average	20	49	51	48	35	17	20	42	38	10	23	42	25

Source: Field data 2016

KEYS: n=number of respondents M=Male F= Female INF=Informal PE= Primary education SEC=Secondary education AS=above secondary

4.2 Stakeholders identification participation in SWM

Stakeholders involved in SWM were identified by different study population i.e. Households, Politician, NGOs/CBOs and Government officials. Results are presented in Table 3 and Figure 3 below.

Table 3: Main stakeholders in SWM in KTC

Ward	Street	Stakeholders identification and Participation			
		Household	Politician	NGOs/CBOs	G/Officials
Kahama Mjini	Igalilimi	KTC, Local community, Stendi Tunaweza Hekima Group	KTC Local community Stand tunaweza	KTC Local community Hekima Group	KTC Local community Stand tunaweza Hekima Group
	Namanga	KTC Local community Pamoja Group	KTC Local community Hekima Group	KTC Local community Pamoja Group	KTC Local community Pamoja Group
Majengo	Sokola	KTC Local community Pamoja Group	KTC Local community Harakati Mazingira	KTC Local community	KTC Local community
	Majengo	KTC, Chavila Mchangamano Harakati Mazingira Pamoja Group Mganda Mazingira	KTC Local community Harakati mazingira	KTC Local community Mchangamano Pamoja Group Mganda Mazingira	KTC Local community Mchangamano Pamoja Group Mganda Mazingira
Nyasubi	Nyasubi Kati	KTC Local community Tuinuane Vijana	KTC Local community Tuinuane Vijana	KTC Local community	KTC Local community Tuinuane Vijana
	Nyakato	KTC Local community Tuinuane Vijana	KTC Local community	KTC Local community	KTC Tuinuane Vijana Local community
	Sango	KTC Local community Tuinuane vijana	Local community Tuinuane Vijana	Tuinuane Vijana KTC	KTC Local community Tuinuane Vijana

Source:: Field data survey, 2016.

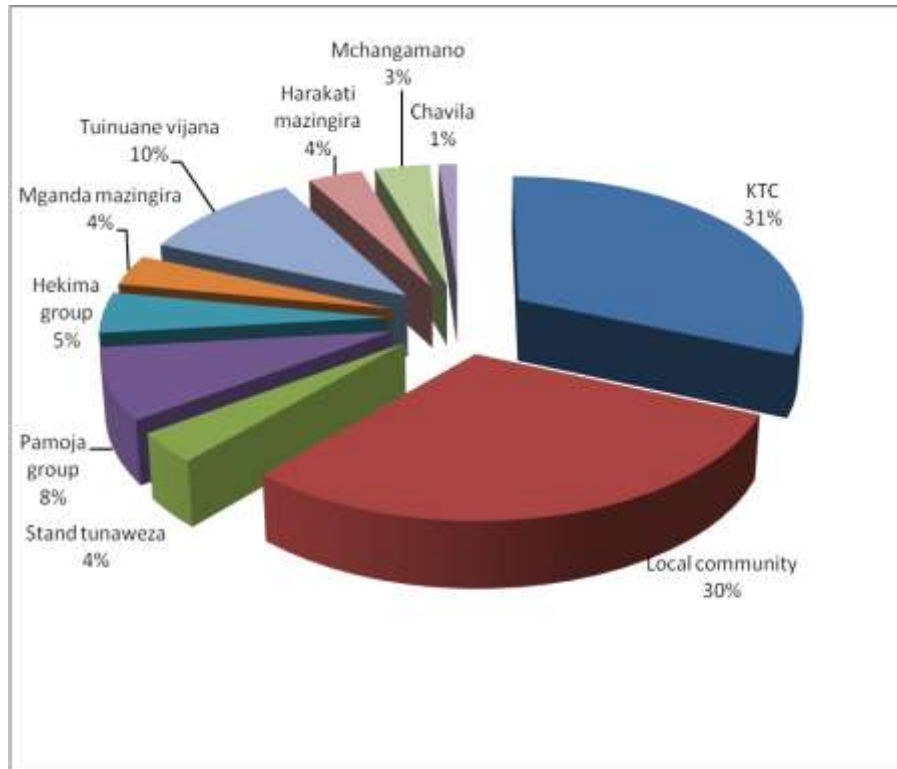


Figure 3: Main stakeholders in SWM in KTC

Source: Field data survey, 2016.

From the Table 3 and Figure 3 above indicated that, the most frequently mentioned stakeholders in order of importance were KTC (31%) and local communities (30%). Other were CBOs i.e Tuinuane Vijana (10%), Pamoja Group (8%), Hekima Group (5%), Stand tunaweza, Mganda Mazingira and Harakati Mazingira each had (4%), Mchangamano (3%) and Chavila (1%).

These stakeholders are important if SWM had to be effective. They needed to be involved in all strategies that which are meant to mitigate the SW problems in towns or cities. The main reason for identifying stakeholders among others, were to observe how best they could be integrated in the PPP framework. As from CBOs, the active ones in SWM were Tuinuane Vijana, Pamoja Group and Hekima Group (Figure 3 above). However, these CBOs lacked coordination with KTC and among themselves.

KTC should be put in a press mechanism of working closely with different SWM actors and/or stakeholders including CBOs. SWM stakeholders' participation in SWM was also investigated and results are presented in the Figure 4 below.

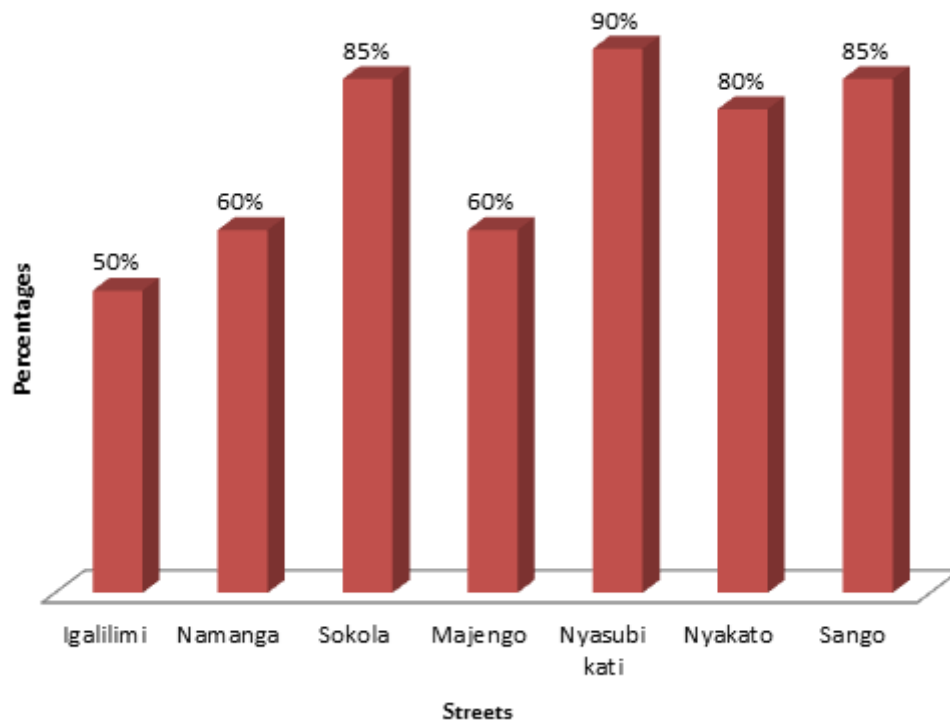


Figure 4: Stakeholders participation in SWM at KTC.

Source:: Field data survey, 2016.

Findings indicated that participation was high in Nyasubi Kati, Sango, Sokola and Nyakato while in Namanga, Majengo and Igalilimi was low. High participation in the four streets could not be established. However, the probable reasons could be enhanced SWM education funded by Buzwagi Goldmine, which was initiated to date. In areas of low participation probable an explanation could be due to inadequate awareness on SWM.

It was further observed that, stakeholders had different roles. For example, the KTC roles were identified as to encourage people in SWM, maintaining, disposing and collecting SWs in the town and law enforcement (Table 4 below).

Table 4: KTC as a stakeholder in SWM

			Response (%)		
Ward			Encouraging people in solid waste management	Maintaining disposing solid waste collection in the town	Law enforcement
	Street	N			
Kahama	Igalilimi	20	25	40	35
Mjini	Namanga	20	20	35	45
Majengo	Sokola	20	45	30	25
	Majengo	20	50	30	20
Nyasubi	Nyasubi Kati	20	55	15	30
	Nyakato	30	40	45	15
	Sango	20	45	20	35
Average		20	40	31	29

Source: Field data survey, 2016

4.2 Factors that influence the success of stakeholders on SWM in KTC

Factors, which influenced the success of stakeholders on SWM in KTC, were investigated during the study. Field findings have revealed that the availability of funds, law enforcement, skills, knowledge and equipment and the community participation as the main factors (Table 5) in order of importance. Main factors were community participation (47.2%), skills, knowledge and importance (16.4%), and the management factors (15%).

Table 5: Main factors that influence the success of stakeholders on SWM in KTC

Ward	Street	Response (%)					
		Availability of fund	law enforcement	Management factors	skills, knowledge and equipment	community participation	
Kahama Mjini	Igalilimi	20	15	5	10	25	45
	Namanga	20	5	15	10	25	45
Majengo	Sokola	20	20	10	15	15	40
	Majengo	20	5	15	10	15	55
Nyasubi	Nyasubi	20	15	10	20	25	30
	Kati						
	Nyakato	20	5	10	25	5	55
	Sango	20	0	20	15	5	60
Average	20	20	9.3	12.1	15	16.4	47.2

Source: Field data survey, 2016

4.2.1 Community participation

Findings have revealed that, poor community participation in SWM could lead to bad littering habits and attitudes of people, lack of awareness among communities, support and public interest in the waste management intensified the problem of SWs in Kahama TC.

According to Gotame (2012), community participation is considered to be important because it is believed that the activity of SWM helped them decide about their life and the issues that affected their daily life. It is also believed that, the community participation gave an efficiency and effectiveness to the work. It helps them decide

their priorities. Community participation in solid waste management is always required because solid waste management is a continuous maintenance system, for example to store the SWs in a specific bag or bin, to bring it to an agreed point, to separate it in dry and wet waste.

4.2.2 Skills, knowledge and equipment

The study has revealed that skills, knowledge and equipment were very important in SWM. This reflected that, failure in the improvement of skills, knowledge and equipment among KTC employees, CBOs, NGOs, FBOs and businessmen in dealing with SWM could weaken the implementation of SWM services in KTC.

According to Malenya *et al.*, (2015) revealed that the failure of SWM in Kampala and other Ugandan cities, was largely resulted by the lack of trained manpower/personnel to execute SWM. They found out that human, resources for the waste management in Dar es Salaam were very inadequate in terms of managerial and technical staff and even labourer. The lack of qualified waste management personnel has been blamed for the lack of training and poor conditions of service in the sector.

4.2.3 Management factor

The management factor was the least among the three factors with high frequencies. This reflects that KTC authority, CBOs, NGOs, and FBOs manpower/personnel whom were responsible for the handling, adequate provision of facilities for SWM, an effective approach to carry out SWM, and awareness to understand the needs of the community, the SWs collection process must have systematic and practically

effective knowledge in Institutional management and SWM; this will make sustainable SWM in KTC.

Muller *et al.*, (2001) reported that, an Integrated Sustainable Management in Local authority manpower, NGOs/CBOs, Service users, Private informal sector, private formal sector donor agencies, Technical workers in SWM, Environmental managers, Financial managers, Economic managers, Socio-cultural workers, institutional, Policy makers Legal Officers and Political leaders could enhance a good result in SWM.

4.3 Challenges hindering the success of stakeholders on SWM in the study area

From Table 6 **below has** revealed that, shortage of casual labourer (36%), poor selection of priority (24%) and low community participation (24%) were the main challenges.

Similar findings was observed by Mwandilawa (2010) who argued that shortage of casual labourer, inappropriate prioritization , and the poor community participation in SWM hindered different institutions in dealing with SWM.

Table 6: Challenges hindering the success of stakeholders on SWM as per covered by household area

Ward		Response				
		Shortage of Casual labour	Poor selection of priority	Inadequate means of transportation	Poor community participation	
Street	N					
Kahama Igalilimi	20	45	15	15	25	
Mjini Namanga	20	25	35	30	10	
Majengo Sokola	20	50	25	5	20	
Majengo	20	30	15	15	40	
Nyasubi Nyasubi Kati	20	20	10	15	45	
Nyakato	20	30	40	25	5	
Sango	20	40	30	5	25	
Average	20	36	24	16	24	

Source: Field data survey; 2016

Challenges mentioned by government officials are presented in Figure 6 below. Findings have shown that, main ones were lack of education on SW (30%), increasing population (30%); lack of facilities for transportation of SW (20%) and lack of priority in SWM (20%).

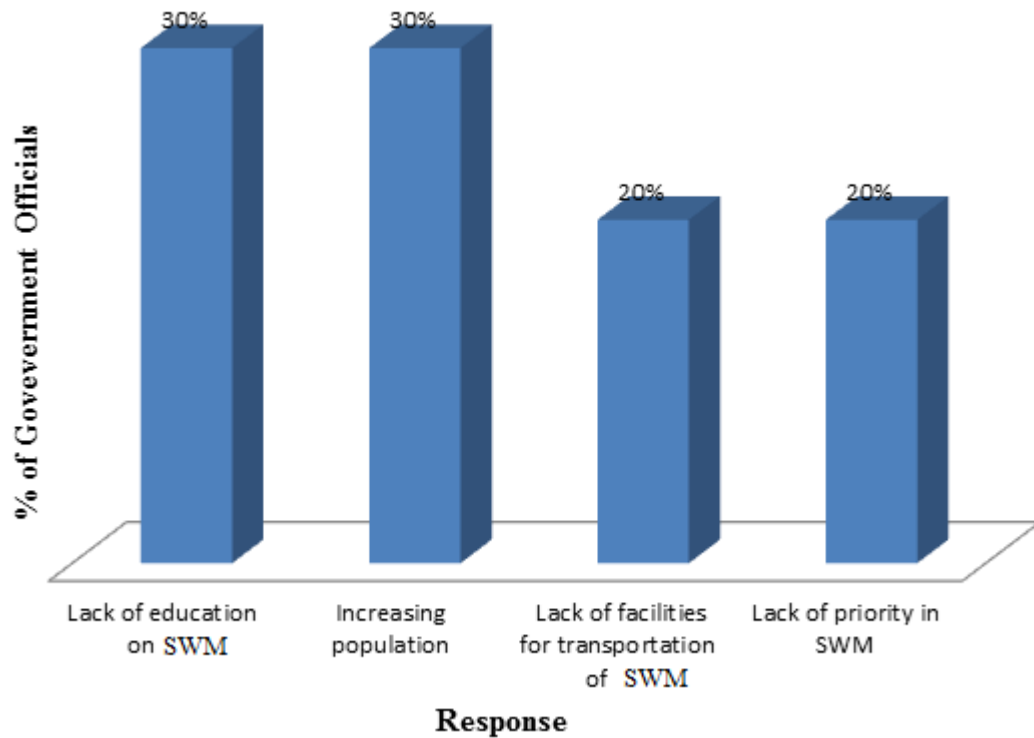


Figure 5: Challenges facing KTC in improving SWM services

Source:: Field data survey, 2016.

4.3.1 Casual labour shortage

Findings have revealed that casual labour shortage had higher frequency (36%) among the challenges that hindered the success of stakeholders on SWM in the study area. The reason could be inadequate financial resources, lack of awareness of the community to participate in SWM and non PPP involvement in SWM.

The study which was done by Mwandilawa, (2010) similarly, reported that most stakeholders in many institutions which dealt with SWM faced challenges like poor budgeting, technology and this affected the implementation of SWM. Moreover, the Muniafu , (2010) supported the study finding by reporting that there was generation of large amount of wastes which impacted the environment due to the increase of

cost in implementing SWM .However, according to this study it was concluded that casual labour shortage lead to poor SWM.

4.3.2 Poor selection of priority

Results from respondents indicated that, poor selection of priority (24%) was the second in the order of importance. This reflected that, during the budget, the KTC and other SWM stakeholders did not give priority on the SWM implementation. These findings from the study are similar to the report from Pets (2004), which authenticated that, poor coordination and the selection of priority settings affected SWM in many developing countries, for example in Sub Saharan Africa SWM become poorly managed due to poor selection of priority. Therefore, the study concluded that poor selection of priority was a challenge in SWM.

4.3.3 Low community participation

Results from this study authenticated that (24%) of respondents reported that low community participation was a challenge facing SWM in the study area. This implied that, many people in the study area were not involved in the whole process of implementing SWM .This can be evidenced to a study done by Steets, (2004) in Nepal and Kibonde, (2014) in Tanzania, which both contended that, the community participation in SWM was a tool of making environment policy to be effective which directs and guide all stakeholders to implement SWM.

Parallel to Shiruthi, (2007) in Egypt reported that, the community was the first stakeholder who should implement and involved in any programs about SWM in order to increase the sustainability of SWM. However according to this study it concluded that many majorities did not participate in all programs of SWM.

4.3.4 Lack of education on SWM

From this study, results authenticated that (30%) whom have reported the lack of education in SWM also was a challenge facing SWM which reported by government officials in the study area. This implied that the government officials lacked education on the whole processes of SWM implementation. This can be evidenced to a study done by Vidanaarachchi *et al.* (2006) in India, which contended that, lack of education in SWM from the public officials was the major constraints which hindered the success in SWM.

However, Passarini *et al* (2011) have revealed that, improvement of education in SWM by the government officials is not only a tool to achieve SWM, but it was a process that involved both the working commitment, availability of funds and good governance. According to this study, government officials have evidenced that, lack of education contributed much for the failure in SWM.

4.3.5 Increasing population

Findings from the study have revealed that high increase of the population in the KTC (30%) was also a factor, which contributed to the challenges of failure in the success of stakeholders to perform in SWM. This implied that, the population increase in the KTC was one of the major issues which contributed much in the failure of the success of stakeholders to perform in SWM.

Moreover, Achankeng, (2003) discussed that, the population increase in the urban area especially in developing countries goes similarly with the high rate of SWs generation, hence, become as difficult to handle them. Kaseva and Mbuligwe, (2005) in Tanzania, both contended that, the population increase in the municipal and town

areas are factors which hindered the success of stakeholders in SWM. However, according to this study, respondents concluded that, the population increase was one of the major factors that contributed much in the failure of the stakeholders, to perform well in the success of SWM in the study area.

4.3.6 Lack of facilities for transportation of SW

Findings have revealed that, lack of facilities for transportation of SWs was another challenge hindered the success of stakeholders in SWM from the study area as reported by the government officials. The implication of this challenge was a failure of KTC in performing poorly in allocating enough funds for purchasing facilities for transportation of SWs, from the source to the collection points, then from the collection points to the final SWs disposal site, Busoka area in order to improve SWM services.

For the successfulness SWM, the availability of transportation facilities such as wheel burrows, Bajaj and vehicles, are of prime importance. Findings from the study indicate that some of these facilities particularly vehicles were lacking. For example, within KTC there were no vehicles for such activities (Masele, prob obs). Plate 1 below shows the failure of KTC to collect SWs from the collection point, to the final disposal area which is located at Busoka village.

To overcome the problem, government officials responded that facilities for transportation of SWs should be considered as a key factor of solving the SWs problem in KTC.



Plate 1: Poor solid waste disposal at Nyasubi Kati due to inadequate means of transportation from the household to collection point (Photo by David Masele, 2016).

4.4 Suggested mitigation strategies to overcome SWM Challenges

Findings indicated that, the major suggested mitigation strategies to overcome SWM challenges discussed by the households were the allocation of enough funds (24%) followed by the employment of casual labourers (17%) and using landfills (17%). Government officials reported that, the employment of casual labourer (20%) as well as law enforcement encountered for (20%) and the distribution of dustbins in the street respectively. This implied that, both households and government officials have advised the KTC to improve the employment of casual labour, allocation of sufficient fund to address SWM, use landfill, law enforcement and the distribution of dustbins in streets for overcoming SWM challenges (see Table 7 and Figure 6 below)

4.4.1 Allocation of sufficient fund to address SWM

Findings have revealed that, the allocation of enough funds to address the SWM challenges was the leading factor presented by the households. This implied that, the KTC and other SWM stakeholders in the town council did not allocate enough funds for SWM hence, to become a major causative factor for the failure in SWM. For example, the actual funds allocated budget of the environment and sanitation department did not relate with the funds released for the expenditure.

Bernard *et al* (2005) reported that, inadequate funds for SWM was major factor hindered the SWM strategies in Africa and some part of Asia. Apart from the insufficient fund, Delmas (2000) said that, poor budgeting and policy as well as the legislation, poor planning and auditing, lack of priority in SWM were also leading factors in developing countries to become worse in SWM. According to this study which concluded that, allocation of sufficient funds could address the SWM.

4.4.2 Employment of casual labourers

Results of this study authenticated that (17%) of them asserted the shortage of casual labourer. This implied that, KTC did not have the strategies of employing casual labourers, which led to the failure of achieving the suggested mitigation strategies to overcome SWM challenges. This can be evidenced to a study done by Meyer, (1987) in Sub Saharan Africa, who contended that, lack of casual labourers in SWM has resulted to poor implementation of the SWM action plan, hence led to the major constraints which hindered the success in SWM.

However, Passarini *et al* (2011) has revealed that employing the casual labour cannot only improve the SWM of the municipal and town council, but multi-sectoral

collaboration could help much. According to this study, casual labourers which were evidenced were the suggested mitigation strategies to overcome SWM Challenges.

4.4.3 Use landfill

The last major factor, presented by the household in mitigating strategies, to overcome SWM challenges, was by using landfill (17%). This has revealed that KTC did not have the landfills for disposing the SWs. This is evidenced by Lu *et al.* (2015) whom elaborated that, the usage of landfill in urban areas ensured the long-life of SWM and minimized the scattering SWs in the streets.

Olowu, (1981) in Nigeria discussed that, the usage of landfill as a final disposal of the SWs in urban areas ensured the control of the nuisance and minimized the vermin and vector breeding site in order to improve the situation; household findings suggested that, KTC should have to pay more attention in landfill construction. This will be the possible solution of the suggested mitigation strategies to overcome SWM challenges.

4.4.4 Law enforcement

Government officials findings have revealed that, law enforcement (20%) addressed the suggested mitigation strategies to overcome SWM Challenges This implied that, KTC and other SWM stakeholders in the town council did not use much laws to address the problem. There was a need for KTC to enforce law in order to mitigate the SWs problem.

4.4.5 Distribution of dustbins in streets

Findings which have been reported by government official have shown that, the distribution of dustbins in the streets (20%) was the least factor out of the three

majors; others were employment of casual labourer and law enforcement. This implied that, the distribution of dustbins in streets was not given a priority hence, to become difficult in overcoming SWs problem in KTC.

Passarini *et al.* (2011) revealed that, household wastes were stored in dustbins plastic bags, cut jerry cans, cardboard boxes by the low-income households, and that, a large percentage of domestic waste storage containers (e.g. sacks, polythene bags and boxes) have made easier to carry SWs from households to the collection point. With these findings, government officials should put in considerations the KTC to distribute dustbins which could accelerate the SWM at the household level.

Table 7: Suggested mitigation strategies to overcome SWM Challenges

Street	N	Response (%)						
		Employing Casual labourer	Allocation of enough fund	Separation of SW at household level	Incineration	Recycling of SW a means of transport	Using Landfill methods	
Igalilimi	20	15	30	15	25	5	5	5
Namanga	20	5	20	20	5	15	0	35
Sokola	20	20	25	10	25	10	10	0
Majengo	20	10	25	0	10	15	5	35
Nyasubi kati	20	30	35	5	10	0	5	15
Nyakato	20	20	15	5	5	0	40	15
Sango	20	20	15	5	5	0	40	15
Total	20	17	24	9	12	6	15	17

Source: Field data survey

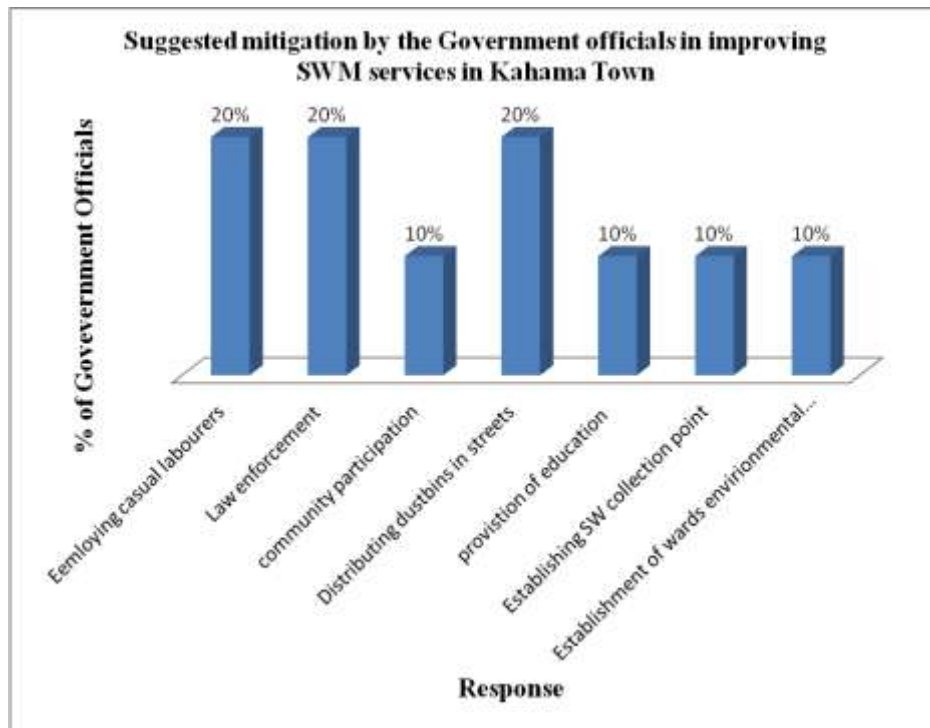


Figure 6: Suggested mitigation by the Government officials in improving SWM services in Kahama Town Council

Source: Field data survey

LEF (2015) reported that, the government interventions on solid waste issues could make a valuable contribution to achieve the development goals, improving people's well-being and encouraging the economic growth. Effective solid waste management, in the form of clean streets, is also a valuable indicator of good governance.

According to the current study findings which have indicated that, employment of casual labourer, community participation, distribution dust bins in the streets, provision of education to the local communities on SWM, the establishment of SW collection point and establishment of ward environmental committee could be the best interventions if well managed and the KTC would contribute much in SWM.

CHAPTER FIVE

DEVELOPMENT OF PUBLIC PRIVATE PARTINERSHIP FRAMEWORK

5.1 Introduction

Development of PPP was one of the specific objectives of the study. To achieve these specific objectives, five assumptions were considered as instrumental in of developing the PPP. They are: the supportive government policies and legislation, High awareness level of solid waste stakeholders, availability of financial resources to manage SWs, Effective implementation of by laws on SWM and the usage of the locally available resources both material and financial

5.2 Assumptions

5.2.1 Supportive government policies and legislation

To enable legal, regulatory, and policy environments are critical to the sustainable PPP. At the baseline level, a policy and legal environment that could support private sector involvement in critical services is needed. The policy and legal environment has, to minimize the likelihood of corruption and must be sufficiently reliable so as to encourage private participation and investment. Equally, possible investors will have confidence with the policy, laws and the contract to be respected and could be enforced in the courts or through arbitration, if necessary.

5.2.2 High awareness level of solid waste stakeholders

The public awareness effort on a broad range of SWM issues is important. This is a proactive distribution of information that would help inform the public reaction to PPP. This might be done through TV, radio, town local leaders/community meetings and newspapers. Communication activities have to begin early in the process and

continue through the implementation period. The PPP action plan structure should incorporate mechanisms to ensure the ongoing communication with the public and customers. The communication program associated with PPP has to occur not only at all stages of PPP but also on several levels from the KTC higher authority to the community.

5.2.3 Availability of financial resources to manage SWs

It is important that, sufficient fund were set aside for the purpose.

5.2.4 Effective implementation of by laws on SWM

Mechanism should be in press to ensure that enacted by laws were enforced

5.2.5 the sage of the locally available resources both material and financial

The action plan of PPP implementation should use the locally available financial and material resources such as finance resource, which will be obtained from the SWs fees from the households and business premises, where by plastic bags and dustbins will be provided to the households and business premises by the SWM stakeholders in order to keep SWs at the source. When filled up, will be picked back by using wheelbarrow, handcart, Bajaj and tractors if is available to the collection point. From the collection point to the final disposal, the SWs will be picked by using Tractor or heavy trucks depending on the capital of the SWM stakeholders.

5.3 Factors considered in the development of PPP

Three factors, have been considered in the development of PPP framework include the identified strength and weakness in managing SWs; experience from elsewhere;

and expert's knowledge and experience for the past 15 years. The proposed PPP is presented in the Figure 7.

5.4 The proposed PPP framework

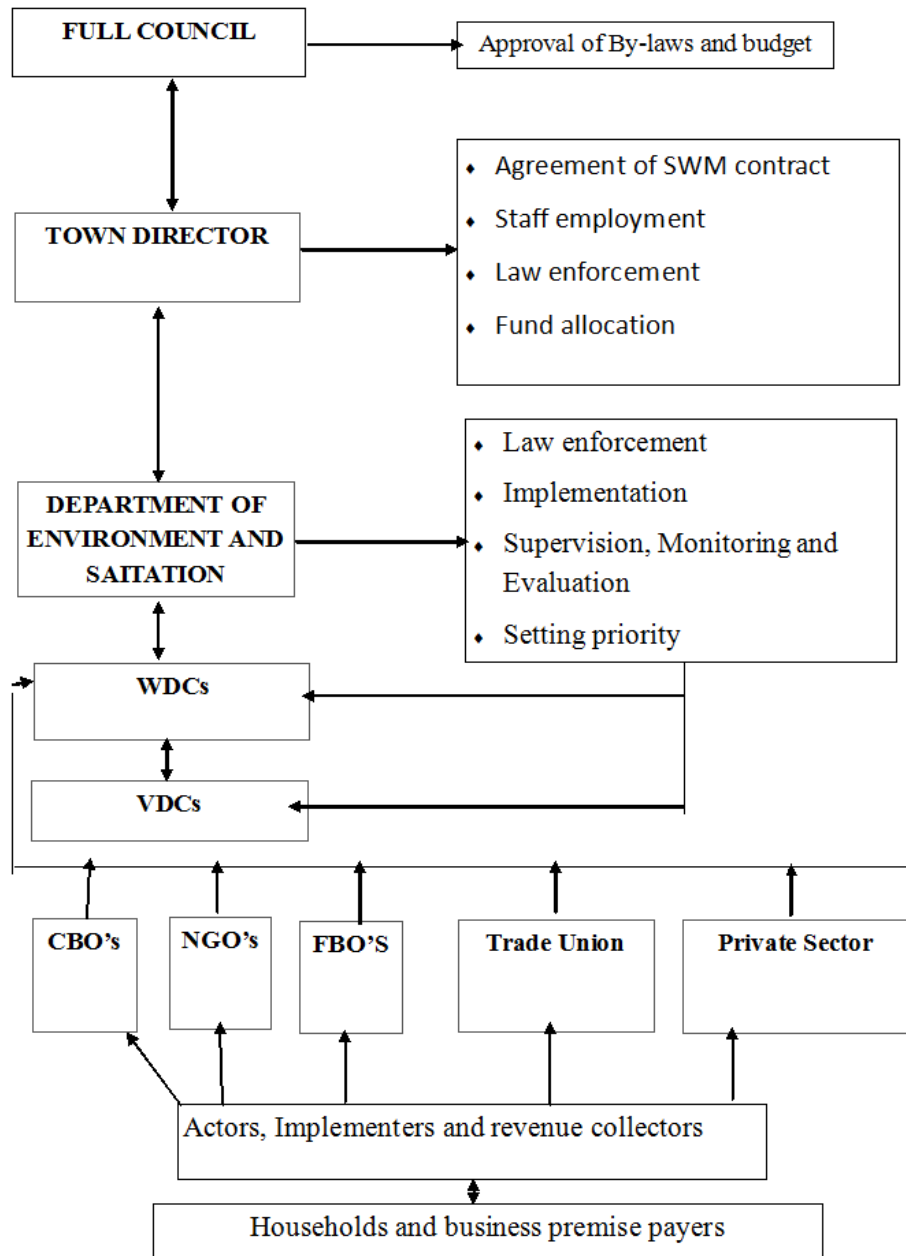


Figure 7 Proposed PPP frameworks for KTC

Source: Researcher

5.5 Operationalization of the PPP framework

The operationalization of the framework is organized into stages. The stages are: (i) Communities-business premises payers (ii) CBOs, NGOs, FBOs, Trade Union, Public sector (iii) Department of the Environment and Communities and Sanitation (iv)Town Director (v) the full council.

i. Communities-business premises payers

These are payers, rate per each households and business premises will depend on the numbers of occupant/ family and Kg/Tons of SW produced per day. Charges rates of SWM will apply after the agreement between the two parties (Payers and Payee)

ii. CBOs, NGOs, FBOs, Trade Union, Public sector

These are the main Actors, Implementers and revenue collectors of the SWM PPP framework. Revenue collection from the source (Household and business premises), will be done with these stakeholders by using the Electronic Fiscal Devices (EFD) and the Point of Sale (POS) Machine, which would send finance transaction automatically direct to the KTC account in the Bank. SW direct collector from the primary source (Households and Business premises) to the collection points will be paid a range between 50% and 55% of the total revenue collected per month. This will be done by the CBO's, NGO's, FBO's and other small scale group. The big trade company which has heavy trucks will pick SW from the collection point the KTC final disposal (Landfill) and will be paid by a range of between 30% and 35% of the total revenue collected per month.

iii. WDCs and VDCs

Their role will include Law enforcement, SWM activities Implementation, Supervision, Monitoring and Evaluation, and Setting priority, range between 5% and 10% of revenue from the grand total of SWM revenue collected per month which

will remain at WDC's and VDC's to support supervision, monitoring and evaluation as well as 10% would remain at the department.

iv. Department of Environment and Sanitation

Their roles include law enforcement, SWM activities implementation, supervision, monitoring and evaluation, and setting priority while 10% of revenue from the grand total of SWM revenue collected per month, will remain at WDC's and VDC's, and 10% will remain at the department to support supervision, monitoring and evaluation.

v. Town Director

The role of the Town Director will be to sign agreements of SWM contracts with all informal sectors, to employ environmental sanitation labourer, staff, law enforcement, and fund allocation. Under this agreement, benefits of both formal and informal sector will be clearly stated.

vi. Full council

The role of the full council will be to approve by-laws made to govern PPP and town council's annual budget allocation for SWM.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The aim of the study was to investigate the way of Managing Urban Solid Wastes in Kahama Town Council where three Wards were involved including Kahama Mjini, Majengo and Nyasubi. The study was based on the following objectives: to assess the SWM stakeholder participation in the study area; to assess factors that affected the success of stakeholders on solid SWM in the study area; and in the Public and Private Partnership in SWM Framework.

Findings from the study have shown that, the main stakeholders of SWM in the study area were the KTC, the local communities itself, CBOs which include Tuinuane Vijana, Pamoja Group, Hekima Group, Stand tunaweza, Mganda Mazingira, Harakati Mazingira , Mchangamano and Chavila respectively.

Field findings further have revealed that, the availability of fund, law enforcement, skills, knowledge and equipment and community participation were the main factors that influenced the participation of stakeholders in SWM in KTC. As a way to mitigate SWM in the Township a Framework has been developed for the purpose. This Framework takes on board different stakeholders namely the Full Council, The Town Director, the department of the environment and sanitation, Ward Development Committee, VDCs, NGOs, communities and businessmen.

For the Framework to be effective it is assumed that (1) there were a supportive government policies and legislation (2) there was high stakeholders awareness to the

stakeholders on solid waste management (3) financial resources to manage SWs were available (4) there was an effective implementation of by laws on SWM and (5) and emphasis was on the usage of the local available resources both material and financial.

6.2 Recommendations

- Solid Waste Management education, is important and will play an important role to correct the attitude of community, regarding the role of the community and the Council in managing Solid Waste
- A change from the open dumping and instead to develop landfills for Solid Wastes disposal. This is because the open dumping of Solid Wastes was hazardous to the health of residents of the surrounding areas.
- NEMC, should develop a working environmental policy monitor and evaluate the framework on Solid Waste collection and disposal as well as less based on policies, should develop strict environmental by-laws that have to be enforced.
- KTC to introduce Solid Waste Management cycle by encouraging the community to separate Solid Waste at the household level and other sources. This would help to reduce the accumulation of solid wastes at the collection points hence, reducing the costs of Solid Wastes transportation from the collection points, to the final disposal at Busoka dumping site.

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APPENDICES

Appendix 1: Questionnaire for Households

PART A: GENERAL INFORMATION

1. Village.....Ward.....Street.....

1. Sex

Male

Female

2. Educational Level

Informal education

Primary education

Secondary education

Above secondary

3. Age of Respondent

18-35

36-52

53 and Above

4. Duration of staying in Town Council

1-5 years

6-10 years

11 and above

PART B: The situation of solid Urban Waste Management in Kahama Town by

House Hold respondent

5. Is solid waste management in your area adequate?

Yes

No

6. If No, what are the probable causes? Mention at least three

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

7. How do you solve the problem of solid wastes at your house? (mention at least three)

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

8. Where do you normally dump your wastes

Dump site

Dust bin

Homemade been

9. What is the average wastes disposal in a day or week ...kgs

10. Are you aware of Kahama Town Council Wastes Authority?

YES

NO

11. If yes, how does Kahama Town Council addressing the problem of solid wastes management in your area? (Explain)

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

12. Are you satisfied with the Urban Authority in solid wastes management services?

i. YES

ii. NO

13. If NO, what are the reasons behind?

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

If YES what is your suggestions to keep sustainable solid waste management services delivery in the Kahama Town Council? (Give at least three)

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

THANK YOU

Appendix 2: Questionnaire for Kahama Town Council Officers

(Kahama Town Council Health Officer and Town Council Director)

1. A. Post

2. Duration of staying

1 Year

2 Years

Above 3 years

3. What are the problems of solid wastes management in Kahama Town Council?

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

4. How does Kahama Town Council address them?

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.....

5. What kind of achievements reached by Kahama Town Council in addressing solid waste supply in Kahama Town?

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.....
.....

6. What kind of constrains that Kahama Town Council face improving solid wastes management?

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

7. What kind of intervention should be done to solve the problem of solid waste in Kahama Town Council?

THANK YOU

Appendix 3: Checklist for Focused Group Discussion

Local Community, Youth, Elders, and Women

- Situation of solid waste management in KTC
- Participation of local community in Solid waste management related operations such as improvement of solid wastes services in KTC
- Households served with KTC waste services
- Achievements in improving solid wastes services in KTC
- Constraints facing KTC access to better solid waste services
- Suggestion to improve Solid waste management in KTC