MASTERS THESIS

Stakeholder's involvement in municipal solid waste management:

A case study of Nairobi city county- Kenya

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ABSTRACT

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Municipal solid waste management (MSWM) constitute a serious problem in most cities in the developing countries. Most of them do not collect in totality the solid waste generated and from the amount collected only a small fraction is properly disposed. This unsustainable SW handling has acted a source of land, air and water pollution, thus, posing risk to humans and the environment as waste find its way on street, roadside and open fields. Most literatures claim that the increase of waste is as a result of urbanization, economic growth and globalization especially in the developing countries. The situation has led cities to increasingly invest in research, technology, infrastructures improvement and formation of a strong legislation in attempting to refurbish the failing SWM systems. But with the current conventional system of SW approach might not allow these attempts to gain stability. It is for this reason this paper examines decentralized approach effectiveness in solving the SWM problems and further supporting these effort using the city of Nairobi as a case study.

The current convectional SWM approach system in operational in the city of Nairobi is bureaucratic, relays on imported technology, dominates other stakeholders and focuses on a centralized system. On the other hand, the decentralized system stresses on stakeholders involvement and recognizes their input in daily SWM decision making process. Using qualitative research method as a method of approach, this research attempted to explore the root cause for the increasing unsustainable SW disposal within the city and to the level the stakeholders are responsible. The method included the face to face and telephone interview questionnaires, observation and past research on SWM conducted on behalf of the city of Nairobi and other cities around the world in order to gain deeper understanding of the SWM system. After the research, the principle cause for the continued rise in unsustainable SWM in Nairobi was found to be basic social factors such as trust, responsibility, communication and commitment breakdown amongst the stakeholders

This paper proposes a policy framework for SWM system and urges a decentralized approach for SWM to be applied to the condition prevalent in Nairobi. The model proposed includes involvement of the stakeholders, awareness and county department coordination among other recommendations. This approach could assist cities or organizations when solving environmental related problems and projects in a socially desirable, economically viable and environmentally sound manner. The advantage of this model is that it creates an avenue to encourage a 3R initiative for the material being disposed and in the long run assist in improving the SWM systems.

KEYWORDS: Stakeholders, solid waste, unsustainable behaviour, involvement, disposal, awareness.

Acronyms

SW (M) : Solid Waste (Management)
MSW (M) : Municipal Solid Waste Management
USEPA : United States Environment Protection Agency
JICA : Japan International Cooperation Agency
SMEs : Small and Medium Size Enterprises

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1 INTRODUCTION

Factors such as environmental protection, reservation of natural resource extraction base in the desire to achieve the millennium development goals in sustainability are some of the key factors directing countries to pressure organizations to act more responsibly through creation of environmental management systems, vision and objectives that are nowadays evident from annual corporate responsibility reports or website. These efforts are mostly designed to create environmental awareness to parties involved in the processes of good and service flow. In over three decade now, multiple research and studies have been conduct by organization aiming to improving and manage resources sustainably. These has been done through taking steps in understanding different parties affecting and being affected by the firm´s daily decision making process in what literature terms as stakeholder's management theory**.** In its analysis and approach, the theory has been tested in different field seeking to answers to a situation or improving it more altogether. These include the business management field (Freeman 1984; Janson, 2005), sustainable development field (Macnaghten & Jacobs, 1997**),** global environmental change field (Kasemir et al., 2000; Kasperson, 2006). In the same way, this paper applies the theory in the field of SW in order to reveal their inter relationship.

Multiple stakeholders are increasingly showing interests in SWM with most of them occurring even prior to waste generation; for example, industry, packing, transportation of goods, commercial sector and the general public (ISWA, 2000; World Bank 1999). According to Zhu et al. (2008); Seman et al. (2012) and Andric et al. (2012), these stakeholders are directly or indirectly responsible for both waste generations as well as in the waste reduction process. In addition, there is also a range of stakeholders at the end of the process where SW represents important economical resources recovery of materials, for instance, glass metal and plastics (Johannes et al., 2012). These groups comprises of civil society groups, scavengers and private waste handlers. Since environmental control is also crucial at the product end of life, other stakeholders who play an important role are companies transforming waste to energy production and mainly situated at the landfill or damp sites (Tanskanen, 2000; Pongracz & Pohjola, 2004). However, the conflicting interests existing among the stakeholders such as the national policy versus local policy, industrial interests versus environmental interests, environmental sustainability

and employment, reuse, recycling, waste reduction and energy production and the public concerns about health effects, create a divisive area on the choices of waste management techniques (Pongracz & Pohjola, 2004).

In most countries it has been known to be responsibility of the local government to offer SWM services (World Bank, 1999; UNEP, 2002). However, the quandary associated with the SWM in a developing country is more acute than in a developed country. Favoured by stakeholder's willingness to comply and own up responsibility, financial capabilities, SW handling knowledge and skills, the local governments in developed countries have managed to eliminate the problems caused during SWM processes. Furthermore, these countries have invested in stakeholder's awareness, infrastructures, technology, law and legislation dealing with pollution (Tanskanen, 2000). But the situation is different for most local government in the developing countries as SWM is a major challenge. These challenges develop as a result of unsteady SW and environmental legislation, lack of (waste handling skills, knowledge, finance, technology and infrastructure) required when handling waste (World Bank, 1999; Kuniyal et al., 1998). In addition to these challenges, unsustainable SWM such as dumping, stakeholder's resistance and unwillingness to take responsibility, negative attitude and perception in SW catalyse the situation (Henry et al., 2006). The domination of the famous slogan "not in my backyard" [NIMBY] (ISWA, 2002) is generally felt on the ground as stakeholders push waste away from their premises. These challenges led to this research paper sorting to seek how this situation facing these cities can be solved through an awareness that focuses on stakeholder's involvement in the daily SWM decision making process using the city of Nairobi as a case study.

Nairobi is currently the largest city in the Eastern African region with a population density of over 3 million inhabitants and receiving over a million visitors daily. This huge population comes bring itself with a vast amount of waste with the city generates more than 3000 tons of SW daily. This figure is a 200% increase compared to the 1990s when the waste generated totalled to 1000 tons per day (Losai management limited, 2011). Under the municipal council act 1977 (NCEO 2007), it is the responsibility of the Nairobi county government (formerly known Nairobi city council) to offer SWM services such as collection and disposal of SW within city estates and streets. But sadly, only 40% of the generated SW is "properly disposed" in the only dumping site situated 25KM from the city centre. This dumping site has been operational from the early 1980s and lies on a 46 acres land with more than 1.8 million m^3 tons of SW and receiving about 220,000 tons annually (JICA, 2010). The uncollected waste is either illegally dumped or found on the roadside, dark corners or disposed through burning (Losai management limited, 2011; Henry et al., 2005; NCEO, 2007). It is estimated that there are more than 70 illegal dumping sites in Nairobi (JICA 2010), most of them concentrated in the slums (Njeru, 2004).

It is perceived that the waste dumped is as a result of the Nairobi SWM system ineptitude in offering the service since the county lack resources, infrastructure among other challenges (Henry et al., 2006) as it will be discussed

at length in chapter 3. It is also alleged that the per capita waste generated ranges between 0.66 Kg to 1 kg per day per individual and the figures are projected to rise. It is also estimated that 60% of this waste is non-hazardous and mostly originates from residential and small entrepreneurs. The remainder is from industries and hospital or pharmaceuticals, which is highly hazardous as a result of importation of cheap counterfeit goods especially electronics and plastics (Kenya vision, 2030). Of the non hazardous waste the organic (Allison & Harro von Blottnitz, 2009), paper and plastic make up the bulk of the county SW composition and is anticipated that these will continue to be the leading SW composition in the future and also projected to pose danger to the population and the environment as the county economy grows (Henry et al., 2006: KNCPC, 2006). On one hand, earlier researches have attempted to draw frameworks to prevent this future problem by recommending the implementation of an integrated SWM system (JICA 2010: Losai management limited 2011). On the other hand, the current unsustainable practises among the stakeholders in SW handling hinder the implementation and success of the system proposed which has also affected the ability of the county government to offer efficient SWM services. This therefore, certifies the claims from Freeman 1984 (cited by Hendrich, 2008) that concluded that stakeholders hold the power to influence organization objectives positively or negatively and can influence the 3R system of waste control, product flow, purchase and lifecycle. Particularly the consumers or the residential have the capability to determine the final destination of a product that is, recycling, reuse or dump filled (Ngau & Harro von Blottnitz, 2010). Creating stakeholder's awareness and participation plus building of the institutional capacity in handling and monitoring these issues need to be given a priority if the Integrated SWM system is to gain ground (Marshall & Farahbakhsh, 2013).

1.1 Research Task

The key purpose of stakeholder involvement in an organization is to create conducive environments for awareness and participation in the daily decision making processes, introduce or change a certain pattern of how things are done. This is why this thesis aimed to illustrate how the stakeholder's involvement can be employed as a tool in achieving a sustainable SWM system for the city of Nairobi. In order to tackle the task, this thesis was led by 3 main questions:

i. How are stakeholders involved in SWM decision making?
ii. What are the hindrances to stakeholder's involvement?
iii. What can be done to eliminate these hindrances from the SWM systems?

1.2 Prospects and Motivation

The results prospected are aimed at improving and enabling the integrated SWM system to freely function and further assist the city to achieve the vision 2030 that intends to reduce effects of SW in the city by year 2030 (Kenya vision, 2030). The aspiration to this task was influenced after reading an

online magazine (makingitmagazine.net) that claimed that the SW problem in Nairobi has reached dangerous levels such that in 2013 the UNEP had classified it as one of the worst humanitarian crises facing the city. This being my home town awakened the desire to be part of solution finding. One of the advantages was that I had acquired some experience after working with one of the Finnish SWM company. Furthermore, I desired to gain more experience in the field of waste management and environment at large. After requesting the Nairobi city management for permission to conduct a research in the area of interest the request was granted and the research proposal was constructed and forwarded to the thesis supervisor. The research process began as it will be discussed in the following chapter.

1.3 Thesis Organization

Chapter 1: Firstly, introduction of the thesis and the research aim are listed

Chapter 2: Methodology used in answering to the research question and achieving the goal of the research. The chapter also list the stakeholders interviewed and some of the articles and publication used during the research.

Chapter 3: Theoretic framework which is based on various articles published. These articles deal singularly with stakeholders and SWM or both.

Chapter 4: Consist of previous studies conducted in Nairobi.

Chapter 5: Lists the findings from the research conducted in answering the research questions.

Chapter 6: Discussion of the findings are done and further reflection of the entire research is done discussing and summarizing

Chapter 7: Mirror the entire study and summarizes the main findings and their implication. Also, it shows the importance of the research aim and how it can be applied. Finally, it presents the research limitations and suggestions for future research.
Lastly, the references and appendices are listed. Photos taken during the research are shown and also the semi structured open ended questionnaires used

2 METHODOLOGY

The study was undertaken from September 2013 to December 2013. The duration was divided into two where the first 2 months I worked as a SW field officer and thereafter a 2 months period as an independent researcher. The study was developed to understand the SWM in an urban environment of a developing country system in order to suggest ways they could achieve higher level of sustainability in SWM.

2.1 Research Study Approach

The research uses Nairobi as a case study. The objectives of this paper were met through the use of a qualitative research method as it was found to be subjective as its focal point relies on the individual experiences and usually associated with the social constructivist paradigm or interpretive paradigm which emphasises the socially constructed nature of reality (Schwandt, 2001). The research involved why and how questions and the researcher had no control or manipulation over the behavioural events, a characteristic that made the study suitable (Yin, (2003). The first task for this research was to find out whether there was existence of a collaborative relationship between the stakeholders and the county SW systems with a special focus on their involvement in the SWM systems. The next step was to find out the major stabling blocks for the collaboration and finally determine the action to be undertaken.

2.2 Data Collection

The data collection method used involved semi structured open ended questionnaires conducted through the use of face to face and telephone interviews. Beside earlier reports conducted for and on behalf of the city of Nairobi and the published information were reviewed. These literatures reviewed guided the selection and formulation of questions and the questionnaire design. The questions were chosen based on their ability to bring forth data that will respond to the main research questions of this study. The questionnaire was sent to the supervisor who gave a go ahead to conduct interviews. After the, a pilot testing of the data collection with two parties as suggested by Yin, (2011) the outcome assisted with the modification and restructuring of some questions. The pilot testing was conducted on one civil

society group "*locally recognized as community based organisations in Nairobi* (*COBs*)" and the SW assistant director. Later the researcher embarked to the interview process which in turn was more or less a conversational type of interview as the researcher was working as an employee of the county as a SW field officer.

A total of 55 interviews were conducted among them 4 focus group discussions from each of the 4 wards as they will be listed below. Single focus group comprised of not less than 3 participants including the ward SW field employee. According to Bryman, (2004), group interviews may takes on a wider span, and that the interviews are done for purposes of saving time by interviewing a number of people simultaneously. He continues to note that the purpose of focus groups is to understand how people discuss an issue as "members of a group" (Bryman, 2004). In the focus group, attention was put on how the participants interact with each other than with the interviewer and it is from the interaction of the participants that data emerge (Cohen, Manion & Morrison, 2000). In this research, focus groups were done for the category of groups that engage privately and individually in solid waste collection from residences, markets and trading centres. This was intended to complement the method of research.

Not all stakeholders contacted were willing to participate in giving information that was required for the study. Some refused out rightly especially when accompanied by the SW field supervisor especially in Kibra area, while others feared that they might not have the required information or fear of being victimized later as a result of the information disclosed. Most of them complained that there has been several interview conducted earlier and they participate with no change after and held a notion that "*interview and research are a waste of words and time*". I therefore interviewed those respondents that were willing, and had time to spare in answering to the interview questions. Also I rescheduled time to some of the interviews to attend without the presence of the field supervisor. The data was collected from stakeholders prior identified with the assistance from the SW assistance director and field supervisors they included:

- The county solid waste department, that is; assistance director, Kibra and Embakasi area ward SW field supervisors and environment managers, Dandora dumpsite manager and two group discussion with employees in the SW department.
- NGOs including JICA, NET fund and the US-AID.
- Civil society groups *or as locally referred as community based organizations (CBOs)*: 4 in Kibra ward (Olympics Sala Ngombe group, Eric's foundation group, Kibra youth group, Al-hadid self help group), three in Embakasi ward and the Kayole environmental association.
- Three religious institutions (Kibra Mosque, the Anglican church of Kenya laini saba, Catholic church Embakasi).

- Education institution which were picked on random (Olympics primary school, ACK kindergarten, St Juliet education centre, Heshima primary school).
- SMEs–for instance, roadside restaurant within these areas that is; (two in Kibra, two in the capital area, one in Kayole sub county and one from Embakasi) and the SMEs located close to collection centres and the dumpsite that is; (two saloon in Kibra, two roadside wood carpenters and two tailoring business in Embakasi) two roadside traders, three sugarcane vendors and one group discussion with Nairobi public means transporters that comprised of seven participants which are two drivers, three conductors and two travellers at Timboroa lane Nairobi.
- one group discussion with young people in Kibra comprising of fifteen participants in conjunction with one civil society group young in and five household in Embakasi area.
- General plastics manufacturer –Kenya.
- Other stakeholders who include former Embakasi ward councillor who is now a business man and the Embakasi south administration assistance chief.

2.2.1 Semi Structured Interviews

This type of interview was chosen with an aim of gaining the individual stakeholders perspective concerning the SWM in the Nairobi. The interview questions were structured pointing to understand

I. How the stakeholders perceived to the problems linked to the current SW in the county.
II. What do the stakeholders value as the major area of concern, deterrent and inspiration toward future efficiency in for the county SWM system?

The interview respondent were classified into

- Business premises and business operators
- Civil society groups, scavengers, private waste contractors and handlers
- Nongovernmental organizations
- Local community, local administration
- County SW employee

The questionnaires were different for each set of stakeholders group as it will be reflected later in the appendices. But it is important to note they had the same goal ideologically. The questions were asked according to the comfort level of the responder and were flexible as the flow and the direction of were modified according to the responses of the stakeholder which assisted in maintaining the flow (Chambers, 1994). In safeguarding the response where permissible the researcher used a recorder and where not applicable, short-hard jotting was applied in writing the key words used by respondents. In the identification of the stakeholders to interview the researcher spent ample time working with the county SW assistance director, field supervisors and the civil society groups as they were more aware of the situation. The duration of the interview per group or respondent differed aging from 10 minutes to 1.5 hours depending upon the

willingness of the respondent to offer information and their knowledge in the SWM systems. It also depended upon the time of the interview, place and type of stakeholder since at some instance the consumer interrupted as in the case of SMEs and roadside establishment and trader.

2.2.2 Non-Participant Observation

A structured observation is systematic and enables the researcher to generate data from the observations (Cohen et al., 2000). This being a study that is partly dependent on a case study framework, it was expected that the behaviour and actions from the respondents would most likely be inferred. Therefore, direct observation on their action with regard to their responses was done to verify the accuracy of their responses and therefore used as a method of data collection (Bryman, 2004). Notably, unobtrusive observation is non-participatory in the interest of being non-reactive and can be done in an informal way (Robson, 2002; Leedy & Ormrod, 2005). However, this approach has some weakness since the observer is an outsider and he may fail to understand the behaviour of the observed in its entirety. Also, the observation may be misinterpreted. The objective of this study necessitated to spend ample time within the study area and integrate with the stakeholders. This was not difficulty since I was familiar with the culture, language and some of the community in the areas (Bernard, 1988). Nevertheless, I opted to be a non participant in order to understand the system and the stakeholders. As a non participant various aspects of the present SW system were studied, for instance, waste collection, transportation, sorting methods and disposals etc. Much of the non participant work is reflected in this thesis in form of photos taken during the research. This method enabled to visualize and verify the response of various stakeholders and assisted in forming strategies or developing policy recommendations.

2.3 Secondary Data

To make sure no repetition of the topic from previous existing reports in the same area I committed to investigate past researches and publication conducted by and on behalf of the city. But although most of them suggested involvement of stakeholders few if none was found specifically majoring on their involvement in the county SWM system. But on the other hand, the studies were found useful as they were used to enhance the understanding of the county SWM problems. Further, they enhanced the collected primary data triangulation, verification and I was able to ascertain the reliability of the data collected from the entire study. Literatures selected were;

- Business daily online editions
- City of Nairobi environmental outlook 2006
- Eco digest magazine November 23, 2011
- Guererro et al., (2013)
- Gulis et al 2004
- Harro von Blottnitz and Ngau (2010)
- Henry et al., (2006)

- Kasozi and Harro von Blottnitz (2010)
- Kenya national cleaner production centre 2006
- Khamala & Alex (2013)
- Losai management limited (2011)
- Marshall & Farahbakhsh, (2013)
- Nairobi news March 20, 2014
- Njeru, J. (2006)
- Okumu and Nyenje (2011)
- Tibaijuki, A. (2007)
- United Nations, Nairobi county program document 2013-2015
- Standard newspaper online edition of
  - Sunday June 30, 2013
  - Wednesday 19th , 2012
- Nation newspaper online edition of
  - Monday August 19, 2013
  - Monday August 5, 2013
  - Tuesday July 30, 2013
  - Wed March 28, 2012
  - Monday January 10, 2011
  - Friday January 7, 2011
  - Saturday February 20, 2010
  - Friday December 11, 2009

2.4 Data Analysis

For data analysis, aspects of the conventional content analysis tool are used for the study considering that coding categories are obtained unswervingly from the data text. The benefit of using the conventional approach during content analysis is that undeviating information is obtained from the diverse perspectives of research participants to capture the intricacy without imposing pre-conceived categories (Hsieh and Shannon, 2005). I transcribed all the data collected from different stakeholders and classified according to the content. The qualitative data from the semi-structured interviews and focus groups, was edited every break of day to get the clear transcriptions of the interviewees accounts. The notes were then typed on the computer, where emerging themes were identified and classification done. After the classification the data was then organised and overviewed so as to tap in the general sense of the emerging trends, pattern and concepts. Further, the data was subdivided into broad categories developed during the literature review. When the final classification of the themes had been constructed, findings and the discussion were arranged with regard to the literature review and from the secondary data reviewed.

3 THEORETICAL FRAMEWORK

Theoretical framework will be based on previous studies done. The studies selected have already been published inform of articles, connected to the topic of this research. First the study will attempt understand stakeholders and their classification and further investigate their connection to SWM and its classification. Moreover, the chapter explore the challenges developing countries face in the process of SWM.

3.1 Stakeholder Theory and Classification

Stakeholder theory was coined by Freeman 1984 (Mitchell et al., 1997; Frooman, 1999; Hendrich , 2008). He defined and identified the stakeholders as any group or individual who can affect or is affected by the achievement of the organizational objectives. The objectives have extended to accommodate elements for example, actions, decisions, policies, practices or goals of an organization (Carroll & Buchholtz, 2000). However, Freeman definition was broad as it accommodated infinitive type of stakes (Mitchell et al., 1997). But in the process of narrowing it down most literatures have differed mostly in the identification, type, level, classification and management depending on the area of study (Kasperson, 2006). The theory explains and predicts how organization influences the stakeholder and vice-versa (Frooman, 1999). In this paper the author use the (Freeman 1984) definition of stakeholders at the starting point but have elaborated the definition further with the assistance of several other studies in stakeholder theory.

In handling stakeholders, Clement (2005) holds that relationship maintenance is essential since it has an impact on the success of the organizational vision and objectives. This relationship is a two sided and offer benefits to both the organization and the stakeholders involved. Besides the success, Grote (2004) and Udovyk & Gilek (2013) claims stakeholder management assist an organization in coping with uncertainties and unstable environment. The contribution of these relationships in shaping the vision, objectives and executing the plans could be used in directing the management and consensus reaching amongst the organization and the key stakeholders on what is needed to be done and in which way (savage et al., 1991). Berman et al. (1999) brought forward an approach in managing the relationships based on two classifications of stakeholders; that is, Normative and Instrumental. But

Donaldson & Preston, (1995) supersede as they had earlier put forward the same approach based on a three classification of the stakeholder as they added descriptive classification in managing their relationships. Normative aspect is the core and is a fundamental base of the theory as it involves acceptance that: stakeholders are persons or groups with legitimate interests in procedural and/or substantive aspects of corporate activity. Also the aspect views stakeholders as having intrinsic value and are managed on the ground of moral principal (Berman et al., 1999). The second aspect the descriptive, describes what a corporation is; that is, the perspective describing the corporation as a constellation of cooperative and competitive interests possessing intrinsic value. Last is the Instrumental aspect that establishes a framework for examining the connections between the practice of stakeholder management and the achievement of various corporate performance goals. This principal focus of interest in this dimension acts on the proposition that corporations practicing stakeholder management will be relatively successful in conventional performance terms such as efficiency, profitability and stability (Donaldson & Preston, 1995).

Other researchers' attempting to classify the stakeholders includes:

a. Mitchell et al., (1997) as they simplified and classified the stakeholders basing on Legitimacy, power and urgency. Using these attributes the value of the stakeholder can be measured, which is referred to as the stakeholder salience, (Mitchell et al., 1997). The power attribute could be further classified in to three power types; that is, coercive, utilitarian and normative (Etzioni 1964). The coercive power is based on the resources of physical power and therefore is not applicable in this setting. But the utilitarian and normative powers are based on financial or symbolic resources and are present in many stakeholders. The definition of legitimacy used by Boonstra (1999) and Mitchell et al., (1997) was originally drawn by Suchman (1995) as a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definition "According to Mitchell et al., (1997) legitimacy and power can be independent of each other, however when the stakeholder possesses both he is said to have more authority over the organization. The attribute of urgency causes a more dynamic nature in the typology as it is defined as the degree to which stakeholder claims invite an immediate attention
b. Primary and secondary classification (Wheeler and Sillanpaa, 1998; Lynch, 2000; Harrison, 2003; Welp et al., 2006).
c. Internal and external classification and identification (Mbuligwe, 2004; Srivastava et al., 2005).

Through the use of the effect criterion as a base these literatures have attempted to identify and classify the stakeholders depending on the research objectives, the issue has caused debate with no consensus arrived at on which suited model and classification to use (SWA, 2002 and Srivastava et al., 2005) but it is up to the organization to determine the class of its stakeholders. Despite

this enormous study and the application of the stakeholder approach in numerous fields, their approach and influence in the field of SWM has been leanly researched especially in the developing countries. Literatures for instance, Guerrero et al., (2013); Heidrich et al., (2008); Contreras et al., (2008); Tadesse et al., (2007); Kurian, (2006); Srivastava et al., (2005) among others, have recommended stakeholder approach amongst other recommendations in tackling SW problems in developing countries. However, only few of them have weighed on one or two stakeholders through involving them in the SWM. But before discussing more in depth of how they have been linked to the problem in SWM, it is important to first understand what is meant by the term SW as the following sub topic attempt to.

3.2 Solid Waste Management and Classification

The World Bank (1999) defines SW as human unwanted, thrown away or discarded as useless materials. These materials are non-liquid, non-hazardous, non-gaseous and consist of organic matter (that is easily degradable) and inorganic (non-biodegradable, for instance, metals, plastics, bottles and broken glasses). These materials originate from households, commercial establishments, institutions, markets, and industries (Arukwe, 2012; Patwary et al., 2011; Zhang et al., 2010). It is also known as municipal solid waste (MSW) as it is managed by local/municipal government bodies. Its characteristic differs depending on source and nature and exists in two forms, that is; refuse and trash (USEPA, 2009).

- Refuse; includes garbage (highly de-compostable food waste such as vegetables and meat scraps) rubbish (dry material, such as, metal, cans glass, slow decomposing materials, combustible materials, textile, woods).
- Trash comprises of bulky waste materials that require special handling for instance electronics, furniture's and household items and equipments (World bank, 2006, 1999).

Therefore, SWM could be defined as the art of managing garbage in a specific location which may include; waste collection, recycling, treating and disposing in accordance with the agreed national or international standards (Nathanson, 2000).

3.2.1 Solid Waste Classification based on the Origin

World Bank (1999, 2005 and 2006) attempted to classify, find the origin and lists the composition of SW commonly found in the developing economies into eight classes as follows-

- Industrial waste: The World Bank 1999 report classified Industrial waste into two forms that is; Hazardous and non hazardous SW
- Commercial Wastes: These are waste produced by the retail and wholesale establishment for instance, hotel and restaurants, malls, closed and open air markets, theatre amongst other service rendering sectors. The type of waste generated range from expired goods, food staff, and electronics among others.

- Residential Wastes: These are waste generated at household level which includes bio waste, dust, rubbish and trash. Furthermore it may include some hazardous waste, for instance, electronics, batteries, plastics, chemicals and paints.
- Institutional Wastes: these are waste that generate from institution such as learning institution, health institution, research institution and public buildings.
- Municipal services: These are waste that usually generated during street regular cleanup, landscaping, parks and other recreational areas. Also include water and waste waters treatment plants. The type of waste produced in this area includes: street sweepings, landscape and tree trimming wastes, other mixed waste and sludge's.
- Construction and demolition debris and yard wastes are not generally included in the MSW generation rate per capita since: they are highly variable and skew quantity assessments and in addition they usually require less or no disposal standards which are stern to meet in comparison with those for other types of SW. These may include: wood, steel concrete, stones among other construction materials.
- Processed waste: These are waste produced during production process in manufacturing and extraction plants. The type of waste produced is composed of residual sludge.
- Agricultural waste: These are mainly waste produced during or as a result of farming exercises. They contain pesticides and other waste, for instance spoiled food stuff, agricultural waste and rubbish.

3.2.2 Stakeholders Relation to Solid Waste

The roles of the stakeholders have metamorphosed over the period. According to Contreras et al., (2008) stakeholders have transmogrified from being spectators or recipients of impacts to becoming part of/ involved in the important role of designing, implementing and promotion of the SWM systems. In reality they are multi faced and are either affected positively or negatively by the SWM decision. Furthermore, stakeholders can be identified according to their interest in an improved waste management (Guerrero et al., 2013) and participation in continuous activities in attaining SWM efficiency (Sarki, 2000). Undoubtedly, SW is generated in different forms after any stakeholder activity and could be generated at any level of goods and supply exchange activity (Andric et al., 2012). These activities differ from one location to another as stakeholders extends from: government, local authorities, employee public and private enterprises, organizations (non-governmental, civil society organizations), households/residential, (Srivastava et al., 2005; Contreras et al., 2008) waste collectors and processors (Kurian, 2006; Okumu & Nyenje, 2011) formal and informal agencies, financing institutions (Guerrero et al., 2013) educational and research institutions, political parties, farmers, health care centres, media, donor organizations and religious organization.

Waste management is a key element in achieving of resource management and a sustainable urban environment (Corsten et al., 2013). Also it contributes to efficient resource management through a 3R control system, that is, Reduction/waste prevention, reuse and recycling. Therefore, SWM is an important part of urban and city management as it ensures protection of environment and human health (Al-Khatib et al., 2010; ISWA, 2002). If SW is disposed improperly it could cause serious ecological and environmental damage. This damage may range from air pollution resulting from inadequate SW incineration, soil contamination as well as surface and groundwater pollution. In attempting to reduce SW in developing cities Article 21.4 of the agenda expand beyond the 3R system and stating that "Environmentally sound waste management must go beyond the mere safe disposal or recovery of wastes that are generated and seek to address the root cause of the problem by attempting to change unsustainable pattern of production and consumption" (Agenda 21, 1992). It is therefore recognizable that stakeholders mentioned in this sub chapter are involved as seen in every level of product flow and contribute directly and indirectly to the challenges currently faced in developing nations in SWM systems.

3.3 Challenges in Solid Waste Management

Having the light of it connection with stakeholders, classification, origin and composition as described above it is an allegory and interesting to know some of the challenges faced by the developing countries SWM system leading to their incapability in managing it. Therefore, these section attempts to find out the challenges that hinder the SWM systems in these countries and how they affect the stakeholders.

3.3.1 Structure of Settlement in Urban Areas

The recent studies conducted by the United Nation (2009) revealed more half of the world population (developed and developing countries) already live in the urban areas and the figure is expected to rise. As they migrate they bring with themselves huge piles of SW as a result of activities such as commercial, institutional, industrial markets. Several other studies have agreed and linked the increasing rate in mass and problems in SWM in the developing nations to the high population growth (Couth and Trois, 2011; Zurbrugg, 2003; Medina, 2002; the world bank, 1999; Schubeler et al., 1996). As these cities attract people from the rural areas, the local governments are incapable of offering the basic needs such as; accommodation to the booming population resulting to people settling illegally on vacant spaces they would find. Tukahirwa et al., (2013); Marshall & Farahbakhsh, (2013) assert that the informal settlement in developing countries are a source of the SW problems as they exist without laid system of SWM. They claim these settlements are poorly planned and lack of access for SW easy removal which confirms earlier researches by UNFPA (2011); UN-Habitat (2007); KNCPC, (2006) and Henry et al., (2006) as they revealed that the rising informal settlement are to blame for the increase in

illegal dumping site as they lack local governments services as a result of a hysterical SWM system.

The huge volume of SW found dumped in these cities have facilitated the emergence of informal and formal waste handlers who aid in waste management. As Wilson et al. (2006); Kurian (2009); UNEP (2009) aver, various institution both from the informal and private sectors, have evolved and indulge in the chain of managing and offering the SWM services. The sector comprises of [small enterprises, scavengers civil society group (waste pickers either street, door to door or at the disposal sites), itinerant waste buyers, junk shop owners and street sweepers] (Allison Kasozi & Harro von Blottnitz, 2009; Marshall & Farahbakhsh, 2013) these groups are small in size mostly of 20 members formed by rehabilitated youths/women groups (Srivastava et al., 2005) or poor, uneducated, street families and children. Member join on a volunteering basis aiming at making a living as they engage in sorting waste and selling it as recyclables to middlemen and manufacturing companies. But although these informal sectors are low class citizens it is certain that they play an important role in resource recovery , collection and transporting the MSW as the local governments are incapable to offer SWM services (Schubeler, 1996). Their services not only create jobs but also could contribute to reduction in pollution, natural resources conservation hence their inclusion in the daily decision making process of the SWM system could assist in overturning negative public perception and attitude towards SW handling and handlers and in turn realize the treasures hidden in waste.

3.3.2 Solid Waste Composition and Infrastructure

Waste differs widely from place to place, the most striking one being their organic contents percentage (Wagner & Bilitewski, 2009; Ghose et al., 2005). Comparing the high and low income areas organic concentration in waste, it is certain that in low income areas concentrations is high (Parrot et al., 2008), while the paper and plastic (KNCPC, 2007; Njeru 2006) are much higher in high income areas. This reflects the difference in consumption pattern, cultural and educational differences. That is, in higher income areas disposable material and packaged food are used in higher quantities (Khateeb & Al-Khateeb 2008) which give rise to the waste having higher calorific value, lower specific density and lower moisture content. In the case of lower income areas, the usage of fresh vegetables to packaged food is much higher (Hazra & Goel, 2009) which results in a waste composition that has high moisture content, high specific weight and low calorific value. Thus, identifying the SW composition is important in order to assist in the selection of the most appropriate handling techniques and technology.

Infrastructure is a challenge in these countries. Facilitated by the lack of financial resources (Henry et al., 2006) the countries have to rely on external donors for financial assistance (Kurian et al., 2005). Not only financials challenges but in a study Schubeler, (1996) professed that difficulty in accessibility to various locations, for instance, slums areas affects SW collection.

The reason might be that these slums are congested which hinders the easy movement of garbage collection truck. Where accessible the contracted private waste handlers lacks the required standard trucks as waste is transported using open trucks and tractors, This therefore results to waste being dragged and transported on human drawing carts (Schubeler, 1996) barrows (Afon, 2007; Srivastava et al., 2004) as well as human backs (Kassim & Ali, 2006). Furthermore as Bleck &Wettberg (2012) claims, the SWM systems has been characterized by the dominance of manual handling tasks due to lack of basic tools needed to efficiently handle SW. These tools include garbage bins (Parrot et al., 2009) collection and transportation services (Srivastava et al., 2004; Guerrero et al., 2013). Literatures fault the systems of handling as not effective as it is time consuming and contribute to the scattering of the SW. Also, it complicates the service delivery as this unsustainable SW handling is incapable of effectively managing the increasing volume left uncollected (UNEP, 2009; Kassim & Ali, 2006) causing the stakeholders result to dumping wastes elsewhere or even burning it.

Although the World Bank (1999) had recommended waste burning as a solution stating that the exercise minimises 85-90% of waste, there are limitations if uncontrolled. These are;

i. It may result in the release of harmful gases into the atmosphere (Zurbrugg, 2002)
ii. Rise in greenhouse gases (Prechthai et al., 2008; Arukwe et al., 2012)
iii. Is a threat to the health of the environmental and human as Bleck & Wettberg (2012) and UNEP (2009) researches found a high blood lead concentration and gastric diseases mostly affecting the waste collectors/handlers and the surrounding communities cause by the smoke usually found in dumping site and collection centres. Also, traces of mercury, heavy metals, polychlorinated biphenyls (PCBs) and copper contents particles were in high concentration on streams of water originating from the leachates flowing from the damping site to nearby lakes and rivers. The uncollected waste generated an odour as it decompose I open field as a result of being exposed to direct sunlight, and rainfall which creates harm to the fauna.

In the sight of these limitations, this paper believes that the arguments from World Bank were not environmentally friendly and also because burning encourages extraction of virgin material since product recovery is lost. And even though these literatures mostly focused on households' unsustainable waste disposal practises connection to composition and infrastructure challenge, they similarly agree and report a positive outcome even as this cities improved not on the infrastructure but the volume of waste and illegal dumping were transformed after the stakeholder was involved in the SWM system. This is clear that despite the challenge the situation might still be influenced in a positive way when stakeholders participate in the cities SWM systems decision making.

3.3.3 Stakeholders Trust

Building trust is a process and is earned over time through listening; talking and making sure that you walk the talks. Beslin & Reddin (2004) earmarks trust as a powerful asset that create loyalty which gives an organization the benefits of doubt in situations where they want to be understood and believed. Some literatures investigate on some factors to verify if they affect trust or vice versa. For example, Sullivan & Peterson, (1982) review trust by measuring it in terms of sincerity, caution, effort in establishing a relationship, equality, goal congruence, consistency, and expectations of cooperation. Alternatively, Crosby et al. (1990) and Reeds, (2008) evaluate it by measuring sincerity, competitiveness behaviours, honesty, and beliefs in information sharing. This literatures found trust to affect and affected by this factors and concludes that trust is the foundation to all positive relationships that organization ought to create between its objectives and visions and its stakeholder. Therefore, when trust is in existence in an organization, stakeholders cooperate more eagerly, challenge less, easy to retain, interact and agree with the organizational objectives. From this it can be held that trust is multi-dimensional and complex phenomenon, which could occur in three states;

i. Competence trust which is the perception of others' ability to perform the required work.
ii. Integrity trust which is the perception of others willingness to protect the interest of their counter parts.
iii. Intuitive trust which is founded on the party's prejudices, biases or other personal feelings towards its counterparts (Moorman, et al., 1993)

The same way in the environmental issues stakeholder trust in the organizational service delivery is paramount (Canning & Hanmer-Lloyd, 2007; Haejmose et al., 2012). For instance focusing on recycling which is usually designed to minimise extraction of virgin resources (Canning & Hanmer-Lloyd, 2007), it is equally important for the success of reverse logistics and must be the central pillar where participants involved the entire product stages and processes must exhibit, that is, from the manufacturers to the final consumer and vice-versa. Held by Haejmose et al., (2012) and Jones et al., (2009) the literatures show a situation where is needed, for example, the manufacturers must rely on the final consumer on the assumption that he will recycle on the other hand the consumer and other intermediaries must also trust that manufacturer produce quality product that could be, reused or recycled and still trust they will purchase back the recycled materials.

3.3.4 Ineffective Governance and Legislation

Governance is a challenge in most developing countries SWM systems. Citing from World Bank (1992), Khan (2002) list circumstances in which governance becomes ineffective, among them; lack of involvement and transparency in the decision making process and in addition failure in making clear distinction between what is public and private by the local authorities. This might facilitate the misuse of public resources for private gains which in

turn create a breakdown in the private- public relationship and partnership. Beside this, Bhuiyan (2010) and Zurbrugg (2003) affirm that crummy governance result from breakdown of organizational/local authority interdepartmental relation especially in the SWM. As a fact, lack of coordination between the departments and Failure of the department entrusted in maintaining environmental legislation in proper governance is among the highest contributors to SW problems.

Legislation related to SWM is usually fragmented in several laws that include clauses on rules/regulations regarding SWM, for instance, in the public health act, Local government act and the environmental protection act (Srivastava et al., 2005 and Minciardi et al., 2007). The rules and regulations are enforced by the different agencies. However, there are often duplication of responsibilities of the agencies involved and missing elements in the regulatory provisions for the development of effective SWM systems. Because of a low priority given to the sector, the institutional capacity of local government departments involved in SWM is generally weak. Local ordinance or the by-laws on SWM are not also well developed (Srivastava et al., 2005). The institutional responsible are generally weak as they are not provided with clear mandates, sufficient resources and infrastructures in order to fulfil their mandates (Minciardi et al., 2007). For effective waste management it is important to recognize that legislation is only effective if it is enforced. Therefore, comprehensive legislation is required in achieving a sustainable development in SWM systems which avoids the duplication of responsibilities, fills in the missing elements of important regulatory functions and is enforceable. In solving governance related challenges, the UNEP (2009) directs governments and municipal governments to establish regulations, institution and departments to monitor the SW service delivery in managing the outsourced roles of undertaking the public utilities by the private sectors, communities groups and institutions.

3.3.5 Stakeholders Awareness

It is essential that the stakeholder be fully aware from the outset in the planning of the local SWM segments systems. Their awareness is particularly important regarding the setting of facilities such as SW transfer locations as they are responsible for waste generation. The positive response is certainly determined by personal capabilities among other factors including; reaching out (Nzeadibe, 2008) thats includes knowledge and skills required for particular action (Parrot et al., 2006; Bhuiyan, 2010 and Jones et al., 2010). The benefit to their awareness in environment management reduces the reactive and proactive side of the environmental related cost (Waddock et al., 2002 cited by Clement 2005; Andric et al., 2012). The reactive side involves fines imposed to stakeholders for environmental law violations; for instance, damping fines and the proactive side is where the stakeholders invest in minimizing or preventing waste, eco designing and production and use of full cost environmental accounting of any ongoing processes (Jansson et al., 2012). These stakeholders may include:

- The SW employees: they are crucial as they act as the pillar of the organization objectives and vision. This reflects mostly due to their strategic position in connecting the service provider and the service receiver as part of the internal stakeholders (Mitchell et al., 1997). In offering SW service the municipal government achieve these goals through their semi and permanent employee (Henry et al., 2006). Perhaps these are the basis on which Ramus (2005) held strongly that they poses power to decide actions that affect the organizational activities and image but not vice-versa as they represent and functions on behalf of the firm. Therefore, for the success of goal, vision and objectives, it is a must that the employee's awareness salience in SWM decision making is recognized and exercised (Alvarez-Gil et al., 2007). This may be achieved through on job or outside training and seminars.
- Choe, (1999) and Tadesse et al., (2008) accredit household and residential areas to illegal dumping as they contribute high percentage of SW. The dumping behaviour develops in the instances of unawareness and or at the same time possessing a negative attitude in SWM (Parrot et al., 2006). But Jones et al., (2010) maintains that they are aware but resisting to comply with most unwilling to pay for SWM services and result to self incineration (ISWA, 2002), whether knowing, ignoring their awareness in the SWM system is most important based on their strategic position as they hold attribute of power in determining the destination of products between recycling and dumping (Tadesse et al., 2008).
- Adding to the lists of waste generators, Jabril et al., (2012) and Maldonado (2006) focuses on public and private institutions. These could range from educational, health, recreational, religious and other service rendering institutions depending on one area to another. These literatures hold the views that institution contribution is ideal in providing a showcase for SW reduction and avoidance. Some them such as, educational institution are similar to small towns based on their large size, population and wide range of activities taking place within them (Alshuwaikhat & Abubakar, 2008). In the occurrence of such activities waste is generated. This poses an environmental and health hazard if no system put in place for handling SW (Jabril et al., 2012). In studies conducted by Maldonado, (2006) and Mbuligwe, 2004) from the institution in Mexico and in Tanzania the authors found out that the SW generated was overwhelming since the institutions lacked SWM systems in place. Nemathaga et al., (2008); Karamouz et al., (2006) and Kumar et al., (2009) while researching on health institution, similarly maintained that institution contribution in SWM crucial but goes without noticing in most developing countries. The waste generated by these health institutions was found existing in two forms, that is; toxic and non toxic. These originated from activities such as; diagnosis, treatment and immunization of human and animals (WHO, 2000). This wastes are an increasing problem that have detrimental effect on environment and human health when in contact either directly and

indirect. But though the World Bank (1999) had earlier maintained the toxic waste should have a different avenue of disposal other than in the MSW disposal avenue, Karamouz et al., (2006) and Kumar et al., (2009) in a study held in Iran and Indian health institutions found that this was not the case as waste separation system does not exist in this premises. This could have been caused by the lack of toxic disposal infrastructures, awareness on the impact or maybe evasion of charges incurred during disposal of toxic waste.

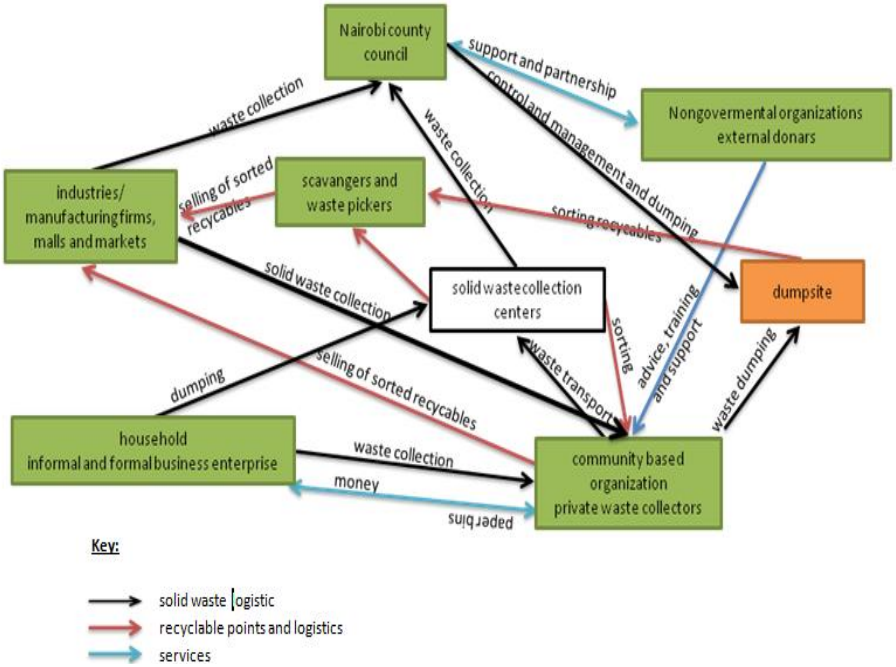
- Lastly, as the population in these countries increases the people who can no longer find employment in multi private and public enterprises usually result to entrepreneur as traders and small and medium scale businesses (Mccormick, 1999). Muraya, (2004) claims the eruption of SMEs is unregulated which conceivably make it easy for operators to enter as the scale of operation is low and requires no formal education. Unlike Mccormick, (1999) and Muraya, (2004) who insist that these small entrepreneurs and traders are important in a growing economy, Redmond et al., (2008) and Begum et al., (2007) differ as they view them as being unstable as they are irresponsible, unwilling to cooperate, lacks infrastructures and resources for SWM. However, financial constrain and challenges force most of them to depend on recycling of materials privately, individually or groups as they sort waste collected from households, collection centres and dumping sites for their livelihood and assisting in (Medina, 2002; UNEP, 2003). Johannes et al. (2012) reveal how involvement benefits these groups in transforming negative attitude and perception. From a research in Philippines the Authors embarked on the training and awareness attempting to put a message across that their contribution in SWM system is essential. These actions had positive result as these groups resulted to waste ownership, responsible behaviour and spreading awareness to other stakeholders. Therefore, this clearly demonstrates that negative attitude and perception towards waste is among the main standing blocks for the SWM system (Medina, 2000; Wilson et al., 2006). In summary, it could be claimed that the success of a sustainable SWM system depends on the degree to which the served stakeholders identifies with, takes ownership and are committed to the SWM system.

4 NAIROBI COUNTY SOLID WASTE MANAGEMENT SYSTEMS

The purpose of this chapter is to establish the current SW situation in Nairobi based on the secondary data and leanly relying on the primary data for verification and additional. In addition the use of this data was to understand the current SWM system strength or weakness and further avoid repetition of what has already been done.

4.1 Current Solid Waste management

The current SWM system in Nairobi may be described in a diagram as below.



Flowchart 1: Current SWM flow in the County of Nairobi

The management of SW is under the county environment department chaired by the environmental director. The department has further been subdivided in to two that is the environmental management and the solid waste management departments with each having jurisdiction in task management.

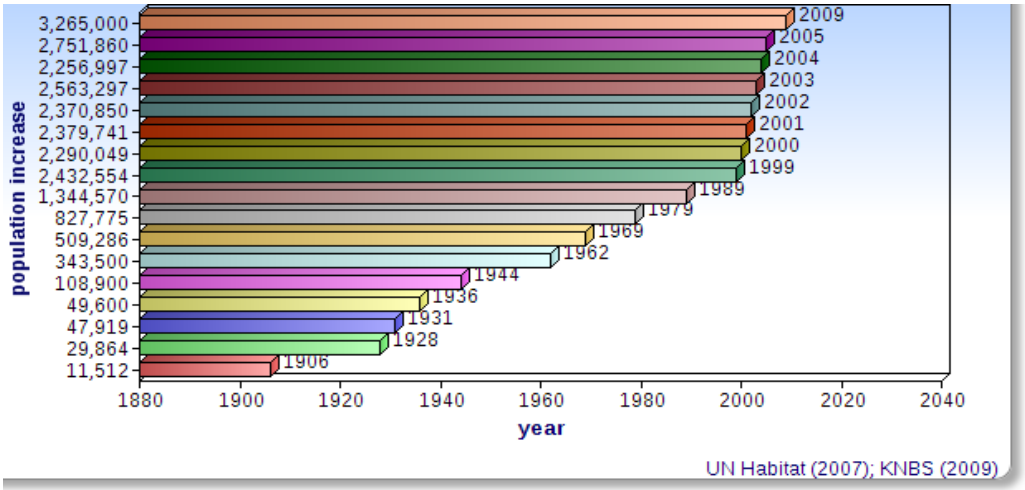
Under the current systems the SW department is further subdivided into sub counties or ward office each office controlled by the SW field supervisor whose major task are ensure the ward office is focused towards the achievement of the laid vision. Other duties include the management and overseeing supervision of the SW collection and transportation from the estates to the dumping site with the assistance from SW field employees. Further, They also ensures a daily streets and estate cleaning are done through and also organizes the monthly cleanups within their ward in mobilizing stakeholders within the ward on volunteering basis. The city SW vision is to deliver a waste free city in supporting and mainstreaming of the environment and climate change into planning in order to attain the envisaged goal of sustainable development (SD) of Vision 2030. It is worth noting that the SW department is not responsible in clearing blocked roadside water runaway trenches but it is under the responsibility of the ward environment department to clear and pile the waste together and inform the SW ward offices for collection. Further, the responsibility of enforcing illegal dumping bylaws is under the ward inspectorate and not the department of SW wards offices.

In order to offer service to diverse wards the county undertakes the outsourcing of the waste collection and transportation to the private SW handlers currently over fifty in number (standard newspaper 21st march 2014) selected from a tendering exercise (Losai management limited, 2011). Even though their involvement in the waste system began in the 1980s (RIA COMESA and the UNEP project 2009) the situation has continued to deteriorate as different factors arises and challenges the system. Due to these challenges another group of stakeholders emerge in order to assist the Nairobi SWM system. This group of stakeholders include the scavengers, the civil society goups and private waste handlers who are either solely or in partnership with the county government (Tibaijuki, 2007; Takahirwa et al., 2013). Their core task is to collect waste from households and traders then transport it into the collection centres (Henry et al., 2006; Marshall & Farahbakhsh, 2013). The groups embark to sorting processes and assist to load the remainder of the waste in trucks for transportation or sometimes discard it through open incinerations (UNEP, 2003).

4.2 Factors Affecting the SWM System in the Nairobi

4.2.1 Human settlement

The 2009 population census showed the population density of Nairobi to 3 million inhabitants (UN Habitat, 2009; Kenya census, 2009) with a total household of 985,000. Similar to other cities in the world, the figures have multiplied since first recorded in 1906 shortly after the establishment of city as the bar-graph below shows

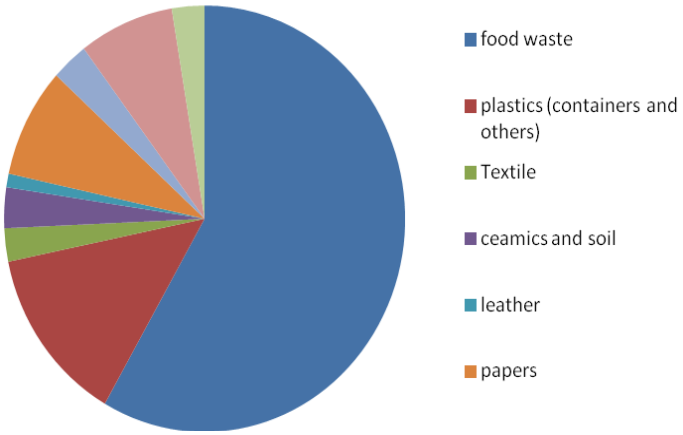


Bar graph 1: Population of Nairobi county 1906-2009

It is estimated that 60% of the city population live in slums informally constructed and without planning. This happens as the population increase and people are not in a position to find appropriate housing and employment, hence, these informal structures serve both as residential and small business enterprises (Gulis et al., 2003). This literature further claims that there is neither garbage bins nor the cleaning infrastructure existing in these areas which makes the situation deplorable and a health risk. This unplanned construction has resulted to the congestion triggering the hardship in SW collection from these estates leaving the only option for waste transportation to: human drawn carts, barrows and human backs as garbage truck have no access (Tibaijuki, 2007).

4.2.2 Nature of Solid Waste in the County

In a research Funded by JICA (1998), it was estimated that a total 1530 tons of waste per day was generated, of which more than 60% was from households (domestic waste) and from 6road side traders and entrepreneurs which is usually organic. Given that the population at that time was over 2 million they gave an average per capita residential waste generation of 0.60 Kilogram per person per day. As the population increased the per capita waste generation also increased, for instance, in 2004 it was estimated that 2400 tons of SW was generated per day (Bahri, 2005). With the city current population the nature and the volume of SW is overwhelming. Rating by the nature of waste generated volumes, the domestic and commercial waste takes 70% of the total waste generated and industrial takes the remaining percentage (UNEP/NEMA, 2003 Ngau & Kahiu, 2009). According to other literatures, the nature of waste can be described using a pie chart and a table as below;



Pie chart 1: waste composition in Nairobi Kenya -JICA 1998

Waste category	High population density zones	Medium population density Zones	Low population density zones	Capital centre the (CBD area)
Putrescibles	64 %	64%	57%	53%
Plastics	14%	13%	16%	23%
Leather and textile	12%	6%	4%	8%
In-organic (metal , glass and others)	8%	8%	11%	3%
Papers	6%	9%	12%	23%

Table 1; Waste composition in Nairobi Kenya Sources: (Allison & Harro von Blottnitz, 2009; UNEP and UN-Habitat, 2007; Henry et al., 2006)

From the figures above it can be established that the putrescibles/food waste form huge part of the MSW composition. This waste containing organic matter capable of being decomposed by microorganisms and of such a character and proportion as to cause obnoxious odours as its moisture content is high and could easily attract birds, animals (Allison & Harro von Blottnitz, 2009). This type of waste is also highly degradable and can easily be transformed into organic manure. It is also notable that low population density areas have high percentage of plastics waste compared to the high population density zone. The difference could be that in high density areas packaging is of small quantity and goods packaged in thin plastic bags (Allison & Harro von Blottnitz, 2009). Another fact could be that the plastics bags are offered as an after sale service by supermarkets and shopping outlets to consumers which might rise in high density area. Perhaps this could be the grounds Njeru (2006) relied on in placing plastics waste as a major threat in the city of Nairobi, with 24 million plastics bags used on monthly basis. Reasonably this explains a huge

percentage of bags that are not recycled nor disposed properly being evident blocking the trenches and spreading on open field. This must have been the observation behind the views from KNCPC (2006) after they recommended to the city that the manufacturers, shopping malls, outlet and consumers be involved in the SWM decision making. Finally, it can be observed that waste papers seem to be in high percent in the capital area which could be attached to office establishment in the central business district capital area compared to other residential zones (Khamala & Alex, 2013).

4.2.3 Governance in Environmental Law

Governance issues in environment protection includes policy instruments such as legislation, rules, procedures and the development of an enabling environment where product are designed in an eco friendly manner to allow the uptake of the 3R concept. In Nairobi the laws governing MSW exist in the national environmental management association (NEMA). This body is committed to the initiative directing stakeholders, particularly manufacturers and dealers to join hand in waste reduction through eco friendly production. To enforce this initiative NEMA establishes the provisions in the Act that deals with parties failing to comply, known as the *polluter pays principle*. In these Act the manufacturers and dealers pays for the impacts that their product cause to environment. The Act also provides guide lines and discourages open uncontrolled waste incinerations. Further, in accordance with the environmental management and coordination Act, the body calls on the counties environment committees, manufacturers and garbage handlers to leadership provision in the implementation and enforcing the plan of action on the SW situation. However, this is not the case as Henry et al., (2006) and Marshall & Farahbakhsh (2013) maintains that, these Act and by-laws have been rendered ineffectual as they have been ignored. In addition, the department mandated to oversee this Act enforcement lacks manpower, skills, and mostly the stakeholder is not willing to comply. For example, eco production is not effective as low quality product find their way in the market despite the existence of Kenya bureau of standard (Ngau & Harro von Blottnitz, 2010).

4.2.4 Stakeholder Perception and Attitude

The perception of "not in my backyard" (NIMBY) affects the management of waste in Nairobi (Marshall & Farahbakhsh, 2013) as a result of the stakeholders pushing waste away to trenches and roadside (Daily Nation newspaper 19th Aug, 2013). This unsustainable behaviour has escalated the SWM problems as these stakeholders perceive and delegates waste management to be the responsibility of the county government (Ngau & Harro von Blottnitz, 2010). This assumption is mostly held by SMEs, road traders and the residential on the claims that they pay for business licences, rent and operational charges to the county and therefore need not to pay for waste management. Earlier findings found out that the stakeholder's mindset was constructed on a negative attitude with supposition that reuse and recycle

waste belong to the low class citizens (Ngau & Harro von Blottnitz, 2010). It created an environment where response and views towards SW and waste handlers was negative (Takahirwa et al., 2013) as a result promoted increase in illegal dumping. This mindset might have been caused by the stakeholders unfamiliar with what they pay for or they purposely reject SWM responsibility to escape the cost and fee charged by the civil society groups and private waste handlers in SWM. It can therefore be avowed that stakeholders perception/attitude especially (Households and SMEs) has influenced not only the characteristics of waste generation, but also the effective demand for waste collection services in the county, such as their interest and willingness to pay for collection services (Marshall & Farahbakhsh, 2013).

4.2.5 Handling Skills and Infrastructures

Infrastructures, tools and skills are important device in determining the effectiveness of stakeholder's involvements (JICA 1998, Bahri, 2005). The UNEP, (2009) and Henry et al., (2006) attached SWM skills, tools and infrastructures challenge to the increase of SW mostly found disposed. Other literatures also revealed that the waste handlers usually manage waste without adequate skills and knowledge on the type, importance and hazard associated with the SW they handle (Takahirwa et al., 2013; Marshall & Farahbakhsh, 2013). In addition, other claims raised were that the county SWM system lacks basic infrastructures such as accessible roads, garbage trucks and waste disposal sites. It is obvious that these are a major catalyst in the huge amount of SW left uncollected and for a long time (Gulis et al., 2003) or the increase in illegal dumping (UNEP/NEMA, 2003). The lack of handling skills and infrastructures might results to surfacing of low level of confidence among stakeholders questioning the ability of the county SWM systems (Ngau & Kahiu, 2009).

5 FINDINGS

This chapter summarises the information obtained from the interviews that comprised of open ended semi structured questionnaire which was grouped into three classes so to fulfil the aim of this paper. Two of which will be discussed in these chapter and the third one will be discussed in chapter 6. All the quotes presented in this chapter are excerpts from the interview transcriptions from the data collection. The first grouping of response obtained gave answers to the first research question that attempted to find out how stakeholders are involved in SWM systems. The second grouping of responses answering the second research question was classified into four main parts that were arrived at after the analysis of the data on the areas the stakeholders stressed on as the main challenge for the SWM system in Nairobi county and the researcher observations. These parts includes; trust and confidence, communication and channels, responsibility and commitment and finally skills knowledge and infrastructures in solid waste management.

RQ1: *How are stakeholders involved in SWM decision making processes in Nairobi county?*

From the research it was clear that the only instance that almost all stakeholders within the county are involved or made aware in SWM is the monthly cleanups. Some of them (the majority being the community) participate besides the civil society groups and the county SW ward employees. While focusing on the civil society groups involvements in SWM decision making processes, it was noted that only in Embakasi South area that the groups were well involved especially the planning of the monthly clean ups and collaborating with the sub county SW office in the awareness campaigns. This was done through the mind mapping planning meeting held at the Embakasi SW ward offices chaired by the wards SW supervisors in which the researcher was in attendance.

Although other NGOs exist in the county, for instance, the Prestige Green Award (PGA) under the Kenya ministry of environment, Small Grant program US-AID and the United Nations development program (the global environment

facility) only JICA international was fully involved in the cleanups, training, awareness campaigns and developing strategies on SWM. It was exhibited that neither the ward supervisors nor the civil society had knowledge of other organization existing, though the organization stated that they announce of their activities and invite project proposals different groups and individuals practicing sustainable actions and protecting the environment for financial support and funding on national newspapers and radio stations. In addition, out of the four constituencies researched it was only in Kibra constituency that JICA activities and presence was evident through their partnership with the civil society groups and the other stakeholders, for instance Schools in SW awareness campaign and provision of SW handling tools. However, beside Kibra constituency having 5 different civil society groups only one group, that is; Erics Foundation was favoured and supported by JICA in cooperation with and the Kibra division SW ward office.

County employees were partly found involved in the decision making process through seminars and memos sent to them on periodic intervals although as it will be shown later this has been faced with various challenges.

Despite factors that will be discussed later down commitment from some of the stakeholders was noted. First, the county was found to stand firm with the ongoing monthly cleanups which are compulsory at least in each of the 18 constituencies within. Second, the county has committed to train and educate its employee on SW and environmental issues in cooperation with Japan governments where selected one or two employee undergo training in Japan for a period of 3-4 months. Currently it was found out of 2000 employees in the SW department, less than 20 employees have undergone training abroad. Also, on the 19th march 2014 the county through the Governor unveiled 19 new trucks to assist in waste transportation on a 24H basis. In dealing with unscrupulous private contractors the county revoked 54 private waste contractors functioning around the capital area contracts as they were replaced by county own trucks.

The civil society were found committed to the system, although, they maintained it was their source of living. They were found to offer waste bags to their client free of charge and were committed to collecting the waste from clients without delay. Some of the civil society groups have automated their offices and were found to possess skills in handling SW acquired from Swedish SWM system and from JICA. Unlike others, the Kayole environment association were found to be experienced and skilful having the up to date technology where the waste they collect from their clients is used without wastage at a 100% for the production of variety of product such as, bio fuels, mattresses and organic manure which they even exports.

RQ2: *What are the hindrances of stakeholder's involvement?*

5.1 Trust

From the findings it was strongly evident that SWM is highly affected by the level of trust and confidence existence between stakeholders and the county government. Mostly stakeholders possess less confidence on theward SW offices ability in managing and solving the menace connected waste. This was noted as some entrepreneurs opted to contact the Nairobi county government headquarters for assistance and viewed the ward SW office in a local term "*TASA"* translating to "*IMPOTENT*". For example, one business man who has been an area former elected Counsellor in the former Nairobi city council run a business meter from the SW ward office but he opted to contact the headquarters (City Hall) in solving and trying to close down an illegal dump site next to his business premise citing he has no confidence on the ward SW office in the area. Similar case was witnessed where JICA international opted to contact the headquarters on their awareness campaign held at one of the learning institution while the local SW ward office had no idea of what was taking place.

Another area where trust was found lacking is in the selection and pilot testing program of JICA in partnership with county government as tension was evident between them and other civil society groups in Kibra. Some of the civil society groups claimed that the exercise was opaque as they are left out of the involvement in the SWM systems as one group is taken into consideration (Erics foundation). The tension has mounted to the point that in one group discussion held a participant claimed;

> *"if it happen we spot the JICA vehicle driving this area the reaction will be stoning and burning it"* further statement for instance "*we can never rely on the ward SW office to offer services because they are selective and will never consider our contribution as their view toward us is negative, that is, illiterate and criminals*".

In the same group discussion it became clear that most of these groups are not expecting any future partnership with COUNTY and JICA. Moreover, lack of trust was highly exposed especially in the situations where the ward SW field employee was present as most of these individual/group discussion participants were seen to withhold information.

Further, tension was found to exist between the civil society groups especially in Kibra area as war of words and occasional confrontation with each other was experienced. The groups seem to accuse each other of client hunting especially all groups seems to ally themselves against Eric's foundation group. The group professed they can never agree or partner with each other. These actions were found to affect the social and institutional trust lacks in which business premises, household and the community as they disapproved some of the civil society terming them as criminals.

On the county SWM capabilities most stakeholders held strongly that the system has collapsed and might never be relied on. The stakeholders felt the

county has failed to manage their internal affairs especially due to the increase of the county waste handlers downing their tools in protest, leaving the stakeholders to find other solutions in managing waste. Likewise the county trust on the other stakeholder for instance the community and the traders was found to be wobbly as they claimed unless force is used their cooperation can never be achieved. In addition the trust breakdown has been witnessed as the county claimed during the monthly cleanups most participants takes away/steal away the tools that they are offered during the exercise leaving the county government to purchase new tools. Supporting this claims some observation was made during the research as we were transporting some of the cleanup tools from one ward to another on an open van and it could not be left an attended as the onlookers were waiting for the opportunity to offload the van and steal away and sell the equipments.

Mistrust of the system capabilities was mostly seen to be highly influenced by skills, knowledge, infrastructures, and handling tools deficiency as the response from the interviews in one accord claimed the system have let them down with waste remaining for a long time without collection which causes odour in the area. While responding to this claim the county acknowledged this and stated that it was the reason they relied on the private waste handlers and contractors. But interestingly even though this was the case trust between them was found to be fading away as the county field supervisor's stated that these private waste handlers dump waste illegally and are responsible for waste scattering in the streets of Nairobi. The private sector demonstrated that they have to be monitored during collection and dumping for they usually throw away waste in order to have time to collect more as payment is based on how many times they transport waste from estates and the Nairobi central business district. Finally trust and confidence are in a test between the internal stakeholders and the management as it was exhibited. The SWM staff had less trust and confidence on the current management citing accumulated salary arrears. During the research, this was visible as a strike lasting for a week was ongoing leaving the waste to accumulate as also the protesting striking workers were involved in scattering waste on the street.

5.2 Solid Waste Responsibility

The slogan "NIMBY" from stakeholders manifested through the mass of waste found dumped on the roadside, railway lines, trenches, pavements, corners and open field in the county. According to the SW ward supervisors

> *"Especially the household and the SMEs stakeholders are mostly responsible for the situation as they pack waste on smart plastic bags and leave the bags on bus stops and railway lines grounds early in the morning as they go to daily chores or during the night".*

Supporting these claims the civil society groups similarly revealed more stating

> *"The problem is worsened when the households and SMEs and traders pay the street boys to dump waste as far from their premises so to escape charges charged during collection of waste or at the collection centres".*

However, some of the area were found to slowly overturning this behaviour as the Embakasi area SW field supervisor testified that they began to partner with the area civil society groups to eliminate the street boys and families activities. This as the supervisor claimed was to encourage monitoring of the streets revealing the illegal dumpers. This is achieved through as SW ward supervisor claimed

> *"When the groups get hold of a street boys dumping waste they compel them to reveal the source of waste. After this revelation together with the inspectorate department when applicable they enforce fine to the stakeholder responsible for illegal dumping who are mostly households and traders*".

On these claims the roadside traders and SMEs claimed they pay for the services to the county through daily licenses, rent and taxes and therefore needed not to pay more charges. This attitude has facilitated the pushing away of waste as they avoid fines and arrests. They push waste on roadside, trenches and walking paths as it will be shown in the appendices through a photo taken during the research. However as investigated, the sugar cane vendors selling sugarcanes in a perambulate style are not taken into consideration in the system as responsible for increase in dirty streets and illegal dumping. These traders were found to be irresponsible as organic sugar cane (chuffs/pills) wastes were found on high concentration on the streets and roadsides. According to some of their customers the vendors are supposed to offer an extra plastic paper to their customers to pack the chuff after cane consumption which was found not to be the case as sugarcane consumers disposed waste on the move. Further, in the process of attempting to identify the source of the SW illegally dumped on corners and roadside, I engaged in the process of sorting. It was found out that the source of waste is traceable since it comprised of receipt and packages specifically found on certain nearby shops (green grocers, tailors, hotels, boutique saloon and beauty). Plastic bottles and plastic bags were also found to possess the contact info for their source. Some of them identified in large quantity were:-

- Off-cuts from fabrics originating from nearby tailors
- Fruits and vegetable from nearby roadside traders
- Dasani bottles- a product of the Coca-Cola Company
- Afia fruits drinks bottles and plastics- a product of the Kevian K. Limited
- Aberdares and Mt Kilimajaro drinking water bottles
- Star pop drinking bottles
- Daima water drinking bottles by Sameer Agricultural and Livestock Ltd
- Faris water drinking bottles by Farris enterprise
- Uchumi plastic bags a product of Uchumi supermarket
- Ukwala plastic bags a product of Ukwala supermarket
- Tuskys plastic bags a product of Tuskys supermarket
- Others were from bread pack and newspaper waste

It was also clear that the plastic manufacturing industries purchases back only high quality papers and plastics leaving multitude of under quality plastics which are either locally produced or imported to scatter all over.

Another silent group was found lacking responsibility contributing to waste papers increase on the streets, are the advertisers as they mount posters on walls and posts without ever taking their poster away even after expiry of the advertised function. These advertisers included traditional practitioners (herbal doctors), politicians, churches advertising open air meeting and others. On many occasions as it will be shown on the appendices through photo taken during the research it is the county employees who tear the ads down and burn them. The one common similarity found from these ads was that the source could easily be traced since most of them displayed contact addresses and most of them were known individual who could be held responsible. Finally on a positive note it was discovered that the attitude of "NIMBY" amongst stakeholders is gradually overturning as they are slowly appreciating waste responsibility as the county commit to compulsory monthly cleanups held as the main theme of the cleanups is **"My waste my responsibility**" printed on T-shirts and caps offered to participants. Although faced with hardship, most of them especially the civil society groups and the SW ward office employee were optimistic of the future SW responsibility.

5.3 Commitment of the Stakeholder

Several factors were found to affect the commitment of stakeholders to the county SW system these includes;-

- First, the exclusion of some stakeholders from the county SW decision making systems, for instance, (health, learning, religious and public administration) institutions affected the commitment as their contribution in SW generation is not considered. It was discovered these institutions uses pit waste disposal where a pit is dug or a certain corner is designated for waste disposal and later burnt. Moreover, most of these institutions are unfenced which make it easy for the illegal dumpers to find their way in these pit disposal site dumping their waste to the existing garbage as claimed by some education institutions principles. It was also discovered that most employees in these institutions were unwilling to commit to the system but in turn opted to self incinerate the waste.
- Low or lack of quality handling tools amongst the county SW employee as most of the tools are substandard lasting only for a short time. It was discovered most of these tools lay broken waste in store. The same issue was found from the civil society groups and hindered their operation as evident for most operate without protective garments especially the civil society groups except for three groups, that is, the Eric foundation who receive tools from JICA, Kibra youth association and the Kayole environment association whom purchase their own tools. As they claimed

  "sorting the waste is a problem as it is not efficiently done because the composition is unpredictable as sometimes there are toxic and sharp objects from households waste and health centres"
- Except for the Kayole environment association other civil society similarly encountered market limitation on the sorted recyclables and the organic

they claimed extortion from the scrap metals and plastics middlemen who buy at cheaper prices and when they take the product directly to the manufacturing companies' they refusal to purchase.

- Negative perception on waste and waste handler was found to highly affect the civil society commitment as households and business sector view them as criminals, poor and treat them harshly especially when charged for SWM as most of them were unwilling to pay for the service.
- Delay in collection of waste from the collection centres had an influence on the stakeholder commitment as some of the household, traders and SMEs showed no interest in paying for the service as the waste is not collected on time and sometimes lay in estates open air collection centre for weeks thus being blown away and spread by wind, scavengers and animals and birds. Furthermore it was found to cause an odour as a result of moisture content usually caused by rainfall and the hot sunshine which made the area sting. Mostly this was found to be caused by the private contractors mandated to offer the service breaking down as their trucks were found to be un-roadworthy and breaking down occasionally on the streets and dumping site. It was clear that their commitment towards SWM was not based on the desire for a clean environment but for economic purposes basing on the shape and condition of their garbage trucks. Furthermore it was found insufficient bins, size, distribution and emptying intervals on the street of Nairobi caused waste to spread as street users claimed the bins were too far apart, small in size and at times full to capacity as they were not equivalent to the population in the city street such that waste overflow.
- Handling skills and separation knowledge was found to affect the commitment of the stakeholders. For instance the civil society groups were unfamiliar with how to handle certain waste and only sorted on waste they thought was beneficial to them according to the market availability. Due to this it was noted the left over waste could still be sorted as it contained newspapers, other office stationary and materials that could be remanufactured. The same case the household possessed no skills in separation as they were found to mix the waste despite being supplied with different waste bags by the civil society groups as most of them saw no use of sorting as waste will end up in the same collection centres.
- On the side of the county SW employee it was clear that lack of enough manpower in the SW department affected their commitment as this was found to cause some of them be assigned large areas beyond their capability for instance street sweepers and field SW supervisors and employees. Additionally lack of logistic modes for the field employees within the estate the field forced them to walk long distances in their daily SW supervision some time up to 10 KM per day as one supervisor responded. This was found to be tiresome and security risk. Office space, stationary and office equipments in the SW ward offices were crowned as a "motivation killer" for they were not up to the standards. Most of the wards lacked an office space and when available lacked storage facility for the waste handling

tools. These tools were found to be dusty as most of them are used during cleanups and are never cleaned after use most of them hanging on ceiling. Other challenges noted were;

- Employee purchased stationary without a refund as the county did not offer as orders placed are never delivered.
- Lack of proper filling and electronics such as computer and printers in these offices complicated the matter as crucial information was mounted on the office walls.
- Delayed payment and salary arrears from the county to their SWM employees were highly affecting their mundane as workers strikes with workers demanding their right was on high alert. They claimed the management has let them down as their agreement on job environment improvements, salary and arrears were not honoured by the management.

- Communication breakdown between stakeholders and within the county was found to influence negatively their commitment. Specifically communication between the county environmental office at the county hall and the wards SW offices, the staff claims the communication between them is low and many instances they are strained to function in emergency due to information flow channel delay. Further, the employees claim the channel is too long as there is no direct contact to the county management as any information sharing may be altered at different stages. Not only has commitment been affected by communications channels to the SW employees but also to their supervisors as it was found especially that the existing mode of communication was through **memos and mobile short messaging services (SMS**). These modes are normally used to invite them for a SW seminar or cleanup exercises which generally was found to delay or meet them unprepared. This is as one field supervisor maintained;

  "Sometimes you are invited to a compulsory meeting without prior notice which make us to cancel important things and sometimes we lack bus fare in which we have to borrow from somewhere and we pay later. This brings down the mundane in the working environment. Sometimes we have planned out weekend with different function only to be informed on Friday afternoon that there is a compulsory seminar that we have to attend. Also the environment director office usually communicates, but the Memo delays in the office until the last day and sometimes we have to call and ask for ourselves." This also happened during the research as the supervisor in one area had to ask for a memo two days to the monthly clean-up exercise in the area.

Other discovery on communication breakdown leading to less commitment in the SWM systems within the county was inter departmental information flow. The information circulation between the environment/SW wards department and the inspectorate, where most of the time they fail to support the field supervisors in cases where they arrest an illegal dumper. According to the SW supervisor in Kibra area, this destroys their commitment as they are left to watch the situation deteriorate as they alone cannot enforce a law. For this he claims

"We are forced to release the culprit in fear of being stoned by the suspect relatives and idlers who wait for such an opportunity. Sometimes we usually request for backup from the inspectorate which never comes".

But in their defence according to the department they claimed they receive such request but they have few officers and therefore, they cannot control the county at it entity. This was exhibited during the research when persons were cornered burning waste as it will be shown in the appendices but as field officers we were not in a position to influence as we too ignored the situation. Another example of communication breakdown found was that, the environment department at the county hall withheld crucial information for instance, in one of the SW campaign and involvement at Kibra schools by JICA and Eric's foundation, it was found that the activities dates and info were relayed to county hall well in advance so that they prepare and send a representative from their ward SW office in the awareness campaign. Unfortunately, the information was detained and the ward office at Kibra had no information whatsoever of such an event. The ward office knew of the function after spotting the JICA van parked near a school entrance and desired to inquire from them. Other information found to be withheld at the county hall was concerning the monthly cleanups. Wards are required to submit their request in advance to create time for tools and invitation letters to stakeholders detached. Instead it was evident that these invitation letters delays and usually leads to the wards lateness in inviting local companies and schools to participate. At one occasion the planning committee including the researcher in Embakasi area had to deep in their pocket (*which was later learnt it was not refundable*) to sponsor a cleanup that was occasioned to occur two days prior to the planning meeting as there was no time to invite other stakeholders. If in such an occasion was planned early in advance it was found out that Nairobi county is home to huge national and international organization such as the Coca Cola, Pepsi, and other soft drinks companies, hyper and super markets whom if communicated and information passed most of them claimed they could donate beverages and snacks. Not only that, they claimed they could also take part in the cleanups. But due to invitation delay, in most cases they ignore because such gesture of corporate responsibility follow a certain protocol. Interestingly, it was discovered that these letters are usually pre-printed and prepared in advance but delay in supply awaiting governor's signature.

RQ3: What can be done to eliminate these hindrances from the Nairobi county SWM systems?

Stakeholders offered different opinions on what needed to be put in place for the SWM system to flow efficiently they include;

The civil society groups: Equal treatments, transparency and information sharing was a suggestion to the SW ward offices for a sustainable SWM system. As for their incompetence and handling tools challenge the group request the county for support in training and offering the necessary required information on SW. Apart from this the group suggested working in partnership with the county for instance, most of them suggested they be offered with county working overall with an inscription as a sign of partnership of which they similarly agreed could eliminate distrust and negative perception issues for they will be viewed and feel to be part of the county SWM system. Apart from these they claimed to be in knowledge of the dumpers within the estates and the street boys who are paid to dump waste elsewhere. The groups claimed if they were entrusted with the mandate of monitoring and controlling some of the area the groups profess the situation would take a turn around. Further, the Kayole environmental and Kibra youths associations claimed they possess knowledge of how thing are done in other developed countries for instance Sweden and therefore they are in a position to assist in idea generation. One of the most important arguments was when one group suggested

> *"The county could construct an underground go-down in a designated area where SW collected is taken. And instead of some of the civil society groups relying on the collection charges they could be employed in those go-downs to sort waste using a conveyor belt for easier sorting. Furthermore, every estate should have at least one go-down as the county have spaces that lay waste and it is the reason waste is dumped in those spaces because they are free. This not only creates employment but also it protects the environment as waste should be kept under certain temperature which is internationally accepted".*

Kibra youth suggested urgency in negative attitude towards them by the county employees and be viewed as system partners and not as criminals and illiterate. These arguments were fully supported by the Kayole environment association as they added they are highly skilled, possessing the latest SW handling technology. Additionally, they are in a position to educate other stakeholders and training them on ways to handle waste and maximise it use turning it from waste to gold 100%. For these to be effective, the groups maintained it is only the county that that has the ability to mediating and linking all civil society groups, SMEs and the public.

The county employees: at the time the research was in progress the county had already planned to introduce a bill in the county assembly seeking to ban the use of plastics bags in the county and further introduce a monthly fee of KSH 100 for waste management to all stakeholders. In addition there were plans to purchase more garbage trucks to assist in waste transportation as they had recognized it as a hindrance toward future SWM system. For the efficiency

in collection and transportation of waste the field supervisors maintained that if each ward is assigned with own truck on a daily basis and they are given the responsibility of controlling the routes no waste can be found lying on the estates. In addition, if they are offered support from the inspectorate and provincial administrators in enforcing the dumping and incineration law the entire field will have a turn around these as they attested

> "*The county have one of the most ignorant households and the only way to enforce the law is sometimes using force through arrest and fines many times mere talk bears no fruit*"

- They also claimed they need to be involved in the procurement of tools and offer suggestion since most of the tools lay in offices broken. Others suggestion included
- Offer transportation means for the field employees within the estates for efficient monitoring
- The channel of communication to their superior to be easily accessible and information to be passed earlier enough which could be done if SW offices were equip with required stationary, storage and equipment for them to resemble their function.
- Honouring the agreement for instance on salaries and they could be offered with risk allowances.
- Finally, training on upgraded SW handling techniques and when offered as the dumpsite manager claimed

  > *"The County use resources in training us abroad but on the contrary we are not given an opportunity to share what we learnt or put it use, in the future we need to sit down together and learn from one another".*

The business sector, traders and households: they viewed SWM charges to be the responsibility of their landlords since almost all of them operate and live on rented premises and residential areas. Few of them whom were engaged in a group discussion were in agreement that the premises owners offer no facilities, channel nor space where waste could be stored. Those who paid for the service were also loosing trust as they added the SW collection need to be done on time otherwise things could worsen in the future as many will not pay. Because of the current financial situation they claimed the rent, daily operation permit and licences were high enough to incorporate the SWM fee if this was the case they were willing to support the system. If the SWM system is to be effective they suggested future interactions and cooperation with county through training, workshop, seminars in planning the system. Likewise the roadside traders envisioned cleaner streets as one vendor claimed

> *"this is only possible if garbage bins are installed permanently or brought on a daily basis at designated places and the responsibility of monitoring the bin be given to the business establishments next to the bin so to avoid them being vandalized by scrap metal and plastic dealers."*

6 DISCUSSIONS

The aim of this thesis was to show how stakeholders networking can be employed as a tool for efficient waste management using Nairobi as a case study where currently SW is currently a dilemma. The research questions directed to establish how the stakeholders are involved in SWM in Nairobi Kenya and further understand the hindrances to stakeholder's involvement and the third question on how they could be eliminated is further discussed in this chapter. In order to provide answers for the research questions the study first investigated the background information of the SW related problems in the county. The outcome of this research showed major factors that directly influence the involvement in implementing a sustainable SWM system within Nairobi are trust, responsibility and commitment which also include factors for instance, information sharing and communication. Each of these was found to affect stakeholders directly in the city SWM system functionality.

6.1 Trust and Responsibility

Organization that has a culture based on trust is responsible, collaboration and its firm in its objectives have a higher stakeholder's involvement (Evans & Cowles, 1990; Beslin & Reddin, 2004; Loosemore, 2010). A SWM organization that does not have a culture of involvement will have to recognize the need to plan for stakeholders involvement programs within the implementation and decision making process in SWM. The findings exhibited that majority proportion of the stakeholders in Nairobi County are not fully or not willing to be involved in the daily SWM decision making processes. It was found they failed to trust the current system capability in service delivery, due to past and present events which occurred when the city was under Nairobi City Council and now under Nairobi City County. It was marred with corruption, brutality and stakeholder's extortion, delayed waste collection, lack of tools manpower and skills, infrastructure challenges, employee strikes and non functioning departments. But though, the current county government have attempted to regain back a good image, except for the corruption, brutality and stakeholders extortion which no longer exist others are still evident, (Berkun, 2005). Further, it showed trust breakdown is also affecting the relationships between

stakeholders within the county that can be classified as a social factor and is a significant explanatory parameter connecting perceptions and effectiveness.

Strong statist culture was revealed, as waste management is regarded solely as the responsibility of the county government, the common mantras repeated among the stakeholders repeatedly was a Swahili term "***HIYO NI KAZI YA KANJU***" which translates **"*IT IS THE RESPONSIBILITY/ job done* by and *OF THE COUNCIL*"**. With the stakeholders repeatedly referring the county as a council exhibited the old image and management was still functional and therefore support Sullivan & Peterson (1982), where the expectation of the stakeholders to the county and vice versa is low. This has created an NIMBY attitude as the county lacks infrastructures and the mandated private contractors fail to deliver on the promised service (see Berkun, 2005) as a result waste find its way illegally on the walking pavements, blocking trenches, streams and roadsides as stakeholders push it away a move that Kurian, (2006) withholds that most of these problems are as a result of stakeholders not willing and owning up responsibility towards their action. Using Crosby et al. (1990) and Moorman et al., (1993) measurement of trust, that is, information sharing, fair treatment, honesty, sincerity and competitive behaviours it can be seen from the research that these attributes of trust are missing between the county and the stakeholders such that there is no strong connection between them. The introduction of a **"MY WASTE MY RESPONSIBILITY"** campaign in the monthly cleanups is one step the county has positively done in the wake of advocating for waste responsibility. On the contrary there is no agreement with stakeholders on involvement as its on voluntary basis. This might be the reason the planning remains to be the responsibility of the SW wards employees and the civil society in planning. There is therefore a need for the involvement of community (see Tadesse et al., 2006, Parrot et al., 2006) business sector (See KNCPC 2006) institutions (Imam et al., 2008; Medina, 2000; Wilson et al., 2006). Another step in gaining waste responsibility is the planned introduction of KSH 100 charges for every household and business enterprise (Daily Nation 20th March 2014). But although households claims this is a high charge as they cannot afford the KSH 20 charged by the civil society groups, this has been seen to function as it was revealed that the Kayole environment association civil society group they have the highest number of client totalling 12000 who willingly pay KSH 120 for SWM services. But, although this might shows as if the stakeholders are financially stable it off course raises the questions who are these stakeholders and do they represent the entire county financial abilities?

With the current fear of natural resources diminishing caused by unsustainable virgin raw materials extraction the county need to restructure and build an environment of trust between the groups and mediate as Marmborg (2002) a fix a duty to the local government role in connecting the stakeholders aiming to lay a foundation where the 3R system of waste management is firm (see (Haejmose et al., 2012; Jones et al., 2009). Rebuilding trust on the county objectives and vision is a process that needs to be developed as the main foundation to all positive relationships and stakeholder in that will

assist in SWM (see Reeds, 2008; Canning & Hanmer-Lloyd, 2007; Haejmose et al., 2012). As KNCPC (2006) recommended the manufacturers, malls, supermarkets and plastics importers involvement in accepting responsibility for their product lifecycle, the county assembly requires to view the urgency and pass the bill (see Daily Nation online publication April 3rd 2014) to regulate and control companies in investing in quality production that will enhance free flow channels of product recycling and motivate consumer to reuse the product.

Nairobi anti dumping law that exist lack enforcement, this has resulted to reckless behaviour from households. The inspectorate department that mandated to enforce them is challenged as the department is faced with less manpower, resources and coordination with other department. Davoudi (2000) urge organizations to improve in these areas as they affect the attainment of the organizational objectives and vision and contribute to trust breakdown (Berkun, 2005). Particularly in high density area where the hostility from external stakeholders towards the SW county workers and other handlers is high, the county fails especially in the coordination when the inspectorate fails to respond promptly to calls from the SW ward field employees on the occasion an illegal dumper is arrested which result to the suspect freed and cause them at instances to watch as the situation happen as they are regarded toothless and powerless. In summary, if legislation (Taskanen, 2000) and governance (Bhuiyan, 2010) are put in place, inspectorate department set in every ward in the county, infrastructure and tools in SW improved, illegal dumping could be a thing for the past (Srivastava et al., 2005; Minciardi et al., 2007) as trust and SW responsibility take roots. Moreover, most residential and business premises are rental, thus the county could involve and impose SWM service charge responsibility to the real estate developers and the landlords whom have easier access to the tenants.

6.2 Communication and Commitment

The overall result indicated that the channel of communication between and amongst the stakeholders both external and internal is poor. This in additions to the above factors has affected the stakeholders SWM commitment within the county. Krucken & Meroni (2006), urge communication especially the information sharing and feedback mechanisms are among the important elements for a thriving external or internal stakeholder interaction and involvement. The negative effect in the county is evident clearly from the attitude and perception the stakeholders hold towards another and the SWM. Minimal interaction result in non commitment as the stakeholders are not pre and post informed on environmental policies. Furthermore, they are not fully involvement in the decision making processes for ideas generation and transfer of knowledge (Mainela & Puhakka, 2008). For instance, negative attitude between the civil society groups in high density area is as a result of miscommunication and commitment breakdown when crucial information is held back by the COUNTY and the JICA international. That is they have not been fully informed that it is a pilot project underway to commit single group and later incorporate others if the project is a success. This has resulted to

tension mounting between groups, county employees and NGO. Except in Embakasi area where these groups are fully involved in the decision making in other studied location they are viewed as trouble makers, criminals but not as allies (Tadesse et al., 2008; Parrott et al., 2006). This affects the group's commitment in SWM as they face rejection and degraded by other stakeholders.

Commitment towards sorting has been mostly affected by lack of sufficient information, knowledge, handling tools and market. Though part of the collected waste is sorted at the collection enters and the dumping site, most of it depends on what the sorter values as usable. The sorted materials are mostly metals, plastics bottles (Henry et al., 2006) and the materials that will find market fast. In addition to what Tadesse et al., (2008) and Wilson et al., (2008) maintains the nature and composition of waste from household and institution affect the efficiency in sorting. It was found that the waste contain hazardous for instance injection needles, broken glass and sometimes explosive. Adding to the menace the sorters and handlers lacks handling tools resulting to shallow sorting in fear of the harmful substances as they sort on bare hands. This means product that could be reused/recycled ends up being buried in the pile of waste. With the county lacking strategies to encourage source sorting of a three stream solid waste system (hazardous, organic, and dry waste) and in turn but in turn using a single collection dumping site is not a way to solve SWM problem in the county, (Seman et al., 2012; Andric et al., 2012). Waste segregation at the source in Nairobi may require multiple campaigns for the awareness to gain root in a negative minded environments (Srivastava et al., 2005; Hazra & Goel, 2009)

Arguably investing in new 19 garbage trucks (Daily nation 19th March 2014) is a step towards the infrastructure improvement (UNEP, 2003). Nevertheless, these actions have no capability of changing the attitude or unsustainable behaviour of the stakeholders on SWM. In addition kicking out 54 private contractors and replacing them with 19 county managed trucks is a mark down since the county magnitude is higher than the services the trucks could offer. Kicking them out of business was not a solution but rather a body or department should have been established to control, manage, assess and conduct a continuous evaluation of their capabilities as they are held responsible in cases of a failed service delivery. From the research it was openly seen that the problem in the Nairobi SWM system is not transportation but rather illegal dumping as a result of increasing waste generation and lack of commitment from stakeholders in SWM. The move to purchase the trucks was part of the election promises by the governor and therefore a political friendly rather than environmental friendly. The population of Nairobi is increasing daily at the same rate waste generation increases (UN Habitat, 2009; Kenya census, 2009). The paradox of the trucks is a temporary solution to a permanent problem. There is need not only to invest the KSH 224 million/= 2 million € (Nairobi county, 2013) to ease transportation but also invest in buying quality tools, office stationary, digitalizing the SW offices and honouring workers salary agreement in the department of the SW which will enhance

communication and interaction channels as Ramus (2003) assert this action boast staff mundane in achieving the organization vision and objectives and also assist in the information spread at the right time and place. As Bowen & Lawler 1992 and Berkun 2005 insist that the failed empty promises destroy the motivation and commitment of workers, if they are not remunerated as required or the working environment is unfavourable,). This has resulted to strikes as Nairobi county employees down their tools (Daily Nation, Sept 23rd 2013) in protest as they seeks their rights, promises; needs and voice taken into consideration. Employee feel left out, ignored and used lacking the enthusiasm to deliver. In turn increases stakeholder's negative perception on the county´s capability and the SWM system at large.

On the positive side ever since the county embarked on monthly cleanup campaigns as a way to communicate and raise awareness some level of commitment from the public has been witnessed. The perception and attitude towards SW has improved as the slogan for these cleanups is "*MY WASTE MY RESPONSIBILITY*" as some stakeholders assert. However, there is need for early information sharing and system planning involvement of the community leader's for instance religious leaders and public administration leaders as information could flow easily to other stakeholders as they holds some power and authority. These cleanups campaigns are not sufficient as they are only done ones per month but as Ahmed & Ali (2004a; 2006) such actions should be followed by installation of infrastructures for example garbage bins with information and clear sign of what should be. The cleanups alone as a way of awareness could result to increment of negative perception as the stakeholders dump awaiting the impeding cleanup. It can therefore be maintained that stakeholders accustomed to throw garbage on the street or into drains could stop this practice and they start bringing their garbage to collection vans/transportable bins if installed and communicated efficiently (see Medina, 2002; Tadesse et al., 2006). Apart from these, in establishing change to sustainable behaviour in Nairobi, legislation, fines, monitoring and by law (UNEP, 2003) must be enforced to deal with resisting stakeholders. Although as seen in chapter laws exists but still SW is recklessly dumped, burnt openly and manufacturers still produce substandard products. Leaving the inspectorate to deal these unsustainable behaviours and themselves facing challenges such as few employees/ground officers, infrastructures and tools, the situation will continue to be out of hand. Therefore, there is need for the county to involve the local administration for instance local chief, district officer and police who currently are not included so as to establish a strong SWM systems commitment and sustainable practices from all stakeholders.

7 CONCLUSION

In chapters 1, 3 and 4 population, nature of waste and infrastructures limitation are some of the factors the researcher's claims to affect the SWM systems in developing countries. Though these claims are justifiable, after accessing the situation through interaction with stakeholders these are not the only factors and hence it can be said they are catalyst but not the main cause. For instance similar to any other developing and developed cities across the globe, the population in Nairobi is currently not the highest in the world. Therefore, attaching population increase to SW dumping can be seen as a secondary factor after a certain basic foundation collapse. It might not be possible to mitigate population increase or the county is not able to install the required facilities for SWM but the city of Nairobi could put measures that will prevent and reverse the broken system. These measures will assist the county to improve the future SWM. In improving or changing the approach in the future system, the important things is to detect the root causes of the unsustainable SWM behaviours and their emergence and transform the sources. In attempting to determine the causes, this paper provided an assessment of the existing system based on the factors, such as waste generation, waste disposal practices, waste collection, etc. and the analysis shows that the causes are connected to elements found in social factors that can be dealt with through establishing an integrated SWM system that encourages involvement and participation of stakeholders.

Most of the researches mentioned in chapter 2 have proposed an integrated SWM system. However, except for the KNCPC (2006) most of them do not address to solve the problems in totality when compared to other researchers conducted on behalf of cities in other developing nations since they fail to realize the social factor affecting SWM. However, according to this thesis interpretation, these recommendations are yet to be put in use since more than 60% of waste composition dumped is organic. This view is held because the integrated SWM invites the availability of channels for awareness for waste reduction, recycling and facilities for composting establishment (Losai management limited, 2011) which is currently not available in the city. Therefore, there is an urgency to have systems encouraging the community,

household or county compost production system which is currently undertaken by individuals with interest. The basic factor that affects the participation of stakeholders and the establishment of integrated SWM systems in Nairobi was found to fall under social category. These are trust, ability to take responsibility and ownership of waste, communication channels (information flow and exchange) and commitment to both the SWM system and 3 R initiatives amongst stakeholders and county government. These elements are the foundation this thesis believes where all other factors claimed by the literatures causing the increase in SWM dumping could be built upon. Their absence or weakness causes a system collapse no matter the investment, technology or area and cannot be separated since they are interwoven and support each other.

As discussed in the literature review chapter many cities have involved stakeholders and interacted with them in designing and operating their SWM systems. The end result according to these literatures has assisted in closing down illegal dumping sites and turning unsustainable practices in waste management by raising an awareness that encourages the 3 R initiatives. it is clear that if these basic social factors are restored and built firmly stakeholder's participation and involvement in the SWM system decision making will gain roots in Nairobi. From the findings it was certain that higher percentage of waste can be dealt with at the source if an awareness aiming to establish 3 R initiatives is encouraged. These will means that there will be no need to invest heavily in waste transportation and in the future there will be less supervision when a sustainable community is established. Additionally, from the findings it was discovered that some of the civil society group in Nairobi are in a position to exploit 100% of waste collected to manufacture different types of commodity for instance, bio fuels, organic manure, plastics and other fabrics using a simple technology. This is the point where Marmborg (2004) call to local government intervention to assist in connecting and transferring this type of skills and knowledge to other stakeholders. This will assist to achieve the vision 2030 that prospect a green city which will be achieved not only by simple or complex technology but also through daily green actions and decision making from the stakeholders. Involving and recognizing their contribution in system success is important because they possess power to influence through green purchasing to green disposal. Therefore there is need for Nairobi and other developing cities to construct a SWM system focused on strengthening the basic social factors of trust, commitment and stakeholders acting in a responsible manner. This might be the only way to eliminate resistance and create awareness and avenue for sustainable development goals. In short, the Nairobi city government has the potential to influence the SWM positively through stakeholders involvement and ensuring they participate in daily SWM decision making for if other cities have achieved why not *Nairobi city*?

7.1 Recommendation

The efficiency of any SWM system depends on numerous factors; however, one of these important factors is the will and attitude of the stakeholders to change the existing behaviour and developing it positively.

Some of the stakeholders in the Nairobi City County area in general are willing to contribute positively and participate in a SWM system. Further, the county seems to be opening up for ideas and opinions through, employee training, civil society groups and NGO involvement. Given this background recommendations for development of a sustainable SWM system are as follows.

7.1.1 Stakeholder's involvement and consultation

For efficiency in SWM system the stakeholder's consultation should be made a prerequisite. By doing so, the county stands to gain on many different fronts. First, their involvement in decision making could assist the county government communicate and bring the issue at hand to them. This could aid in information sharing and awareness to the existing problems or solutions proposed as stakeholders are in a position to share their ideas, thoughts and concerns regarding various aspects of SWM in the county. This may restore trust and refine communication as the system is crafted transparent and efficient, as decisions once taken with general consensus will be easier to execute and stakeholders will be hopeful and more willing to join hands in executing the plan. Such decision may include reduction of waste, waste segregation et cetera. This could be achieved through stakeholder's participation in open forum, through NGOs selected, or the use key of political and social figures/ celebrities and media, for instance, the social media.

Another way of achieving this is awareness and information transfer through social and education institutions such as religious leaders/gathering (churches and mosque of which the leaders advise are taken very serious in this regions) schools and higher education institution. Doing this saves the County time and resources as information flow faster. These can further be made possible through setting a team that is responsible for visiting such places and discusses and share with different stakeholders or another way is holding regular ward level meetings with stakeholders to keep them involved and informed. Furthermore, the county should co-partner with school curriculum planners to include the SWM in the environmental and social studies to pupils and students from early stages and involve teachers, pupils and student in regular street cleanups. Further they could arrange games, festivals and competition aimed at creating awareness in the entire county. Most Nairobi city residential and business premises are on rental basis which shows there are real estate owners involved. Therefore this paper recommends their involvement as it is easier to reach to the real estate owners than to tenants. They should be required to install and offer SWM infrastructures to their tenants and also adhere to the city planning Act that directs real estate developers to create a handling mechanism for SW generated from their premises from construction to daily operation. Every real estate developer should be held responsible for waste generated and made accountable in showing how waste is handled by giving records to the SWM ward offices on a monthly basis.

7.1.2 Improvement of SW wards offices and working condition

The county requires taking the issue of employee working condition with caution. First the employee deserves punctual remuneration as their right. Also the county could add to them the risk allowances and hardship allowance based on the environment they work since most of them walk long distances especially the field supervisors and that other employee accomplish their daily chores without protective clothing and tools. Additionally, these field supervisors should offered transportation for efficient SW supervision for instance low consumption motorbikes which proves efficient basing on the structure and space of the streets within estate so that they could respond to emergencies in case of illegal dumping. As the research revealed stakeholders are not even aware of the office existence and them that know do not value office capabilities in SWM. The County should make visible through sign installation of the offices whereabouts and install machinery for instance, computers and printing materials for easier communication with area stakeholders. Ward supervisors should be empowered with the ability to print letters and invite stakeholders in their wards during monthly cleanups instead of waiting for letter being sent from the headquarters, for instance invitation of companies and malls as they require invitation letter two weeks prior to the function date. Further, they should be given access to financial and accounting department so to forward their budget for support directly. SW ward offices also require improvement with proper a filling systems and a provision of storage spaces for tools to enhance a clean working environment. The workers should also be involved through feedback systems in decision making processes and especially before the procurement of waste handling tools as they know what is needed instead of buying tools that lay in stores. Finally, SMS text message meetings should be stopped unless on emergency basis this is the point where digitalization is important as such a message can be relayed in advance through emails which can be printed out direct from the SW ward offices. In cases where worker use their resources in a certain task they should be refunded and workers trained to keep records as prove for refund. These actions could motivate the SWM staff acting both responsible and committed.

7.1.3 Harmonization of Departments

Department need to speak in one voice, support and coordinate with each other. These department are (transport department that controls route of garbage trucks, SW wards , inspectorate department responsible for ensuring the laid laws enforced, procurement department and the public & business relation department. For efficiency in SWM this department need to partner and communicate more frequently.

7.1.4 Target and goals

The county government need to set a target city that is; a green city they prospect in the next 10 years and a banner created to motivate other stakeholders in the county. They need also to set targets and goals in terms of what is needed to achieve the green city. A realistic proposition would be to set

a target of at least 10'% annually in diverting waste from ending up in dumping sites. A goal of ensuring maximum possible diversion may be set to be achieved a longer period of vision 2030. This will call for both long term and short term action taken to boast awareness in the county. On recyclables, targets should be set to improve collection and recovery of recycling materials, involvement of informal sector in recovery of recyclables should be achieved within first five year period. Littering in all forms should be discouraged, and stakeholders who litter especially the household and business as they are well known by the civil society groups should be made liable through legal action and use of both the inspectorate department officers and the state administration departments. Further, education, awareness and information sharing regarding SW issues, should be made a priority in the county; hence, stakeholders made part of the solution and certain indicators should be developed to monitor the progress. For instance, no plastic bottles being thrown in the garbage could be an indicator of success in resource recovery.

7.1.5 Creating of a Three Stream Solid Waste System

Sustainable SWM system also depends on the commitment from the SW source segregation: Therefore, a three stream which include (garbage/mixed waste, bio degradable and recyclables) may assist in finding and planning appropriate disposal option. First, the real estate developers and owners should be mandated to install such facilities in their premises for easier waste segregation. Or the private waste contractors should not only offer waste transportation but also they should offer mobile bins at designated areas and cost charged to real estate owners who will push further the charges and cost to their tenant and force them to include SWM charges in the rent charges. The reasons for mobile bins recommendation are to avoid vandalism and misuse of the bins which usually occur when darkness set in. further actions that the county could undertake is to encourage county or community based composting system which could reduce the amount of bio degradable finding its way in to the dumping site. Furthermore, the county is privileged with two civil society groups (the Kibra youth and the Kayole environmental association) who possesses bio/organic manure processor and are experienced in waste handling and therefore they are in a position to train and educate other civil society groups, traders and households in utilizing waste at a 100%. To encourage the compost even at individual level, the county environmental department need to assist in market security with the county and the state agricultural ministry through the purchase of organic manure for instance during county tree planting exercises and agricultural fields. Burning of waste is a threat to the three stream SWM systems and should be discouraged and action taken on whoever found exercising it as it destroys recoverable and at the same time harmful to environment and human health.

7.1.6 Collection and transportation

In gaining trust waste should be collected and transported away instead of lying for days at the collection centres. The county could adhere to a non

failing weekly collection plan from households and institution and a daily collection from business premises. This is only possible if VATS are installed at major locations and premises. In the cases where there is failed service, the service provider if a private contractor should be held responsible/liable and pay. It is important that the county gain control of the outsourced services under the facility management department. This is because when private sectors are mandated with offering SWM services it implies a shift in the principal role of county SW from being service providers to regulators. In gaining regulation and control the activities and performance of contracted private enterprises and the appropriate systems of monitoring and control need to be established. In addition corresponding skills and capacities should also be developed both at the level of the county government and other waste handlers. In some cases, it is also advisable for the county to improvise technical assistance to those enterprises that demonstrate potential for involvement in SWM. Furthermore, there should be measures and requirement put in place on the condition and size of the trucks used in transporting SW as waste should be covered during transportation to avoid spilling on streets. Proper records should also be kept on the waste collected signed by the ward supervisor and the dumping site manager so to keep track of their action at both ends. This will apply if only SW ward offices are digitalized lifting them to quality office stature with the required infrastructures so as to create communication from the sending and receiving side and vice- versa. Not only the trucks but also the county could own up the collection centres as they are currently under the management of the civil society groups. The county could employ some of them to operate on behalf of the county. This will eliminate illegal dumping at the collection centres and on the other hand restore order and trust from the households and traders. Lastly the county could construct a roof at all collection centre to protect waste from direct sunlight, rain and strong wind

7.1.7 Promotion of the 3´R initiatives

Emphasis should be placed on it; that is (reduction, reuse, recycle). This will aid in minimizing waste generation at the same time increased resources recovery as it is the only way of achieving the sustainable development goals. Reduction could be achieved by starting a deposit/tax refund system to encourage manufacturers and companies to aim at green production and marketing. Further, it should be made compulsory for companies and suppliers responsible for handling/taking back certain types of waste generated under extended producer responsibilities and polluters pays policy which is only achievable if eco-production is in place. Supermarkets and shopping outlets could be encouraged to install plastic bottles recycling technology in partnership with the manufacturing companies which will encourage consumers to recycle at a fee that can be reused to reduce cost during purchase. This could reduce the burden of waste to a great extent, hence, encourage the consumers to recycle and collect waste for financial incentives and in the long learn transform their perception and attitude towards SW and waste recyclers.

It is important for the county to note that the initiative could acceptance if a team comprising of consumers/households/community, shopping outlets, wholesalers, supermarkets and manufacturing industries is formed aiming at raising awareness and involvement to design the way forward.

7.2 Research Limitations

***Trust and Security*:** Some of the areas of study have been known to have high rate of insecurity and the researcher had to be careful even in the company of the County employee the Kibra area and the phase 8 area (*Mukuru kwa Njenga area where insecurity is well evident such that not even the SW supervisor can access nor any arrest for illegal dumpers made*). Further, some of stakeholders in these areas were unwilling to offer productive information especially when the researcher was accompanied by the county employee in fear of being victimized and information used to hunt them down. This is because there has been a history and a bad reputation in the relationship between the resident & traders and the county workers. Security and trust breakdown led to some response being hand written which is sometimes not efficient way to record data as one may skip important information. Not only this but also the researcher feared recorder would be stolen. During the time the research was being conducted there was tension between the county employee and their seniors as the county devolution system type of government was still new and was conducting a head count to ascertain how many employees worked within the county aiming at scrapping down the non performing and ghost workers existing in the payroll (Business Daily 2013). This caused difficulties in the reception as SW employee feared the researcher was sent by their seniors to investigate what happens backstage as they were first unfamiliar with the researcher purpose and goal.

Minimal or Lack of Baseline Data and the magnitude of the county; Though in the past years studies have been conducted on dilemma of SWM facing the Nairobi there was none that has deeply concentrated on the stakeholder's involvement approach as a solution to the dilemma. Furthermore, the lack of documentation from the county wards management on various stakeholders involved in the SWM may lead to assumptions that all the 18 wards in the city's systems the same. In addition the Nairobi County is huge and therefore single researcher may not be in a position to perform research in the county in general which lead to the researcher randomly choosing only four wards from the existing 18 in assumption that they represent the whole Nairobi County and that the problems found in these areas is a duplication of what happens in other constituencies.

***The Researcher Bias*:** The researcher was born and raised in the Nairobi region and thus quite familiar with the SWM dilemma within Nairobi. Therefore, understanding the objective of the study was easier to the researcher as he could place himself in the mindset of some of the stakeholders and still remain a non participant observer. Furthermore he was familiar with the local language, street languages, cultures and customs in the areas of studies which

made him to dress and present himself according to the occasion. These were positive bias which encouraged the researcher to study the context in depth.

7.3 Potential Future Research Related to the Subject

During the process of the research I have acquired much knowledge on the subject of stakeholder's involvements and some of the factors that usually affect the involvement directly and indirectly. The experience acquired will assist in the future related problem solving. Further, in the process I have learnt different ways to conduct a research and scale down to the important information and stick to the research objectives. For the future researches, this synthesis provides ideas for additional investigation in relation to stakeholder's attitude. One approach could be to investigate the attitude concrete in relation to sustainable behaviour in waste management and generation. Especially due to the fact that in this research paper it was clear that stakeholders involved in SW generation and management had negative attitude towards each other on one way or another. It would be interesting to find out the effect of attitude change in reduction or sustainable purchasing in developing countries. One aspect would be to analyze the stakeholders purchasing behaviour, the current behaviour is not based on environmental aspect but on economic aspect and purchasing power. The future object could focus on how stakeholders especially the Business/Industrial sector and the final consumer integrate environmental issues in their production and purchasing behaviour. This research mainly weighed on the factors that hinder involvement of the stakeholder in SWM on a general level. Further research could be done in a way of renewing similar research that has occurred in this synthesis on stakeholder's involvement for efficient waste management. Finally, a research on the transfer of SWM to the future generation in the developing countries could also be a subject of research. In this research the approach would be to investigate how SWM could be introduced as from the early childhood development so to motivate and equip the future generation with knowledge in the 3R systems.

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Appendices I – Photo Images

Waste Illegally Dumped On Dark Corners, Pavement and Drains

Dumping at school compouds

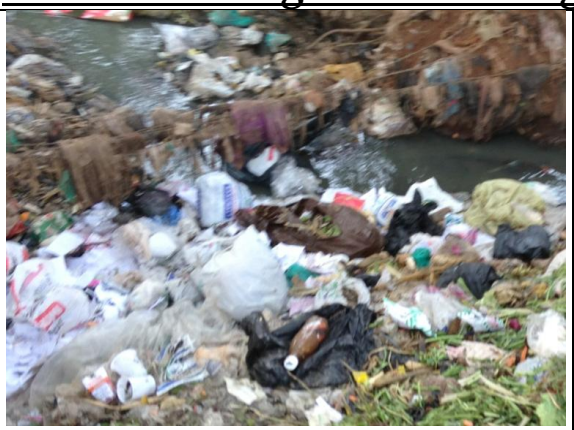
Dumping at bus stops

Composition of waste dumped on Nairobi street

Dumping in water escape trenches

City streets

Waste blocking water drainage and river streams



Blocked river near Mathare estates

Result of the drainage blocking

SMEs Irresponsibility

Sweeping waste away from his premise to the road reserve

Business man fixing waste on the road

Waste collection centres

waste hanging even on walls

Waste waiting collection

Organic manure production

Collection centre

County Solid Waste Communication Slogan

Waste waiting collection from household

State and Congested Streets within Estates

Human Drawn Carts Transporting Waste from Estates

Private Waste contractors

Private contractor at the dumpsite

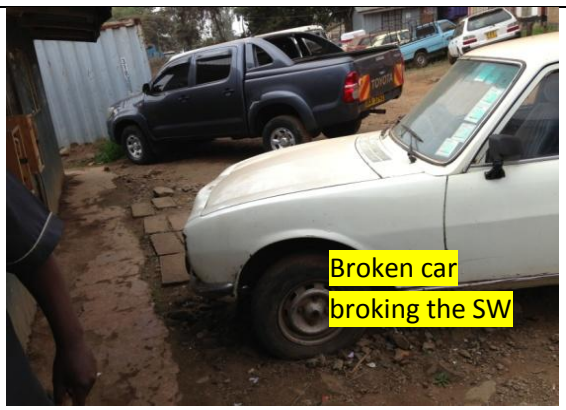
County Old Waste Trucks, courtesy of Nation Newspaper

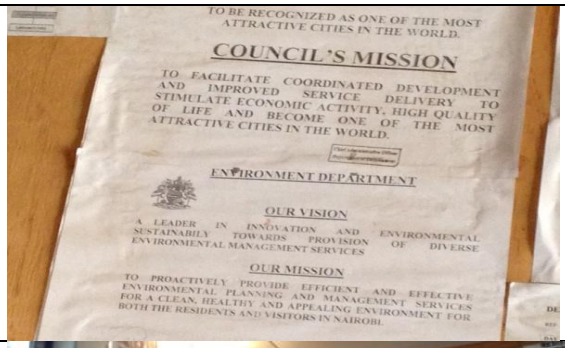
New waste transporting trucks unveiled on March 19th 2014

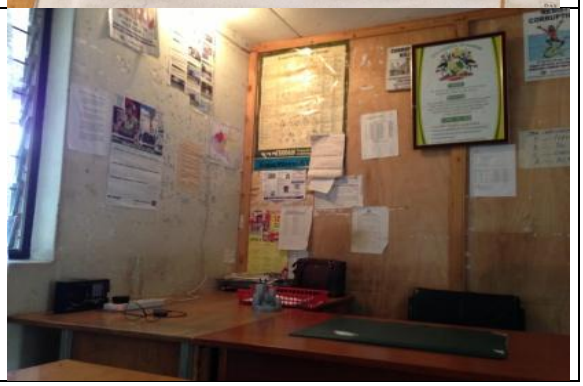
State of the street garbage bin

Dumping site at Dandora Nairobi

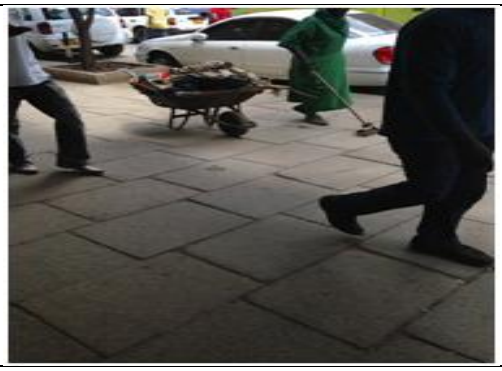
Solid Waste Ward Office Situation







County Employee in the Street of Nairobi



County employee removing ads from posts

County employee burning ads

Monthly cleanups led by Kenyan president
Courtesy of Standard newspaper June 13. 2013

Waste burning at down town Nairobi

Waste burning in estates

Waste burning at illegal dumping site

Waste burning at the dumping site

Waste burning at collection centre

NGO (JICA International) in SW
Campaign Mission

Appendices II Open Ended Questionnaires

Business sector

- Approximately how many customers does your business cater for per day?
- Does your Kiosk/business/shop have a waste management plan or system in place? If yes, can you briefly describe it?
- Do you have any segregation of waste? Please describe in brief
- Is there any composting of organic wastes that you are aware of? Is there any centralized or backyard composting? Is there any institutional composting e.g. by municipality office, school, etc?
- Are there any recycling programmes for paper, glass, metals, cardboard, and plastic in your premise? (if any) give details of collection and separation.
- What the major constituents are of waste (organic, biodegradable, non-degradable, inorganic, plastics)?
- How has waste composition changed over the years (trends and changes)?
- What has been the major area of concern in terms of waste composition (particular article/item, changing nature of composition etc)?'
- Do you encourage your customers on waste management
- What is the role of the county in Waste Management?
- Are you involved in the county to discuss or deliberate waste management situation?
- How are you involved in the arrangement of the monthly clean-ups?
- How have the clean-up assisted in your awareness and in improving the SW situation in the county?
- Do you cooperate with civil society groups in your area
- What are some of the challenges you encounter in SWM
- What is your role in SWM and what would you recommend for the improvement would you recommend in SWM efficiency

Civil Society Groups

- When the group was formed ad why?
- How many members do you have?
- Where and who are your clients whom you collect waste from?
- Do you have any sponsor or how are you able to maintain the group?
- How do you cooperate with the county government in waste management?
- Do you cooperate with other groups within the slum?
- Have you been offered on training in solid waste management?
- How often is waste collected from the client to the collection centre?
- Do you charge you client?
- How do you communicate and involve your client in sorting waste from the source?
- Do you offer tips and bin bags to client if yes how often?
- Where do you get those bins from?
- Do you sort the garbage before storing it and do you have the waste handling tools?
- How often is waste collected by the county?
- How can waste be controlled and managed in the slums?
- Do you corporate and how your relationship with NGOs and the SW is ward offices?
- Does the ward/division environment office benefit the group if yes how? If no how would you want it to be?
- How are you involved in the arrangement of the monthly clean-ups?
- How have the clean-up assisted in improving the SW situation in the county?
- How has the clean-up impacted the working environment in your area for instance, in the awareness campaigns?

County environmental director

- What is the size of the area covered by the county in waste management and correction?
- How does the county plan the waste collection within the city?
- Who is responsible for the sections and how many workers/garbage handlers does the county have?
- How long do staff do their work and how are task divided
- How often are employees trained on waste handling?
- What risks do the staff face and what has the county done
- Do the employees have necessary tools?
- Who is responsible for waste collection and street cleanliness within the city?
- Does the county cooperate with private waste collectors?
- If no who control the private waste collectors?
- How are your employees involved and other stakeholders in the arrangement of the monthly clean-ups?
- Have the clean-up assisted in improving the SW situation and awareness in the county?
- What challenges do you encounter during cleanups?
- What is the greatest challenge that the county face?

Questioners to the Plastics Manufacturing Industry

- Who are your clients and how often do they buy your product?
- Have you ever conducted an LCA/ a research on your product?
- Do you take back secondary raw material and from whom?
- Do you have a waste management system in place?
- Do you cooperate or engaged aware of the county SWM systems and are you involved in the decision making. If yes how?
- Currently the SWM situation is not efficient what do you think could be done to efficiently manage waste and who should be responsible?

Questioners to the private waste correctors

- What your vision towards the environment in the county environs
- How has the SWM ward office impacted the group and what is your relationship?
- Who are your clients and how do you acquire them?
- How often do you collect waste from your client?
- Do you charge the client?
- How do you communicate with client and problem solving?
- Why will client choose you and not the county waste collectors?
- Do you sort waste before taking it to the damping site?
- What challenges do you face dealing with client and county?
- What cooperation do you have with other competitors and the county government?
- How are you involved in the arrangement of the monthly clean-ups?
- How have the clean-up assisted in improving the SW situation in the County and waste collection?
- Do you train your clients on SWM?
- What future expectation do you have and what do you think can be done to achieve a cleaner greener city?

Questioner to NGOs

- Who/which organization is responsible for solid waste management in Nairobi? Where does this agency derive its power from (constitution, acts, and regulations etc)?
- Does your organization hold enough power to formulate rules, laws or policies pertaining to solid waste management in the county of Nairobi? Or what role does your organization have in SWM?
- Which stakeholders do you partners with?
- What assistance do you offer to your partners?
- What achievements have your organization attained in the county since it was established?
- What are the challenges you encounter SWM partnership?
- What are the major problems in SWM in the county and who is responsible?
- How are you involved in the arrangement of the monthly clean-ups?
- How have the clean-up assisted in improving the SW situation in the county?
- How can these problems be eliminated and what do you recommend?
- In your recommendation what role and effort will your organization put in place?

Questioner for household/public

- How many members of the family do you have?
- How do you deal with the waste that you produce?
- Do you cooperate with the civil society groups in waste collection program? If yes how much do you pay?
- Have you been involved or trained in SW handling?
- Do you recycle or reuse/ produce compost from the waste you produce?
- Are you aware of the SWM Ward office and what role do you think it has?
- Do you participate or how are you engaged in the monthly clean-ups?
- How have the clean-up assisted in improving the SW situation in the county?
- How has the clean-up impacted the knowledge in SW?
- What challenges do you face in SWM?
- How do you rate the SWM systems in the county and how do you?
- What do you think can be done to attain a waste free city?

Questioner to County SWM supervisors/staffs

- How many workers and how many clients do you attend to?
- How is waste managed in your area/how do you manage solid waste?
- How are you involved in the arrangement of the monthly clean-ups?
- How have the clean-up assisted in improving the SW situation in the County?
- How has the clean-up impacted the working environment in your area?
- Currently what is the relationship status with the top management and is your voice heard?
- How do you cooperate with other department within the county?
- Have you been offered training in SWM and if yes how often?
- Are you offered support by the county government for instance in tools and protective attires?
- What are the main challenges you encounter in your daily duties?
- How do you deal with those challenges and what do you think could be done?
- How do you cooperate with civil society groups and other stakeholders in SWM?

Questioner to religious institution and the Public administrations

- How is SW managed in your institution and do you encourage your congregation/ staffs in SWM?
- Do you have any experience in SWM?
- Who do you think is responsible for SWM in the County?
- Do you think the system is functioning as expected?
- How are you involved in the SWM decision making in the County?
- How often are you involved in the County monthly clean-ups?
- How has these clean-ups benefited in the awareness campaigns?
- Do you partner with other parties in SWM for instance the civil society groups?
- What do you think the County should do to efficiently manage SW?