

# Challenges Influencing Sustainable Monitoring and Evaluation of Solid Waste Management Projects in Nairobi City County

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**Abstract-** This research project has analyzed the challenges influencing sustainable monitoring and evaluation of solid waste management projects in the County based on four independent variables namely; technical capacity, performance indicators, budget to support M & E of solid waste management projects and coordination in terms of solid waste depository points and consistency in enforcement of the policies. Random sampling methodology was adopted. At a confidence level of 95% and a significant level of 5%, a sample of 73 respondents was used for data collection by use of semi-structured questionnaires. Secondary data was collected using published sources such as journals and published articles. Data collected was analyzed using measures of central tendencies, percentages, SPSS, ANOVA and multiple regression and presented using frequency distribution tables and charts. The four independent variables studied were found to collectively influence the dependent variable which is sustainable monitoring and evaluation at 62.1% with 37.9% influence due to other variables not captured in this study. Performance indicators recorded the greatest influence on sustainable monitoring and evaluation at 58%, technical capacity at 19%, coordination at 16% and budget at 7%.

**Index Terms-** technical capacity, performance indicators, budget, Coordination, solid waster depository points

## I. INTRODUCTION

Sogorov (2012) defined solid waste as any unwanted materials discharged to the environment and which disrupts the normal ecosystem. According to World bank (2013) a decade ago, there were approximately 2.9 billion residents living in major urban set ups in the world who dissipated approximately 0.68 billion tonnes of waste per year.

As of today, there are approximately 3 billion people in the world living in urban set ups. Due to changes in lifestyle and growth in industrialization, globally each person generates an estimated 1.2kg of solid waste on daily basis which translates to about 1.3 billion tonnes of solid waste per year. Statistics shows that this is expected to increase further. By the year 2025, world urban population will likely be 4.3 billion dissipating a total of 2.2 billion tonnes of solid waste per year, which means each person will likely generate about 1.42 kg of solid waste per day (World Bank, 2013)

Monitoring as stated by Tache & Ispatoiu (2013) is a systematic organised process undertaken throughout the project

lifecycle and it involves continuous checking of various aspects of the project with an aim of enhancing superior decision making. The reason for monitoring is to provide consistent and trackable feedback concerning the project. Evaluation spans between middle-term and long term. It is the process through which a project is reviewed mid-way or after completion. Information gathered is analysed to establish project effectiveness, efficiency, impact and relevance in regard to the activities undertaken. It is the means through which the project worthiness is determined and to unveil possible areas for improvement(Sproat, 2011).

As estimated by Allison (2010), JICA (2010), Nairobi City County on daily basis generates an estimated 4,000 tonnes (4 Million Kgs) of solid waste. Of this total daily tonnage, an estimated 36% is collected and delivered to designated solid waste disposal site (Dandora), 4% is recycled and a whopping 60% is never collected and/or disposed. For public health reasons, this percentage of unattended solid waste is extremely high for a place like Nairobi City County as the ecosystem is congested and cannot naturally absorb all of it. On the other hand, population and industrialization continue to grow at an accelerated rate within the county giving clear indications that solid waste problems will persist if proper measures are not put in place by the NCCG (Chang & Feyyisa 2013).

M & E is key to the success of any project of whatever nature. Formerly NCC and now the NCCG has in the recent past tried to streamline solid waste management projects through enactment of by-laws. Some of the good initiatives undertaken include; the enactment of the EMCA in 1999 aimed at ensuring each Kenyan's right to a clean environment is upheld and protected, involvement of the private sector and CBOs in management of solid waste popularly referred to as integrated solid waste management and the 3R (UNEP, 2010), (Njeru, 2009).

However, the intended results are yet to be realized many years after the legislation of the by-laws. Big heaps of solid waste as well as emergence of illegal waste dump sites (other than Dandora dump site) can still be seen within the County particularly in the downtown of CBD. According to McKinnon & Hole(2015), this failure to handle solid waste management projects could largely be attributed to poor m & e by the authority. Further to that, inadequate or lack of m & e makes any project very costly, and SWMPs are no exception. Ngau & Kahi (2009) stated that, an estimated 130 plus private companies and over 150 casual private establishments mandated by formerly NCC and now NCCG aids in solid waste collection and disposal.

However, activities of these entities are not adequately monitored and evaluated by the NCCG yet they get paid for services offered even when such falls below the expectations. On average it costs CBOs and other related set ups such as residential associations (RA's) Kshs 900 per tonne of solid waste collected and about Kshs 1800-2000 per tonne of waste collected by private companies (Mwangi, 2007).

Previous studies carried on SWM in Nairobi have not addressed challenges that prevent the NCCG from conducting sustainable m & e of SWMPs. A study done by Allison & Harro (2010) aimed at analysing SWM in Nairobi laid a lot of emphasis on the proportion of solid waste generated versus the proportion collected and/or recycled. Collectively they found that an estimated 4% is recycled, 36 % is collected and 60% remains unattended to. The study never went ahead to research on what challenges hinder the 60% of solid waste to be collected, an area which this current study seeks to explore.

The general objective of this study was to determine the challenges influencing sustainable monitoring and evaluation of solid waste management projects in Nairobi City County. The study was guided by the specific objectives of determining the influence of technical capacity on sustainable monitoring and evaluation of solid waste management projects in Nairobi City County, determining how performance indicators influence sustainable monitoring and evaluation of solid waste management projects in Nairobi City County, establishing the influence of budget on sustainable monitoring and evaluation of solid waste management projects in Nairobi City County and examining how solid waste coordination influence sustainable monitoring and evaluation of solid waste management projects in Nairobi City County.

## II. LITERATURE REVIEW

### 2.1 Theoretical Framework

#### 2.1.1 Theory of Waste Management

This theory advocates for a universally accepted knowledge pool on waste management. The focal point of this theory is to emphasize the importance of waste management as a tool towards prevention of any harm to mankind and to the environment (Amegashie-Viglo & Nuertey, 2014).

The theory assumes that resources are optimally utilized whenever there is efficient waste management. This theory represents the modern today world where the scientific research meets the engineering technical design, hence the reason why waste management theory is always supported by the design theory. The underlying principle of the waste management theory is industrial ecology. As stated by Leigh & Li (2015), industrial ecology is a relatively new branch of science which seeks to scientifically study the impacts of industrial activities on the environment with an aim of reducing the negative consequences. Industrial ecology covers a wide scope and have an encompassing approach which conceives that industrial systems can better improve in terms of efficiency and sustainability if issues of concern are investigated from all possible angles. The proponents of this theory argue that; just like the natural ecosystem, the industrial systems can produce waste which in turn can be input to other industries. This has a tripple effect of minimizing the depletion of raw materials, reducing pollution

and finally lowering the cost of waste treatment (Yu, Han, & Cui, 2015).

#### 2.1.2 Production Theory with Waste and Recycling

This theory was advocated by Klaus Conrad (1997) which analyses the impact of charging fee on; waste reduction, recycling of waste, production structure and material conservation effort. This theory is part of the wider theory of the firm which stipulates that the government motivates the enterprise firms to recycle their waste through the imposition of fines on the waste generated and disposed to the environment unrecycled. The theory serves two mutually beneficial purposes whereby, it assumes that the firm aims at remaining competitive in its products and services through waste reduction and recycling and the government benefits from this through clean environment and improved economy (Young, Tsai, Wang, Liu, & Ahlstrom, 2014).

As far as this theory is concerned, the producer of the waste is mandated to ensure that he/she disposes the waste responsibly. The priority outlook is waste prevention and that which cannot be prevented is recycled and any residue unrecyclable is disposed. Therefore, this means that the product always accompanies the person who produced it from the beginning till the end (Teece, 2014). This theory will be significant to this study research because it will be a reference point through which the role of county government in minimizing solid waste in Nairobi will be assessed.

#### 2.1.3 System Theory of Management

System as defined by Ceric (2015) is a linkage of several components which act in complimentary to each other to achieve a larger beneficial goal. System theory of management states that a system has inputs, processes and outputs, and the removal of any one component makes the entire system unfunctionable. Feedback is a critical component of the system. By input, the theory refers basically to the manpower, resources and technologies. It is these inputs which are processed or put to work to produce the desired output. These components are married to each other and information generated by one is used as feedback by the other for evaluation purposes (Alter, 2015).

The main aim of this theory is to change the management style and approaches in all spheres of life. The style advocated by the theory is that of practicing management with a broader perspective. Through this, the authority in charge is able to quickly identify and interpret patterns in a subject of interest. This is made possible through appreciation of the fact that different parts of the project are related and understanding the nature of such interrelation is key to good management of any project as there is synchronization of the activities. The choice of the theory for this study is to get a deeper insight as to what management style is best suited for the solid waste management projects in Nairobi City County.

#### 2.1.4 Theory of Change

This theory was developed in the 1990's to encourage and stimulate projects and programs geared towards positive social, political and economic change. As described by Pessa, Abram, & Minati (2012) it represents the road map towards a certain phenomenal desirable change. It help to identify a suitable

method for achieving the change, the planning on how the change will be achieved and finally the evaluation to either qualify or quantify the change. The proponent of this theory aimed at portraying clearly the picture of the short and middle terms changes as a result of an initiative such as a project that ultimately leads to the long term outcome and/or impact. Through this theory, the stakeholders are able to identify the processes required to achieve a goal of interest. This identification helps in realistic assessment of whether the goal(s) is/are achievable with the resources and time available, what sort of interventions that the stakeholders can manipulate and the impact associated with such manipulations (Keogh, Tully, Matthews, & Hurley, 2015).

Theory of change is important especially in monitoring and evaluation of projects. The theory is normally formulated before the project is initiated through the development of a desired change model. As the project progresses and the monitoring and evaluation data is generated, the theory of change is refined accordingly. The benefit with this theory is that it is very flexible and can easily be formulated through reading relevant project and/or program materials or talking to the stakeholders and critically analyzing the information obtained.

## 2.2 Empirical Review

According to the study conducted by Chong & Suryawati (2010), most organizations fail in carrying out project monitoring and evaluation because they lack the technical capacity to do so. Such include the logical frameworks (Log frame) which is a planning tool used to monitor projects by presenting key project information in form of a four by four matrix (table). Through the framework, various important parts of the project are presented clearly, concisely, logically and systematically. Many organisations undertaking projects have little or no technical competence for handling and/or preparing a feasible log tool. Other technical competences necessary for handling M& E on projects include the means to travel to project sites to conduct surveys as well as the equipment to aid in surveying such as photography devices and personnel (Rabe & Sojakova, 2013).

Project performance indicators can either be qualitative or quantitative. As described by Grant (2014) performance indicators are project management tools that guide the project managers and other stakeholders in making evidence based decisions. He further described performance indicators as the means which guide in collection of project data and subsequent comparison of the actual project results with the planned results. This is particularly true in typical solid waste management projects where the city councils or county governments partially outsource these services to private contractors without proper indicators in place to assess progress. According to Todorović, Mitrović, & Bjelica (2013), with well laid out performance indicators, the stakeholders/management are able to have an objective and concrete proof that intended project results are being achieved. One of the reasons that projects fail to achieve their goal(s) is/are lack of performance indicators which consequently cripples sustainable monitoring and evaluation. As a result, monitoring and evaluation experts across the globe describe lack of clear project performance indicators as one of the toughest challenge they face on daily basis in their work (Ishii & Katsumata, 2007). Performance indicators provide post valuation

guiding documents which are important in evaluating future projects.

Previous study done by Sundeen (2007) indicated that one of the leading causes of project failure is budget constraints or budget overruns. According to Liu, Wang, & Chua (2015) is caused by limited availability of funds either due to lack of sponsors, misappropriation of the available funds or collectively lack of top management support. He further argues that; budget overruns is often as a result of poor project management skills which fail to properly plan the project from onset. Monitoring and evaluation is a critical aspect for successful project management and as a result, project budget constrains cascades down to M&E activities. It is imperative that in any project undertaken, there is a budget kitty set purposely for M&E activities (Caballé, Daradoumis, Xhafa, & Juan, 2011). The budget should be adequate and should be accurately accounted for to the last coin.

Due to the nature of the solid waste management projects and the sprawling urban population, there is always an emerging trend of solid waste being littered in uncontrolled manner. This according to Kemunto (2009) makes monitoring and evaluation efforts difficult to execute or sustain given the scarcity of resources. In order to conduct sustainable monitoring and evaluation of solid waste projects in Nairobi, the County Government officials need to be aware of the exact or designated solid waste collections points and this has to be gazetted and shared with the public for awareness. With the current strategy of outsourcing solid waste collection to private companies, the NCCG can best monitor contractor's work only if the various solid waste collection points are known. Kemunto (2009) stated that most of the money paid to private companies to manage solid waste in Nairobi cannot be accounted for and on the other hand, NCCG finds it difficult to audit the private contractors' practices.

Caballé, Daradoumis, Xhafa, & Juan (2011) defined sustainable monitoring and evaluation as that which generates regular and reliable feedback to the stakeholders on the project progress. The feedback is to ensure that the project is adhering to the laid down plans and any deviations and/or problems are identified early and rectified. Also sustainable monitoring and evaluation generates lessons learnt which are used to improve future project performance thus resulting to increased project efficiency, project success and minimizes wastage of resources.

## 2.3 Critique of Existing Literature Relevant to the Study

Substantial research on solid waste management has been conducted in Kenya with key focus being in Nairobi. However, given the topic is broad with many aspects, the studies have not been exhaustive and further studies should be explored. Kemunto (2009) studied the Nairobi city's household solid waste management problems where she found out that a number of factors contribute to this problem. One is the weak institutional structure that lacks the political and social goodwill to manage and keep up with the city's population growth. She noted that the existing social amenities have been stretched to the limit and no efforts have been made to match up the solid waste collection activities with the ever increasing urban population.

The second problem she identified was the highly demoralized city council workforce due to poor pay and deplorable working conditions. As a result, numerous cases of

absentism and sickness characterizes these workforce resulting to lower per capital work output. She recommended the workforce to be well equipped, trained and well remunerated. Further to that, she recommended revolutionization of the organisational structure at the then Nairobi city council to ensure that there is social and political goodwill to improve the living conditions of the Nairobian.

Thomas, Xiujin, Henry & Simon (2007) did a study on solid waste management options for a developing mega city-Nairobi Kenya where they found that there is need for the private and public sector to collaborate towards ensuring that solid waste management is efficiently sustained. They concluded that problems of solid waste in Nairobi are occasioned by poor solid waste disposal and lack of adequate investments to address the menace. Further to that, the study found out that the necessary waste legislation was lacking not to mention the compounding of all waste without differentiation. Solid waste in Nairobi is rarely differentiated to biodegradable such as food litters and the non biodegradable such as nylon papers. The net effect is that recycling of such solid waste becomes complicated due to manual sort out exercise.

Mwanthi, Nyabola & Tenambergen (1997) did a study on the present and future status of municipal solid waste management in Nairobi. Among the findings of the study was that at least 90% of the city of Nairobi residents lack dust bins in their residential and office premises. As a result, they opt for unorthodox means of dumping waste. Also the study revealed that Nairobian also contribute largely to waste mismanagement through littering hence rendering the city ugly and hazardous. The study recommended sensitization of the public on their own individual responsibility in managing solid waste and also for the then city council to provide strategic dustbins within the city.

Mwanthi & Nyabola (1997) also did another study to ascertain among other things the contributing factors leading to poor solid waste management in Nairobi and the residents knowledge of the health effects of a poorly managed solid waste disposal system. The study found that in a linear scale of one to ten, waste is not collected at least six times for every 10 times it is supposed to be collected. This was largely due to the poorly trained personnel who were not even enough in number to handle all the solid waste in Nairobi, siphoning of resources meant for solid waste management purposes and carelessness of the Nairobi residents who normally show no concern for their environment. A big percentile of the waste in Nairobi city is as a result of people not wanting to take responsibility of their environment by not exercising restraint in garbage loitering. The duo concluded their study by recommending that the public be actively involved in solid waste management and demand accountability from the then Nairobi city council. They argued that, people have so much power with them which if unified can take legal action against the authority to demand their right to a clean and safe environment.

## 2.4 Research Gaps

The above discussed literature is the reference point through which this study was based on. Whereas it is debatable that the solid waste problems in urban centres are due to a myriad of issues, one common denominator for these problems is the inadequate monitoring and evaluation of such projects.

However, analyzing the existing literature, none touched on the issue of monitoring and evaluation of solid waste projects as a possible variable that which if implemented could unlock the solid waste management problems. Also given that the research studies providing the above literature were conducted more than five years ago, circumstances have changed and therefore the need to conduct a new study to provide a more updated and relevant literature.

One common trait in the existing literature is that every researcher acknowledges there is a problem with solid waste management in Nairobi. The point of departure is how to go about addressing this problem without generalizing solutions. More than 50% of solid waste management projects in Nairobi County are implemented by private contractors. The client who is the Nairobi County Government does not exercise sustainable monitoring and evaluation of these projects. As a result, the contractors get paid for work that does not match the standard of expected output and the environment continues to degrade. This study will try to ascertain what challenges that deter the county government of Nairobi from conducting sustainable monitoring and evaluation of solid waste management projects within its jurisdiction.

## III. RESEARCH METHODOLOGY

The research was conducted through descriptive research design. According to Mugenda and Mugenda (2003), descriptive research refers to a systematic and empirical study whereby the researcher has no direct influence on the independent variables under consideration. The variables cannot be manipulated because primarily they occurred in the past. This research design is more concerned with the “what”, “how” and “where” phenomenon. The design was most suited for this research because the study aimed at profiling the challenges influencing sustainable monitoring and evaluation of solid waste management projects in Nairobi City County. Therefore, the researcher had no control over the variables (challenges) and thus only described their existence.

The target population for this study was people who work in the environment department of the Nairobi City County Government. The sampling frame for this research was the cleansing (solid waste management) section of the NCCG environmental department which has about 300 staff both skilled and non-skilled. According to Kothari (2004), random sampling is where each object in the population has a chance of being selected and helps to eliminate biasness in the data collected.

The sample size consisted of 73 respondents computed as below:

Confidence level= 95%

Standard deviation = 10%

Significance level-5%

Population (N) =300

Proportion (p) = 0.5; p+ (1-p) =1

$n = \frac{[z^2 * p (1-p)]/e^2}{\{1 + (z^2 * p (1-p))/e^2 * N\}}$

(Survey Monkey, 2016)

**Table 3.1: Sample Size**

Population 'N'	Standard Deviation/margin of error 'e'	Confidence Level	Z-critical Value	Proportion (p)	Sample Size "n"
300	10%	95%	1.96	0.5	73

This study used questionnaires in primary data collection. Secondary data was gathered from the review of documents such as published journals and newsletters touching on the empirical and theoretical review of solid waste management and sustainable monitoring and evaluation. A research assistant was deployed to collect primary data and the respondents were served with the questionnaires in a similar manner. For clarity of the purpose, a letter of introduction was attached to the questionnaires.

For this study, a pilot test of 5 respondents was carried out for assessment of the validity and reliability. Content oriented validity (format of the instrument) was adopted by pretesting the questionnaires on a small section of the target population. This helped in identifying the suitability of the instrument in measuring the research variables (Kothari, 2004). The reliability for the opinion questions was calculated using SPSS and tested using Cronbach alpha.

The descriptive data was analyzed using frequencies, percentages, statistical package for social sciences (SPSS) and measures of central tendencies such as mean, standard deviation. Mugenda (2003) defined measures of central tendency as that which shows the centre in a probability distributed information. Moradi, Brown, & Guo (2014) defined percentage as a ratio expressed as a portion of one hundred and SPSS is a software used for data analysis in statistics (Kothari, 2004)

Inferential data was analyzed using multiple regression analysis and analysis of variance (ANOVA). Analysis of Variance compares the means between and within two or more groups or variables whereas regression analysis indicates the relationship between variables under study (Kothari, 2004). Qualitative data was analyzed using content technique.

The results of the study were presented using frequency distribution tables and charts. Kothari (2004) defined frequency distribution table as a diagrammatic representation of the count of occurrences within a particular interval or group of values. A chart can take several forms but the underlying principle is to provide a summary of how elements in a sample are distributed (Mugenda, 2003).

#### IV. DATA ANALYSIS AND INTERPRETATION

##### 4.1 Response Rate

The study targeted 73 respondents in collecting the data about the challenges that influence sustainable monitoring and evaluation of solid waste management projects in Nairobi City County. From the study, 55 out of the 73 people responded and

filled in the questionnaires. This was a response rate of 75%, which is a reasonable response rate that can be used to analyze the findings.

##### 4.2 Reliability and Validity

Reliability is the extent to which a measuring instrument contains variable errors that appear inconsistently from observation during any one measurement attempt or that vary each time a given unit is measured by the same instrument. Construct validity is established by relating measuring instruments to a general theoretical framework so as to ascertain whether the instrument is tied to the concepts and theoretical assumptions they are employing (Nachmias & Nachmias, 2008). SPSS version 22 was used as the statistical software to analyze the relationship between the dependent variable and the four independent variables as shown in the diagram below. Cronbach's alpha test was done and a Cronbach test value of above 0.7 implies that the instrument was sufficiently reliable for the measurement. As most item total correlations were reasonably high, the construct validity of the instruments was considered reasonable (Brown, 2000).

**Table 4.1: Alpha Coefficients**

Variable/Construct Description	Item mean values	Item standard deviations	Coefficient Alpha Reliability
<b>Technical Capacity</b>	16.3	2.9	0.773
<b>Project Performance Indicators</b>	16.2	2.3	0.756
<b>Budget</b>	16.6	2.3	0.729
<b>Coordination</b>	17.2	8.3	0.754
<b>Sustainable monitoring and evaluation</b>	17.1	4.1	0.753

##### 4.3 Bio Data

###### 4.3.1 Age of the Respondents

From the respondents who participated in the study, 49.10% were between 25-34 years of age, 21.80% of the respondents were between 35-44 years of age, 18.20% of the respondents were below 25 years of age whereas 10.9% of the respondents were between 45-54 years of age.

Skirbekk (2003) stated that the intellectual ability of an individual has a direct correlation on job performance in terms of delivery and efficiency.

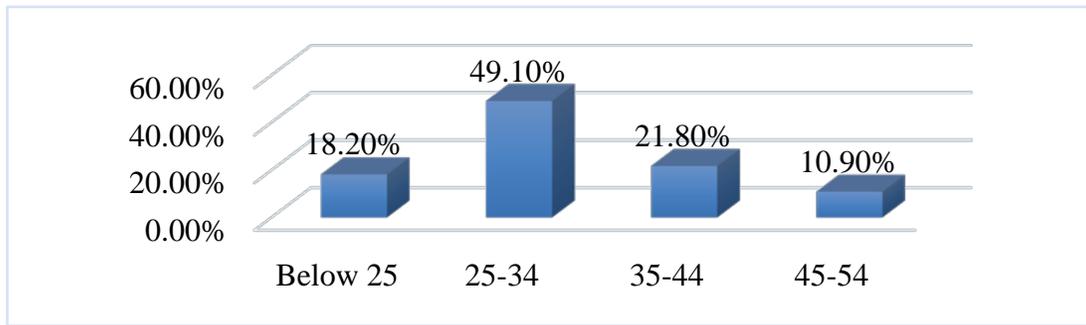


Figure 4.1: Age of the Respondents

**4.3.2 Level of Education**

The study sought to establish the highest level of education achieved by the respondents. The study findings showed that 49.10% of the respondents had attained a college/university level

education, 32.70% of the respondents had attained a postgraduate education whereas 18.20% of the respondents had attained a secondary level education.

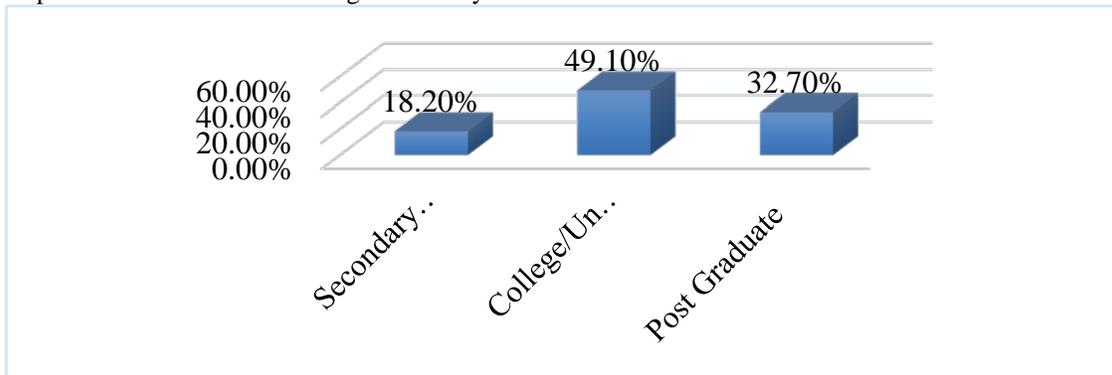


Figure 1.2 Respondents Level of Education

**4.4 Study Variables**

**4.4.1 Technical Capacity**

The first objective of the study was to determine how technical capacity influences sustainable monitoring and evaluation of solid waste management projects in Nairobi City County. The respondents were served with questions and statements aimed at answering the research question. The findings of the study are discussed below as presented in the research questionnaire. The main statement of the study sought to find out how technical capacity influences sustainable monitoring and evaluation of solid waste management in Nairobi

City County. According to the results, respondents strongly agreed that; m & e personnel with the right mix of academic knowledge and experience plays a key role in sustaining monitoring and evaluation as shown by a mean of 4.1; that mobility to project site by whatever means available is a critical component to sustaining monitoring and evaluation as shown by a mean of 4.0; and that M & E tools such as logical framework helps in a great way to examine the advancement of the project and co relating the project activities and the results achieved as shown by a mean of 4.0.

**Table 1.2 Technical Capacity and Sustainable Monitoring and Evaluation of Solid Waste**

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Dev.
Sustainable monitoring and evaluation is dependent on the qualified M & E personnel in terms of knowledge and work experience	0	9.1	12.7	38.2	40	4.1	0.9
Mobility to project sites influences how well a project is monitored	3.6	10.9	5.5	40	40	4.0	1.11
Monitoring and evaluation tools help in tracking the project	7.3	5.5	7.3	40	40	4.0	1.2

#### 4.4.2 Technical Capacity and Sustainable Monitoring and Evaluation

The research study sought to find out extent to which technical capacity influences sustainable monitoring and evaluation of solid waste management projects in Nairobi City County. From the findings, 32.7% of the respondents indicated that technical capacity influences sustainable monitoring and evaluation of solid waste management projects to a very great extent, 56.4% of the respondents indicated that technical capacity influences sustainable monitoring and evaluation of

solid waste management projects to a great extent, 7.30% of the respondents indicated that technical capacity influences sustainable monitoring and evaluation of solid waste management projects to a neutral, 3.6% of the respondents indicated that technical capacity influences sustainable monitoring and evaluation of solid waste management projects to a less extent and 0% of the respondents indicated that technical capacity influences sustainable monitoring and evaluation of solid waste management projects to no extent.

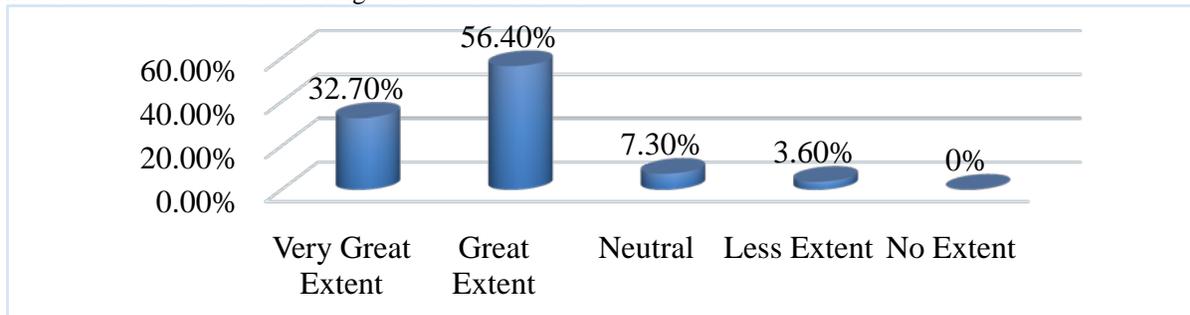


Figure 4.3: technical capacity influence on sustainable monitoring and evaluation

#### 4.4.2 Project Performance Indicators

The second objective of the study was to determine how project performance indicators influences sustainable monitoring and evaluation of solid waste management projects in Nairobi City County. The respondents were served with questions and statements aimed at answering the research question. The findings of the study are discussed below as presented in the research questionnaire. The statement of the research sought to find out the extent to which respondents agreed with the statements about the influence of project performance indicators on sustainable monitoring and evaluation of solid waste

management in Nairobi City County. According to the results, respondents strongly agree that; M & E need to be benchmarked against an already predefined measure of the project success as shown by a mean of 3.6; that organizations with well documented procedures for conducting monitoring and evaluations experiences high levels of project success as shown by a mean of 4.1; and that information gathered during project monitoring and evaluation need to be communicated to stakeholders to increase future project success as shown by a mean of 4.5.

Table 4.3: influence of project performance indicators on sustainable monitoring and evaluation

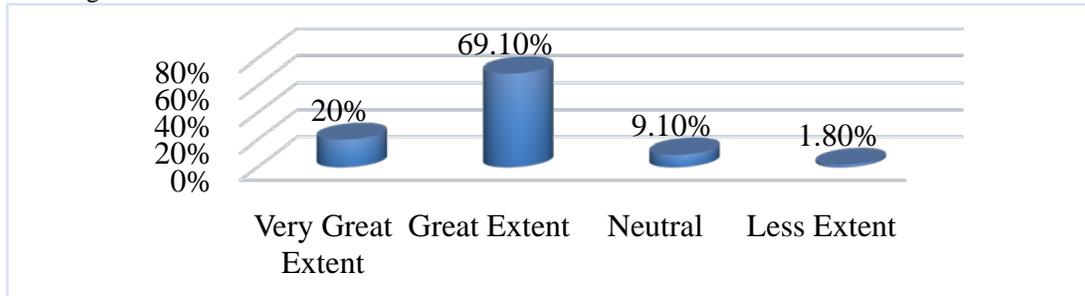
Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std Dev.
M & E need to be benchmarked against an already defined measure of project success	5.5	10.9	21.8	47.3	14.5	3.6	1.1
Organizations that have well documented procedures for doing m & e experience high levels of success	1.8	5.5	10.9	47.3	34.5	4.1	0.9
Information gathered during monitoring and evaluation need to be communicated to stakeholders to increases future project success	0	0	9.1	36.4	54.5	4.5	0.662

#### 4.4.3 Extent to which project performance indicators influences sustainable monitoring and evaluation

The research sought to establish the extent to which project performance indicators influences sustainable monitoring and evaluation of solid waste management projects in Nairobi City

County. From the results of the study, 20% of the respondents indicated that project performance indicators influences sustainable monitoring and evaluation of solid waste management projects to a very great extent, 69.10% of the respondents indicated that project performance indicators influences sustainable monitoring and evaluation of solid waste management projects to a great extent, 9.10% of the respondents indicated that project performance indicators influences sustainable monitoring and evaluation of solid waste

management projects to a neutral, 1.8% of the respondents indicated that project performance indicators influences sustainable monitoring and evaluation of solid waste management projects to a less extent and 0% of the respondents indicated that project performance indicators influences sustainable monitoring and evaluation of solid waste management projects to no extent.



**Figure 4.4 project performance indicators influences on sustainable monitoring and evaluation**

**4.4.4 Budget**

The third objective of the study was to determine how budget influences sustainable monitoring and evaluation of solid waste management projects in Nairobi City County. The respondents were served with questions and statements aimed at answering the research question. The findings of the study are discussed below as presented in the research questionnaire. The statement of the research sought to find out the extent to which respondents agreed with the statements about the influence of budget on sustainable monitoring and evaluation of solid waste

management in Nairobi City County. According to the results, respondents strongly agree that; sustainability of monitoring and evaluation is directly related to the budgetary funds allocated shown by a mean of 3.9; that the m & e personnel should be trained on the optimal utilization of the m & e budget to avoid misappropriation as shown by a mean of 4.3; and that budget for m & e should be audited for accountability purposes as shown by a mean of 4.2.

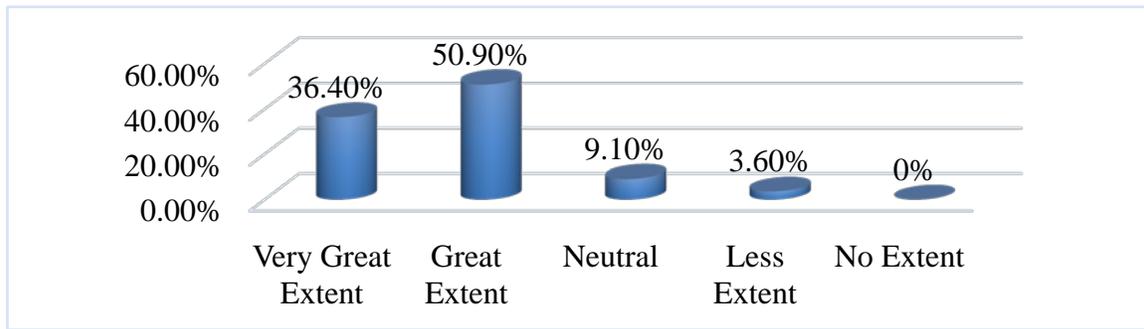
**Table 4.4: influence of budget on sustainable monitoring and evaluation**

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Dev.
Sustainability of monitoring and evaluation is directly related to budgetary funds allocated	3.6	7.3	14.5	41.8	32.7	3.9	1.1
Monitoring and evaluation personnel should be trained on the optimal utilization of the m & e budget to avoid misuse	0	1.8	12.7	41.8	43.6	4.3	0.8
Budget for m & e should always be audited for accountability purposes	0	10.9	5.5	40	43.6	4.2	1.0

**4.4.5 Extent to which budget influences sustainable monitoring and evaluation**

The research sought to establish the extent to which budget influences sustainable monitoring and evaluation of solid waste management projects in Nairobi City County. From the results of the study, 36.4% of the respondents indicated that budget influences sustainable monitoring and evaluation of solid waste management projects to a very great extent, 50.9% of the respondents indicated that budget influences sustainable

monitoring and evaluation of solid waste management projects to a great extent, 9.1% of the respondents indicated that budget influences sustainable monitoring and evaluation of solid waste management projects to a neutral, 3.6% of the respondents indicated that budget influences sustainable monitoring and evaluation of solid waste management projects to a less extent and 0% of the respondents indicated that budget influences sustainable monitoring and evaluation of solid waste management projects to no extent.



**Figure 4.5** Budget influence on sustainable monitoring and evaluation of solid waste management projects

**4.4.6 Coordination**

The fourth objective of the study was to determine how coordination influences sustainable monitoring and evaluation of solid waste management projects in Nairobi City County. The respondents were served with questions and statements aimed at answering the research question. The findings of the study are discussed below as presented in the research questionnaire. The statement of the research sought to find out the extent to which respondents agreed with the statements about the influence of coordination on sustainable monitoring and evaluation of solid

waste management in Nairobi City County. According to the results, respondents strongly agree that; uncoordinated solid waste disposal or collection points makes it difficult to carry out sustainable monitoring and evaluation shown by a mean of 4.3; that enforcement is key to ensure solid waste is only disposed and collected on designated points as shown by a mean of 4.3; and that it is costlier to conduct sustainable monitoring and evaluation if there is uncoordinated solid waste disposal and collection points as shown by a mean of 4.3.

**Table 4.5: Influence of coordination on sustainable monitoring and evaluation of solid waste Projects**

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Dev.
Uncoordinated solid waste disposal points make it difficult to carry out sustainable M & E	9.1	0	3.6	29.1	58.2	4.3	1.2
Enforcement is key in ensuring that solid waste management is only put and collected at designated points	0	5.5	9.1	36.4	49.1	4.3	0.9
It is costlier to consider sustainable monitoring and evaluation if there is uncoordinated solid waste disposal points	1.8	7.3	3.6	32.7	54.5	4.3	1.0

**4.4.7 Extent to which coordination influences sustainable monitoring and evaluation**

The research sought to establish the extent to which coordination influences sustainable monitoring and evaluation of solid waste management projects in Nairobi City County. From the results of the study, 50.9% of the respondents indicated that coordination influences sustainable monitoring and evaluation of solid waste management projects to a very great extent, 34.50% of the respondents indicated that coordination

influences sustainable monitoring and evaluation of solid waste management projects to a great extent, 14.50% of the respondents indicated that coordination influences sustainable monitoring and evaluation of solid waste management projects to a neutral, 0% of the respondents indicated that coordination influences sustainable monitoring and evaluation of solid waste management projects to a less extent and 0% of the respondents indicated that coordination influences sustainable monitoring and evaluation of solid waste management projects to no extent.

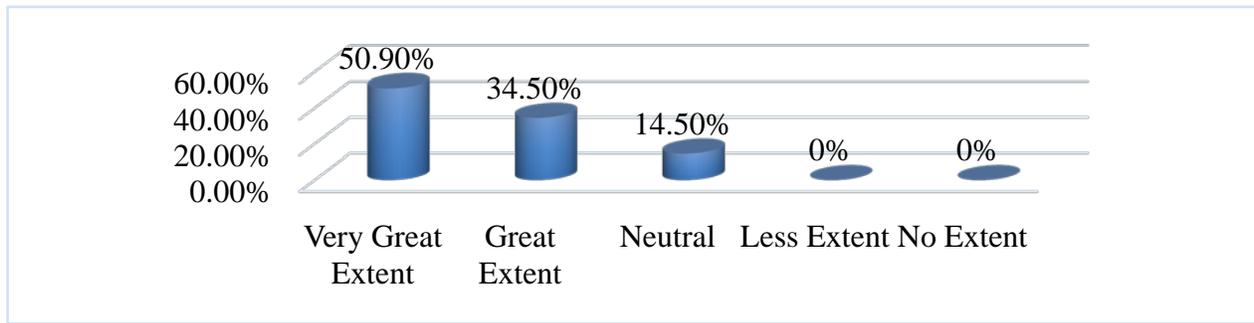


Figure 4.6: Coordination influence on sustainable monitoring and evaluation of solid projects

**4.5 Regression Analysis**

The researcher also conducted multiple linear regression to test the relationship between the dependent and independent variables. statistical package for social sciences (SPSS) was used

to code, enter and compute the values of multiple regressions for the study.

Table 4.6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.729	.621	.311	.482

Source: Research, 2016

The degree of variation in the dependent variable (sustainable monitoring and evaluation) due to variation in the independent variables (technical capacity, project performance indicators, budget and coordination) can be explained by coefficient of determination. The four independent variables studied, explain only 62.1% of the sustainable monitoring and

evaluation of solid waste management projects as denoted by the R<sup>2</sup>. It therefore means that other variables not covered in this study scope accounts for 37.9% of sustainable monitoring and evaluation of solid waste management projects. Therefore, more research should be done to ascertain the other challenges (37.9%) that influences sustainable monitoring and evaluation of solid waste management projects in Nairobi City County.

Table 4.7: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.582	4	1.645	7.092	.000 <sup>b</sup>
	Residual	11.600	50	.232		
	Total	18.182	54			

Source: Research, 2016

The model is statistically significant as it has a significant value of .000, which is less than 0.05. The F critical at 5% level

of significance was 3.23. Therefore, F calculated is greater than F critical hence the overall model was significant.

Table 4.8: Coefficient of determination

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.711	.546		3.132	.003
	Technical Capacity	.186	.131	.232	1.419	0.002
	Project Performance Indicators	.562	.152	.585	3.696	.009
	Budget	.065	.113	.084	.571	.012
	Co-Ordination	.158	.095	.199	1.663	.010

Source: Research, 2016

As per the SPSS generated table 4.8, the multiple linear regression equation  $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$  becomes:  
 $Y = 1.711 + .186 X_1 + .562 X_2 + .065 X_3 + .158 X_4 + \epsilon$

Where Y represents the dependent variable (Sustainable monitoring and evaluation),  $X_1$  is the technical capacity variable,  $X_2$  is project performance indicators,  $X_3$  is budget and  $X_4$  is coordination.

Going by the regression equation above, taking all the variables in to account (Technical capacity, project performance indicators, Budget and Coordination) constant zero, sustainable monitoring and evaluation will be 1.711. From the analysis, taking all the independent variables to be zero, a unit increase in technical capacity will lead to 0.186 increase in sustainable monitoring and evaluation, a unit increase in project performance indicators will lead to a 0.562 increase in sustainable monitoring and evaluation, a unit increase in budget will lead to 0.065 increase in sustainable monitoring and evaluation and a unit increase in coordination will result to a 0.158 increase in sustainable monitoring and evaluation.

From the foregoing, project performance indicators contributes more to sustainable monitoring and evaluation followed by technical capacity, then coordination and lastly budget. At 5% significance level and 95% level of confidence, technical capacity had a 0.002 level of significance, project performance indicators had a 0.009 level of significant, budget had a 0.012 level of significant while coordination had a 0.010 level of significant.

## V. SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Summary of the Findings

The study found out that technical capacity had a positive influence on sustainable monitoring and evaluation of solid waste management projects in Nairobi City County because P value = 0.002. The findings of the study was further in agreement with (Kalinova, 2007) who reiterated that skills, knowledge and attitude perceptions of a project manager are key determinants in project success.

The study also found out that project performance indicators had a positive influence on sustainable monitoring and evaluation of solid waste management projects in Nairobi City County with a P value = 0.009. This agrees with the study conducted (Finch, 2012) who recognized that project performance indicators helps measure the project progress towards a given goal and which is very critical towards project success.

The study found out that budget had a positive influence on sustainable monitoring and evaluation of solid waste management projects in Nairobi City County with a P value = 0.012. This is in agreement with the study conducted by (Amade, 2010) which recognized budget as a critical determinant of successful project implementation including monitoring and evaluation.

#### 5.1.4 Coordination

The study established that coordination had a positive influence on sustainable monitoring and evaluation of solid waste management projects in Nairobi City County with a P value =

0.010. This is further supported by the study conducted by (Jacobsson, 2011) who stated that coordination helps in managing unexpected occurrences and ensures that project energy is focused only on areas most relevant to the project success. The study acknowledges that coordination is a must have in any given project or else no project would exist. Coordination forms the basis through which supervision, monitoring and evaluation is conducted.

### 5.2 Conclusion

From the research findings discussed in chapter four and from the above summary of findings, the study concludes that sustainable monitoring and evaluation of solid waste management projects is achievable if: qualified personnel, well equipped is deployed to run the projects and have all the necessary tools of work; there are predefined benchmarks and standardized documentation against which the project progress is measured against and communication made to all the project stakeholders; there are adequate funds to support the monitoring and evaluation activities of which audit is conducted for accountability purposes and finally there is coordination to ensure solid waste disposal and collection points are well defined to support enforcement of policies and to cut on cost associated with m & e.

### 5.3 Recommendation

From the above conclusion, the study recommends that the NCCG and other key players in solid waste management projects in the county to employ and equip qualified man power with the right mix of academic knowledge and hands on experience to monitor and evaluate solid waste management projects as indicated by a mean of 4.1. There should be adequate means to facilitate mobility to project sites for purposes of m & e as indicated by a mean of 4.0 as well as availability of m & e tracking tools such as logical framework as shown by a mean of 4.0. For performance indicators, the study recommends that N.C.C.G use predefined standards to measure the project progress and performance as well as maintaining well documented m & e procedures and documentations. The information gathered during m & e should be communicated to the project stakeholders to ensure continued project improvements. Performance indicators will help to determine early enough whether the project is on course and allow for corrective action to be undertaken. As for the funding, the study recommends that a budget to conduct monitoring and evaluation be set aside along side other project funds and to be audited regularly to ensure accountability in utilization. Finally, it is important that NCCG legislate coordinated points through which disposal and collection of solid waste takes place for ease of facilitation of monitoring and evaluation efforts. This will ensure enforceability of the policies regarding solid waste and translate to cost savings as m & e personell will spend less time on site trying to locate the solid waste collection points.

### 5.4 Suggestion for Further Studies

The study focused on four challenges (independent variables) which only influence 62.1% of the sustainable monitoring and evaluation of solid waste management projects in Nairobi City County (dependent variable). Further studies should

be conducted to establish the other challenges (37.9%) influencing sustainable monitoring and evaluation of solid waste management projects especially in other countries for purposes of comparison and making recommendations for improvement.

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