

FACTORS INFLUENCING THE PERFORMANCE OF E-WASTE PROJECTS IN MURANG'A COUNTY, KENYA

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DECLARATION

This project report is my original work and has not been presented in any other institution for examination purposes.

Sign

Date

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L50/84485/2016

This research project report has been submitted for examination with my approval as the university supervisor.

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DEDICATION

I dedicate this work to my mum, Faith Wangari, my wife, Eunice, son, Mwangi and my daughter, Faith who have continuously supported and motivated me to finish this study and accomplish our dream.

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ABBREVIATIONS AND ACRONYMS

CCK:	Communication commission of Kenya
CSR:	Cooperate social responsibility
EEE:	Electric and electronic equipment
EIN:	Electronic industries alliance
EMCA:	Environmental management coordination act
EPR:	Extended producer responsibility
ICT:	Information communication technology
NEMA:	National environmental management authority
ROA:	Return on assets
UNEP:	United Nations Environment Programmer
WEEE:	Waste electrical and electronic equipment

ABSTRACT

All used electronics which are destined for reuse, resale, salvage, recycling or disposal are considered e-waste. Rapid changes in technology, changes in media (tapes, software, MP3), electronics' falling prices and planned obsolescence have resulted in a fast-growing surplus of electronic waste around the globe. Murang'a County is one of the five counties in Central region of the Republic of Kenya. Being a new establishment of the Kenyan Constitution 2010, the County has heavily adopted electronic and digital communication but has not adequately addressed the disposal of the obsolete electronic gadgets. The researcher set out to examine factors influencing the performance of e-waste projects in Murang'a County. The independent variables included disposal regulations, financial resources, technology and corporate social responsibility. The researcher used descriptive study design and acquired data from 94 respondents out of 102 respondents who were sampled from the 340 employees of the county Government. Data was collected using structured questionnaire after a pilot study was conducted to ascertain the validity and reliability of the research instruments. The sample was selected using stratified purposive sampling. Data coding and analysis was done using SPSS technique and results presented in tables. The analyzed results indicated the lack of proper regulations for the disposal of the e-waste was the leading factor influencing the e-waste projects followed by the availability of appropriate technology, corporate social responsibility and availability of financial resources had the least effect. The researcher fronted that effective e-waste projects would ensure that the environment is conserved and would as well provide a business opportunity and employment to the locals. The study concluded that all the factors investigated had an influence on the performance of e-waste projects. The study recommended that more regulation should be formulated to give guidance on e-waste management. It also recommended that county staff should be given more training on e-waste management best practices. The study also recommended that more financial resources should be allocated to e-waste activities and there should be more social spending on e-waste related projects. The study finally suggested further studies should be done on performance of e-waste projects in other similar counties.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Innovation and development in the field of science especially information and technology has led to diverse changes in all spheres of life. These changes have simultaneously impacted our lives positively in enhancing efficiency and productivity as well as negatively on the part of the environment due to waste generation from electronic and electrical equipment. Despite the comforts and the benefits derived from these changes, they have posed a great challenge on their disposal. Wastes in general comprise of substances which are disposed or intended to be discarded by provisions of national laws (Basel convention on movements of hazardous waste, 2002). E-waste otherwise referred to as WEEE (Waste Electrical and Electronic Equipment) includes components consumable and sub-assemblies that are loosely discarded out of date electrical and electronic devices (Amit, 2008).

Globally, 50 metric tons of e-waste are generated annually. If filled into a train container it would be enough to go round the planet earth once (Bono et al, 2005). China produces about 2.5 million tons (Basel convention, Geneva 2002). This is as a result of increased wastes from electric and electronic equipment. According to Robinson (2009), Europe, United States of America, Australia, China and Latin America are the leading e-waste producers in the world. The high obsolescence rate of electric and electronic wastes make e-waste one of the fastest growing waste streams (Arora, 2008). African countries are the recipients of e-waste that is illegally exported to third world countries from the developed ones. These countries have in their effort to reduce the e-waste resorted to collection, recycling and subsequently dismantling of e-waste. These efforts have been hampered by lack of appropriate infrastructure to handle e-waste (Ban, 2005). In Kenya, the population is embracing new technologies at a very high rate leading to the e-waste problem. Kenya lacks a well laid out legal frame work to address this challenge. Despite the contribution of ICT technologies in development and its advantages, the country is faced with the dilemma of increased e-waste and the government's initiative to promote access to ICT, (Sergon, 2010).

Murang'a County, the epicenter of this study, is a county that has employed the use of ICT to a great extent. A lot of ICT focused enterprises, electrical and electronic shops

and government offices are located in Murang'a town, the administrative quarters of the County. Clients of electronic equipment flock the town to transact on these gadgets. As the population visits the center, the disposal of e-waste takes toll. It is one of the fastest growing challenges to the municipality and the County at large. The accumulation of e-waste in the County is expected to rise as evidenced in China and South Africa (UNEP, 2009). The problem of e-waste in the county is also escalated by the fact that e-waste disposal involves special logistical requirements for e-waste collection from its sources and sub-sequent transportation to recovery and/or disposal sites. The actions must be assigned clearly defined financial and physical responsibilities in regards to products legislative and economic incentives (Kanda, Taye, 2009). Though Kenya is a signatory to major environmental agreements, most of these have not been domesticated. This is the trend in many African countries especially on disposal of hazardous materials (Hatton, 2009).

1.1.1 Performance of e-waste projects

E-waste is a popular, informal name for electronic products nearing the end of their "useful life."(www.calrecycle.ca.gov), Computers, televisions, VCRs, stereos, copiers, and fax machines are common electronic products. Many of these products can be reused, refurbished or recycled. Unfortunately, electronic discards is one of the fastest growing segments of our nation's waste stream. Some researchers estimate that nearly 75 percent of old electronics are in storage, in part because of the uncertainty of how to manage the materials. Certain components of some electronic products contain materials that render them hazardous, depending on their condition and density. Some electronic items that could be considered to be hazardous include, but are not limited to; televisions and computer monitors that contain cathode ray tubes, LCD desktop monitors, LCD televisions, Plasma televisions, Portable DVD players with LCD screens could be classified as hazardous in some countries (www.dosomething.org). Electrical and Electronic equipment contains metallic and nonmetallic elements, alloys and compounds such as Copper, Aluminium, Gold, Silver, Palladium, Platinum, Nickel, Tin, Lead, Iron, Sulphur, Phosphorous, Arsenic etc. If discarded in the open, these metals can cause a severe environmental and health hazard. Therefore, the non-functioning electronics that cannot be repaired should be recycled by an organization qualified to do so.

1.1.2 E-waste projects in Murang'a County

The Constitution of Kenya 2010 provides for two distinct and interdependent levels of government –the national and the county Governments. Murang'a County is one of the devolved units created under the Kenya Constitution 2010. It is one of the five counties in Central region of the Republic of Kenya and occupies a total area of 2,558.8Km². It borders Nyeri County to the North, to the South Kiambu, to the West Nyandarua and to the East Kirinyaga, Embu and Machakos Counties. It lies between latitudes 0°34' South and 107' South and Longitudes 36°East and 37°27' East. The county lies between 914m above sea level (ASL) in the East and 3,353m above sea level (ASL) along the slopes of the Aberdare Mountains in the West.

The 2009 Population and Housing Census recorded a population of 936,228 persons for Murang'a County consisting of 451,751 males and 484,477 females and a growth rate of 0.4 per cent per annum. This population was projected to rise to 947,530 in 2012; 958,969 in 2015 and 966,672 persons in 2017.

The County has seven constituencies namely Kiharu, Kangema, Gatanga, Mathioya, Kigumo, Kandara and Maragwa. Kiharu Constituency covers Kiharu and Kahuro sub counties while Mathioya covers Mathioya Sub County, Kangema covers Kangema Sub County, Gatanga constituency covers Gatanga Sub County and part of Thika East Sub County, Kigumo covers Kigumo Sub County, Kandara covers Kandara Sub County and Maragwa covers Murang'a South Sub County.

The seven constituencies are divided in to 35 electoral wards. Kiharu, Gatanga, Kandara and Maragwa constituencies have the highest number of electoral wards with six wards each. They are followed by Kigumo with five wards. Mathioya and Kangema constituencies have the least number of electoral wards with three each.

Table 1.1: Constituencies in Murang'a

Constituency	Land Area(Km²)	No. of Sub-Counties	No of Divisions	No. of Locations
Kiharu	409.8	2	7	19
Kangema	173.6	1	2	10
Gatanga	599.0	2	7	19
Mathioya	351.3	1	4	12
Kigumo	242.1	1	3	11
Kandara	235.9	1	3	9
Maragwa	547.2	1	3	11
Total	2,558.9	9	29	85

Source: County Development Planning Office, Murang'a (2012)

1.2 Statement of the problem

Murang'a County government and other public establishments in Murang'a County are faced with a huge challenge in the disposal of electric and electronic wastes. The establishments are new entities established by the 2010 constitution of Kenya. As Murang'a County attempts to integrate ICT technologies in its endeavor to close gaps arising as a result of ICT literacy deficiencies, the problem of e-waste is a concrete challenge witnessed in Murang'a town and other towns in the county. As much as there is a high adoption rate of technology among different actors in the county, a high obsolescence rate of electronic gadgets is evident in the county. Lack of disposal policies and an appropriate regulatory framework has led to lack a functional e-waste disposal system (Waema, Mureithi, 2008). The Murang'a County government has made tremendous efforts to expand the rural electrification programmes to cover most trading centres and expand ICT coverage to improve communication to open up commerce and trade. It has also endeavored to Provide ICT training and supply of ICT equipment to some institutions of learning and increased access to computers through zero rating of ICT equipment. ICT is expected to ensure that information has been disseminated to the masses and also provides the public with correct information and portrays a good image of the Government.

The government's initiatives to enhance service delivery has led to fast growth of ICT department in Murang'a county government in an effort to improve competitiveness and participation, both internal and externally. The poor disposal strategies have led to the negative environmental impacts and deteriorating human health as noted by (Waema, Mureithi, 2008). (Cairns, 2005) notes that there is a need for urgent intervention by the government and other stake holders. The problem of e-waste if unchecked can leave the county with eroded benefits accrued from use of ICT gadgets. This is the basis on which this proposed study sought to examine the factors influencing the performance of e-waste projects in Murang'a County, Kenya.

1.3 The purpose of the study

The purpose of this study was to examine the factors influencing the performance of e-waste projects in Murang'a County.

1.4 Objectives of the study

The objectives of this proposed study were:

- i. To establish how existing disposal regulations influenced performance of e-waste project in Murang'a County.
- ii. To determine the influence of availability of financial resources on the performance of e-waste project in Murang'a county.
- iii. To establish how availability of appropriate technology influenced performance of e-waste project in Murang'a County.
- iv. To assess the influence of corporate social responsibility on the performance of e-waste project in Murang'a County.

1.5 Research questions

This study sought to answer the following questions:

- i. How did the existing disposal regulations influence the performance of e-waste project in Murang'a County?
- ii. To what extent did availability of financial resources influence the performance of e-waste project in Murang'a County?
- iii. How did the availability of appropriate technology influence the performance of e-waste project in Murang'a County?

- iv. What was the influence of corporate social responsibility on the performance of e-waste project in Murang'a County?

1.6 Significance of the study

This study would be of help officers assigned with e-waste disposal function to develop disposal regulations that align to public procurement and disposal act. It would assist the Murang'a County Government to mobilize financial resources that would help in performance of e-waste project by helping it to integrate appropriate technology that would assist in proper performance of e-waste project. That integration would create job opportunities for the jobless youth in e-waste recycling industry. The study also created awareness on the influence of extended producer responsibility on performance e-waste project in the County. Finally, it would create awareness that could lead some organizations to take up e-waste management as a business venture or as their corporate social responsibility

1.7 Basic Assumption of the study

The study assumed that the variables being investigated influences the performance of e-waste projects. It also assumed that heads of the departments and other relevant county officers use ICT devices for their daily operations. The study further assumes that the respondents possessed relevant knowledge of the county regulations including e-waste disposal.

1.8 Scope and limitations of the study

The study sought to identify and analyze factors influencing the performance of e-waste projects in Murang'a County. The study was limited to County Government officers in the County. It also limited itself to four objectives; that is, disposal regulations, availability of financial resources, availability of appropriate technology and corporate social responsibility.

The time to carry out the proposed study was limited leading to limited scope. There was also a limitation of research funding because the researcher was a self-sponsored student. However, the limitations were overcome since the researcher put up a schedule of activities that was strictly adhered to.

1.9 Delimitation of the study

The study was focused on Murang'a County. This County is divided in to 9 Sub-Counties: Kiharu, Kahuro, Kangema, Gatanga, Thika East, Mathioya, Kigumo, Kandara and Maragwa The nine Sub-Counties are further divided in to 35 electoral wards. The basic County Government operations in these units were automated indicating a high presence of electronic gadgets. This enabled easy access to the study population and gathering of the required information by the researcher.

1.10 Definitions of significant terms used in the study

Appropriate technology: Technical knowledge and appropriate infrastructure needed for effective management of e-waste disposal.

Effective waste management: Proper administrative operational activities used in handling and disposal of waste.

Electronic waste: Expired electronic and electrical products that are no longer useful.

Financial resources: Quantity of funds required for effective management of e-waste disposal.

Regulatory framework: Institutional and legal structures and instruments needed for effective management of e-waste disposal.

1.11 Organizational of the study

The project study entailed five chapters: Chapter one involved background of the study, statement of the problem, purpose of the study, objectives and research questions. It also encompassed significance of the study and assumptions, delimitation of the study, limitations of the study and significant terms used in the study. Chapter two comprised of review of the related literature, the theoretical framework and the conceptual framework. Chapter three included research methodology under the following subtopics: research design, target population, sample selection and sample size, research instruments, data collection methods, validity and reliability of the instruments and pilot study. Chapter four tackled data analysis, presentation and discussion of research findings while Chapter five presented a summary of the study findings and discussed theoretical and practical implications of the study. It acknowledged limitations of the study and proposed future areas of further study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed literature related to electric and electronic waste management. It contained the following sub-topics: concept of e-waste management, present status of e-waste management in Kenya and finally factors influencing the performance of e-waste projects.

2.2 Performance of e-waste projects

E-waste is electric and electronic products that have become obsolete and must be disposed. Electronic waste, also known as e-waste contains very toxic elements for example cadmium, mercury among many others. Ineffective e-waste disposal therefore strains the environment with hazardous toxic elements. This results to diverse health complication and therefore there is need for a regulatory frame work to address these challenges.

Murang'a County has adopted the use of electronic activities which results to e-waste streams of wastes. Environmental pollution therefore can be minimized by waste recycling. E-waste management is not only constricted to Kenya. It is a global problem that is requires global solution. 50 metric tons of e-waste is generated in the world. Though the exact waste of e-waste is not known, an estimate 3000 tons are generated yearly (Mureithi, 2008). These wastes consist of old mobile phones, PCs, and obsolete television sets as a result of the advent of digital television transmission. Lack of strong policies as regards importation of second hand electronic gadgets, for example computers has compounded the problem. Kenya vision 2030 has seen expansion of the ICT with diversification of electronic activities leading to e-waste problem management (Scott et al, 2004). Some countries dump their e-waste in disguise that they are helping to boost ICT technologies in less developed countries (Musili, 2008).

The low prices attached to second hand computers have made Kenya a large and potential market for electronic equipment. In response to this hazardous waste imports, the Basel convention on the control of Trans - boundary movement was convened in 1992 to address the situation. Many countries have joined the convention.

The convention agitates for innovation solution for environmentally friendly e-waste disposal, (Buenker, 2007). Though there is need to address the digital divide; care must be exercised as regards e-waste disposal as most of them consist toxic components (Liu, 2009).

Due to the fast growing sectors in the telecommunication sector, a wireless system has been introduced of mobile telephony and heavy investment in the mobile sector. The passing away of fixed landlines installation has led to radical investment in mobile telephony in Kenya. The subsequent introduction of M-pesa transaction and benefits associated with it for example, credit services through M-Shwari has compounded the problem of e-waste disposal. The number of mobile subscribers has grown from 7 million in 2005 to 11 million in 2007, an increase of 44 percent (CCK, 2007). The resultant variable is an increase in tele-accessibility by 30 percent.

Due to the above advantages of e-transaction, a high proportion of reconditioned mobile phones and other electric and electronic gadgets have found their way in Kenya. An estimated 60 billion has been realized in mobile segment alone leading to further huge investments (CCK, 2007). Currently the influx of cheaper electronic gadgets from Asia has accelerated the problem of e-waste in Kenya. Many of these are second hand generation with a short life span especially second hand television sets. It is known television can contain very hazardous and toxic components, for example lead and phosphorescent as noted by Barba –Gratierrez et al (2007).

The actual amount of generation of e-waste in Kenya is not documented. Various authors have given diverse estimates, for example, Mureithi (2008) estimates an annual generation of about 30,000 metric tons. These wastes includes old computer parts and mobile telephones international organization like UNEP(2009) have also put up their estimates of at least 6,000 metric tons in a year. Although Kenya is not a major e-waste producer, it's at the risk of e-waste accumulation (Scott 2004). A key concern is policy failure in regard to imports of second hand electronics gadgets like the mobile phones and obsolete computers and their components.

Therefore, there is a need to put a provision of e-waste disposal as the country gears up for vision 2030 that enshrine ICT infrastructures as a foundation of its

achievement. In the first medium term of 2008-2012 the Kenya vision 2030 states that for sound knowledge economy, ICT infrastructure is a pre-requisite in pursuit of the vision's goal. Electronics equipment must be sourced. This equipment shall certainly lead to e-waste accumulation as well Scott (2004).

The Basel convention on the trans-boundary waste management heightened the e-waste problem in Kenya especially in major towns. Prior to this convention, the problem of e-waste was not considered a major problem due to the relatively low consumption of EEE.

A lot of computer imports have not been in line with a system of their disposal after their lifespan (Musili, 2008). Majority of these computer imports are unusable compounding e-waste disposal problem Diarra (2007). Although efforts of addressing digital divide are a concern for less developed. Countries in Africa there is a problem in regard to management of e-waste Scott (2004).

The above situation is escalated by the following reasons; ineffective e-waste processing sectors that don't view e-waste as a source of income (HICK 2005). The reluctance to pay for garbage disposal services as majority view garbage is money. Lack of willingness to participate in EEE management, lack of awareness on a range of re-use options and the options in recycling (Meinhardt 2001). Lack of data on e-waste trade and misinformation on the life span of purchased electronic products.

2.3 Availability of technology and performance of e-waste projects

The technology used to dispose e-waste must be cost effective and environment friendly. WEEE recycling can be categorized into two categories – disassembly and upgrade. Disassembly also called dismantling technology is used to retrieve components from electronic scrap for example, computers. The isolated parts are reused because they are valuable to the user.

On the other hand upgrade entails two cycles, combination and separation of materials using physical or metallurgical processing to prepare for refining. Treatment methods based on the make-up of WEEE include Physical separation, Thermal treatment, Hydrometallurgical treatment and electrochemical treatment

Physical separation is a method that involves separating different components into fractions for example, iron and copper or capacitors and batteries, etc. After separation they are reduced in size by use of shredder which produces small even fine-sized particles. The physical separation recycling can produce full material recovery. The resultant materials are enriched in certain materials and further processed using other method (W. Spruzina and Prior, 2006 F; Kuo- Shuh and Tien-chin, 2004).

Hydrometallurgical treatment entails caustic or acid leaching of solid materials. The metal required is separated from the solution and concentrated through various processes like extraction, precipitation, filtration and distillation (Spruzina & Prior, 2006). This involves interaction between a metal ion in aqueous solution and a complexing agent dissolved in an immiscible organic stage. A limitation of this method is that it cannot treat more complicated scrap materials (Tae & Myong, 2003). Thermal treatment involves incineration and smelting in a plasma furnace or blast furnace at extreme temperatures (Spruzina & Prior, 2006). It is used to remove organic and concentrate material further. An advantage of this method is that there are no material problems.

Electrochemical treatment is used to separate metals among themselves. This happens usually in aqueous electrolytes or molten salts. E-waste is therefore a challenge which can be detrimental to the environment if not tackled in an appropriate way. Reduce, Reuse and Recycle (3R principles) must be integrated in policy and management of E-waste. Therefore sustainable innovation is useful in achieving development for current and future generation and hence a sound technology involvement in e-waste disposal is required (UNEP, 2009).

After recycling, markets for the recycled materials must be sorted although market potential of e-waste recycling technologies varies between countries (Wipo, 2007). Transfer of technology would help minimize costs, energy and assist developing countries to be independent.

Here in Kenya, there is a gap of relevant technology that can be utilized in e-waste management especially in recycling technologies. This has led to emergence of crooks

who use primitive recycling methods that compound the threat to environment and peoples' health.

Lack of adequate technology and expensive technology has hampered recycling of e-waste in Kenya. Lack of technological infrastructure is complicated by the following; lack of ongoing e-waste surveys and assessment of mass flows to inform e-waste management and interventions, lack of data a database of import and exports of products, lack of regional e-waste collection centers, failures and lack of initiation of the pilot projects, lack of e-waste collectors schemes. Lack of registration and formalization of e-waste collectors & transporters and lack of technology training of e-waste management.

2.4 Disposal regulation and performance of e-waste projects

Any effective policy on electrical and electronic equipment (EEE) must define WEEE or E-waste appropriately including life cycle regulation. Chandra (2004) says that this management should start at generation point to achieve maximum waste minimization techniques and products designs that are sustainable. The global regulations started with formation of Basel convention in 1992 to control e-waste disposal. The WEEE directive of 2002 was also formulated to address E-equipment designed for use with a voltage not exceeding 1000 voltage of alternating current and direct current of 1500 volts. The EEE is further divided into ten categories of waste under the EU-WEEE directive (Rossem, 2002). The frame work released by Electronic Industries Alliance (EIA) in the year 2007 led to federal legislation that established the national program for household recycling of household televisions and information technology products like computers and associated peripheries. It outlined that television collection and recycling to be primarily undertaken by industry sponsored third party entities and supported by a fee paid by client at the point of purchase (Davis and Heart, 2009).

The public health Act (Cap242) and local government Act (Cap 265) are the basis of waste management in Kenya. This legislation is responsible for management of municipal waste. The public health act (Cap 242) states that nuisance is any refuse deposit accumulation which is offensive and dangerous to one's healthy. It also defines nuisance as accumulation of timber and stones and any other pests (section

118(i) (h)). However, there are gaps in the Act as it does not give guideline on solid waste management procedures. It does not address storage collection, transportation and waste disposal. It only stipulates penalties for non-compliance by a medical notice of medical officer of health to remove nuisance (GoK, 2010). To cater for the deficit by the above Acts, the environment management and coordination Act (EMCA, 1999) was enacted detailing about waste handling. It deters anybody from waste disposal that may cause pollution to the environment or temper with the health of persons. It also hinders unlicensed transportation of wastes except by a licensed establishment (EMCA, 1999).

The National Environment Management Authority (NEMA) is also mandated by the act to develop regulations on management of hazardous wastes. The regulations outline the classification criteria of toxic wastes. The constitution of Kenya (2010) states the right to a clean and healthy environment for all citizens. The Bamako convention also recommends signatories to ensure reduction of waste that is hazardous in a country (Bamako, 1991). The above regulations have gaps and weak reinforcement that need to be addressed. It is based on foregoing that this proposed study sought to examine the influence of regulatory frameworks together with their deficiencies on performance of e-waste projects in Murang'a County.

Lack of adequate regulatory frameworks, incomprehensive policies, low standards and laxity in the implementation of the existing regulations are the key hindrances to performance. There is no specific law on WEEE as noted at Basel convention held in Nairobi in 1999, sessional paper No.6 (1999). Lack of adequate strategies of policy implementation especially the ICT policy of 2006 have not been put in place (Waema2007). The present statutes are also inadequate in dealing with end of life management of ICT equipment because they concentrate on licensing only (Basiye, 2008).

Waema (2008) noted that the ministry of health is incapacitated to handle e-waste in Kenya. NEMA has developed regulations for producers, manufacturers, importers and other stakeholders in e-waste management. It has outlined mechanisms of e-waste disposal as highlighted below: collection at municipal level, designation of collection

Centre, schemes of producer responsibility, storage on the offsite, transportation, handlers, training and licensing of centers.

Kenya is a signatory to international and regional treaties. It is a party to the Bamako convention a treaty of Africa nations that prohibit import of hazardous e-wastes and mineral resources.

2.5 Availability of financial resources and performance of e-waste projects

Mobile telephony has taken a fashion style design. The masses attribute high cost and new mobile phones to modernization and fashion. They are replaced by users before their life span as a result of competition in fashion (Hicks, 2005).

Inadequate finances affects delivery of municipal services in solid waste management. Though recycling is advocated as an effective way of waste disposal, the overhead cost exceeds benefits (Stephenson, 2006). Much of the E-waste is disposed by way of landfills. Land is an expensive factor of production that the municipal entities are strained to acquire financially (Sign, 2010). The work force assigned to execute e-waste disposal is limited and inadequate. The machinery involved is also very expensive hindering effective disposal of e-waste. The scarce financial resource is a handicap to e-wastes management in Kenya.

2.6 Influence of CSR and performance of e-waste projects

CSR is a deliberate action where organizations adopt strategies aligning their operations to the interest of stakeholders. However, pursuing CSR is a voluntary decision for organization even though society pressures have influenced many firms to integrate social and environmental concerns in their strategic plans (Nelling and Webb, 2009). Whereas CSR is taken to have positive effect on financial performance, those opposed to it argue that CSR involves the undertaking of a set of actions which are potentially cost increasing (such as higher attention to workers conditions within the organization and in subcontracting companies, adoption of more environmentally, and costly productive processes). Engagement in CSR implies extra cost for the company, the first objective of management is profit maximization; companies need more certainties about the increase in value that the introduction of CSR brings (Mwangi, 2011). Friedman (1970) argues that there is one and only one social

responsibility of business, which is to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which means to, engage in open and free competition without deception or fraud. Reich (2007) contends that, as a result of high competition in the market, instead of engaging in CSR projects, which harm themselves, corporations need to concentrate on activities that have positive effects and gains. If the aim of business is to maximize profits, what are the motives that lead organizations to engage in social projects yet they are not profit generating?

This might be explained by the view that CSR projects provide sustainability for organizations long term profits; therefore it could be a tool for profit maximization. In the literature, it is argued that organizations engage in CSR projects for commercial benefits to increase the value of the organizations to the society and the government (Rynes, 2006). CSR projects help organization differentiate themselves from other companies (Scheneewis, 1988) which could have a positive effect on stakeholders (Jamali & Mirshak, 2007).

In Kenya, CSR is gaining momentum as organizations recognize the important role it plays in organization performance. This is so mostly on the large corporations who are using it as a corporate positioning tool and have continued to enjoy high profits from positive market perception due to CSR. In pursuing CSR, companies have also benefitted from operational efficiency through the reduction of waste with policies requiring organization to protect their environment by using eco-friendly systems for example, 'going green' that ensures paper usage is drastically reduced as the use of electronic mail is the modern trend of communication. Corporate disclosures of performance in social and environmental areas have helped businesses build a good reputation based on recognition of their efforts by stakeholders. It is also important to use CSR as a means of meeting stakeholder's demands, since this allows the business to explore profitable opportunities with the support of stakeholders (Zegreld, 2004).

The efforts by Murang'a county government to perfect e-waste performance project are an endeavor to pursue social responsibility. The proper disposal mechanisms are geared towards a healthy and harmonious existence of community devoid of detrimental effects of e-waste pollution.

2.7 Theoretical Framework

It is structure that supports a theory of research study. It introduces and explains why a research problem exists. The researcher employed Relational theory which has its root from the complex firm-environment relationships. Corporate citizenship of the relational theory strongly depends on the type of community to which it is referred. It is necessary that the Social responsibility of the business need to reflect social power that the business possesses. The approach is both within the interactive and ethical theories, where the former emphasizes the integration of social demands and the later focuses on the right thing to achieve a good society (Garriga and Mele 2004).

Corporations are proactive in publishing reports on economic, social and environmental performance following the idea of triple-bottom line (William, 2006). Stakeholder approach is one of the strategies of improving the management of the firm. Corporate relationship of relational theory depends on the type of community it refers to while the social contract theory explains the fundamental issue of justifying the morality of economic activities in order to have a theoretical basis of analyzing social relations between the corporation and the society. In the stakeholder approach, the purpose of the firm is to create wealth or value for its stakeholders by converting their stakes into goods and services (Griffin, 1997), or “to serve as a vehicle for coordinating stakeholder interests” (Hull, 2008).

Stakeholder approach has been developed as one of the strategies in improving the management of the firm. It is a way to understand the reality in order to manage socially responsible behavior of a firm.

2.8 Conceptual framework

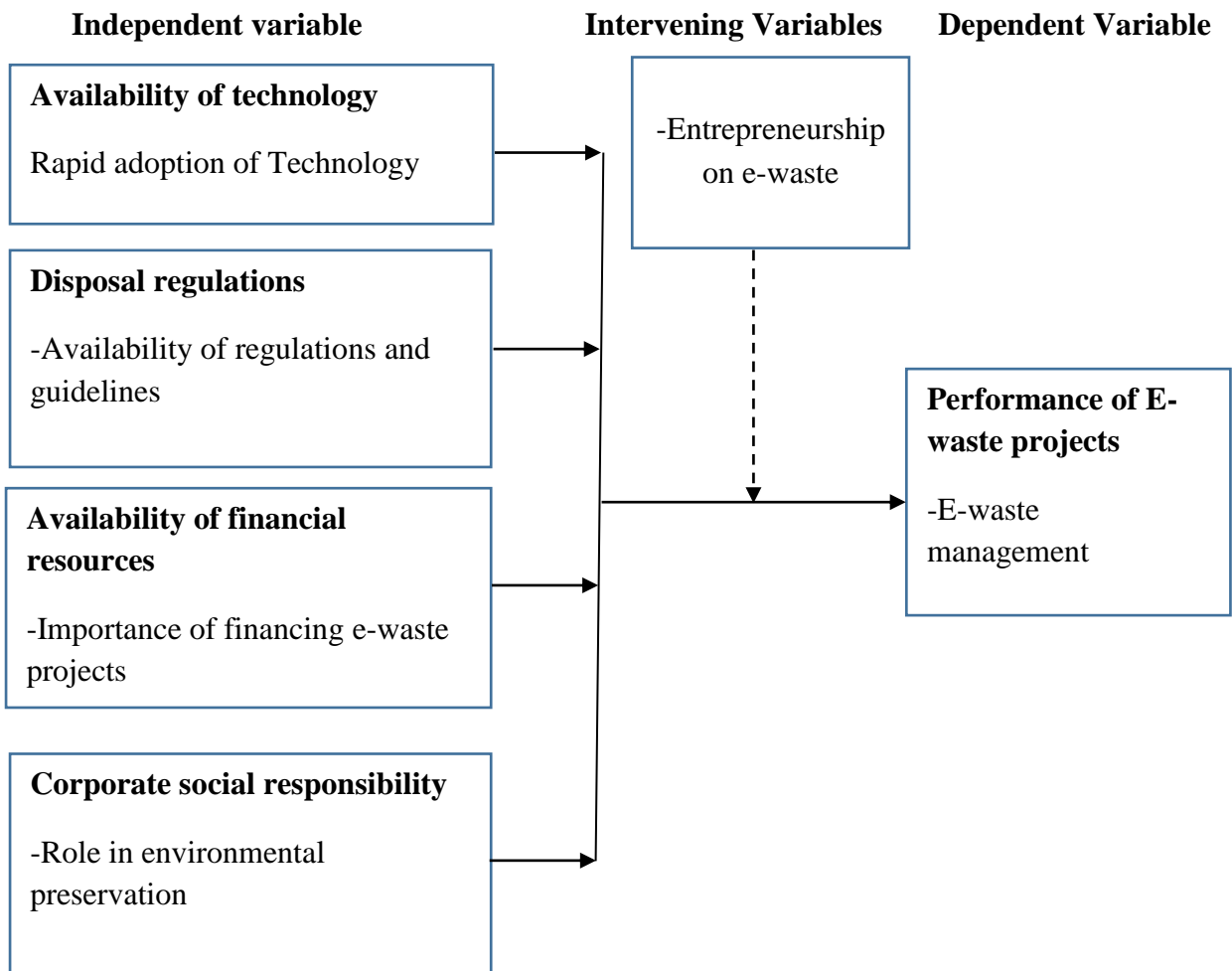


Figure 1: Conceptual framework

2.9 Knowledge Gaps in Literature reviewed

This research study concerned itself with factors influencing performance of e-waste projects in Murang'a County. Earlier studies had a national approach to the management of e-waste.

2.10 Summary of Literature Reviewed

The chapter dealt with literature from past researchers and other academic writings. It revealed that just like any other society, Murang'a County faces a myriad of challenges in respect to e-waste management. Finally, the chapter presented a theoretical framework and a conceptual framework for the operationalization of the variables.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter three included the research design, target population, sample size and sampling procedure, instruments, validity and reliability, data collection procedures and data analysis

3.2 Research design

This study employed a descriptive research design which is mainly concerned with the description of the characteristics of a particular research environment, pertaining to the facts and characteristics of the variables, (Kothari 2003). It described the state of affairs as they existed without manipulation of the variables. It also allowed for generalizations of data to be made (Mugenda and Mugenda, 1999). This research design was chosen because it aimed at discovering whether the identified factors affected the performance of e- waste projects.

3.3 Target Population

A population is the entire group a researcher is interested in; the group about which the researcher wishes to draw conclusions. Mugenda & Mugenda (1999), define a population as a complete set of individuals, cases or objects with some common observable characteristics. The proposed study targeted Murang'a County, with a population of 340 employees and stratified Purposive sampling technique was used.

The study focused on the ten departments of the entire County Government in purposefully selected proportions namely: Education & Technical Training, Agriculture, Livestock & Irrigation, Public Service, Finance, IT & Economic Planning, Commerce, Trade, Industry & Investment, Youth culture & social services, Energy, Transport & Infrastructure Development, Health, Water & Sanitation, Environment & Natural Resources and Land, Housing & Planning.

Table 3. 1: Target population

Department	Population	Purposive Sample from each Dept.
Education & Technical Training	36	10
Agriculture, Livestock & Irrigation	42	6
Public Service	30	10
Finance, IT & Eco. Planning	34	20
Commerce, Trade, Industry & Investment	43	8
Youth culture & social services	27	10
Energy, Transport & Infrastructure Development	38	8
Health, Water & Sanitation	34	10
Environment & Natural Resources	27	12
Land, Housing & Planning	29	8
Total	340	102

3.4 Sample size and sampling procedure

Since the target population in the area of study was 340, stratified purposive sampling method was used whereby members of the population were grouped into relatively 10 subgroups before sampling and every element in the population was assigned to only one stratum (Valerie, 1998). Stratified purposive sampling was used to capture key population characteristics in the sample. It produced characteristics that were purposefully proportional to the overall population. It also worked well for a population with a variety of attributes.

According to Mugenda & Mugenda (2003), a sample size of between 10 and 30 percent is a good representation of the target population and hence the 30% sample size was adequate for analysis. The sample size of this study was 102 respondents. The sampling ensured that each member of the population had an equal chance of being included in the sample.

Table 3. 2: Sample size

Department	Population per Dept.	Sample Size from each Dept.	Percentage of the Dept. Popl
Education & Technical Training	36	10	10%
Agriculture, Livestock & Irrigation	42	6	6%
Public Service	30	10	10%
Finance, IT & Eco. Planning	34	20	19%
Commerce, Trade, Industry & Investment	43	8	8%
Youth culture & social services	27	10	10%
Energy, Transport & Infrastructure Development	38	8	8%
Health, Water & Sanitation	34	10	10%
Environment & Natural Resources	27	12	11%
Land, Housing & Planning	29	8	8%
Total	340	102	100%

3.5 Research instruments

Data was collected using open and closed- ended questionnaires.

3.5.1 Questionnaire

A standardized abstraction form and procedure was developed to provide consistency, reduce bias, and improve validity and reliability by using open and close ended questionnaire (Wright, 2013). The researcher used questionnaire because they could be self-administered to many people at the same time. The researcher was expected to formulate clear and unambiguous questions to make it easy for data collection and accuracy.

3.5.2 Pilot testing of the instruments

For consistency of the questionnaire, pilot study was done at Mukuyu one of the town whereby ten questionnaires were issued. This gave ten percent of sample size as recommended by Mugenda and Mugenda (2003).

3.5.3 Validity of the instruments

Validity is the degree to which evidence supports any inferences a researcher makes based on the data collected using a particular instrument. This refers to the extent to which a test measures what it claims to measure. There are two types of validity; internal validity and external validity. Singleton (1996) defines internal validity as the adjustment of the measure or designs within the sample, where the independent variable produces the observed changes in the dependent variables. Internal validity can be threatened by extraneous variables, such as maturation, history, testing among others. Ngechu (2006) states that untrained research assistants and poor field data collection methods are some of the threats to internal validity.

This study utilized content validity because it involves adequacy of sampling. This is a matter of determining whether the instrument contains a sample that is adequately representative of the target population. The instrument to be used in this proposed study considered five main variables namely; disposal regulations, availability of financial resources, availability of technology, influence of extended producer responsibility and influence of corporate social responsibility on effective management of e-waste projects.

3.5.4 Reliability of the Instruments

For the sake of reliability, the researcher utilized the test-retest technique. This involved administration of a test to test method. The instrument was tested on a group selected randomly. After 2 weeks, a similar test was administered to the same group. The two sets of scores were regressed by use of Pearson's product moment correlation coefficient formula to determine correlation coefficient(r) between the two sets of scores. According to Mugenda and Mugenda (1999), reliability coefficient above 0.6 is satisfactory for instrument reliability.

3.6 Data collection procedure

The data was collected using questionnaires as the tool. The questionnaires were self-administered to encourage high response rate. This was reinforced through explanations made to the respondents about the importance of the questionnaire to the them.

3.7 Data analysis Technique

Kerlinger (1973) defines analysis as categorization, ordering, manipulating and summarization of data to obtain answers to the research questions. Data collected in this study was analyzed using descriptive statistics and presented by use of tables.

A multi regression analysis was conducted so as to find out the relations between each independent variables and the dependent variable in the study area. The regression model was computed as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon \dots\dots\dots (i)$$

β_0 =Constant

$\beta_1, \beta_2, \beta_3, \beta_4$ = Coefficients of determination

X_1 = Disposal regulations

X_2 = Technology availability

X_3 = Availability of financial resources

X_4 = Corporate social responsibility

ε = Error term

3.8 Ethical consideration

Ethics are norms which govern the human conduct and have a major effect on the human welfare (Kothari, 2005). The researcher obtained a letter of transmittals permitting him to carry out the research in Murang'a County. He also ensured that the research tools were used solely for the purpose of this research and the respondents' identities were concealed. All respondents were be informed of the purpose of the study and were treated with courtesy and respect.

3.9 Operational definition of variables

The independent variables included: E-waste disposal regulations, Availability of financial resources, Availability of appropriate technology and corporate social responsibility. The dependent variable was the influence of e-waste projects in Murang'a County. The operational definition of variables is given in Table 3.3.

Table 3.3 Operational definition of variables

Objectives	Variables	Indicators	Measurement	Scale	Tools of analysis
Establish how disposal regulations influenced performance of e-waste project	Regulatory Framework and performance of e-waste projects	By laws Court cases on violations Court fines from violations	Fines meted on offenders Volumes of waste Bank records	Interval	Statistical Package for Social Sciences Frequency table
Determine extent to which availability of financial resources influenced on performance of e-waste projects.	Availability of financial resources and performance of e-waste projects	Access to credit Cost of credit Default records from credit reference bureau	Credit facilities Interests rates Processing fees	Ratio Interval	Frequency table “ “ “ “
Establish how technology availability influences performance of e-waste	Technology and performance of e-waste project	Technical knowhow Availability of technicians	Number of technicians Number of electronics with manuals	Ratio	Frequency table

		Availability of electronic manuals Electronic applications inductions Provision of expiry dates on products Warranty on products	Number of usage inductions Number of products and warrants. Frequency and number of complaints	Ratio Interval Interval	Frequency table
To assess influence of CSR on performance of E-waste project	Level of social spending Ongoing CSR projects Level of corporate participations	CSR on performance of e-waste projects.	No of meetings No of projects No of disposal sites and e-waste services	Interval Interval Interval	Frequency table

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

Chapter four contained data analysis, presentation and interpretation of the research findings. It gave the results and interpretation of the study in the following areas: return rate of questionnaire, respondents' profiles analysis of the independent variables and dependent variable which was the performance of e-waste projects.

4.2 Questionnaire return rate

Out of the 102 questionnaires dropped, 94 were adequately filled and collected indicating a (92.16%) return rate. This high return rate was achieved because the researcher used trained research assistants to administer and collect the questionnaires immediately after the respondents completed them. The return rate was above 90% of the administered questionnaire and therefore was deemed adequate for the analysis as cited by Mugenda and Mugenda (2003).

Table 4.1 Questionnaire return rate

Response rate	Frequency	Percentage%
Response	94	92.16
Non Response	08	7.84
Total	102	100

Table 4.1 shows response rate based on total number of questionnaires issued. 94 out of 102 questionnaires, representing 92.16% were fully answered and returned. 12 of the respondents did not return the questionnaire, representing 7.84% of the total sampled respondents.

4.3 Demographic characteristics

Respondents demographic revealed to the researcher the distribution of responses in relation to variables under study across the population.

Table 4.2 Gender distributions

Gender	Frequency	Percentage%
Male	71	75.53
Female	23	24.46
Total	94	100

Table 4.2 shows analysis of responses by gender. Majority 71 representing (75.53%) were male depicting that most of the employees are male in Murang'a County Government. Female employees comprised 24.46% of the employees in the County Government.

Table 4.3 Age Distribution

Age	Frequency	Percentage%
Below 30 years	28	29.79
30-34	42	44.68
35-39	9	9.57
40 and above	15	15.96
Total	94	100

Table 4.3 shows analysis of response in relation to age majority 44.68% belonged to (30-34) age category. 29.79 % were below 30 years of age, 15.96% in the 40-45 age brackets and the least 9.57% represents (35-39) age bracket.

Table 4.4 Respondent's distribution experience

Experience category	Frequency	Percentage%
Below 3 years	24	25.53
3-5 years	48	51.06
Over 5 years	22	23.40
25 years and above	00	0.00
Total	94	100

From Table 4.4 shows that majority of the respondents were between the ages of 3-5 years of experience.

The respondents were asked to indicate their highest academic qualification. Table 4.5 shows their responses.

Table 4.5: Highest academic qualification

Highest academic qualification	Frequency	Percentage
Primary	10	10.63
Secondary	54	57.44
University	25	26.60
Others	5	5.32
Total	94	100.0

Table 4.5 shows that majority of the respondents 54 (57.44%) had attained secondary education while 10 (10.63%) respondents had attained primary level of education. A considerable percentage 25(26.60%) had gone beyond secondary education and a small percentage 5(5.32%) showed there were no formal education. This indicates that majority of the respondents had acquired basic education and would be easily trained on e-waste management.

Table 4.6 Disposal regulations on performance of e-waste projects.

Response	Frequency	Percentage%
Yes	79	84.04
No	15	15.96
Total	94	100

Table 4.6 shows analysis as to whether Disposal regulations influenced performance of e-waste projects in the county. Majority of them 79, (84.04%) agreed that regulatory frameworks influenced performance of e-waste projects.15.96% did not agree that regulatory frameworks influenced performance of e-waste projects.

Table 4.7 Response on absence of central points to collect e-waste

Response	Frequency	Percentage%
Yes	81	86.17
No	13	13.83
Total	94	100

Table 4.7 shows analysis of whether there were central points to collect e-waste. 86.17% agreed that there were no central points to collect e-waste. While only 13.83% highlighted that central points were present.

Table 4.8 Whether there were rules governing purchase of computers in the County Government

Presence of rules	Frequency	Percentage%
Are not present	64	68.08
Implied	20	21.27
Yes	10	10.64
Total	94	100

Table 4.8 shows analysis on the extent presence of rules governing purchase of computers affect performance of e-waste projects. Majority 68.08% showed that there were no of rules for purchase of computers, 20%, indicated implied rules while 10.64% indicated there were rules.

Table 4.9 Analysis of familiarity with government agencies dealing with e-waste

Response	Frequency	Percentage%
Yes	34	36.17
No	60	63.83
Total	90	100

Table 4.9 shows analysis as to whether they were familiar with government agencies dealing with e-wastes. 36.17 % agreed that they were familiar with government agencies dealing with e-waste. 63.83 % of the respondents did not agree.

Table 4.10 Financial resources availability influencing performance of e-waste projects

Response	Frequency	Percentage%
Yes	74	78.72
No	20	21.27
Total	94	100

Table 4.10 shows analysis as to whether availability of financial resources affected performance of e-waste projects in the County Government. Majority 78.72% showed that availability of financial resources influenced performance of e-waste projects while the least 21.27% showed that availability of financial resources did not affect performance of e-waste projects.

4.4 Awareness on existing rules governing e-waste management

Table 4.11 analysis on number of staff aware on existing rules governing e-waste management within Murang'a County.

Response	Frequency	Percentage%
Aware	14	14.89
Not Aware	80	85.10
Total	94	100

Table 4.11 shows analysis as to the number of staff aware on existing rules governing e-waste management within Murang'a County. 85.10 % of the respondents indicated that they were not aware of existing rules governing e-waste management within the county. Minority represented by only 14.89% indicated that they were aware.

Table 4.12 analysis of whether cost of e-waste management exceeded financial gains.

Response	Frequency	Percentage%
No	14	14.89
yes	80	85.10
Total	94	100

Table 4.12 shows analysis as to whether e-waste management exceeds financial gains. 85.10 % (majority) suggest that e-waste costs outweighed the relevant economic gains to be drawn out of it. Only 14.89% showed that e-waste management costs do not outweigh the accrued benefits.

Table 4.13 Availability of appropriate technology & its influence on performance of e-waste projects

Response	Frequency	Percentage%
Yes	78	82.98
No	16	17.02
Total	94	100

Table 4.13 shows analysis as to whether availability of appropriate technology influences performance of e-waste projects. Majority represented by 82.98% showed that availability of appropriate technology influence performance of e-waste projects. 17.02% highlighted that the availability of appropriate technology had no role to play in performance of e-waste projects.

4.5. Presence of technological knowhow to recover valuable items from computer systems.

Table 4.14 Availability of technological knowhow to recover valuable items from computer systems

Response	Frequency	Percentage%
no	80	85.10
yes	14	14.89
Total	94	100

Table 4.14 shows analysis as to whether availability of technical know-how to recover valuable items from computer systems. Majority represented by 85.10% said that there was no technical know-how to recover valuable items from computer systems. Minority represented by 14.89 % highlighted that there was technical knowhow on recovery of valuable items from computer systems.

Table 4.15 analysis of whether there is adequate technical expertise.

Response	Frequency	Percentage%
Yes	8	8.51%
No	86	91.49%
Total	94	100

Table 4.15 shows analysis as to whether there was adequate technical expertise. Majority 91.49 % agreed that there was inadequate technical expertise, but only 8.51% indicated there was enough technical expertise.

Table 4.16 analysis as to whether donation of obsolete electronic equipment was a good way of handling e-waste.

Response	Frequency	Percentage%
Donate	25	26.60
Not to donate	69	73.40
Total	94	100

Table 4.16 shows analysis as to whether donation of obsolete electronic gadgets was a good way of dealing with e-waste. 26.60 agreed that it was while 73.40 did not agree.

Table 4.17 analysis as to whether CSR has resulted in better handling of e-waste.

Response	Frequency	Percentage%
Better	88	93.61
Not	06	6.38
Total	94	100

Table 4.17 shows analysis as to whether CSR had resulted in better handling of e-waste. 93.61 agreed that it was while 6.38 did not agree.

Table 4.18 Social spending influence on performance of e-waste projects

Response	frequency	percentage%
Better performance	88	93.61
No effect	06	6.38
Total	94	100

The results indicate that social spending has led to better performance of e-waste projects.

4.6 Inferential Statistics

To evaluate the relationships between the dependent and independent variables, correlation and multiple regression analysis was done and the findings presented in the following subsections.

4.6.1 Correlation Analysis

In this subsection a summary of the correlation and regression analyses was presented. It sought to first determine the degree of interdependence of the independent variables and also show the degree of their association with the dependent variable separately. These results are summarized in Table 4.19.

Table 4.19 Correlation Analysis

	Performanc e of e-waste projects	Disposa l regulati ons	Availability of appropriate technology	Corporate social responsibili ty	Availabi lity of finances
Performance of e-waste projects (r)	1	0.829	0.756	0.625	0.365
Disposal regulations (r)	0.829	1	0.326	0.163	0.162
Availability of appropriate technology	0.756	0.256	1	0.196	0.233
Corporate social responsibility	0.625	0.163	0.216	1	0.462
Availability of finances (r)	0.345	0.141	0.233	0.432	1

The correlation summary shown in Table 4.24 indicates that the associations between the independent variables were significant at the 95% confidence level and a strong comparison to their associations with the dependent variable. This means that the inter- variable correlations between the independent variables were strong enough to

affect the relationship with the dependent variable. Results of the Pearson's correlation coefficient depicts that there is a significant positive relationship between Performance of e-waste projects and disposal regulations ($\rho=0.829$). Secondly, the study showed that there is a fairly strong positive relationship between availability of appropriate technology and the Performance of e-waste projects ($\rho =0.756$). Thirdly, the findings showed that there is a moderate positive relationship between performance of e-waste projects and corporate social responsibility ($\rho=0.625$). Finally, there is a weak positive relationship between availability of finances and Performance of e-waste projects ($\rho=-0.345$.)

4.6.2 Regression Analysis

The study used coefficient of determination to evaluate the model fit. The adjusted R^2 , also called the coefficient of multiple determinations, is the percent of the variance in the dependent variable explained uniquely or jointly by the independent variables. In our case the coefficient of determination explained the extent to which variations in performance of e-waste projects is accounted for by the independent variables under study (disposal regulations, availability of appropriate technology, corporate social responsibility and availability of finances).

4.6.2.1 Model summary

Model summary' table, provides information about the regression line's ability to account for the total variation in the dependent variable.

Table 4.20: Relationship between performance of e-waste projects and independent variables.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.801 ^a	.792	.785	.0291

Table 4.20 illustrates the strength of the relationship between effective waste management and independent variables. From the determination coefficients, it could be noted that there is a strong relationship between dependent and independent variables given an R^2 values of 0.792 and adjusted to 0.785. This shows that the

independent variables (disposal regulations, availability of appropriate technology, corporate social responsibility, and availability of finances) accounts for 79.2% of the variations in performance of e-waste projects.

4.6.2.2 Anova

Table 4.21 Anova

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	124.528	4	211.062	6.9874	.002 ^b
	Residual	259.655	100	19.027		
	Total	434.383	104			

a. Dependent Variable: Performance of e-waste projects

b. Predictors: (Constant), disposal regulations, availability of appropriate technology, corporate social responsibility, and availability of finances

From Table 4.21, the significant value ($P=0.002$) show that there was a strong significant relationship between the independent variables (disposal regulations, availability of appropriate technology, corporate social responsibility, and availability of finances) and the dependent variable (Performance of e-waste projects). The P- value of 0.002 which is less than 0.05 denotes that the model of project implementation is significant at the 5 percent significance level.

4.6.2.3. Coefficient of correlation

Multiple regression analysis was conducted as to determine the relationship between the Performance of e-waste projects and the four independent variables.

Table 4.22: Coefficient of Correlation

	Un-standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta	t	Sig
(Constant)	2.47	0.451		10.374	0.004
Disposal regulations	0.652	0.121	0.146	6.3627	0.001
Availability of appropriate technology	0.433	0.079	0.126	6.4507	0.002
Corporate social responsibility	0.413	0.073	0.045	4.3743	0.004
Availability of finances	0.332	0.073	0.142	5.1663	0.003

a. Dependent Variable: Performance of e-waste projects

Performance of e-waste projects = 2.47 + 0.652 * Disposal regulations + 0.433 * Availability of appropriate technology + 0.413 * Corporate social responsibility + 0.332 * Availability of finances.

From the finding in Table 4.22, the study found that holding disposal regulations, Availability of appropriate technology, corporate social responsibility, and availability of finances, at zero performance of e-waste projects will be 2.47. It was established that a unit increase in disposal regulations, while holding other factors (Availability of appropriate technology, corporate social responsibility, and availability of finances) constant, will lead to an increase in performance of e-waste projects by 0.652 (p = 0.001). Further, a unit increase in Availability of appropriate technology, while holding other factors (disposal regulations, corporate social responsibility, and availability of finances) constant, will lead to an increase in Effective waste management by 0.433 (p = 0.02). A unit increase in corporate social responsibility, while holding other factors (disposal regulations, availability of appropriate technology, and availability of finances) constant, will lead to an increase in performance of e-waste projects by 0.413 (p = 0.002).

Moreover, a unit increase in Availability of finances, while holding other factors (Disposal regulations, Availability of appropriate technology, Corporate social responsibility) constant, will lead to an increase in performance of e-waste projects by 0.332 ($p = 0.004$). This infers that disposal regulations contribute most to the performance of e-waste projects followed by availability of appropriate technology. At 5% level of significance and 95% level of confidence, Availability of appropriate technology, Disposal regulations, corporate social responsibility and availability of finances are significant in the performance of e-waste projects.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSION, CONCLUSION & RECOMMENDATIONS

5.1 Introduction

This chapter summarized the study findings. The discussions provided a basis upon which conclusions and recommendations were advanced in order to address the factors influencing performance of e-waste projects in Murang'a County, Kenya

5.2 Summary of findings

The summary of findings presented followed the profile of the respondents and the four specific objectives analyzed in the study.

Out of the 94 respondents who participated in this study, 71 (75.3%) were male and 23 (24.46%) females. This showed that the male respondents being the majority of staff were key decision makers, they had more opportunity on key decisions on e-waste management. From the findings 84.04% of the respondents had attained secondary education (and above) and therefore were in a position to be easily trained on new technology regarding e-waste management best practices. The findings also showed that 66 (70.21%) of the respondents fall in the productive age of between 31 and 70 years of age. 70 (74.5%) of the respondents had worked for the county for more than 3 years thus were familiar with the county e-waste management processes.

5.3 Discussion of the findings

The study sought to find out the factors that influence performance of e-waste projects within Murang'a County. Performance of e-waste projects was measured using four variables namely: disposal regulations, financial resources, appropriate technology and CSR. The study showed the influence of the independent variables (disposal regulations, financial resources; appropriate technology and CSR) on the dependent variable (performance of e-waste projects.)

5.3.1 The influence of existing disposal regulations on the performance of e-waste projects

The first objective of the study was to examine the extent to which existing disposal regulations influenced the performance of e-waste projects.

This was intended to determine how existing disposal regulations influences performance of e-waste projects. Several questions were asked to determine this. On average, most of the respondents 79(84.04%) expressed that regulatory frameworks have an influence on the performance of e-waste projects within the county.85 (90.42 %) of the respondents indicated that the existence of legal provision legal provisions had a bearing on the performance of e-waste projects. The study further revealed that most of the respondents 64 (68.08%) felt that there were no rules governing the purchase of computers in their work environment. The study also revealed that a majority of the respondents 60(63.83%) of the respondents were not familiar with government agencies dealing with e-waste management.80 (85.10%) of the respondents indicated that they were not aware of rules addressing e-waste within the county.

5.3.2 The influence of finances on the performance of e-waste projects.

The second objective of the study was to establish whether the effect of availability of financial resources on influence of the performance of e-waste projects. Majority 74(78.72%) indicated that availability of financial resources improves performance of e-waste projects. The study also revealed that 80(85.10 %) of the respondents felt that cost of e-waste management exceeded the financial gains.

5.3.3 The influence of appropriate technology on the performance of e-waste projects.

The third objective evaluated the role of appropriate technology on the performance of e- waste projects. 78(82.98%)of the respondents highlighted that technology influenced performance of e-waste projects. Lack of technology hampered performance of e-waste projects. The study further found out that a majority of the respondents 80(85.10%) felt that the county had enough technical know -how to recover valuable items from the computer but did not have enough technical expertise on dealing with e-waste management as represented by 86(91.49%) of the respondents.

5.3.4 The influence of corporate social responsibility on performance of e-waste projects.

The fourth objective was set to establish the influence of corporate social responsibility on performance of e-waste projects.

69(73.40%) of the respondents indicated that donation of obsolete electronic equipment was not a good way of handling e-waste. A further 88(93.61%) indicated that CSR/social spending resulted in better handling and management of e-waste.

5.4 Conclusions

With regard to the first objective of the study which sought to establish the influence of disposal regulations on the performance of e-waste projects in Murang'a County, the study concluded that a considerable percentage of the staff in Murang'a County felt that existing disposal regulations do not address e-waste management adequately. The regulations were inadequate thus hindering e-waste management within the county. The study also concluded that a significant number of the county staff were not aware of national agencies dealing with e-waste. This lack of awareness also hampered the county's effectiveness in dealing with and adopting best e-waste practices. The closest the County got to e-waste best practices was on putting in place regulations on the purchase of computers but did not address the issue of what happens after the computers have become obsolete.

With regard to the second objective of the study which sought to establish the influence of financial resources on the performance of e-waste projects within Murang'a County, the study concluded that most of the county staff agree that financial resources do have an impact on the performance of e-waste projects but they felt that e-waste management was an expensive undertaking that outweighed the gains. This goes in tandem with the county staff's lack of awareness that is why they felt that e-waste management is not a priority for Murang'a County at the moment. This implied that little or no budget allocations were made for e-waste management within Murang'a County as at then.

With regard to the third objective of the study which sought to establish the influence appropriate technology on the performance of e-waste projects in Murang'a County, the study concludes that Murang'a County had staff that had computer know-how but

had a shortage of staff with the appropriate technical know-how on best e-waste management practices. The researcher concluded that there is a need to set up a department that can handle e-waste in the right manner.

With regard to the final objective of the study which sought to establish the influence of CSR on the performance of e-waste projects within Murang'a County, the study concluded that majority of the Murang'a county staff did not favor donating obsolete electronic equipment rather to dispose them off safely. This shows some degree of awareness on e-waste best practices. The study also concluded that Murang'a County could allocate a budget for social spending as it resulted in better handling of e-waste.

5.5 Recommendations

Based on the findings of the study, the following recommendations were made.

That there is need to improve on existing disposal regulations to improve management of e-waste disposal. Proper legislation procedures should not be lengthy and bureaucratic but be limited in formulation of e-waste disposal regulations.

That reduction in budgetary allocations created gaps in financing of e-waste management activities and thus increasing budgetary allocations could narrow these gap.

That lack of technology and inappropriate ones hindered performance of e-waste projects. Therefore, efforts could be made to incorporate modern and appropriate technologies in e-waste disposal. Train new and existing staff on new technologies to boost management of e-wastes.

The lack of awareness on e-waste best practices among the Murang'a county staff hinders adoption and enforcement of the same within the county thus proper training from relevant bodies such as NEMA on the staff should be conducted.

Lastly, the county should practice social spending on e-waste management so as to enhance the effectiveness of e-waste management.

5.6 Suggestions for Further Research

A study of this magnitude would be inadequate to address gaps in performance of e-waste projects. The researcher recommends that similar studies be carried out in relation to other forms of waste in such and other organizations. The study also recommended that similar studies be done in the other 46 counties of the country as to ascertain the current situation on the performance of e-waste projects.

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APPENDICIES

APPENDIX I: LETTER OF TRANSMITTAL

Dear Sir/Madam,

**RE: REQUEST FOR YOUR PARTICIPATION IN AN M.A.
RESEARCH STUDY.**

I am a student at the University of Nairobi pursuing Masters in Project Planning and Management. I am expected to submit a research project on the factors influencing the performance of e-waste projects in Murang'a County.

Kindly assist in completing the attached questionnaire. I assure you that the information provided therein is purely for academic purpose and was accorded the confidentiality it deserves.

Yours faithful,

Kenneth Waweru

Reg. No. L50/84485/2016

APPENDIX II: QUESTIONNAIRE

This questionnaire aimed at establishing factors influencing effecting management of e-waste disposal projects in Murang'a town. You are kindly requested to fill the questions. The information provided therein was treated with utmost confidentiality and was used for academic purpose only.

PART A: Profile of the respondents

- 1) Please indicate your gender
 - a) Male []
 - b) Female []
- 2) Please indicate your age
 - a) 30 and below []
 - b) 31-50 []
 - c) 51-70 []
 - d) Above 70 []
- 3) Please indicate your highest level of education?

Primary	[<input type="checkbox"/>]
Secondary	[<input type="checkbox"/>]
College (Certificate)	[<input type="checkbox"/>]
College (Diploma)	[<input type="checkbox"/>]
University (Degree)	[<input type="checkbox"/>]
Postgraduate qualification	[<input type="checkbox"/>]
Any other	[<input type="checkbox"/>]
- 4) How long have you worked in your department?

0 – 5 years	[<input type="checkbox"/>]
6 – 10 years	[<input type="checkbox"/>]
Over 10 years	[<input type="checkbox"/>]

PART B: Factors influencing performance of e-waste projects

Section I: influence of regulatory framework.

1. In your opinion what would you say is the largest source of e-waste in Murang'a County?

2. How many registered e- waste collecting companies are in Murang'a County?

3. Are there legal provision governing e-waste in your county? Yes [] No []

4. Is there a designated area where the e-waste is taken? Yes [] No []

5. Are there rules on procurement of digital devices? Yes [] No []

6. Are you familiar with agencies (government) that deal with e-waste management?

Yes [] No [].

7. Do waste collectors in your area collect e-waste too?

8. Are you aware of any people/organizations that are have been taken to court and prosecuted for the breach of e-waste management law(s) in Murang'a County?[yes] [No]

Section II: Influence of financial resources on performance of e-waste projects

Do you have adequate resources to upgrade your computer systems?

Yes [] No []

Do you have enough resources to refurbish used digital devices for reuse?

Yes [] No []

Do you have employees to dismantle used digital appliances for recovery of valuable item? Yes [] No [].If yes, how many?

Are there trucks or other resources that are dedicated for collecting e-waste in your county? Yes[] No[]

In your opinion do you have a well-established e-waste disposal system? If yes

Please explain

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

a) Does the government provide any incentives to facilitate e-waste management?

Yes [] No []

b) If yes what kind of incentives? Please explain.....

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

Is the cost of e-waste management more than finance allocated to it?

Yes [] No []

Is it hard to access funds for e-waste management? Yes [] No []

Section III: influence of technology on performance of e-waste projects

Do you have computer refurbishing system in your department?

Yes [] No []

2. Does your department have a culture of upgrading technology of existing systems?

Yes [] No []

3. Are there enough technical experts on disposal of e-waste in your department?

Yes [] No []

4. Does the cost of technology affect the management of e-waste disposal?

Yes [] No []

Section v: Influence of CSR (Corporate social responsibility) on performance of E-Waste project

1) In your opinion, has social spending resulted in flexibility of the project?

Yes No

2) In which ways has flexibility been brought about by social spending?

.....
.....

3) Do you think CSR has resulted in better performance of e-waste projects?

Yes No

4) If yes to Q3 briefly explain how

.....
.....

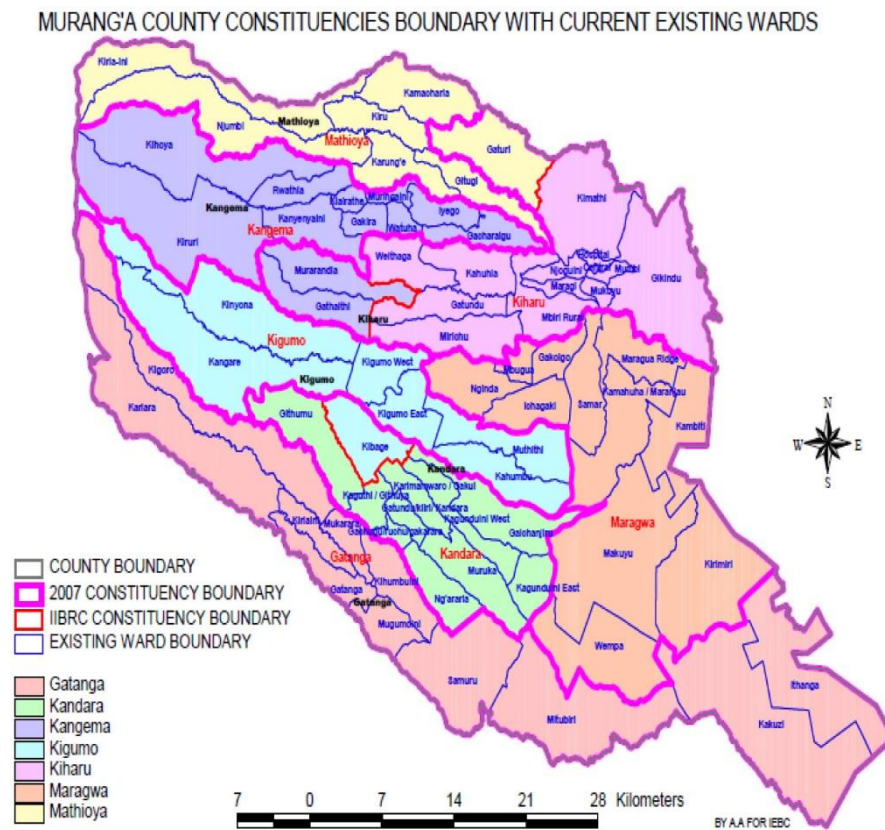
5) To what extent does CSR economic spending affect performance of your project?

Very high

Moderate

Low

APPENDIX III: MAP OF MURANG'A COUNTY



Source: Republic of Kenya (2014)

**APPENDIX IV: AUTHORIZATION LETTER FROM THE UNIVERSITY OF
NAIROBI**



**UNIVERSITY OF NAIROBI
OPEN DISTANCE AND e- LEARNING CAMPUS
SCHOOL OF OPEN AND DISTANCE LEARNING
DEPARTMENT OF OPEN LEARNING
NAIROBI LEARNING CENTRE**

Your Ref:

Our Ref:

Telephone: 318262 Ext. 120

Main Campus
Gandhi Wing, Ground Floor
P.O. Box 30197
NAIROBI

13th November, 2017

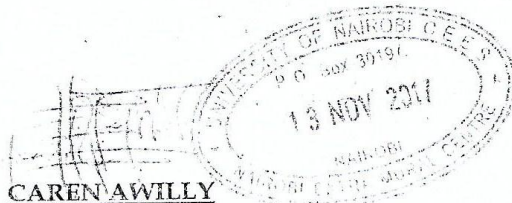
REF: UON/ODeL/NLC/27/486

RE: KENNETH WAWERU - REG NO.L50/84485/2016

The above named is a student at the University of Nairobi Open, Distance and e-Learning Campus, School of Open and Distance Learning, Department of Open Learning pursuing Master of Arts in Project Planning and Management.

He is proceeding for research entitled "Factors Influencing Performance of E-waste Projects in Muranga town."

Any assistance given to him will be appreciated.



CAREN AWILLY
CENTRE ORGANIZER
NAIROBI LEARNING CENTRE