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DETERMINANTS OF SUSTAINABLE E-WASTE MANAGEMENT PROJECTS IN KENYA

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ABSTRACT

This study sought to determine the factors that influence the sustainability of the E-Waste management projects. Its specific objectives included: to establish the influence of stakeholder partnership on the sustainability of e-waste management projects; to determine the influence of technology on the sustainability of e-waste management projects; to examine the influence of planning on the sustainability on e-waste management projects; and to establish the influence of monitoring and evaluation on sustainability of e-waste management projects. This study applied a descriptive research design and focus on a target population of 150 employees of 50 organizations in Kenya. The study used a census approach where the entire population was used in the sample since the study population was less than 200. It used self-administered questionnaires on 150 members of the target population and gave the respondents two weeks to complete the questionnaires before collection. The collected data was analysed using both descriptive and inferential statistics with the aid of SPSS. The results were then presented using tables. The results indicated that organisations had been able to identify stakeholders, planning of stakeholder engagement, management of stakeholder engagement, and monitoring of stakeholder engagement had not been accomplished adequately. The organisations also ensured the development of appropriate IT skills and knowledge amongst their staff but they had not been able to translate these skills and knowledge into the application of social media, the internet and technological equipment in the pursuit of sustainability of e-waste projects. The organisations under review in the study had also prioritised the welfare of the societies where they operated as well as the establishment of appropriate mechanisms for protecting the environment. The study recommended that organisations should endeavour to raise awareness amongst the employees about various stakeholder engagement initiatives; they should also conduct research and development, in ways which they can incorporate social media technology, the internet and technological equipment into the e-waste projects; and recruit the services of M&E experts to develop detailed M&E frameworks.

Key words; *Stakeholder Partnership, Technology, Planning, Monitoring and Evaluation, Sustainability of E-Waste Management Projects*

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INTRODUCTION

In the beginning of the 21st Century most countries turned their focus to the solid waste management generated by the households and businesses which had posed a serious disposal challenge (Premalatha, Tabassum-Abbasi, & Abbasi, 2014). Solid waste management started becoming a concern in Kenya in the 1980s. The Environmental Management and Co-ordination (E-Waste Management) Regulation 2013, defines electronic waste (e-waste) as the waste that emanates from electrical and electronic equipment including components and sub-assemblies (National Environment Management Authority, 2013). Otherwise known as waste of electric and electronic equipment (WEEE), it can also be defined as comprising electronic or electric products that either connect with power plugs or batteries that have been rendered obsolete by advances in technology or changes in fashion, style or status (Khan, Lodhi & Khokar, 2013).

The increasing global concerns over the proliferation of e-waste and the attendant environmental risks has pushed environmental activists to put pressure on governments to come up with legislation to improve e-waste management and even lobby developed countries to support the developing countries in this endeavour. Thus, the issue of sustainability of these projects is of great interest to all concerned actors but also to the beneficiary communities. The sustainability of projects is the incorporation of the concept of sustainability into project management. Kulman & Farrington (2010), define sustainability as the situation where the aggregation of man-made and natural resources remains at least constant for the foreseeable future so that the well-being of future generations is not compromised. A project is a temporary enterprise that seeks to create a unique product, service or result, while project management refers to the application of knowledge, skills, tools and techniques to project activities so as to meet project requirements (PMI, 2013). Agarwal & Kalmár (2015) define project sustainability as the process of delivering value in projects without compromising the lives and opportunities of future generations and without interfering with the ecosystem. The short-term nature of projects and the long-term orientation of sustainability are compatible, as such, project management must be adjusted to consider the allocation of resources beyond the planned life of the project by incorporating the ideals of sustainability that include the consideration of the interests of all stakeholders (Silvius & Schipper, 2012). It is therefore important to explore different perspectives of project sustainability during this study.

Tanzania's efforts of promoting community-led policy planning run into difficulties despite support from international partners mainly due to the persistent problems of coordination and implementation; a situation which clearly manifested itself in the Jatropha Project crisis of 2009 (Hashim, 2014). Accordingly, Hashim (2014) noted that in the Jatropha project, sustainability could not be attained since the Government failed to perform its oversight role and allowed private interests of companies involved to override the interests of the beneficiary communities. According to Mgonja, Sirma & Mkumbo (2014), Tanzania has been promoting ecotourism as a more sustainable form of tourism since it leads to conservation benefits to its natural resources including social, cultural and economic; thus, ecotourism projects are expected to practice a number of principles including minimizing physical, behavioural, and psychological impacts; build environmental and cultural awareness; providing positive experiences for both visitors and hosts; amongst others.

Oina, Towett, Kirui & Luvega (2015) posit that a vast majority of community development projects in Kenya faced sustainability challenges with only a few managing to attain some moderate levels of sustainability owing to strategies such as the effective mobilization of communities through sensitization and training which achieved ownership; collaboration with key stakeholders such as government, local leaders, politicians and

target community members in the project sites ensured actual implementation of the projects as well the continuity upon the cessation of donor support; considering environmental impacts; as well sensitivity to socio-cultural factors. Spaling, Brouwer & Njoka (2014) concur with this view and explain that community water projects in Kenya require internal cohesion amongst the project management team as well as a strong relationship between the management and the community exemplified by transparency and accountability; high managerial and technical competencies; and positive external relations with government authorities so as to ensure cooperation in the issuance of permits, licenses and tariffs, and ownership claims over project assets.

Statement of the Problem

Sustainability of E-waste projects has been a serious problem in our country; most of the project begun died at inception or failed to take off. It is estimated that Kenya generates 44,000 metric tons up from 17,350 metric tons of e-waste annually according to a research done by the ministry of Environment in 2019, following wide usage of refrigerators, TV's, computers, mobile phones among others, according to statistics released by the Ministry of Environment in 2017 (Bel, van Brunschot, Easen, Gray, Kuehr, Milios, Mylvakam & Pennington, 2019). Additionally, there has been an enabling environment for ICT in Kenya which has focused on universal access to ICT and has led to a high proliferation of mobile phones. Indeed, Kenya had a total of 45.6 million mobile subscribers and 41.8 million Internet users (GoK, 2019). This has pushed the demand for electronic devices and computers which has, in turn, driven the accumulation of e-wastes in the country. According to a baseline study carried out Mureithi and Waema (2008) on e-waste generated in Kenya between 2007 and 2008, 3,000 tonnes of e-waste was generated from computers, monitors and printers alone.

Most of the projects and initiatives that have been begun by several organizations including former Supermarket chain Nakumatt failed to realize their intended goal. The retail chain in 2011, partnered with UNEP, Hewlett Packard and the East African Compliant Recycling Center (EACR), to scale up sustainable management of e-waste, under a project dubbed "Recycle today for a better tomorrow". The project only run for a month with the Nakumatt branches before it was abandoned because of sustainability issues. Although Safaricom mobile company established collaboration with some county governments, creating special collection bins in 2014, specifically for E-Waste and marking them as such, there was no sufficient stakeholder partnership on the subject owing to lack of sensitization and public participation which is key in ensuring sustainability of any project (Ministry of Environment and Forestry, 2019).

E-waste is known to contain hazardous material and heavy metals which are harmful to both human and the environment affecting people's livelihood. Discarded electronic goods contain a number of toxic metals which are very dangerous which calls for special handling. According to Sthiannopkao & Wong (2013), developed countries have laws that regulate e-waste and places the burden on extended producer responsibility to ensure that manufactures take back the obsolete electronics collected by retailers which, unfortunately, is not done locally. The few e-waste recyclers in Kenya do it out of business need, the laws stipulating disposal are not as strict within the Country and enforcement is completely lacking. Improper legislation, poor planning, deficient collection centres, lack of information to the public, poor handling and disposal, and lack of enforcement and follow up are some of the issues that have made the projects unsustainable. Two plants begun in Nairobi and Mombasa failed because of sustainability challenges, currently the only centre existing is struggling with sustainability too, although support by a few strong organizations has kept it afloat. According to Omari, Mutwiwa and Mailutha (2016), electrical and electronic waste

does not decompose easily which leads to cumulative increase to its volume.

Despite clear national regulations and hazardous material waste laws, most people and organizations still treat e-waste as general refuse, as such crudely disposed or burned (Sthiannopkao & Wong, 2013). In a study conducted by Lancet Global Health on the health consequences of exposure to e-waste, it was discovered that victims suffered from complications such as change in thyroid function, changes in cellular expression and function, adverse neonatal outcomes, changes in temperament and behaviour and decreased lung function (Grant, Goldizen, Sly, Brune, Neira, Van den Berg, & Norman, 2013). These findings are echoed by Songa & Lubanga (2015) who determined that health hazards of exposure to e-waste in Kenya include respiratory problems, oxidative stress, DNA damage, and the likelihood of cancer.

There has been little research conducted in the area of sustainability of e-waste projects locally (such as Tocho & Waema, 2013; and Maranya, 2017) which could have assisted the Kenya government with providing sufficient information to be able to formulate policies and enforcement, this compounds the situation further. The studies carried out have been mostly in the area of solid waste management and these include Wang'ombe (2014), Mugo (2013), Oyake-Ombis (2017), Moreka (2017), and Sibanda, Obange & Awuor (2017) to name a few. This study, therefore, sought to enrich both the national but specifically the county governments with information that would act as a guideline on how to come up with sustainable E-Waste projects in Counties and set a basis against which they may bench mark in future.

Research Objectives

The general objective of the study was to determine the factors that influence the sustainability of the E-Waste management projects in Kenya. The specific objectives were:-

- To establish the influence of stakeholder partnership on the sustainability of e-waste management projects.
- To determine the influence of technology on the sustainability of e-waste projects management.
- To examine the influence of planning on sustainability of e-waste projects.
- To establish the influence of monitoring and evaluation on sustainability of e-waste management projects.

LITERATURE REVIEW

Natural Capitalism Theory

This theory supposes that natural resources that are exploited by organisations for profit need to be protected by adopting four major shifts in business practices, namely: dramatically increasing the productivity of natural resources by reducing wastefulness and destruction of natural resources; shift to biologically inspired production models that utilize a close-loop production system aimed at eliminating waste; move to solution-based business models that focus on delivering value as a flow of services; and reinvesting in natural capital (Lovins, Lovins & Hawken, 1999).

Four Capital Theory of Sustainable Development

According to the proponents of this theory, capital can be broken into four parts, manufactured capital – assets that are used to produce other goods and services; human capital – health, well-being and productive potential of human beings; social capital – relates to the well-being of the society which consists of social networks which supports a cohesive society and enable social and intellectual interactions among its members; and natural capital – natural assets which are difficult to assign material value such as biodiversity, endangered species and the ecosystems (Ekins, Dresner & Dahlström, 2008).

Corporate Social Responsibility (CSR) Theory

This theory holds that organisations depend on the society for their existence, continuity, and growth and, as such, must consider social demands in their

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corporate management policies and integrate them in such a way that they operate in accordance with established social values (Garriga & Melé, 2013). Indeed, Safarzad, Farahnaki & Farahbakhsh (2017) posit that CSR organisations tend to employ strategies that ensure that they conduct their business in such a way that they comply with ethical, society friendly and beneficial to the community development through the integration of social, economic, ethical and environment expectations with social, economic, and environmental expectations.

CSR is a practical tool that aims to boost an organisation's image and brand so as to act as a source of competitive advantage, and assumes that all the activities involved in this endeavor will add value to the organisation (Ceglińska & Cegliński, 2015). Milton Friedman combined CSR and stakeholder theory and supposed that organisations must assume their social responsibilities to all their stakeholders and also their environment, competitors and society (García-de-Madariaga & Rodríguez-de-Rivera-Cremades, 2010).

Triple Bottom Line Theory of Sustainability

Alhaddi (2015) explains that the Triple Bottom Line (TBL) theory provides a framework for measuring organisational performance using three lines: social, environmental and economic which correspond to people, planet and profit, respectively. Given that the concept of sustainability deals with the same three constructs, it is clear that the theoretical foundations of TBL are consistent with those of sustainability. The economic line refers to the economy's capability as one of the subsystems of sustainability to survive and evolve into the future so as to support future generations; the social line deals with the beneficial and fair business practices that pertain to labour, human capital, and to the community; while the environmental line is concerned with practices that do not harm the environmental resources for future generations.

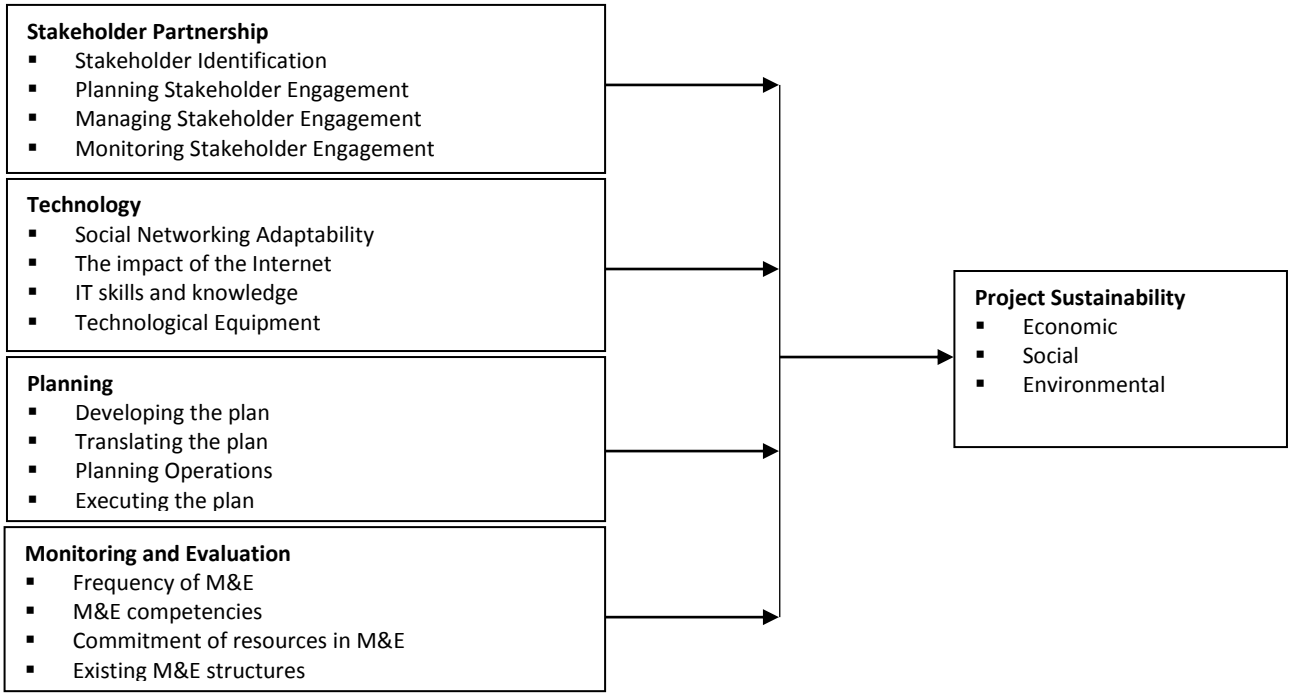

Figure 1: Conceptual Framework

Empirical Literature Review

According to Borthakur and Sinha (2013), the vast majority of actors in the e-waste management sector in India are in the informal sector and they comprise waste collectors/dealers, dismantlers, and recyclers; who draw the interest of a number of

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stakeholders who are identified according to the role that they play in e-waste management. For instance, IT industries, government offices, public and private sector establishments, education institutes, business and corporate are identified as the primary producers or generators of e-waste. The government agencies play the role of enablers by providing incentives such as land and finance so as to ensure a viable collection and recycling system for the rest of the actors (Begum, 2013). Indeed, Kiniti (2018) affirm that governments such as Kenya's which have not adopted appropriate legislation that emphasises the identification of multiple stakeholders are unable to properly address the challenges faced by actors in the sector and this is a reflection of the lack of prioritisation of e-waste management.

Sulemana, Musah & Simon (2018) posit that the most effective means through which organisations can monitor stakeholder engagement in the course of implementing their projects is through the incorporation of participatory monitoring and evaluation (PM&E) which ensures through continuous consultations with relevant stakeholders, their priorities are addressed which then fosters stakeholder ownership. Kamau (2017) echoes these sentiments when he explains that the application of PM&E provides a platform for management and other stakeholders to track the progress of a project so as to gain valuable insight into deviations, their causes and affords them the opportunity to develop appropriate remedial actions.

Given the increasing proliferation of e-waste on account of ever changing electronic technology, some environmentalists and other activists have taken to using modern technology in the form of social media to increase awareness of the e-waste management issues to a wider audience where interactive sessions in blogs provide a platform for discussed and be eventually escalated to mainstream media (Mishra, Shamanna, & Kannan, 2017). Social media technology can also be used by e-waste recyclers and e-scrappers in the informal sector in Nigeria to establish a social network that ensures regular interactions that lead to exchange of information on a wide range of issues including consultations with e-waste professionals on best practices, materiality of e-waste, and building social networking skills (Omokaro, 2018). Alternatively, electronic appliance producers and manufacturers in developed countries make use of reverse logistics networks (third parties who specialise in handling e-waste so as to free manufacturers to focus on their core business) as a means of effective recycling of potentially hazardous e-waste; this system is facilitated by the establishment of social media networking (Li and Tee, 2012).

According to Kwatra, Pandey and Sharma (2014), there are environmental actors who have set up internet website blogs for raising awareness to the public regarding e-waste management and the ramifications of e-waste management through unbound and low cost communication channels which ensure faster spread of information on initiatives undertaken such as recycling and gaps in interventions. Baldé, Forti, Gray, Kuehr, & Stegmann (2017) affirm that the advances in communication technology such as the Internet and the concurrent improvement of equipment to take advantage of the Internet has increased access reduced the replacement cycles of mobile phones and computer equipment and led to an increment in the e-waste problem, particularly given the increment in disposable incomes in many developing countries.

The re-use and re-purposing of electronics and electronic equipment requires specialised skills and knowledge in ICT which will ensure proper dismantling and assembling of parts to reappropriate them through advanced computer software programming skills (Kim and Paulos, 2011). This is echoed by the International Labour Organisation (ILO) (2014) who found that many e-waste recycling efforts are hampered by the lack of adequate ICT knowhow on the part of informal workers, dismantlers, and traders. Dutta, Goel, Hait & Jha (2016) posit that the e-waste proliferation

problems experienced in different parts of the world can be mitigated somewhat by improving the ICT knowledge of users on how to enhance the longevity of electronics and electronic equipment which will lengthen their replacement cycle.

According to Serrona, Yu, Aguinaldo & Florece (2014), the application of M&E in waste management provides a mechanism through which progress can be measured, costs quantified, and impacts assessed at community level; this is facilitated by the development of an M&E framework which provides the structure for all the M&E activities including how the M&E information will be collected, reported and used (as well as schedules and frequency). However, Alameer (2014) found that the management of e-waste in Arab countries is adversely affected by the lack of reliable data and institutional framework owing to the inability to incorporate appropriate M&E systems that would ensure a better understanding of the problem of WEEE and lead to an improved response to issues as they arise through enhanced time schedules and frequency of reporting. EACO (2017) recommends that in order for organisations to be able to put in place an effective M&E mechanism for e-waste management, they should collaborate with relevant stakeholders to establish and maintain a database for e-waste generation and disposal which will also stipulate the frequency of M&E activities.

Muhani (2012) posits that the regulatory process of e-waste management in Kenya is aided by the inclusion of individuals with exemplary academic competence in environmental matters within the National Environment Tribunal whose mandate includes the inspection of existing M&E systems, particularly their efficacy in tracking the generation and disposal of e-wastes. Chaplowe and Cousins (2016) affirms that the most effective means of implementing M&E in projects is through the pretesting of data collection tools which helps detect problematic techniques and questions, authenticate collection time, identify potential ethical considerations, and develop the competencies of data collectors.

Nasiri, Piatkowski & Westfall (2016) posited that environmental sustainability of e-waste management is best effected through the enactment of appropriate legislation that ensures punitive punishment for errant individuals and companies through heavy fines and also establishes disposal vendors or facilities for taking care of e-waste that cannot be recycled so as to conserve valuable environmental resources. Seitz (2014) explains that environmental sustainability in e-waste management involves a number of initiatives including de-manufacturing into sub-assemblies and components; depollution; separation of materials; mechanical processing of similar materials; mechanical processing of mixed materials; and smelting or refining of metals. Gathuka (2013) found that the unsafe disposal of e-waste poses a number of environmental sustainability challenges including disruption of sensitive eco-systems, resource recovery, the reduction of the use of toxic and hazardous substances in the manufacture of electronic appliances, and enacting laws that ensure the protection of the environment through the improvement of the regulatory environment of e-wastes.

METHODOLOGY

This study applied a descriptive research design since, according to Cooper and Schindler (2014), it seeks to find out the restrictions relating to who, what, where, when and how much. This study focused on a target population of 150 employees (the units of observation) from 50 different organizations (units of analysis) who had direct or indirect interaction with the e-waste management project. The study used a census approach where the entire population was used in the sample. This study used a Likert scale (Harpe, 2015) to code data into a form that is easier to understand and then use SPSS (version 22) (Arkkelin, 2014) to conduct regression analysis, descriptive analysis using measures of central tendency and inferential

analysis using techniques such as Analysis of Variance (ANOVA).

RESULTS

The study sought a target population of 150 participants and got 118 returned questionnaires which represented a response rate of 78.7% which corresponds with the recommended 50% return rate by Mugenda and Mugenda (2003).

Stakeholder Partnership

The descriptive statistics for stakeholder partnership were illustrated in table 1. Accordingly, 80% of the respondents agreed that stakeholder identification plays a key role in the sustainability of e-waste projects. This was consistent with Borthakur and Sinha (2013) who found that the vast majority of actors in the e-waste management sector in India are in the informal sector and they comprise waste collectors/dealers, dismantlers, and recyclers; who draw the interest of a number of stakeholders who are identified according to the role that they play in e-waste management. Further, the study determined that only 42.4% of the respondents agreed that their organisation had put in place effective planning of stakeholder engagement while 54.2% were either uncertain or in disagreement. This echoed Kaloki (2014) who identified a number of critical e-waste stakeholder engagement planning issues in Kenya including: for the government– environmental pollution, lack of management regulations and formal collection system, how to regulate waste electronic products; for sellers, manufacturers and importers – fears of increase of production costs through the addition of disposal and recycle fees.

The study also found that only 41% of the respondents agreed that their organisation's management of stakeholder engagement had influenced the sustainability of e-waste projects while 58.5% were either uncertain or in disagreement. This tallied with EACO (2013) who found that organisations in the East African region have had to circumvent the absence of appropriate legislative policy and framework to engage relevant stakeholders in initiatives such as research on the magnitude and generation of e-waste to establish EoL e-waste management; collection of obsolete electronic equipment; and establishment of recycling/refurbishment centres for e-waste. Finally, according to the findings, only 40.6% of the respondents agreed that their organisation has incorporated effective monitoring of stakeholder engagement while the rest were either uncertain or in disagreement. This rhymed with Sulemana *et al*. (2018) who posited that the most effective means through which organisations can monitoring stakeholder engagement in the course of implementing their projects is through the incorporation of participatory monitoring and evaluation (PM&E) which ensures through continuous consultations with relevant stakeholders, their priorities are addressed which then fosters stakeholder ownership.

Table 1: Descriptive Statistics of Stakeholder Partnership

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
Stakeholder identification plays a key role in the sustainability of e-waste projects	3.4%	5.9%	11.0%	40.7 %	39.0%
The organisation has put in place effective planning of stakeholder engagement	3.4%	9.3%	41.5%	42.4 %	3.4%
The organisation's management of stakeholder engagement has influenced the sustainability of e-waste projects	5.1%	22.9%	30.5%	34.7 %	6.8%
The organisation has incorporated effective monitoring of stakeholder engagement	5.1%	24.6%	29.7%	36.4 %	4.2%

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Technology

The distribution of responses to the descriptive statistical questions for technology were shown in table 2. According to the findings, the organisation had adequate IT skills and knowledge to ensure the sustainability of e-waste projects had the highest mean score of 3.5593 indicating that most of the respondents agreed with this assertion. This was consistent with Kim and Paulos (2011) who found that the re-use and re-purposing of electronics and electronic equipment requires specialised skills and knowledge in ICT which will ensure proper dismantling and assembling of parts to appropriate them through advanced computer software programming skills. The next factor in terms of popularity was the organisation has acquired adequate technological equipment for ensuring the sustainability of e-waste projects which had a mean score of 2.7458 indicating that slightly more than half of the respondents agreed with this. This was in agreement with Thaqi (2015) who determined that as a response to the increasing menace of e-waste, producers all over the world have revised their production methods of electronic equipment by reducing the amount of metal to incorporate more bio-degradable materials that lower the carbon emissions and are less toxic to the environment.

The question of whether the organisation has incorporated social networking in the pursuit of sustainability of e-waste projects, got a mean score of 2.6356 indicating a moderate level of agreement amongst the respondents. This is backed up by Kumar (2014) who posited that given the increasing proliferation of e-waste on account of ever changing electronic technology, some environmentalists and other activists have taken to using modern technology in the form of social media to increase awareness of the e-waste management issues to a wider audience where interactive sessions in blogs provide a platform for discussed and be eventually escalated to mainstream media. Finally, the question of whether the organisation has put in place mechanisms for using the Internet in the sustainability of e-waste projects got a mean score of 2.5847 indicating a only a moderate agreement by the respondents with almost half of them not agreeing. This is consistent with Baldé, *et al.* (2017) who affirmed that the advances in communication technology such as the Internet and the concurrent improvement of equipment to take advantage of the Internet has increased access reduced the replacement cycles of mobile phones and computer equipment and led to an increment in the e-waste problem, particularly given the increment in disposable incomes in many developing countries. All the standard deviations were between 0.7 and 1.07 showing that the responses were spread close to the mean responses, in other words, the variations in the responses when compared to the mean responses was low.

Table 2: Descriptive Statistics of Technology

	N	Mean	Std. Deviation
The organisation has incorporated social networking in the pursuit of sustainability of e-waste projects	118	2.6356	.88352
The organisation has put in place mechanisms for using the Internet in the sustainability of e-waste projects	118	2.5847	.81990
The organisation has adequate IT skills and knowledge to ensure the sustainability of e-waste projects	118	3.5593	.73429
The organisation has acquired adequate technological equipment for ensuring the sustainability of e-waste projects	118	2.7458	1.07167
Valid N (listwise)	118		

Planning

The descriptive statistics pertaining to planning are shown in table 3. According to the results, 88% of the respondents were either uncertain or disagreed that their organisation's development of plans has influenced the sustainability of e-waste projects.

This contradicts Anyango (2011) who found that one of the most critical aspects of e-waste management that require developing a plan is the establishment of an e-waste management strategy framework as a concerted effort of all the relevant stakeholders which then becomes the basis for effective project implementation by establishing clear responsibilities for all stakeholders, well defined financing, and adequate monitoring and regulation. The study also found that 86% of the respondents were either uncertain or in disagreement that their organisation has established effective strategies for translating plans. This is not consistent with Subramanian (2014) who found that organisations require adequate internal and external resources so as to ensure that the e-waste management plans are translated into practice since these resources will be a manifestation of the acknowledgement by the project management of the importance of the plans as reflected policies towards the environment, their values and motivations for this, and the strategies needed to actualise them.

Additionally, according to the results, 61% of the respondents agreed that their organisation has established effective mechanisms for planning its operations which was echoed by GIZ, 2013) who found that small e-waste management businesses in South Africa are required to align their e-waste management operations with the strategic thinking and planning of the local municipal authorities and future operational planning which supersede the national operational guidelines given that they are developed and integrated accordingly. Lastly, the study found that 56% of the respondents were uncertain about whether their organisation has been able to ensure the execution of its plans. This was in agreement with Kanda and Taye (2011) when determined that the execution of e-waste plans by organisations in many developing countries is hampered by the fact that most of the e-waste management plans are extracted from best practices that have been developed in western countries which tend not to be exact fits given the distinct differences in operational environments.

Table 3: Descriptive Statistics of Planning

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
The organisation's development of plans has influenced the sustainability of e-waste projects	5.1%	42.4%	40.7%	11.9%	0.0%
The organisation has established effective strategies for translating plans	5.9%	12.7%	67.8%	11.9%	1.7%
The organisation has established effective mechanisms for planning its operations	5.9%	9.3%	22.0%	61.0%	1.7%
The organisation has been able to ensure the execution of its plans	5.9%	12.7%	55.9%	25.4%	0.0%

Monitoring and Evaluation

The results of the descriptive statistics for monitoring and evaluation were captured in table 4. According to the findings, the organisation had established appropriate frequency of its monitoring and evaluation had a mean of 2.9746 indicating that the majority of the respondents agreed with this. This was consistent with Serrona *et al.* (2014) who found that the application of M&E in waste management provides a mechanism through which progress can be measured, costs quantified, and impacts assessed at community level; this was facilitated by the development of an M&E framework which provides the structure for all the M&E activities including how the M&E information will be collected, reported and used (as well as schedules and frequency). Further, the organisation has committed adequate resources in monitoring and evaluation had a mean of 2.8814 also indicating that the majority of respondents were in

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agreement. This contradicted Balde *et al*. (2017) who posited that given that many of the e-waste actors are informal in nature, they were resource constrained and unable to operate effectively, as such, the World Health Organisation (WHO), had been involved in enhancing the capacity of both global and local actors in M&E as well as promoting e-waste issues which are an important component of public health.

The results also showed that the organisation had developed adequate capabilities in monitoring and evaluation had a mean of 2.8475 indicating that the majority were also in agreement. This tallied with Muhani (2012) who found that the regulatory process of e-waste management in Kenya is aided by the inclusion of individuals with exemplary academic competence in environmental matters within the National Environment Tribunal whose mandate includes the inspection of existing M&E systems, particularly their efficacy in tracking the generation and disposal of e-wastes. Lastly, the organisation had developed appropriate structures for monitoring and evaluation had a mean of 2.7627 also indicating that most of the respondents were in agreement. This was consistent with Glasson and Therivel (2013) who determined that in order for waste management projects to make effective utilization of M&E, they need to institutionalise proper structural arrangements that ensure objectivity and quality by bearing in mind role definition that confirms the credibility, objectivity and quality in M&E; clarity on duties and responsibilities in planning and carrying out evaluations; making sufficient funding provisions; and establishing linkages with other governmental information systems. All the standard deviations were between 0.7 and 1.02 showing that the responses were spread close to the mean responses, in other words, the variations in the responses when compared to the mean responses was low.

Table 4: Descriptive Statistics of Monitoring and Evaluation

	Mean	Std. Deviation
The organisation has established appropriate frequency of its monitoring and evaluation	2.9746	.73336
The organisation has developed adequate capabilities in monitoring and evaluation	2.8475	.76936
The organisation has committed adequate resources in monitoring and evaluation	2.8814	.75299
The organisation has developed appropriate structures for monitoring and evaluation	2.7627	1.02680

Project Sustainability

The distribution of responses to questions relating to project sustainability were illustrated in table 5. According to the table, 47.5% of the respondents disagreed that their organisation has put in place effective economic sustainability mechanisms on e-waste management. This was in agreement with Kumar and Bhaskar (2016) who determined that manufacturers of electronics and electronic equipment tend to focus primarily on immediate consumption concerns such as pricing, promotion and branding rather than on the after-sales effects of the consumption such as e-waste caused by obsolescence. The results also showed that 73% of the respondents affirmed that their organisation has ensured that the welfare of the society is prioritised in its business practices. This contradicted Utkucan *et al.* (2010) who found that the improper management of e-waste as exemplified by the use of inappropriate recycling technologies result in further social degradation in the form of air pollution, deforestation, ozone layer depletion, climate change, loss of biodiversity, scarcity of food and freshwater, widespread poverty, and loss of social fabric thereby inhibiting the realisation of social sustainability. Finally, according to the results, 79% of the respondents were in agreement that their organisation has established appropriate mechanisms for protecting the environment. This was echoed by Gathuka

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(2013) who discovered that the unsafe disposal of e-waste poses a number of environmental sustainability challenges including disruption of sensitive eco-systems, resource recovery, the reduction of the use of toxic and hazardous substances in the manufacture of electronic appliances, and enacting laws that ensure the protection of the environment through the improvement of the regulatory environment of e-wastes.

Table 5: Descriptive Statistics of Project Sustainability

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
The organisation has put in place effective economic sustainability mechanisms on e-waste management	10.2%	37.3%	24.6%	22.9%	5.1%
The organisation has ensured that the welfare of the society is prioritised in its business practices	6.8%	10.2%	10.2%	64.4%	8.5%
The organisation has established appropriate mechanisms for protecting the environment	3.4%	3.4%	14.4%	68.6%	10.2%

Inferential Statistics

Correlation

Table 6 illustrated the Pearson Correlation Matrix for the study. The table indicated that all the independent variables, Stakeholder Partnership, Technology, Planning and Monitoring and Evaluation had strong positive correlations of r = 0.792, r = 0.699, r = 0.890 and r = 0.732, respectively, with the dependent variable.

Additionally, all the independent variables had p-values lower than 0.05 at 0.037, 0.031, 0.001 and 0.012, indicating a statistically significant relationship between each independent variable and the dependent variable. This was consistent with Lind, Marchal and Wathen (2006) who found that given intervals of 95%, p-values of less than 0.05 indicate that observed differences between groups are unlikely to be due to chance and, as such, are statistically significant. This reflects the relevance of the p-value as an acceptable test of statistical significance.

Table 6: Pearson Correlation Coefficients

		Stakeholder Partnership	Technology	Planning	Monitoring and Evaluation	Project Sustainability
Stakeholder Partnership	Pearson Correlation	1				
	Sig. (2-tailed)					
Technology	Pearson Correlation	.783**	1			
	Sig. (2-tailed)	.002				
Planning	Pearson Correlation	.668**	.526**	1		
	Sig. (2-tailed)	.000	.000			
Monitoring and Evaluation	Pearson Correlation	.732**	.594*	.695**	1	
	Sig. (2-tailed)	.000	.036	.000		
Project Sustainability	Pearson Correlation	.792*	.699*	.890**	.732*	1
	Sig. (2-tailed)	.037	.031	.001	.012	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Multiple Regression

The results showed that the R Square value for all the variables was 0.707 indicating that the model explains 70.7% of the variation in Project Sustainability when there is a one percent change in the four independent variables. This is echoed by Hamilton, Ghert and Simpson (2015) who found that in order for R square values to be significant they should be higher than 0.7.

ANOVA Statistics

The results indicated that the ANOVA F-test score, calculated value F_{cal} at 5% level of significance was equivalent to 3.389 which was greater than the F critical value (F_{crit}) of 2.53 indicating that there is a significant relationship between all the independent variables and the dependent variable of Project Sustainability; while the p-value of 0.012 was less than 0.05 indicating that there is a statistically significant relationship between each of the independent variables and Project Sustainability. This demonstrated the goodness of fit of the model.

Beta Coefficients

The values of the constant and coefficients enabled the generation of the multiple regression model as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4$$

$$= 1.582 + 0.238X_1 + 0.168X_2 + 0.084X_3 + 0.082X_4$$

Where, Y refers to the dependent variable (Project Sustainability), X_1 refers to the Stakeholder Partnership variable, X_2 refers to the Technology variable, X_3 refers to Planning variable, and X_4 refers to the Monitoring and Evaluation variable.

According to the equation, taking all the independent variables to be zero (Stakeholder Partnership, Technology, Planning and Monitoring and Evaluation), Project Sustainability will be a constant equivalent to 1.582. The data analysis of the findings also showed that a unit increase in Stakeholder Partnership would lead to a 0.084 increase in Project Sustainability when all other independent variables are held constant; a unit increase in Technology would lead to a 0.082 increase in Project Sustainability when all other independent variables are held constant; a unit increase in Planning would lead to a 0.238 increase in Project Sustainability when all other independent variables are held constant; finally, a unit increase in Monitoring and Evaluation will lead to a 0.168 increase in Project Sustainability when all other independent variables are held constant. Lastly, the p-values for all the variables are all below 0.05 which indicates that they are all statistically significant.

Table 7: Multiple Regression Statistics

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.827a	.707	.676	.88940

a. Predictors: (Constant), Monitoring and Evaluation, Technology, Stakeholder Partnership, Planning

Table 8: ANOVA Statistics

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.724	4	2.681	3.389	.012b
	Residual	89.386	113	.791		
	Total	100.110	117			

a. Dependent Variable: Project Sustainability

b. Predictors: (Constant), Monitoring and Evaluation, Technology, Stakeholder Partnership, Planning

Table 9: Beta Coefficients

Coefficientsa						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.582	.530		2.986	.003
	Stakeholder Partnership	.084	.126	.066	.666	.507
	Technology	.082	.149	.058	.552	.582
	Planning	.238	.145	.186	1.638	.104
	Monitoring and Evaluation	.168	.133	.125	1.261	.210

a. Dependent Variable: Project sustainability

The findings demonstrated a generally strong congruence with the empirical literature in a number of ways. Firstly, all the empirical literature on stakeholder partnership was backed up by the findings from the field. Secondly, there was a moderately positive correlation between the empirical literature on two of the indicators of technology, namely, social networking and the Internet, while the remaining indicators of IT skills and knowledge, and technological equipment exhibited strong linkages with findings from the field. Further, with the exception of one indicator, that is the establishment of effective mechanisms for planning, all the other indicators of planning had weak associations between the empirical literature and the research findings. As far M&E is concerned, in all of the indicators, there were very strong linkages between the research findings and the empirical literature. Lastly, the research findings for project sustainability were consistent with the empirical literature for only two indicators, economic sustainability and environment sustainability, while the findings for social sustainability contradicted the empirical literature.

CONCLUSIONS

The organisations performed adequately in terms of identifying the stakeholders for their e-waste projects, however, they had not done enough in planning of stakeholder engagement, management of stakeholder engagement, and monitoring of stakeholder engagement. Indeed, given that the respondents were mainly uncertain rather than in disagreement, it would seem that these organisations had not done enough to raise awareness among their staff regarding their initiatives in planning, managing and carrying out monitoring and evaluation of stakeholder engagement.

It was also apparent that the organisations had ensured the development of appropriate IT skills and knowledge amongst their staff through the provision of training opportunities. Nonetheless, these organisations had not been able to translate these skills and knowledge into the application of social media, the internet and technological equipment in the pursuit of sustainability of e-waste projects. This is a reflection of the negligence by the managements of these organisations regarding the application of these aspects of technology.

The organisations had made some strides forward in establishing the frequency of their monitoring and evaluation, developing adequate capabilities in monitoring and evaluation, committing adequate resources in monitoring and evaluation, and developing appropriate structures for monitoring and evaluation. However, the moderate endorsement for all the aforementioned aspects of monitoring and evaluation indicate that not enough has been done by these organisations to institute M&E towards the pursuit of sustainability of e-waste projects.

Finally, the results also indicated that the organisations under review in the study have prioritised the welfare of the societies where they are operational as well as the establishment of appropriate mechanisms for protecting the environment. However, they have not been able to ensure the same level of commitment to ensuring economic sustainability. This illustrates a gap in the overall implementation of sustainability in these organisations.

RECOMMENDATIONS

The organisations should endeavour to raise awareness amongst the employees about various stakeholder engagement initiatives including stakeholder engagement planning, stakeholder engagement management and monitoring of stakeholder engagement. This can be done through holding quarterly workshops where M&E experts within the organisation can take them through all that is going on in the organisation as far as stakeholder engagement planning, stakeholder engagement management, and monitoring of stakeholder engagement are concerned. Additionally, for those organisations that have not done much on ensuring the implementation of the aforementioned aspects of stakeholder engagement, they should consider benchmarking with industrial leaders to determine the best practices as far as stakeholder engagement is considered so as to try to customise them in their own organisations.

The organisations should conduct research and development into ways in which they can incorporate social media technology, the internet and technological equipment into the e-waste projects. They can also attend technological forums to find out more about the integration of social media, the internet and technological equipment into business practices so as to realise greater benefits to their e-waste projects.

The organisations need to recruit the services of M&E experts to develop detailed M&E frameworks which will articulate in detail all the aspects of M&E including the frequency of their monitoring and evaluation, developing adequate capabilities in monitoring and evaluation, committing adequate resources in monitoring and evaluation, and developing appropriate structures for monitoring and evaluation so as to enhance the M&E competences amongst the employees so as to realise greater congruence between M&E and the sustainability of e-waste projects.

The organisations covered in the study should prepare detailed proposals on the damages caused by illegal dumping of e-waste by developed economies and use this to lobby the Government of Kenya to come up with stricter legislation against the practice so as to enable players to get incentives for engaging in more economically sustainable business practices. This would require strong collaborations between all the players in order to present a unified voice on the ills of illegal dumping of e-waste.

Areas of Further Research

The Government of Kenya should encourage more research to be conducted on sustainable e-waste management by collaborating with international experts to offer scholarships and grants for graduate students and trained researchers to undertake such research ensuring that it is localised in Kenya and within the corporate world. The Government should also take a keen interest to find out what makes enforcement of e-waste regulations a challenge. Further, more research should be done to confirm the strong r^2 value of 0.701.

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