INFLUENCE OF ENVIRONMENTAL MANAGEMENT PRACTICES ON GEOTHERMAL PROJECT PERFORMANCE: A CASE OF THE MENENGAI GEOTHERMAL DRILLING PROJECT IN NAKURU COUNTY, KENYA

BY

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DECLARATION

This research project report is my original work and has not been presented for examination in any other University and/or Institution of Higher Learning.

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DEDICATION

This research project report is dedicated in loving memory of my revered father, Hezekiel Mwangi Githitu, for his support, guidance and source of inspiration throughout my academic life.

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ABBREVIATIONS AND ACRONYMS

CBP	Center for Business Practices
CSR	Community Social Responsibility
EA:	Environmental Audit
EIA:	Environmental Impact Assessment
EMCA:	Environmental Management and Coordination Act, 1999
EMP:	Environmental Management Plan
GDC:	Geothermal Development Company
GWh:	Gigawatt hour
IT	Information Technology
ISO:	International Organization for Standardization
KENGEN:	Kenya Electricity Generating Company
KPLC:	Kenya Power and Lighting Company
LCPDP:	Least Cost Power Development Plan
MGDP	Menengai Geothermal Drilling Project
MPS	Menengai Project Site
MW:	Mega Watts
NAO	Nakuru Area Office
NEMA:	National Environmental Management Authority
NCGs:	Non-Condensable Gases
REA:	Rural Electrification Authority
SAP:	Systems Applications and Products
SPSS	Statistical Package for Social Sciences
SPV:	Special Purpose Vehicle
USD	United States Dollars

ABSTRACT

Environmental management is proving vital in development of projects in Kenya. Gone are the years when projects were carried out without environmental impact assessments and audits. Today, the World Bank, International Finance Corporation and ISO Standards e.g. ISO 14001:2015 are utilized to certify that a project is fit before it is implemented. Environmental management has its pros and cons. Many individuals consider its downsides as requiring a large amount of resources, labour intensive and time consuming. The positive impacts of this practice include attracting donor funds, good public outlook, increased project acceptance, environmental conservation, mitigating negative environmental impacts brought about by project development, just to mention a few. The specific objective of the study was to investigate the impact of environmental management in implementation of GDC projects, more specifically, the performance of the Menengai Geothermal Drilling Project. The study employed a descriptive research design where data was collected from employees of the Geothermal Development Company's Central Rift Region using questionnaires. Data was then analyzed using the Statistical Package for Social Sciences (SPSS) Version 20. A sample of 88 participants was selected from the employees' population using the simple random sampling method and were asked to fill the questionnaires. There was a positive response regarding the influence of budget allocation towards performance of the Menengai Geothermal Drilling Project (MGDP) at an average of 44.1% agreeing and 23.0% strongly agreeing. 21.7% were not certain concerning this aspect while 9.0% and 2.1% disagreed and strongly disagreed respectively. Concerning the influence of environmental management implementation on the performance of the MGDP, there was a positive response averaging at 44.2% agreeing and 37.6% strongly agreeing. 11.9% were not sure, while 4.8% and 1.4% disagreed and strongly disagreed respectively. There was a positive response regarding the involvement of stakeholders in contributing to the performance of the MGDP averaging at 53.2% agreeing and 21.7% strongly agreeing. 20.3% were not sure, 3.8% and 1.0% disagreed and strongly disagreed respectively. Among the three independent variables, it was concluded that stakeholder involvement had the most significant effect on the performance of the Menengai Geothermal Development Project (MGDP). The key recommendation of the study is that GDC Management should focus on increasing/ supporting stakeholder involvement initiatives so as to increase the project's chances of eventual success as it had the highest significant relationship with geothermal project performance.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

During the last few years, the awareness of people for the protection of the environment in society has been gradually increasing. Various types of pressure groups are acting in defense of the environment. The governments are also promoting more and more regulations to protect the environment and the community in general (Chakrabarti and Mitra, 2004).

Geothermal development is budding in Kenya's energy sector. Its immense potential saw to it that a Special Purpose Vehicle (SPV), the Geothermal Development Company (GDC) was formed to fast track the exploration, development and exploitation of geothermal resources in Kenya so as to contribute to the injection of 5000MW into the National grid by the year 2030. This is in a bid to create a green economy for Kenya. GDC has in turn dispensed its resources into its pilot project, the Menengai Geothermal Drilling Project (MGDP). The Company was formed in 2008 though drilling operations began in 2011 (African Development Bank Group, 2011).

According to the Environmental (Impact Assessment and Audit) Regulations (2003), no proponent shall implement a project that is likely to have negative environmental impacts or for which an Environmental Impact Assessment (EIA) is required under the Environmental Management and Coordination (Amendment) Act, (EMCA), 2015 unless an EIA has been concluded and the study report approved by the Authority in accordance with these Regulations. Principle 17 of Agenda 21, (1992) further states that an EIA, as a national instrument, shall be undertaken for proposed activities that are likely to have significant adverse impacts on the environment and are subject to a decision of a competent National authority which is the National Environmental Management Authority (NEMA) in the Kenyan case. EMCA (2015), also states that an EIA study is mandatory before commencement of a proposed geothermal drilling project. An Environmental and Social Impact Assessment (ESIA) study was thus conducted prior to ground breaking so as to anticipate any environmental and social impacts that may have had an effect or may have affected project development.

A public notice published in the Daily Nation newspaper, (2012), p.27 highlighted that geothermal plants are among high impact/risk projects whose reports would be processed at the NEMA headquarters. EMCA, 2015, further elaborates that the owner of a premises or operator of a project for which an EIA study report has been made shall keep accurate records and make annual reports to the Authority describing how far a project conforms in its operations with the statements made in the EIA study report. The Environmental (Impact Assessment and Audit) Regulations (2003), states that an EIA study report shall develop an environmental management plan with mechanisms for monitoring and evaluating the compliance and environmental performance which shall include the cost of mitigation measures and the time frame of implementing these measures. The EMCA (2015), outlines that drilling for the purpose of utilizing ground water resources including geothermal energy are among projects that should undergo an EIA.

Kenya's geothermal resources have attracted exploitation from another Company other than GDC, i.e. the Kenya Electricity Generating Company (KENGEN). This Company also invested in conducting an ESIA study prior to its operations. In the Menengai geothermal drilling project, environmental management is ongoing and with it has derived many incentives. These include acquisition of donor funds, conservation of the environment, community harmony as a result of accrued benefits and data collection for future use, just to mention a few.

Stakeholders including state agencies and the local community consulted felt strongly that the Menengai Geothermal Drilling Project was of National interest and should override all other concerns (Wetang'ula and Were, 2008). Despite this, the project took into consideration the already identified needs and concerns of the stakeholders.

1.1.1 Project Ownership

The Menengai Geothermal Development Project (MGDP) is situated in Nakuru town, about 180 km Northwest of Nairobi. The aim of the project is to meet the Country's increasing demand for power supply by developing the Country's geothermal potential which is consistent with Kenya's green growth vision. Specifically, the project aims to develop the Menengai geothermal steam field to produce enough steam for 400 MW of power. The project proponent is the Government of Kenya while the project implementing agency is the Geothermal Development Company (GDC); a government-owned company that was established in 2008 as a special purpose vehicle for fast

tracking the development of geothermal resources in Kenya. The expected completion time of this project is June, 2017 and it is estimated to cost USD 746 million (African Development Bank, 2011).

The Government of Kenya through GDC is the largest financier of the project. Other financiers include the African Development Bank, World Bank, Agence Francaise de Development, and the European Investment Bank. The project has created employment for approximately 900 skilled and 300 unskilled laborers. The project has also benefited local communities through the drilling of boreholes to provide clean drinking water to local communities, repair of roads, creation of business opportunities, and expansion of the market for local products (Kizambo and Mann, 2014).

1.1.2 Project Performance

Project performance is a vague term that has elicited different interpretations from different people. However, three objective measures; project time, project cost, and project quality (Muller and Jugdev, 2012) can be used to define a projects' achievement status. Project time refers to the period it takes for a project to be completed. One of the defining characteristics of projects is that they have a definite time-line. For a project to be deemed as well performing, it should be completed within an acceptable timeline. Exceeding the completion time for a given project often has significant implications such as escalating the costs and delayed benefits. Sometimes, prolonged delays in the project completion time make a project obsolete.

Project cost refers to financial resources that a given project consumes. Another defining characteristic of projects is that they consume resources in order to deliver the expected outcomes (Prabhakar, 2008). Project management principles emphasize the need to estimate project costs before the project begins in order to enable stakeholders to determine the viability of the project regarding whether its objectives will be met or not. A project is considered viable when estimated cost does not exceed expected benefits. Therefore, for a project to be considered to be of good performance, it must be completed within the projected cost. Cost overruns may lead to losses when the excess costs go beyond the expected benefits of the project. Some projects are terminated before completion when financiers realize that the costs are going to exceed the expected benefits.

Project quality refers to the extent to which the project meets the specifications or the requirements defined by the client. For instance, if the project entails coming up with a computer program, the

quality of the project will be defined by the extent to which the program meets the technical and functional specifications that the client provided. This dimension of project performance also focuses on the impact of the project on the intended beneficiaries (Howsawi, et al., 2014). Project quality is a critical determinant of project performance. For a project to be considered to be of high performance, it must meet the purpose for which it was created. It must satisfy the client's expectations and requirements.

1.2 Statement of the Problem

Given that mainstreaming environmental management best practices has become compulsory in projects in the recent years, little is known about the collective effects it has on performance of these developments. In the present day, prior to developing proposed projects, having an environmental management plan in place is a prerequisite according to the governing National legislations on the environment. It is for this reason that resources allocated for this purpose should be accounted for through equating the significance of environmental management in relation to project performance.

Thus this research sought to determine the influence of environmental management practices on the performance of an existing geothermal project with the case of the MGDP.

1.3 Purpose of the Study

The main aim of the study was to determine the influence of environmental management practices on geothermal project performance with the case of the MGDP.

1.4 Objectives of the Study

The objectives of this study included the following:

i. To determine the influence of budget allocation on the performance of the Menengai Geothermal Drilling Project.
ii. To explore the influence of environmental management implementation on performance of the Menengai Geothermal Drilling Project.
iii. To determine the extent to which stakeholder involvement influences the performance of the Menengai Geothermal Drilling Project.

1.5 Research Questions

This study was guided by the following research questions:

i. How does budget allocation influence the performance of the Menengai Geothermal Drilling Project?
ii. To what extent does environmental management implementation affect the performance of the Menengai Geothermal Drilling Project?
iii. How does stakeholder involvement influence the performance of the Menengai Geothermal Drilling Project?

1.6 Significance of the Study

The geothermal sector is currently being widely pursued in Kenya hence encouraging a lot of research on it. The study was vital as it would determine the relationship between environmental management and geothermal project performance as not much had been documented on the subject as at the time the study was conducted. The research elaborated on whether the environmental management practices being implemented in geothermal development projects are relevant and whether they are achieving objectives set out by geothermal companies in Kenya with the case of the MGDP.

The research project will be useful to other scholars in future for further investigation on the subject matter. It will also inform the Corporate Performance Management Department activities in the Company in regard to reporting back the performance of the project to the office of the Cabinet Secretary, Ministry of Energy and Petroleum. From the study, information that was obtained would form the focal point of attracting more donor funds, stronger relationships between GDC and other Parastatals such as the Kenya Power and Lighting Company (KPLC) and Rural Electrification Authority (REA) would be forged as a result of every entity fulfilling its mandate towards achieving the Kenya Vision 2030 agenda. The local community will benefit from the positive contribution environmental management has had on geothermal project performance through casual employment, project decision making, purchasing of local produce by GDC, among others.

The Kenya Commercial Bank (KCB) for instance through its foundation recognizes that the sustenance of the human race is heavily dependent on the state of the environment and as such a lot of effort is made to contribute towards the conservation of ecosystems (Wakesho, 2013). Lafarge ranks amongst the top three of environmentally proactive companies within its sector. The

Company scores above average on the global warming, energy intensity, and quality of environmental management indicators. Lafarge is among the best in its industry with respect to environmental management, auditing and reporting. It is the impression that Lafarge is one of the Companies that has come furthest in the implementation of global standards having rehabilitated the Bamburi quarry in Kenya into a natural reserve (Lafarge, 2001).

1.7 Delimitation of the Study

The study focused on the case of the Menengai Geothermal Drilling Project (MGDP) as opposed to the expansive Olkaria field due to budgetary constraints, access to data and difficulty in obtaining relevant approvals. The Menengai geothermal area is situated within the Eastern sector of the African Rift system, about 180 km Northwest of Nairobi, Kenya. The prospect area is bound by UTM Co-ordinates 157000 E to 180000 E and 997000 N to 0 (Equator) and encompasses Menengai volcano, Ol'rongai, Olbanita plains and parts of the Solai graben. The prospect area measures about 29 x 30 km^2 and extends from the immediate north of Nakuru Town in the south to Kisanana in the north. It occupies parts of eight (8) administrative divisions that include Nakuru Municipality, Rongai and Kampi Ya Moto divisions of Nakuru District, parts of Mogotio and Kisanana divisions of Koibatek District, and parts of Bahati, Solai, and Subukia divisions of the newly created Nakuru North District, Rift Valley Province of Kenya. The geothermal resource in the Menengai Caldera is centered at the Caldera floor and the area is estimated to be about 48 km^2 (Wetang'ula and Were 2008).

The project population currently stands at approximately seven hundred (700) personnel in the Nakuru office and Menengai project site as per the Human Resource records (2015); however, a sample size was determined based on the objectives of the study and a sampling technique selected.

1.8 Limitations of the Study

The study focused on the implementation of environmental management in geothermal developments with the case of the MGDP. This study examined both the physical and social aspects of the environment. In the physical aspect of the environment, the study focused on resource allocation and utilization in environmental management at GDC compared to overall budget allocation towards environmental management. In the social aspect of the environment, the study focused on GDC staff and the local community *Vis* a *Vis* implementation of environmental

management at the MGDP. This was so because the two groups are considered as key stakeholders in achieving the projects' objectives.

The first limitation that was likely to be encountered in the study included GDC constituting a complex social structure and its value creation depending on the qualifications and motivation of its employees. Given the nature of staff wanting to keep their jobs and being in fear of incriminating the Company, some respondents may have felt the need to cover up the truth by carefully selecting their responses whilst the jilted ones may have wanted to paint the Company in bad light. This was countered by administering questionnaires to be filled out anonymously. This was subject to one on one discussions with the respondents who agreed to fill in the research instrument voluntarily. The researcher had an opportunity to cross examine the responses given from these discussions against the research objectives and questions. Responses were received using the administered questionnaires.

The second limitation was that thus far, not all locals may have benefited from the project hence there was a possibility of obtaining biased results having requested for feedback from staff on the impact of the project on the adjacent local community. While making efforts to remain objective, the research instead randomly selected staff from the project site that were in close contact with the local community by virtue of their work station without having prior knowledge of the project beneficiaries.

Thirdly, the research did not address the economic aspect of the Company given that it was still heavily dependent on the Government of Kenya for its recurrent budget and some records may not have been available as from the project onset. Given this limitation, the study greatly depended on records from System Applications and Products (SAP) which is a software that was adopted in 2012.

1.9Assumptions of the Study

The research study assumed that; the determined sample size was representative of the population; the records were up to date and the respondents would give honest feedback.

1.10 Definitions of Significant/ Key Terms

Drilling: This is the process of cutting using a drill bit to enlarge a hole of circular cross-section in a solid material.

Environmental audit: EMCA, 2015 states that an "environmental audit" means the systematic, documented, periodic and objective evaluation of how well environmental organisation, management and equipment are performing in conserving or preserving the environment.

Environmental impact assessment: EMCA, 2015 states that an "environmental impact assessment" means a systematic examination conducted to determine whether or not a programme, activity or project will have any adverse impacts on the environment.

Environmental management: EMCA, 2015 states that "environmental management" includes the protection, conservation and sustainable use of the various elements or components of the environment.

Mitigating: This is the act of making a situation or occurrence less severe.

Special Purpose Vehicle: This is a legal entity created to fulfil a narrow/specific objective.

1.11 Organization of the Study

Chapter one covers the background pertinent to the study. It goes further to state the research problem, the purpose of the study, the research objectives and questions to guide the study. Covered further in the chapter is the description of the scope of the study, the rationality of the study, its limitations, and concludes with definition of terms significant to the study.

Chapter two presents the literature review relevant to utilization of environmental management Plans at the project level. Findings by other researchers are presented, discussed and a summary of gaps highlighted. The chapter ends with a theoretical and conceptual framework.

Chapter three explains the research design that was used, target population of the study, the sample selection and the sample size. It discusses the research instruments including their administration, validity and reliability. The chapter ends with a discussion of data analysis methods, ethical considerations and operational definition of variables.

Chapter four presents the outcome of data analysis through presentation and interpretation of results. It is organized into various sections including response rate, demographic characteristics of the sample, descriptive and inferential analysis.

The project report is concluded by chapter five which presents a summary of the findings, conclusion, recommendations, and suggestions for further studies as well as contribution to the body of knowledge.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section presents a review of previous works in the area of study and findings of researchers. It begins with defining environmental management practices; the theoretical and conceptual frameworks are also outlined. The chapter is concluded by the research gaps identified following literature review.

2.2. Environmental Management Practices

There are different understandings concerning environmental management practices. Shrivastava and Hart (1995) pointed out that environmental management could provide an overall system perspective to deal with environmental issues. Every organizational activity from raw material inputs, production process, packaging, to waste disposal, are related to environmental issues. Therefore, environmental management practices are a combination of organizational activities aimed at reducing resource consumption and improving waste disposal. Budget allocation, environmental management implementation and stakeholder involvement were are all included as being among environmental management practices that affect project performance.

Bergmiller and McCright (2009) proposed that environmental management practices (green practices) were activities which aimed at improving environmental performance, including improving efficiency, shortening response time, cutting down energy consumption, reducing waste and toxic material usage. Hajmohammad *et al.* (2013) defined environmental management practices as "the level of resources invested in activities and know-how development that lead to pollution reduction at the source", including the application of environmental management systems (e.g., ISO14001), and efforts to recycle materials and reduce waste. These management practices included environmental audits, total quality management, pollution prevention plans, environmental training for employees, total cost accounting, life-cycle analysis, hiring a designated environmental manager, research and development, environmental standards for suppliers, and employee incentive programs for environmental suggestions which are ultimately geared to improved project performance.

2.2.1 Budget Allocation

Kuntz-Duriseti, (2004) insisted that even though economic growth and environmental protection were not necessarily reciprocally exclusive pursuits, critics of the necessity of implementing environmental management still existed. Strengthening the knowledge of environment, when characterized as protecting the environment at all costs, may have been infeasible, especially when there was demand for limited resources for more practical, creative and/or higher priority investments, including addressing other environmental troubles. Budget allocation for coordination of environmental management practices however, does not take prominence in most Organizations in Kenya.

African Development Bank Group, (2011) stated that the positive environmental impacts of the project would emanate from the fact that it was a clean energy project. It would assist Kenya in expanding the use of renewable energy and would displace expensive and environmentally hostile thermal generation. It would provide reliable power supply as opposed to the existing hydropower which had been negatively affected by droughts in the recent past. Thus the budget allocated to environmental management practices in the long run would be negligible compared to the profits gained from implementing the geothermal project.

It seemed that there was a certain level of bitterness to the full implementation of environmental management in projects especially in construction, and barriers existed both internally and externally as stated by Shen and Tam, (2002), for example, an increase in management costs, it was time-consuming and lack of trained staff for improving environmental performance and so on. There are noticeable benefits to the companies from putting environmental management into the practice of project management, such as reducing the production of waste, and decreasing the use of materials and techniques that could have hurtful effects on the environment. The benefits to the owners of these firms could be in a number of ways, for instance, cost savings due to the reduction of fines connected with confidences as a result of going along with environmental legislation (Shen and Tam, 2002).

The (Environmental (Impact Assessment and Audit) Regulations, (2003), (s. 45) states that; (1) Notwithstanding any license, permit or approval granted offences under any written law, any person who commences, proceeds with, executes or conducts or causes to commence, proceed

with, execute or conduct any project without approval granted under these regulations commits an offence and on conviction is liable to the penalty prescribed under the Act. Under the EMCA (2015), (s. 138) states that any person who fails to submit a project report contrary to the requirements of (s.58) of the Act; fails to prepare an environmental impact assessment report in accordance with the requirements of the Act or regulations made there under; fraudulently makes false statement in an environmental impact assessment report submitted under the Act or regulations made there under; commits an offence and is liable on conviction to imprisonment for a term not exceeding twenty four months, or to a fine of not more than two million shillings (2,000,000) or to both such imprisonment and fine.it is therefore paramount for GDC to avoid such fines that would set back the Company's main agenda.

Newman and Breeden (1992 cited Scanlon 2007) imply that the acceptance of an environmental management program by a company would have the following benefits, just like competitive advantage for green marketing as a reply to consumer expectations, media recognition of environmental efforts, the minimization of risks, future costs and positive recognition of environmental efforts by stakeholders. Mrayyan and Hamdi, (2006) also highlighted that in the competitive world, firms that wanted to get much more benefits had to pay for much more efforts than before. Finding an effective way to improve environmental performance in projects especially in industry was very important.

According to Yüksel, (2008), firms stated the same trouble that environmental practices brought about considerable costs. In addition, customers had very important roles in the success of environmental management implementation. What is more, financial restrictions, increase in transport costs, improper location of landfills, shortage in industrial and bulk waste separation, the limited availability of trained and skilled personnel, and the low consciousness level regarding health and environmental impacts could potentially slow the establishment and implementation of environmental management.

Shen and Tam, (2002) indicated that, the industry is a project which makes the main contribution to environmental pollution and that as a leader of such an industrial project, the project manager's conscience played an essential part in the process of implementing environmental management of the project. However, in general, these project managers didn't seem to consider that the implementation of environmental management would bring cost savings. A large number of

project managers' interviews suggested that there was a net cost increase in implementing environmental management as a consequence of the investment in equipment, staff training, human resources and technology such as water treatment and the application of noise-barrier materials. Industrial project managers' practice demonstrated that the cost of implementing environmental management is far more than the worth of the cost savings speculated which is very harmful for implementing environmental management in the project.

2.2.2 Environmental Management Implementation

Yüksel, (2008) identified that the problem they typically came across while implementing the environmental management practices was lack of environmental awareness in all the areas including in the employees, suppliers and customers. As a consequence, the society did not have sufficient awareness and firms faced many troubles in collecting the components to be recycled. If environmental awareness in the society increased, the success of the environmental plans was expected to rise. The firms also stated that they encountered many troubles on account of the employees lacking education and awareness on environmental issues. For this reason, the practices for increasing the environmental awareness of the employees were those that the firms mostly concentrated on while implementing environmental programs.

Hubacek et al. (2007) found that the ever increasing utilization was putting a strain on the environment, polluting the Earth and destroying ecosystems. Large-scale economic development in the developed countries occurred in the first half of the last century leaving deep symbols on the accessibility and quality of natural resources. In addition, the pollution of environment may not only have resulted to many firms competing over a limited market base but also some project managers utilizing the environment extremely and abusively to the detriment of other sectors of society, poorer nations, future generations and other species. This may have been attributed to lacking an environmental management plan in place as well as concerned parties not having the will to practise environmental conservation.

He (2010) stated that, the role of environmental management within projects was playing a more and more essential part to the firms and public. Because of the benefit of implementing environmental management, different methods were being used to improve environmental management in projects especially in industry. In the modern world, making a high-quality project

is playing a more and more essential part in the competitive life. There is no doubt that an initial blueprint of project management in the process of making a perfect project is very significant.

Wetang'ula and Were (2010) explained that the activities that were to be carried out during implementation of the proposed Menengai Geothermal Drilling Project involved the following: civil works for construction of access roads, drill sites, drilling of ten (10) water boreholes, drilling and testing of the geothermal wells. Water for drilling was abstracted from five (5) water boreholes that were drilled at Wanyororo B area. The main product would be geothermal steam for generation of electricity. The main byproduct would be hot geothermal wastewater. Waste products from the process would include worn out machines parts, used lubrication oil, oil contaminated rags and other solid waste; civil works and drilling debris; emission of gases out of the fuel combustion process (CO_2, CO, SO_2 and NO_2), hydrogen sulphide (H_2S) and other Non-Condensable Gases (NCGs) arising from drilling such as CO_2 and CH_4. The NCGs have been linked to global warming, thus making it a global issue.

Wetang'ula and Were, (2010) further elaborated that all impacts arising from implementation of the Menengai geothermal drilling project could be mitigated. Issues relating to land access rights and compensation would effectively be handled. Hydrogen sulphide (H_2S) emission related effects from the proposed project would also be insignificant as data on H_2S monitoring for similar projects implemented elsewhere (e.g. Olkaria IV Domes exploratory drilling) have shown that no significant cumulative H_2S emission effects occurring during drilling.

In 2008, Wetang'ula and Were stated that noise levels would exceed recommended levels during drilling and well testing around the well sites. This would be temporary and of insignificant effects as the sites were further away from human settlements. Dust emissions would occur during site preparation, road construction, vehicle movement during drilling and also a risk of oil pollution resulting from drilling activities. All these could be controlled. Drilling activities would encourage an influx of people into the project area, comprising the workforce as well as people seeking employment. A number of environmental and social impacts could result due to the presence of the workforce. These would revolve around the availability of housing and living conditions, sanitation, wastewater and solid waste disposal, all of which have implications on public health. Appropriate mitigation measures had been proposed.

2.2.3 Stakeholder Involvement

The AFDB, (2011) Group appraisal report indicated that the GDC project aimed at meeting Kenya's rapidly increasing demand for power while diversifying sources of power supply by developing the country's huge geothermal potential, consistent with Kenya's green growth vision. More specifically, the project aimed at developing the Menengai geothermal steam field to produce enough steam for 400 MW power that would be generated by the private sector as Independent Power Producers (IPP). The Report further stated that, in a Country where the electrification rate is only 15%, the project would enable substantial increase in the provision of additional reliable, clean and affordable power generation capacity to Kenyan households, businesses and industries, with an increase equivalent to 26% of the total installed generation capacity in the country. The steam field development would enable electricity generation equivalent to the consumption needs of up to around 500,000 households of which 70,000 in rural areas, 300,000 small businesses, as well as 1,000 GWh of energy to businesses and industries. The project would also help avoid close to 2 million tons of CO_2 per annum. Access to modern energy would help improve health and education opportunities, particularly for women and girls. The project would also ensure an employment ratio of 30% women which would be high for small town standards in Kenya. The transfer of the potable water facility to the community/municipality would have a direct effect in the empowerment of women who normally collect water for domestic purposes.

Benefits that would accrue from implementation of the geothermal project from the AFDB, (2011) Group appraisal report showed that by providing additional installed generation capacity and injecting it into the national grid, the project would ultimately result in affordable and reliable electricity supply to more households, businesses and industries. The 400 MW installed capacity would result in 3,154 GWh of additional energy assuming a plant factor of 90% (typical for geothermal power plants). This additional energy would enable the supply for around 500,000 households of which 70,000 in rural areas, 300,000 small businesses, as well as 1,000 GWh of energy to businesses and industries, assuming the same distribution of consumption per categories of consumers as the one indicated in the 2011 Least Cost Power Development Plan (LCPDP).

The appraisal report also indicated that Kenya has a very low overall electricity access rate of 15%. The project would thus add an additional installed generation capacity equivalent to 26% of the current total installed generation capacity in the Country. Kenyan consumers would benefit most

directly from the increase in installed generation capacity and related electricity supply, as it would promote greater economic growth and equity. The project would provide opportunities for the development of small businesses; expand Kenyans' access to modern energy, Information and Communications Technology (ICT) such as radio, and the internet; and increase employment opportunities and incomes, thereby helping to improve overall quality of life. Women and girls tend to have increased opportunities for good health and education when the community has access to modern forms of energy, which allows for more efficient health centers and lighting.

The AFDB, (2011) Group report also showed that Kenya as a Country would also reap the benefits of a diversified energy mix and enhance energy security, since geothermal is an indigenous resource. The local communities surrounding the Menengai field would benefit from local job creation i.e. GDC would employ and train local workers for construction, operation, security and other positions as well as business and other tertiary opportunities; in fact, the project was expected to create 912 skilled and about 300 unskilled jobs in the area. Women would particularly benefit from the project, as the employment ratio of women would be at least 30% (above the current national women employment ratio in the country). The potable water facilities to be developed by the project for the drilling activities would be transferred to the community/municipality at the end of project implementation; this would have a direct effect on the empowerment of women and girls who normally collect water for domestic purposes. Furthermore, GDC's intentions were to utilize geothermal resources to promote socioeconomic initiatives in surrounding communities, such as fish farming, improved pasture land, milk processing, and grain storage. When electricity would be generated from the steam field, it was estimated to result in the reduction in GHG emissions of close to 2 million tons per year.

Consultation and Public Participation of the relevant stakeholders including the prominent local communities who would be directly impacted by the project was investigated by the AFDB, (2011) Group report which showed that design and implementation modalities benefited from the public consultations that were conducted as part of ESIA study. In fact, the ESIA study involved interviews with communities, stakeholders and project-affected people. It also made an adequate analysis of the project's environmental, social, and economic impacts and of the consultations with the public. The project benefited from insights of various stakeholders during project preparation and design.

When a firm realizes that its main stakeholders use their power to influence its environmental management practices, it tends to adopt an explicit mode of environmental management (Céspedes-Lorente et al, 2003). Hence, He (2010) undertook an investigation that suggested that improving the stakeholder's awareness of environmental management is very essential and that there is no doubt that much work remains to be done if we are to recognize how to improve environmental management in projects.

2.3 Theoretical Framework

The following theories were reviewed in this research.

2.3.1 Resource-Based View (RBV)

Resource-based view theory (RBV), developed by Wernerfelt (1984), suggested that a firm's competitive strategy and performance depend significantly on its valuable, rare and inimitable organizational resources. Many scholars have further developed the theory by integrating RBV with relational theory, social network theory and environmental issues. From the RBV theory, exist two branches; the natural resource-based view (NRBV) (Hart, 1995), and the relational view (RV) (Dyer and Singh, 1998).

NRBV proposes that there are three key strategic capabilities: pollution prevention, product stewardship, and sustainable development. Each of these has different environmental driving forces which builds upon different key resources, and has a different source of competitive advantage. According to NRBV, pollution prevention technologies involve much tacit knowledge through skill development and "green" teams. The tacit knowledge results in a resource that is difficult to be replicated. Product stewardship technologies could produce knowledge of entire "product life cycle", which can be converted into the potential for competitive advantage through strategic priority. In brief, tacit knowledge and product life cycle knowledge, which are generated by environmental management practices, are significant for corporate competitiveness and performance. They are also crucial antecedent variables of another advantage resource or technological innovation.

2.3.2 Stakeholder Theory

Stakeholder theory is one that attempts to explain why organizations invest in CSR activities. The stakeholder theory is an ethical theory that proposes that managers have a duty to pursue the interest of all stakeholders in order to increase the value of the firm (Palmer, 2012). Stakeholders refer to all individuals who have a legitimate interest in the business. The stakeholder theory is an antipode to the shareholder theory, which argues that the sole duty of managers is to maximize the value of shareholders (Scheing, 2009). The stakeholder theory recognizes that, apart from meeting the needs of shareholders, managers also need to cater to the interests of other stakeholders such as customers, employees, suppliers, creditors, local communities, and governments among others.

The stakeholder theory argues that there is a reciprocal relationship between stakeholders and companies. Consequently, a company is more likely to record better performances when its stakeholders are happy. This theory advances a strong argument in favor of the concept of corporate social responsibility. It implies that organizations opt to invest in CSR activities because they have a duty to all stakeholders. It also suggests that investing in CSR activities has a positive impact on the value of the firm because the organization needs the stakeholders as much as these stakeholders need the organization. This theory views the organization as an inclusive entity that must interact with the stakeholders on a constant basis in order to survive. This theory also views the company as a social entity that also has duties and responsibilities towards society.

2.4 Conceptual Framework

The conceptual framework in Figure 2.1 guided the study.

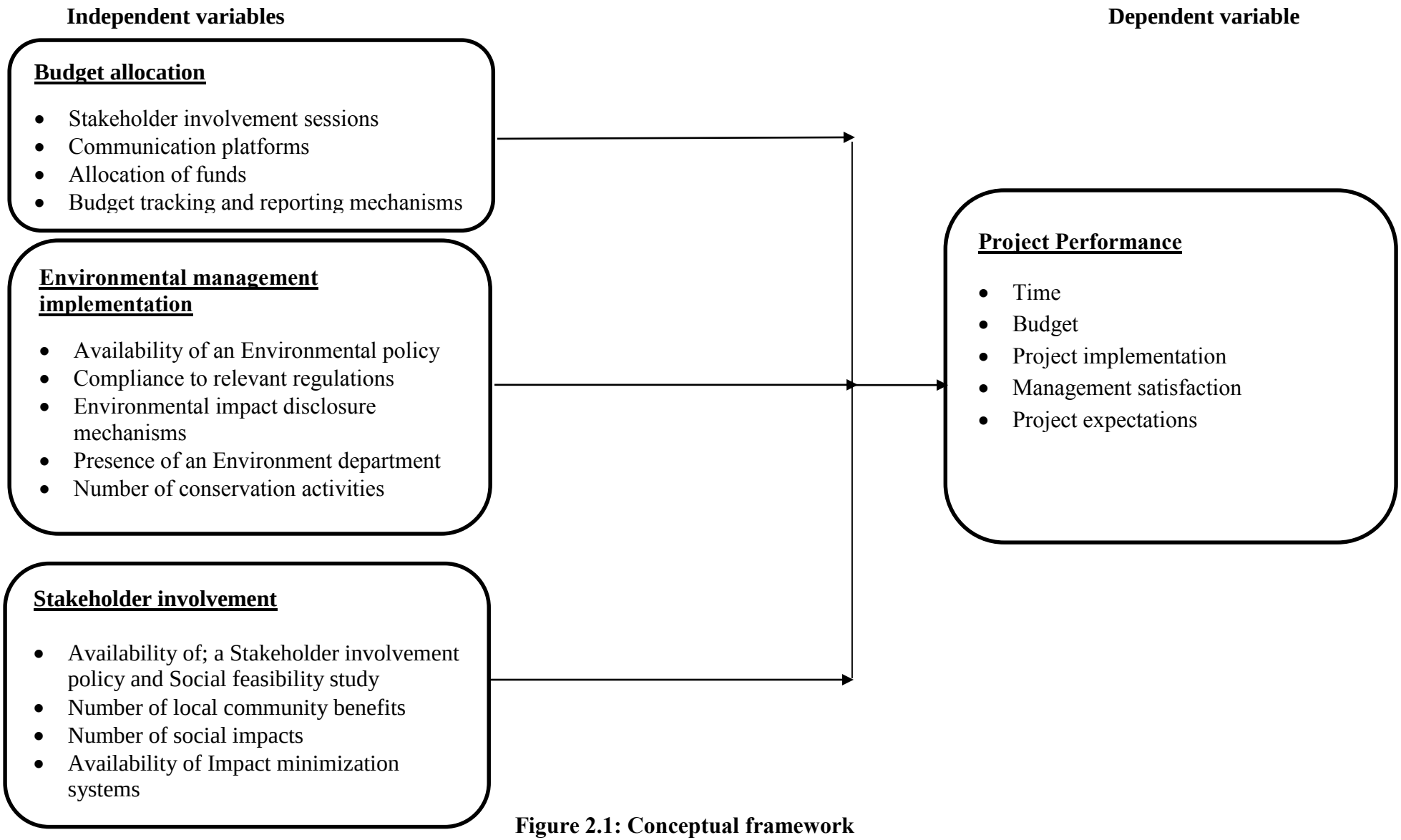

Figure 2.1: Conceptual framework

2.5 Research Gaps

There is still not much research that has been carried out on the influence of environmental management on the performance of geothermal projects in Kenya. Most of the research done focuses on the importance of carrying out environmental management in corporate institutions or it being a requirement by the laws governing Kenya. Kuntz-Duriseti, (2004), for instance focuses on the economic value of the precautionary principle by placing a value on the precaution aspect of implementing environmental management. Shen and Tam, (2002), focused on the benefits and the barriers that a project faces while implementing environmental management in construction projects.

Other gaps identified are as in EMCA (2015) and the Environmental (Impact Assessment and Audit) Regulations (2003). The gap in these documents is noted in regard to there being no specific information on how to handle geothermal projects which are among the projects rated as being of high risk by the Authority. There is no information detailing environmental management activities to carry out following the construction and commissioning phases of a geothermal project.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the research design that was adopted for the study, the target population to the study, the source of data and method of collection, data analysis as well as error reduction procedures. It also explains the data collection instrument that was used and ethical considerations that were put in place.

3.2 Research design

The research employed a descriptive research design. This research design delved into testing the relationship and determining the direction by which budget allocation, environmental management implementation and stakeholder involvement affect geothermal project performance. Data was collected using a structured questionnaire and analysed both quantitatively and qualitatively. According to Mugenda and Mugenda (2003), a descriptive research design attempts to collect data from members of a population in order to determine the current status of that population in respect to one or more variables. This research design was selected as it would determine the characteristics of the sample population and the current conditions of the research variables. Data regarding the respondents' opinions, perceptions, attitudes and views would also be collected using a structured questionnaire. Collected data was analysed using the Statistical Package for Social Sciences (SPSS), tabulated and thereafter subjected to inferential statistical methods such as ANOVA, Correlation and Multiple regression.

3.3 Target Population

The target population comprised of Geothermal Development Company's employees from the Central Rift Office. GDC's Central Rift Office Human Resource records (2015) highlighted that it had approximately 700 permanent employees. From this population, an appropriate sample size was determined using the Taro Yamane (1967) formula:

$$n = \frac{N}{1+N*(e)^2}$$

Where,

n - the sample size

N - the population size

e - the acceptable margin of error

$n = 700 \div [1 + 700(0.1)^2] = 88$

Taking 10% as the desired margin of error, the formula gave a sample size of 88 respondents.

3.4 Sampling Procedure

The research used the simple random sampling method to select participants from the employee population of the Company. According to Cooper and Schindler (2013), the random method of selecting participants aids the researcher in eliminating biasness in the sampling process by giving all members of the population equal chances of participating in the study.

3.5 Data Collection

Data was collected so as to determine the characteristics of the sample population and the current conditions of the research variables.

3.5.1 Data Collection Instrument

Data was collected using structured questionnaires. A structured questionnaire is a form that comprises a list of questions with multiple choice answers (Bryman and Bell, 2011). The questionnaire consisted of five sections: the first section sought to obtain demographic information concerning the sample population whereas the other four sections addressed questions concerning both the independent and dependent variables. The research participant was expected to respond to the questions by selecting the most appropriate answer among the choices provided.

A structured questionnaire is also administered in research in order to facilitate statistical comparison by ensuring that the respondents' answers are limited to a few choices (Cooper and Schindler, 2013). The structured questionnaire facilitated the collection of large amounts of data, which was essential in making statistical inferences. Other advantages of structured questionnaires include low cost of administration, less time required for data collection, and ease of analysis.

3.5.2 Data Collection Procedures

The researcher used the drop-off and pick-up method to distribute the questionnaires, which entails taking questionnaires to participants in person and collecting them after a few days. According to Allred and Ross-Davis (2010), the drop-off and pick-up method of distributing questionnaires increases the response rate as the personal touch increases social psychological cooperation of the research subjects. The researcher met participants in person and gave them printed questionnaires. The participants were given a period of one week to complete the questionnaires after which the researcher returned to collect the filled in questionnaires. The researcher also made follow-up calls to the participants before the one week period had lapsed to remind them to complete the questionnaires.

3.5.3 Pilot testing of the instrument

In 2003, Mugenda and Mugenda determined that a research instrument should be pretested using 10% of the sample size. Since the desired sample size for this study was 88 employees, the pilot study involved 9 respondents. The results of the pilot study were discussed with the respondents to make the required adjustments. The main objective of this study was to assess the clarity of the instrument and whether it was in a language that the respondents would understand.

Anonymity in taking part in the exercise was guaranteed and employees were told that a similar assessment would take place two weeks later. This was to ensure that the research results were not biased towards socially desirable responses. All the 9 questionnaires from the respondents were duly filled.

3.6 Validity and Reliability

These measures were carried out so as to ensure stability and consistency with which the data collection instrument measured the concept and to ascertain that the data analysis method that was used would measure the correct concept.

3.6.1 Validity

Validity refers to the extent to which the findings of the study reflect the real situation (Bryman and Bell, 2011). Validity of the research instrument was enhanced by thorough critiquing by the research supervisor. Given his expertise in the field of study, assurance from him that the research instrument would collect the required data for the research gave the researcher assurance that relevant data pertaining the research would be collected.

3.6.2 Reliability

It was important to ensure that the methods used in the research were reliable. Reliability is the ability of the research methods to generate consistent and stable results (Cooper and Schindler, 2013). A significant determinant of reliability is the consistency of the data collection instrument. The researcher enhanced the consistency of the structured questionnaire by conducting the test-retest method described in the pilot testing section in 3.5.3.

3.7 Data Analysis

The collected data was analyzed using descriptive and inferential statistical techniques. Firstly, data was edited, coded, tabulated and classified for analysis. The descriptive tools that were applied in this research included frequencies and percentages. Inferential statistical techniques were used to analyze relationships between variables, as well as, the direction of relationships by use of correlation techniques. SPSS version 20 was utilized for data analysis. Results were then presented in the form of tables and from this; conclusions were drawn based on the objectives. The multiple regression technique was used to provide inferences regarding the relationships between the variables of the research. The following regression model was tested:

Model I: Independent Variable and Dependent Variable

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \varepsilon$$

Where: Y = Geothermal Project Performance; $\beta 0$= Constant (coefficient of intercept); $\beta 1$, $\beta 2$, and $\beta 3$ = Beta coefficients; X1=Budget allocation; X2= Environmental management implementation; X3= Stakeholder involvement, and ε = Error term

3.8 Ethical considerations

Prior to collection of data, respondents were briefed on the objectives of the study, the research instrument that would be used and how the findings from the research would be utilized. This was so as to elaborate on any misconceptions that would have arisen from the research exercise. Information gathered from this research was purely for academic purposes.

3.9 Operational Definition of Variables

Table 3.1 shows the research objectives, dependent and independent variables used in the study, their measurement indicators, and sources of data, measurement scale and tools of analysis for the collected data.

Table 3.1: Operational definition of variables

Research Objectives	Type of variable	Indicators	Data sources	Measurement scale	Tools of analysis
i. To determine the influence of budget allocation on the performance of the Menengai geo-thermal drilling project.	Independent	• Stakeholder involvement sessions • Communication platforms • Allocation of funds • Budget tracking and reporting mechanisms	Questionnaire	Ordinal	• Frequencies • Percentages • ANOVA • Pearson's correlation tests
ii. To explore the influence of environmental management implementation on performance of the Menengai geothermal drilling project.	Independent	• Availability of an Environmental policy • Compliance to relevant regulations	Questionnaire	Ordinal	• Frequencies • Percentages • ANOVA • Pearson's correlation tests

		• Environmental impact disclosure mechanisms • Presence of an Environment department • Number of conservation activities			
iii. To determine the extent to which stakeholder involvement influences the performance of the Menengai geothermal drilling project.	Independent	• Availability of; a Stakeholder involvement policy and Social feasibility study • Number of local community benefits • Number of social impacts • Availability of Impact	Questionnaire	Ordinal	• Frequencies • Percentages • ANOVA • Pearson's correlation tests

		minimization systems			
	Dependent Project performance	• Time • Budget • Project implementation • Management satisfaction • Project expectations	Questionnaire	Ordinal	• Frequencies • Percentages • ANOVA • Pearson's correlation tests

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

The aim of this research was to assess the influence of environmental management practices on the performance of a geothermal project with the case of the Menengai Geothermal Drilling Project (MGDP). Data was collected from a sample of 88 employees of the MGDP comprising of the Menengai Project Site (MPS) and the Nakuru Area Office (NAO) through the use of structured questionnaires, and analyzed using both descriptive and inferential statistical techniques. This chapter presents the outcome of this analysis. The chapter is organized into various sections including response rate, demographic characteristics of the sample, descriptive analysis, and the inferential analysis section.

4.2 Response Rate

Table 4.1 represents the response rate of the respondents.

Table 4.1: Response Rate

	Frequency	Percentage (%)
Response	71	80.7
Non-Response	17	19.3
Total	**88**	**100**

A total of 88 questionnaires were distributed to the selected sample size. Out of the 88 questionnaires, 71 were duly filled and returned to the researcher. The 71 duly filled questionnaires marked a response rate of 80.7% whereas 19.3% marked by 17 respondents were non-responsive.

4.3 Respondents Work Station

Table 4.2 represents classification of respondents according to their work station.

Table 4.2: Respondents workstation

	Frequency	Percentage (%)
Nakuru Area Office	49	69
Menengai Project Site	22	31
Total	**71**	**100.0**

Of the 71 duly filled questionnaires represented by a response rate of 80.7%, 49 respondents were from the NAO represented by 69% of the sample while 31% were from the MPS having had 22 respondents as shown in Table 4.2. From these statistics, three conclusions can be drawn; (1) there is a higher number of staff in the Nakuru Area Office (NAO) compared to the Menengai Project site (MPS), (2) staff from the NAO were more willing to respond to the questionnaire compared to the MPS staff, (3) given the nature of their work, the MPS respondents were not easily accessible for the study compared to those from the NAO.

4.4 Demographic Characteristic of the Respondents

This section presents the findings related to the demographic characteristics of the respondents.

4.4.1 Respondents job category

Table 4.3 shows the classification of respondents by their job categories.

Table 4.3: Respondents' Job Category

	Frequency	Percentage (%)
Senior Management	4	5.8
Middle Management	17	24.6
Employee	48	69.6
Total	**69**	**100.0**

The researcher sought to determine the job category of the participants. According to Table 4.3, a majority of the participants (69.6%) were line-level employees, (24.6%) were in the middle management position, and only (5.8%) of the participants were in the senior management position. This trend matches what is expected of the workforce of most companies. It is a common trend for companies to have many line employees and few employees in managerial positions.

4.4.2 Duration worked by respondents in GDC

Table 4.4 gives an account of the duration within which the respondents had worked in GDC which implements the MGDP.

Table 4.4: Duration worked by respondents in GDC

	Frequency	Percentage (%)
Less than 5 Years	31	43.7
Between 5-10 Years	40	56.3
Total	**71**	**100.0**

The number of years that the participants had worked in GDC was investigated. A majority of the participants (56.3%) had been in the organization for 5-10 years while the remaining 43.7% of the participants had been in the organization for less than 5 years. This trend was expected given that GDC is a relatively new Company having been established in 2008.

4.4.3 Age of the respondents

Table 4.5 represents classification of respondents by their age.

Table 4.5: Respondents age group

	Frequency	Percentage (%)
Less than 25 years	3	4.2
Between 25 and 40 years	65	91.5
More than 40 years	3	4.2
Total	**71**	**100.0**

As shown in Table 4.5, a majority of the respondents (91.5%) fell within the 25-40 years age bracket, 4.2% were above 40 years, and only 4.2% were below the age of 25 years.

4.4.4 Gender of the respondents

Table 4.6 represents the classification of respondents by gender.

Table 4.6: Gender of respondents

	Frequency	Percentage (%)
Male	47	66.2
Female	24	33.8
Total	**71**	**100.0**

Gender is another demographic variable that was examined. Results showed that a majority of the respondents (66.2%) were male while the remaining 33.8% were women according.to Table 4.6. This gender proportion draws the following conclusions: (1) either more men than women were willing to participate in the study, (2) the MGDP and NAO have more male than female employees, (3) given that the geothermal sector is a technical field, it attracts more men than women in the study of this science and (4) GDC respects the rule of law in maintaining the $^{1}/_{3}$ gender rule attributed to women.

4.4.5 Education level of the respondents

The researcher also examined the education level of the respondents as shown in Table 4.7.

Table 4.7: Education level of the respondents

	Frequency	Percentage (%)
Diploma	22	31.0
Degree	22	31.0
Postgraduate (Masters)	27	38.0
Total	**71**	**100.0**

From the findings of this study, 38% of the respondents had attained Postgraduate (Masters) level of education which formulated the highest percentage of respondents, Degree and Diploma level of education comprised31% each. The findings show that GDC comprises of highly educated personnel which is expected as its purpose is highly technical and requires specialized skills.

4.5 Budget allocation

Budget allocation is one of the components of environmental management activities that were being investigated in this study in relation to geothermal project performance. The researcher asked a series of questions in order to establish the respondents' views regarding the following questions. The findings are shown in Table 4.8.

Table 4.8: Information concerning budget allocation

	(5) Strongly Agree (4) Agree (3) Neither Agree nor Disagree (2) Disagree (1) Strongly Disagree					
	Statement	**5**	**4**	**3**	**2**	**1**
		%	%	%	%	%
1.	The company's board is involved in the planning of annual budgets	35.2	38.0	25.4	1.4	0.0
2.	The company has platforms for reporting and communicating its annual budget to GDC staff	18.3	53.5	8.5	12.7	7.0
3.	Key stakeholders are involved in the planning and execution of the annual budget	15.7	51.4	22.9	8.6	1.4
4.	There is an annual allocation of funds towards environmental management	33.8	53.5	11.3	1.4	0.0
5.	The annual allocation of funds towards environmental management is sufficient	5.6	23.9	46.5	22.5	1.4
6.	GDC allocates some of its resources to community projects	27.5	53.6	15.9	2.9	0.0
7.	GDC has mechanisms for tracking and reporting annual budget use	27.1	48.6	18.6	4.3	1.4
8.	Budget allocation towards environmental management is a critical component for	38.6	48.6	11.4	1.4	0.0

	evaluating the overall performance of the project					
9.	Implementation of environmental management programs is costly to the Company.	5.6	25.4	35.2	26.8	7.0
	Average	**23.0**	**44.1**	**21.7**	**9.1**	**2.0**

Generally, there was a positive response regarding the influence of budget allocation towards environmental management in relation to performance of the Menengai Geothermal Drilling Project (MGDP) at an average of 44.1% agreeing and 23.0% strongly agreeing, 21.7% were not sure while 9.1% and 2.0% disagreed and strongly disagreed respectively. A majority of the respondents (73.2%) gave a positive response to the statement regarding the Company's board involvement toward planning of annual budgets while 25.4% were not sure, and only 1.4% of the participants gave a negative response. The responses to this question gave a strong indication that GDC's Board of Directors is greatly involved in ensuring the Company has finances at any one point through prior planning thus the Company has board support in formulation of annual budgets.

Regarding whether GDC has platforms for reporting and communicating its annual budget to staff, a majority of the respondents (71.8%) gave a positive response to the statement while 8.5% were not sure, and 19.7% of the participants gave a negative response. The study also sought to understand whether key stakeholders are involved in the planning and execution of the annual budget.67.1% gave a positive response, 22.9% were not sure while 10% gave a negative response. This goes to show that key stakeholders are involved in planning and execution of the annual budget which translates to staff having a better understanding of what they need and expect.

The researcher sought to understand whether GDC, the organization in charge of implementing the MGDP, allocates some of its resources towards the financing of environmental management annually. A majority of the participants (87.3%) reported that the organization dedicates some of its resources to environmental management activities and 11.3% were not sure. Only 1.4% of the participants gave a contradicting opinion. These responses indicate that GDC goes beyond compliance with statutory requirements by ensuring financial backing in execution of its environmental management responsibility.

The researcher sought to find out whether the annual allocation towards environmental management was sufficient. The majority of the participants (46.5%) were not sure concerning the statement, 29.5% gave a positive response while 23.9% contradicted the statement. This led the researcher to conclude that; (1) there had been inadequate awareness/information concerning the amount of financial resources allocated to environmental management, (2) top-down communication concerning the annual budget was lacking/inadequate.

A majority of the participants (81.1%) reported that the organization dedicates some of its resources to community projects, 15.9% were not sure while only 2.9% of the participants gave a negative response. The researcher sought to find out whether GDC has mechanisms for tracking and reporting annual budget use. 75.7% were of the opinion that GDC has mechanisms for tracking and reporting annual budget use, 18.6% were not sure while 5.7% gave a negative response. These results enabled the researcher to conclude that GDC being a Government entity is accountable for its expenditure.

Participants were asked to give their opinion regarding whether budget allocation towards environmental management is a critical component for evaluating the overall performance of the MGDP. 87.2% of the respondents gave a positive response, 11.4% were not sure while 1.4% gave a negative response. This led the researcher to conclude that allocation of budget toward environmental management has an effect on the conception regarding geothermal project performance.

The final question concerning budget allocation of environmental management practices sought to obtain information on whether implementation of environmental management programs is costly to the Company. A majority of the respondents (35.2%) were not sure concerning this aspect, 33.8% contradicted with this statement while 30.0% were not sure. The researcher drew the following conclusions concerning these results (1) the respondents were fearful of answering this question genuinely so as not to paint the Company in bad light, (2) there had been inadequate awareness/information concerning the amount of financial resources allocated to environmental management and (3) top-down communication concerning the annual budget was lacking/inadequate.

4.6 Environmental Management Implementation

Environmental management implementation was another component that was being investigated in this research. Environmental management is defined by the EIA/EA regulations, (2003) to include the protection, conservation and sustainable use of the various elements or components of the environment. According to table 4.9, the researcher asked a series of questions in order to establish the extent to which environmental management was being implemented and its influence on the performance of the MGDP.

Table 4.9: Information regarding environmental management implementation

	(5) Strongly Agree (4) Agree (3) Neither Agree nor Disagree (2) Disagree (1) Strongly Disagree					
	Statement	**5**	**4**	**3**	**2**	**1**
		%	%	%	%	%
1.	GDC has formal environmental policies.	45.7	41.4	8.6	4.3	0.0
2.	The Menengai Project has complied with Environmental Regulations.	31.0	50.7	9.9	5.6	2.8
3.	An Environment Impact Assessment study was conducted prior to the commencement of the project.	51.4	40.0	7.1	1.4	0.0
4.	The project disclosed its likely environmental impacts.	31.0	50.7	12.7	4.2	1.4
5.	The project has appropriate mechanisms for environmental impact management.	21.1	53.5	18.3	5.6	1.4
6.	Environmental management plays a key role in the ultimate performance of a project.	46.5	47.9	4.2	1.4	0.0
7.	The Environmental Impact Assessment study conducted has so far regulated conservation activities within the project area.	28.2	52.1	15.5	4.2	0.0
8.	An Environmental Department is tasked with all environmental management practices in GDC.	49.3	40.6	7.2	1.4	1.4

9.	A lack of environmental management awareness by staff can prove to be costly to the Company in the long run.	59.2	29.6	8.5	2.8	0.0
10.	Adequate training has been provided for personnel responsible for environmental management implementation.	12.9	35.7	27.1	17.1	7.1
	Average	**37.6**	**44.2**	**11.9**	**4.8**	**1.4**

There was a positive response regarding the influence of environmental management implementation on the performance of the MGDP averaging at 44.2% agreeing and 37.6% strongly agreeing. 11.9% were not sure, 4.8% and 1.4% disagreed and strongly disagreed respectively. The first question sought to establish whether GDC has formal environmental policies. A majority of the respondents (87.1%) gave a positive response, 8.6% were not sure, and only 4.3% of the participants gave a negative response. The responses to this question gave a strong indication that GDC, which is the project implementing organization, has formal environmental policies.

Participants were asked to give their opinion regarding the extent to which the MGDP had complied with environmental regulations. 81.7% gave a positive response, 9.9% were not sure while 8.4% gave a negative response. The results gave a clear indication that GDC complies with the relevant environmental regulations. The researcher also asked participants whether they had knowledge of an Environmental Impact Assessment (EIA) being conducted prior to the commencement of the MGDP. 91.4% of the participants said that an EIA was conducted, 7.1% were not sure, and only 1.4% reported that an EIA was not carried out. These responses gave a strong indication that an EIA was undertaken prior to commencement of the project.

Participants were also asked whether they felt that the project disclosed its likely environmental impacts. A majority of the participants (81.7%) gave a positive response, 12.7% were not sure, and 5.6% gave a negative response. The responses gave a strong indication that the likely impacts of the project to the environment were revealed. This is supported by the fact that an EIA was conducted prior to the commencement of the project which investigates the likely impacts of a project in the EMP.

The researcher also sought to understand whether GDC, the organization in charge of implementing the MGDP, has appropriate mechanisms for environmental impact management. The majority of the respondents (74.6%) gave positive feedback, 18.3% were not sure while 7.0%

gave negative feedback. These results show that the EMP currently in place derived from the EIA study that was conducted prior to onset of the project was effective. The researcher was also interested in finding out whether environmental management plays a key role in the ultimate performance of a project. A majority of the participants (94.4%) reported that it played a key role, 4.2% were not sure while only 1.4% contradicted this statement. Among the benefits of utilizing environmental management tools are; reduced cost and time of project implementation, cost-saving modifications in project design and improved project performance hence GDC achieves these while implementing environmental management in the MGDP.

Participants were also asked whether the EIA conducted so far had regulated conservation activities within the project area. A majority of the participants (80.3%) gave a positive response, 15.5% were not sure, and 4.2% gave a negative response. The responses gave a strong indication that the likely impacts of the project to the environment were revealed and appropriate measures taken to mitigate them. This is supported by the fact that an EIA was conducted prior to the commencement of the project which investigated the likely impacts of the project in the EMP. The researcher also asked participants whether there was an Environment Department tasked with all environmental management practices at GDC. Majority of the respondents (89.9%) gave a positive response, 7.2% were not sure while 2.8% gave a negative response. The responses support that GDC had a Department specifically handling environmental management issues. This is in respect to the EMP.

The researcher also sought to find out whether lack of environmental management awareness by staff could prove to be costly to the Company in the long run.88.8% gave a positive response, 8.5% were not sure while 2.8% gave a negative response. In order to avoid implications of taking environmental risks such as fines, increased liability to environmental taxes, loss in value of land, destruction of brand values, and loss of sales, consumer boycotts, and inability to secure finance, loss of insurance cover, contingent liabilities, law suits, and damage to corporate image, imparting environmental awareness to staff averts some of these challenges from occurring. This thus secures the future of projects by ensuring good performance.

The final question in Section C of the questionnaire sought to seek information as to whether adequate training had been provided for personnel responsible for environmental management implementation. Majority of the respondents (48.6%) gave a positive response, 27.1% were not sure while 24.2% gave a negative response. Though a majority of personnel stated that adequate training had been provided to staff responsible for environmental management implementation much needs to be done to elevate this percentage.

4.7 Stakeholder Involvement

Stakeholder involvement is another component of environmental management practices that this study sought to investigate. The researcher asked a series of questions that were aimed at investigating the MGDP stakeholder involvement. The findings are as shown in Table 4.10.

Table 4.10: Information related to stakeholder involvement

	5. Strongly Agree 4. Agree 3. Neither Agree nor Disagree 2. Disagree 1. Strongly Disagree					
	Statement	**5**	**4**	**3**	**2**	**1**
		%	%	%	%	%
1.	GDC has a stakeholder involvement policy.	19.7	52.1	23.9	4.2	0.0
2.	Stakeholders have a role to play in environmental management implementation of the Company.	20.0	67.1	11.4	1.4	0.0
3.	Local communities have benefited from the employment opportunities created by the Menengai Project.	36.6	54.9	7.0	1.4	0.0
4.	Local communities are given priority when the project issues tenders for the supply of goods or services.	9.9	29.6	47.9	8.5	4.2
5.	A social feasibility study was conducted before the onset of the project	30.4	50.7	17.4	1.4	0.0
6.	The project disclosed its social impacts	22.9	47.1	27.1	2.9	0.0

7.	The company has a good relationship with suppliers and government agencies within the area.	19.7	54.9	19.7	2.8	2.8
8.	The company has systems for minimizing negative social impacts of the project.	14.3	57.1	21.4	4.3	2.9
9.	The company cares about the wellbeing of its employees	26.8	57.7	9.9	5.6	0.0
10.	I am pleased with the company effort towards stakeholder involvement	16.9	60.6	16.9	5.6	0.0
	Average	**21.7**	**53.2**	**20.3**	**3.8**	**1.0**

There was a positive response regarding the involvement of stakeholders in contributing to the performance of the MGDP averaging at 53.2% agreeing and 21.7% strongly agreeing. 20.3% were not sure, 3.8% and 1.0% disagreed and strongly disagreed respectively. This gave an indication that stakeholders play a very crucial role in the performance of the MGDP.

The first question was whether GDC has a stakeholder involvement policy. A majority of the participants (71.8%) were in agreement with the statement, 23.9% were not sure, and 4.2% disagreed with this statement. The responses indicate that the MGDP has a stakeholder involvement policy. By GDC having a stakeholder involvement policy, the Company ensures that it seeks out all its affected stakeholders. It may also be in a bid to incorporate their comments or concerns pertaining the MGDP hence avoiding instances of misinterpretation/miscommunication of aspects related to the project.

The researcher also sought to find out whether GDC's stakeholders have a role to play in environmental management implementation. 87.1% gave a positive response, 11.4% were not sure while 1.4% were of a contrary opinion. These results show that stakeholders are involved in implementation of environmental management at GDC. Participants were also asked whether local communities have benefited from the employment opportunities created by the Menengai Project. In order to develop a good relationship with local communities, the MGDP needs to ensure that local communities get their fair share when it comes to distribution of employment opportunities.

As shown in Table 4.10, 91.5% of participants gave a positive response, 7.0% were not sure, and 1.4% gave a negative response when they were asked whether the MGDP had provided employment opportunities to local people. This goes to show that GDC has taken steps to ensure

that the local community gets a sense of ownership of the MGDP through participating in determining its performance. Participants were asked whether local communities are given priority during the award of procurement tenders, 39.5% of the participants reported that local people are given priority during the award of procurement tenders, 47.9% were not sure, and 12.7 % indicated that no priority is given to local communities.

Participants were also asked whether a social feasibility study was conducted before the onset of the project, a majority of the participants (81.1%) gave a positive response, 17.4% were not sure while the remaining 1.4% were not sure. The research also sought to understand whether the project disclosed its social impacts. A majority of the respondents (70.0%) agreed with this statement, 27.1% were not sure while 2.9% gave a negative opinion. These findings are supported by the social feasibility study that was conducted prior to the onset of the project.

The researcher sought to find out the nature of the relationship between GDC, its suppliers and government agencies within the MGDP. A majority of the respondents (74.6%) were in general agreement with the statement that GDC has a good relationship with suppliers and government agencies within the area. Only 5.6% of the participants felt that the relationship between GDC, its suppliers, and government agencies was not good while 19.7% were not sure. Findings to this question suggest that despite being a government ran institution, GDC maintains good relationships with its suppliers. Participants were also asked whether the project has a system for minimizing negative social impacts. A majority of the respondents (71.4%) were in agreement with the statement that the MGDP has a system for minimizing negative social impacts. Only 7.2% of the participants had a contrary opinion while 21.4% were not sure. The findings are attributed to the existence of the EMP through the EIA conducted for the MGDP.

Participants were also asked to give their opinion on whether the MGDP cares about the wellbeing of its employees. A majority of the respondents (84.5%) gave a positive response, 9.9% were not sure, and 5.6% gave a negative response. These findings confirm that GDC is concerned about the wellbeing of its employees. The researcher also sought to find out whether employees were pleased with the Company's efforts toward stakeholder involvement, 77.5% of the participants reported that they are pleased with the Company's effort towards stakeholder involvement, 16.9% were not sure, and 5.6% said that they were not pleased with the Company's efforts towards stakeholder involvement.

4.8 MGDP performance

Project performance was the dependent variable in this research. Participants were asked to respond to a set of statements that were aimed at determining their perception regarding the performance of the MGDP. The findings were as shown in Table 4.11.

Table 4.11: Information related to project performance

	(5) Strongly Agree (4) Agree (3) Neither Agree nor Disagree (2) Disagree (1) Strongly Disagree					
	Statement	**5**	**4**	**3**	**2**	**1**
		%	%	%	%	%
1.	The first phase of the Menengai Geothermal Project will be completed within the time limit.	8.5	16.9	47.9	21.1	5.6
2.	The first phase of the project will be completed within the budget limit.	1.4	11.3	60.6	18.3	8.5
3.	The project implementation process has been smooth without major huddles.	1.4	9.9	22.5	49.3	15.5
4.	In your opinion, management is satisfied with the progress made in the project.	1.4	32.4	36.6	25.4	4.2
5.	The project is on course in terms of delivering the required 5000 Megawatts of power by the year	8.5	39.4	38.0	12.7	1.4
6.	The project has met stakeholders' expectations.	1.4	28.6	51.4	17.1	1.4
7.	The project plan has been implemented effectively.	2.8	39.4	35.2	19.7	2.8
8.	The government and other financiers are satisfied with the progress made in the Menengai Project.	2.8	26.8	45.1	21.1	4.2
9.	The Menengai drilling project will ultimately be vital to elevating the Country's economy.	62.0	29.6	5.6	1.4	1.4
	Average	**9.0**	**26.0**	**38.1**	**20.7**	**5.0**

The respondents were not certain regarding performance of the MGDP averaging at 38.1%. 26.0% agreed, 20.7% disagreed while 9.0% and 5.0%strongly agreed and strongly disagreed respectively regarding the MGDP performance status. This gave an indication that besides implementation of the environmental management practices, more emphasis should be given towards the attributes that directly affect performance of the MGDP.

The first statement sought to examine the extent to which respondents felt that the first phase of the project will be completed within the set timelines. A project that is completed within the planned timeline is considered to be of better performance compared to a project that exceeds its timelines. A majority of the participants (47.9%) were not sure, 25.4% held the opinion that the MGDP project is on course and is going to be completed within the planned timelines and 26.7% felt that the project will not be completed on time. It is known that a majority of public sector projects in Kenya run behind schedule due to untimely availability of funds, procurement delays, and climatic factors. Due to the challenges that may be facing implementation of the MGDP, explains why a majority of the respondents may not be certain concerning its timely completion.

The second statement sought to determine respondents' opinion on whether the first phase of the MGDP project will be completed within the planned budget. Projects that are completed within the planned budget are considered to be more successful than projects that exceed their budgets. As shown in table 4.11, a majority of the participants (60.6%) were not sure, 12.7% held the opinion that the first phase of the project will be completed within the allocated budget and 26.8% felt that the first phase of the project will exceed its budget. Most public projects in Kenya fail to adhere to cost estimates due to poor distribution of labor, poor planning, poor site management, and external factors such as weather which may explain these findings.

In the third statement, participants were asked whether the project implementation process was smooth without major huddles. Many of the respondents (65.7%) gave a negative response, 22.9% were not sure, and only 11.4% said that the implementation process was smooth. These results show that the far that the MGDP had gone, major hurdles have been experienced. Participants were also asked whether they felt that the MGDP management was satisfied with the progress made in the project. A majority of the respondents (36.6%) were uncertain, 33.8% felt that the managers were happy with the progress 29.6% felt that the managers were not happy. The research also sought to find out participants perception on whether the project is on course in delivering the required 5000MW of power by the year 2030. 47.9% of the participants gave a positive response, 38.0 % were not sure, and 14.4% gave a negative response. These results show that GDC staff are confident in the role the MGDP has to play in channeling geothermal energy to the 5000MW planned to be injected into the national grid by the year 2030.

Participants were asked whether the project had met the expectations of stakeholders. The extent to which these expectations are met also defines the performance of the project. 51.4% of

participants were uncertain, 30.0% felt that the expectations of the stakeholders have been met or will be met when the project is completed and 18.5% said that the stakeholders' expectations had not been met. The MGDP project has many stakeholders including suppliers, government, employees and surrounding communities as well as financiers. Each of these stakeholders has different expectations towards the project

The research also sought to determine the extent to which participants felt that the MGDP plan had been implemented effectively. A majority of the participants (42.2%) reported that the project had been implemented according to plan, 35.2% were not sure, and 22.5% felt that the project had not been implemented as planned. Since projects can easily deviate from their intended plan by exceeding the estimated timelines, budget estimates, and their scope, it is important to keep the MGDP in check so as to avoid such occurrences. It is paramount to elevate the 42.2% to a higher figure so as to secure the MGDP as valid.

Participants were asked whether the government and other financiers are satisfied with the progress made in the MGDP. A majority of the respondents (45.1%) were not sure, 29.6% were in agreement that the government and other financiers are satisfied with the progress made in the MGDP while 25.3% refuted this statement. These results show that most staff were not in a position to have such information. Most of the respondents (69.6%) were in the employee category (see table 5). Knowledge of this statement would have been best obtained from senior and middle level management.

The final question regarding performance of the MGDP sought to find out whether the MGDP will ultimately be vital to elevating the Country's economy. Majority of the respondents (91.6%) were in agreement with this statement, 5.6% were not sure while 2.8% refuted that the MGDP would be vital to elevating the Country's economy. These findings gave a strong indication that ultimately, the Menengai Geothermal Development Project is of utmost importance to the Country's economy thus has to be implemented. It will be important to employ good project management skills to see to its eventual success.

4.9 Inferential Analysis

Inferential analysis focuses on determining the relationship between study variables. It uses inferential statistical tools to determine whether the observed changes in the dependent variables are as a result of changes in the independent variables, or whether they have occurred by chance

(Cooper & Schindler, 2013). In this section, the researcher made use of ANOVA, Correlation Analysis and Multiple Regression techniques to determine the relationship between environmental management practices and geothermal project performance.

4.9.1. Test for Normality

From the normal probability plot (P-P Plot) represented by Figure 4.1, it was observed that the assumption that the variables are linearly related is true. The line of best fit can be seen to best represent the relationship between the variables.

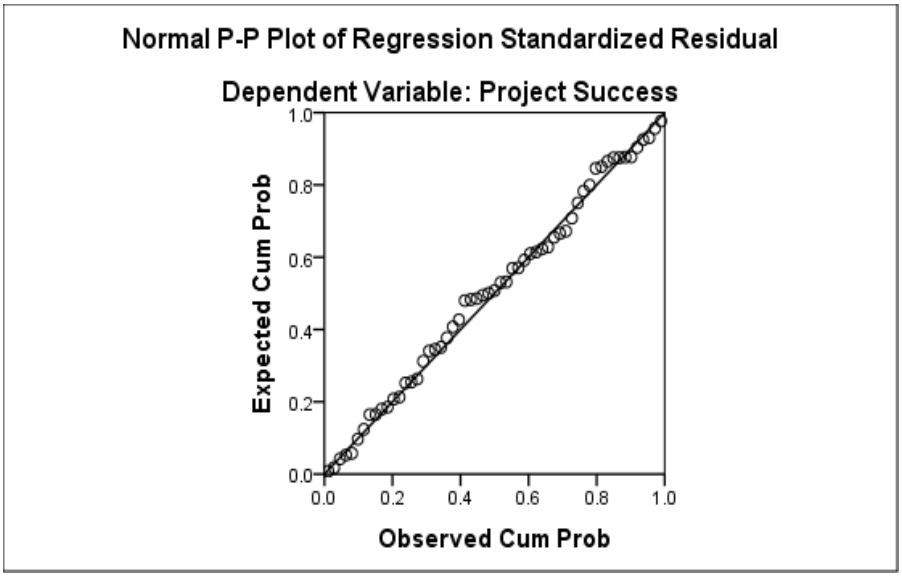

Figure 4.1: Normal P-P plot of regression

4.9.2. Correlation between budget allocation and geothermal project performance

Correlation between environmental management budget allocation and geothermal project performance is as shown in Table 4.12.

Table 4.12: Correlation between budget allocation and geothermal project performance

		Geothermal project performance
Budget Allocation	Pearson Correlation	.459**
	Coefficient of determination	21.1%
	Sig. (1-tailed)	.000
	N	71

**. Correlation is significant at the 0.01 level (1-tailed).

Budget allocation was positively correlated to geothermal project performance with a coefficient of *r=0.459* and was significant at *p=0.01*. This implied that there was a moderate positive correlation between budget allocation towards environmental management and geothermal project performance with a p value that was less than 0.01 hence the relationship was significant. As budget allocation for environmental management increased then geothermal project performance was fostered.

4.9.3. Correlation between environmental management implementation and geothermal project performance

Correlation between environmental management implementation and geothermal project performance is as shown in Table 4.13.

Table 4.13: Correlation between environmental management implementation and geothermal project performance

		Geothermal project performance
Environmental management implementation	Pearson Correlation	.365**
	Coefficient of determination	13.3%
	Sig. (1-tailed)	.002
	N	71

**. Correlation is significant at the 0.01 level (1-tailed).

Environmental management implementation had a low positive correlation to geothermal project performance with a coefficient of *r=0.365*and was significant at *p=0.01*.The p value was less than 0.01 hence the relationship was significant. As environmental management implementation increased then geothermal project performance was promoted.

4.9.4. Correlation between stakeholder involvement and geothermal project performance

Correlation between stakeholder involvement and geothermal project performance is as shown in Table 4.14.

Table 4.14: Existence of mechanisms for tracking and reporting annual budget use

		Geothermal project performance
Stakeholder involvement	Pearson Correlation	.562**
	Coefficient of determination	31.6%
	Sig. (1-tailed)	.000
	N	71

**. Correlation is significant at the 0.01 level (1-tailed).

The correlation between stakeholder involvement and geothermal project performance had the highest positive relationship at *r=0.562*at a significance of *p=0.01*.As stakeholder involvement increased then geothermal project performance increased.

4.10 Model Fit

The summary of the model is as shown in Table 4.15.

Table 4.15: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.627[a]	.393	.359	.486

a. Predictors: (Constant), Budget Allocation, Environmental Management Implementation, Stakeholder Involvement

b. Dependent Variable: Project Success

With R being 0.627, R^2=0.393 which means that the three independent variables within the model (Budget Allocation, Environmental Management Implementation and Stakeholder Involvement) only explain 39.3% variance in project performance. The remaining 60.7% of the changes in the performance of the project are attributed to other factors that are not in the model. Although the model explains less than 50% of the changes in project success, the model is meaningful given that this is a social science research. According to Toole (2013), an R square of above 0.25 is considered meaningful in social science research.

4.11 ANOVA

Table 4.16 shows the ANOVA analysis.

Table 4.16: Cost effectiveness of implementing environmental management programs

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.104	3	2.701	11.446	.000[b]
	Residual	12.508	53	.236		
	Total	20.612	56			

a. Dependent Variable: Project Success

b. Predictors: (Constant), Budget Allocation, Environmental Management Implementation, Stakeholder Involvement

As shown in Table 4.16 the mean sum of squares was SSM=8.104, residual sum of squares was SSR=12.508 and total sum of squares was SST=20.612 while the F ratio is F=11.446 was significant at p=0.01. We can infer that this regression model results in significantly better prediction of project performance than if the mean value record of the independent variables was used.

4.12 Multiple Regression Analysis

A multiple regression analysis was carried out in order to determine the combined effect of all the independent variables (Budget Allocation, Environmental Management Implementation and Stakeholder Involvement) on the dependent variable (Project performance). Table 4.17 represents the relationship between project performance and each predictor.

Table 4.17: Existence of GDC Environmental Policies

Coefficients						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.022	.599		.036	.971
	Budget Allocation	.324	.174	.252	1.861	.068

Environmental Management Implementation	.073	.169	.063	.432	.668
Stakeholder Involvement	.566	.174	.491	3.256	.002

a. Dependent Variable: Project Success

The regression test gave a p-value of 0.00 as shown in Table 4.16 which suggests that the overall regression model is significant.

Therefore;

Project performance = 0.22 + 0.324 (Budget Allocation) + 0.073 (Environmental Management Implementation) + 0.566 (Stakeholder Involvement) + ε

This meant that as budget allocation increased, implementation of environmental management activities increased and stakeholder involvement increased, ultimately project performance improved.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the findings of the study, conclusions, and recommendations drawn from the research. Suggestions for further studies have been indicated. This study aimed at investigating the effect of environmental management practices on geothermal project performance with a case of Menengai Geothermal Development Project (MGDP).

5.2 Summary of Findings

Out of the 88 questionnaires that were distributed, data was collected from 71 respondents marking a response rate of 80.7%. Majority of the respondents worked in the Nakuru Area Office (NAO) compared to 31% from the Menengai Project Site (MPS) most of them being line level employees at 69.6%. Majority of the respondents had worked at GDC for between 5-10 years and were between 25-40 years old. Male respondents were 66.2% while female were 33.8% of the respondents. Majority of the respondents had acquired Postgraduate (Masters) level of education.

5.2.1 Influence of Budget Allocation on Geothermal Project Performance

The first objective of the study was to determine the effect of budget allocation in relation to environmental management and how it affected performance of the Menengai Geothermal Drilling Project (MGDP). Budget allocation was positively correlated to geothermal project performance with a coefficient of $r=0.459$ and was significant at p(two-tailed)<0.01.This reflected a moderate positive correlation between environmental management budget allocation and geothermal project performance. Generally, there was a positive response regarding the influence of budget allocation in environmental management towards performance of the Menengai Geothermal Drilling Project (MGDP) at an average of 44.1% agreeing and 23.0% strongly agreeing.

5.2.2 Influence of Environmental Management Implementation on Project Performance

The second objective of the study was to determine the effect of environmental management implementation on the performance of the MGDP. Environmental management implementation had a low positive correlation to geothermal project performance with a coefficient of

r=0.365,p(two-tailed)<*0.01*.Generally, there was a positive response regarding the influence of environmental management implementation on the performance of the MGDP averaging at 44.2% agreeing and 37.6% strongly agreeing.

5.2.3 Influence of Stakeholder Involvement on Project Performance

The third objective determined the effect of stakeholder involvement on the performance of the MGDP. The correlation between stakeholder involvement and geothermal project performance had the highest positive relationship at *r=0.562, p*(two-tailed)<*0.01*.Generally, there was a positive response regarding the involvement of stakeholders in contributing to the performance of the MGDP averaging at 53.2% agreeing and 21.7% strongly agreeing.

5.3 Discussion

As budget allocation towards environmental management increased geothermal project performance was fostered. Budget allocation towards environmental management accounted for 21.1% (Table 4.12) of the variation in geothermal project performance. An increase in budget allocated toward environmental management at the MGDP would greatly increase its performance.

As environmental management implementation increased geothermal project performance was promoted. Environmental management implementation accounted for 13.3% of the variation in geothermal project performance (Table 4.13).

As stakeholder involvement increased geothermal project performance increased. Stakeholder involvement accounted for 31.6% of the variation in geothermal project performance (Table 4.14).

5.4 Conclusion

According to an article on "Environmental Management Accounting", (2015), businesses have become increasingly aware of the environmental implications of their operations, products and services. Environmental risks cannot be ignored, they are now as much a part of running a successful business as product design, marketing, and sound financial management. Poor environmental behaviour may have a real adverse impact on the business and its finances.

GDC has sought to comply with existing/emerging Laws, Regulations and Policies relevant to the Company. Non-compliance may lead to punishments which include fines, increased liability to environmental taxes, loss in value of land, destruction of brand values, and loss of sales, consumer

boycotts, and inability to secure finance, loss of insurance cover, contingent liabilities, law suits, and damage to corporate image. For GDC to avoid such penalties and fines, it is imperative that it continues allocating funds towards environmental management of its projects so as to abide by the relevant National Laws, Regulations and Policies which guarantees that its mandate is fulfilled.

There are a number of environmental management practices that are outlined to ensure improved performance of projects, however based on the findings of the study, it was concluded that stakeholder involvement had the most significant effect on the performance of the Menengai Geothermal Development Project (MGDP). More emphasis should be granted to make certain that GDC's stakeholders are aware of changes in the MGDP development and that their input is sought whenever required. Further, annual review of GDC's procedures, work instructions and policies should be encouraged so as to align them to amended National Laws and Regulations

It was further noted that bodies responsible for implementing environmental laws such as the National Environment Management Authority (NEMA) is severely underfunded and faces inadequate engagement with relevant stakeholders, which hinders its effectiveness in safeguarding compliance with environmental standards. Much more needs to be done to ensure environmental management is of high prominence before/during/after project development.

5.5 Recommendations

This study makes the following recommendations:

I. Top-down communication concerning the annual budget to all staff should be further facilitated by GDC management.
II. GDC Management should focus on increasing/ supporting stakeholder involvement initiatives so as to increase the project's chances of success as it had the highest significant relationship with geothermal project performance.
III. Due to the percentage of the respondents who were not sure as to the existence of the stakeholder involvement policy, it is recommended that awareness sessions are carried out by the Community Liaison team to impart knowledge of its existence and its content to staff.
IV. Sufficient budget should be allocated by the relevant budget stakeholders towards environmental management and its implementation. This would lead to an increase in geothermal project performance.

V. Bodies responsible for implementing environmental laws such as the National Environment Management Authority (NEMA) should be adequately funded by the GOK.

VI. The environmental bodies should form a consolidated rapport with community stakeholders. This will encourage their effectiveness in implementing environmental regulations.

VII. It is important for GDC staff to employ good project management skills to see to the eventual success of the MGDP and other projects in future.

VIII. Further training on the importance of environmental issues in the improved performance of a project should be facilitated by the Human Resources Department.

5.6 Suggestions for Further Studies

The current study was only limited to the Menengai Geothermal Development Project; hence, the generalizability of these findings may be limited. Future researchers should consider replicating this study in other projects in order to support the generalizations of the findings.

Similarly, the current study was limited to only three components of environmental management practices: budget allocation, environmental management implementation and stakeholder involvement. Future studies should explore other components of environmental management practices.

Lastly, the current study was quantitative in nature as it relied on structured questionnaires to collect data and statistical techniques to analyze this data. Consequently, the study was only able to establish whether there was a relationship between environmental management practices and geothermal project performance, the strength of these relationships, and the direction of these relationships. It was not able to explain why these relationships existed. A qualitative study is needed to provide an in-depth understanding of why the environmental management practices variables influence geothermal project performance.

5.7 Contribution to the body of knowledge

Table 4.18: Contribution to the Body of Knowledge

No.	Objective	Contribution to the Body of Knowledge
1.	To determine the influence of budget allocation on the performance of the Menengai geothermal drilling project.	• Many companies take environmental issues lightly hence do not allocate sufficient funds for this practice.
2.	To explore the influence of environmental management implementation on performance of the Menengai geothermal drilling project.	• Environmental bodies such as NEMA should be more empowered to carry out their regulation mandate regarding projects.
3.	To determine the extent to which stakeholder involvement influences the performance of the Menengai geothermal drilling project.	• Depending on how a project proponent involves its stakeholders can make or break a project.

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APPENDICES

Appendix 1: Letter of Transmittal

Anne Wangui Mwangi

P. O. Box 73361,

NAIROBI.

4th April 2016

The County Commissioner,

Nakuru County,

P. O. Box 81-20100

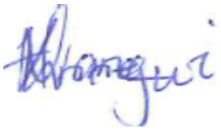
NAKURU.

Dear Sir/Madam,

RE: Request to Carry Out Research

I am a postgraduate student at the University of Nairobi undertaking a Master of Arts degree course in Project Planning and Management. To see to its completion, I will carry out a Research Project on "The Influence of Environmental Management Practices on Geothermal Project Performance. A Case of the Menengai Geothermal Drilling Project". This research is for academic purposes only however its content will be made public for future researchers or any other relevant stakeholders following its completion. Data collection shall employ utmost ethical considerations.

Yours faithfully,



Anne Wangui Mwangi (L50/76122/2014)

Appendix 2: Research Questionnaire for Geothermal Drilling Company Staff

My name is Anne Wangui Mwangi, a student at the University of Nairobi pursuing a Master's in Project Planning and Management. I am undertaking a research on the *Influence of Environmental Management Practices on Performance of a Geothermal Project: A Case of the Menengai Geothermal Drilling Project, Nakuru County.* This questionnaire is strictly for academic purposes and all information given will be treated with the highest level of privacy and confidentiality.

Instructions

- Please answer all questions
- Please put a tick ($\surd$) in the answer of your choice

Questionnaire Number

Work Station

(Use the relevant code to indicate your workstation)

(Nakuru Area Office; Code 01) (Menengai Project site; Code 02)

Section A: Demographic Information

1. **What is your Job category?**

Senior Management ☐

Middle Management ☐

Employee ☐

2. For how long have you worked at GDC, Central Rift Office?

Less than 5 years ☐

Between 5-10 years ☐

3. What is your Age?

Less than 25 years ☐

Between 25 and 40 years ☐

More than 40 years ☐

4. Gender

Male ☐

Female ☐

5. Education Level

Primary School ☐

Secondary School ☐

Diploma ☐

Degree ☐

Postgraduate (Masters) ☐

Others ☐

Section B: Information concerning budget allocation

To what extent do you agree with these statements?

5. Strongly Agree 4. Agree 3. Neither Agree nor Disagree 2. Disagree 1. Strongly Disagree					
Statement	**5**	**4**	**3**	**2**	**1**
The company's board is involved in the planning of annual budgets					
The company has platforms for reporting and communicating its annual budget to GDC staff					
Key stakeholders are involved in the planning and execution of the annual budget					
There is an annual allocation of funds towards environmental management					
The annual allocation of funds towards environmental management is sufficient					
GDC allocates some of its resources to community projects					
GDC has mechanisms for tracking and reporting annual budget use					
Budget allocation towards environmental management is a critical component for evaluating the overall performance of the project					
Implementation of environmental management programs is costly to the Company.					

Section C: Information Regarding Environmental Management Implementation

To what extent do you agree with these statements?

5. Strongly Agree 4. Agree 3. Neither Agree nor Disagree 2. Disagree 1. Strongly Disagree					
Statement	**5**	**4**	**3**	**2**	**1**
GDC has formal environmental policies.					
The Menengai Project has complied with Environmental Regulations.					
An Environment Impact Assessment study was conducted prior to the commencement of the project.					
The project disclosed its likely environmental impacts.					
The project has appropriate mechanisms for environmental impact management.					
Environmental management plays a key role in the ultimate performance of a project.					
The Environmental Impact Assessment study conducted has so far regulated conservation activities within the project area.					
An Environmental Department is tasked with all environmental management practices in GDC.					
A lack of environmental management awareness by staff can prove to be costly to the Company in the long run.					
Adequate training has been provided for personnel responsible for environmental management implementation.					

Section D: Information Related to Stakeholder involvement

Show the extent to which you agree with the statements in the table:

5. Strongly Agree 4. Agree 3. Neither Agree nor Disagree 2. Disagree 1. Strongly Disagree					
Statement	**5**	**4**	**3**	**2**	**1**
GDC has a stakeholder involvement policy.					
Stakeholders have a role to play in environmental management implementation of the Company.					
Local communities have benefited from the employment opportunities created by the Menengai Project.					
Local communities are given priority when the project issues tenders for the supply of goods or services.					
A social feasibility study was conducted before the onset of the project.					
The project disclosed its social impacts.					
The company has a good relationship with suppliers and government agencies within the area.					
The company has systems for minimizing negative social impacts of the project.					
The company cares about the wellbeing of its employees.					
I am pleased with the company effort towards stakeholder involvement.					

Section E: Information related to Project Success

To what extent do you agree with these statements?

5. Strongly Agree 4. Agree 3. Neither Agree nor Disagree 2. Disagree 1. Strongly Disagree					
Statement	**5**	**4**	**3**	**2**	**1**
The first phase of the Menengai Geothermal Project will be completed within the time limit.					
The first phase of the project will be completed within the budget limit.					
The project implementation process has been smooth without major huddles.					
In your opinion, management is satisfied with the progress made in the project.					
The project is on course in terms of delivering the required 5000 Megawatts of power by the year 2030.					
The project has met stakeholders' expectations.					
The project plan has been implemented effectively.					
The government and other financiers are satisfied with the progress made in the Menengai Project.					
The Menengai drilling project will ultimately be vital to elevating the Country's economy.					

Thank You for your participation!

Appendix 3: Letter of Introduction

UNIVERSITY OF NAIROBI
COLLEGE OF EDUCATION AND EXTERNAL STUDIES
SCHOOL OF CONTINUING AND DISTANCE EDUCATION
DEPARTMENT OF EXTRA - MURAL STUDIES

Tel 051 - 2210863

P. O Box 1120, Nakuru
7th June 2016

Our Ref: *UoN/CEES/NKUEMC/1/12*

To whom it may concern:

RE: ANNE WANGUI MWANGI L50/76122/2014

The above named is a student of the University of Nairobi at Nakuru Extra-Mural Centre Pursuing a Masters degree in Project Planning and Management.

Part of the course requirement is that students must undertake a research project during their course of study. She has now been released to undertake the same and has identified your institution for the purpose of data collection on "Influence of Environmental Management Practices on Geothermal Project Performance: A Case of the Menengai Geothermal Drilling Project."

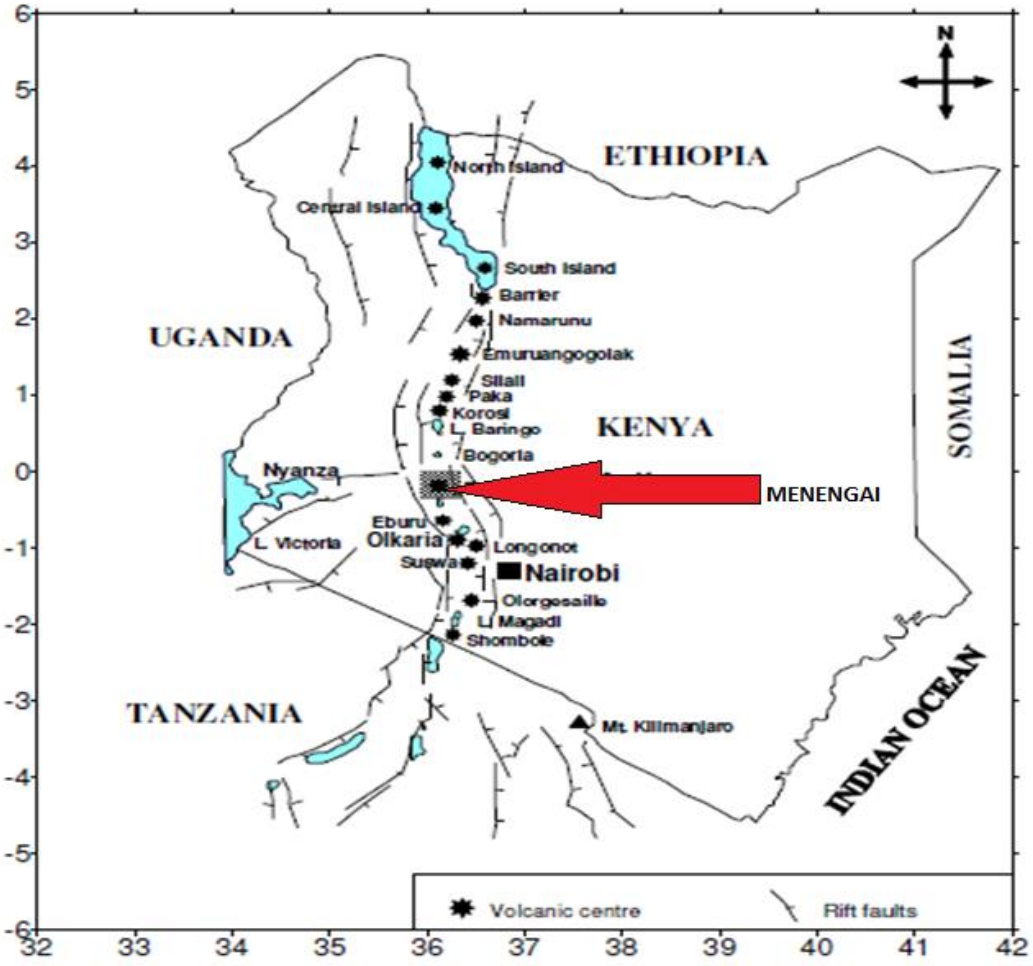
The information obtained will strictly be used for the purpose of the study.

I am for that reason writing to request that you please assist her.

Yours Faithfully,

Mumo Mueke
Ag. Resident Lecturer
Nakuru Extra-Mural Centre

Appendix 4: Map of the Kenya Rift showing the location of Menengai Geothermal Prospect.



Appendix 5: NACOSTI Research Authorization

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471,
2241349,3310571,2219420
Fax:+254-20-318245,318249
Email:dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/16/98711/11873**

Date: **15th June, 2016**

Anne Wangui Mwangi
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Influence of environmental management practices on geothermal project performance: A case of the Menengai Geothermal drilling project,"*** I am pleased to inform you that you have been authorized to undertake research in **Nakuru County** for the period ending **13th June, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Nakuru County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

DR. STEPHEN K. KIBIRU, PhD.
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nakuru County.

The County Director of Education
Nakuru County.

Appendix 6: NACOSTI Research Clearance Permit

CONDITIONS

1. **You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit**
2. **Government Officers will not be interviewed without prior appointment.**
3. **No questionnaire will be used unless it has been approved.**
4. **Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.**
5. **You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.**
6. **The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice**

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 9501

CONDITIONS: see back page

THIS IS TO CERTIFY THAT:

MISS. ANNE WANGUI MWANGI

of UNIVERSITY OF NAIROBI, 0-20100 Nakuru,has been permitted to conduct research in *Nakuru County*

on the topic: *INFLUENCE OF ENVIRONMENTAL MANAGEMENT PRACTICES ON GEOTHERMAL PROJECT PERFORMANCE: A CASE OF THE MENENGAI GEOTHERMAL DRILLING PROJECT*

for the period ending:

13th June,2017

Permit No : NACOSTI/P/16/98711/11873

Date Of Issue : 15th June,2016

Fee Recieved :Ksh 1000

.....

Applicant's Signature

.....

Director General

National Commission for Science, Technology & Innovation