EVALUATION OF THE EFFECTIVENESS OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT IN CONFLICT IDENTIFICATION AND PREVENTION FOR RENEWABLE ENERGY PROJECTS IN KENYA

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DECLARATION AND RECOMMENDATION

Declaration

This thesis is my original work and has not been presented in this university or any other for the award of a degree.

Signature Date 28th June 2023

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Recommendation

This thesis has been submitted with our approval as university supervisors.

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DEDICATION

To God be all the glory and honour for ever and ever amen. This thesis is dedicated to my dear wife Rebecca Ogada Manyi for the unwavering support and encouragement throughout my study period and to our lovely children Terecinta Mocheche Manyi, Mosomi Omenge Manyi and Ashley Nyabisio Manyi for encouraging me to remain focussed especially when my energy was diminishing.

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ABSTRACT

Conflicts that arise before and during implementation of various projects as reported in various countries including Kenya are due to various reasons including; inappropriate application of Environmental and Social Impact Assessment (ESIA) procedures. This study evaluated effectiveness of ESIA in conflict identification and prevention for renewable energy projects. Objectives of the study were to determine how application of ESIA process, quality of ESIA report, resources invested during ESIA and individual/social norms affected conflict identification and prevention. The study used descriptive research design with probability, purposeful and simple random sampling techniques. Research tools used were structured questionnaires, tally sheets and collation sheets. ESIA practitioners were randomly sampled from a list maintained by the National Environment Management Authority (NEMA) excluding those registered but lacked a valid practicing license. Respondents from the ministries of environment and energy and civil society groups were purposefully sampled and the sample disaggregated based on individual experience in renewable energy projects. Data analysis was by Statistical Package for Social Sciences. Cumulative odds ordinal logistic regression analysed ESIA dimensions of procedural, transactive and normative effectiveness while descriptive statistics and Somers' delta test analysed ESIA dimension of substantive effectiveness. Statistical testing for significance was performed at 95% confidence. Results showed 48% of ESIA practitioners, 46% of civil society, 31% by NEMA and 29% by Ministry of Energy respondents stated that public participation was ineffective in substantively contributing to environmental decisions. Quality of 7% of ESIA reports for geothermal energy projects was excellent, 20% good, 53% acceptable while 13% was poor. Quality of 18% of ESIA reports for wind energy projects was good, 55% acceptable and 18% poor. Correlation between public participation and quality of ESIA reports was strong and positive. Significant procedural effectiveness variable attributes were public participation, decision making, project implementation and monitoring. Significant transactive effectiveness variable attributes were time, financial resource, skill, experience and specification of roles. Significant normative effectiveness variable attributes were healthy quality life, institutional policy choices and adjustment of policy on normative goals. To align public participation during ESIA to international best practices, a review of Kenya’s ESIA system in genral and regulations in specific should be done. Continuous, relevant and focused training to all carder of ESIA practitioners should be mandatory. Guidelines on sector specific ESIAexacution timelines should be developed and implemented.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

CEC	Commission of European Communities
CEQ	Council of Environmental Quality
CPP	Consultation and Public Participation
CSR	Corporate Social Responsibility
EA	Environmental Audit
ECA	Economic Commission for Africa
EIA	Environmental Impact Assessment
ELAW	Environmental Law Alliance Worldwide
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FAO	Food and Agriculture Organization of the United Nations
GoK	Government of Kenya
HDI	Human Development Indix
HGNP	Hell's Gate National Park
IAIA	International Association for Impact Assessment
IBM	International Business Machines
IEA	Institute for Environmental Assessment
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
KFS	Kenya Forest Service
KNBS	Kenya National Bureau of Statistics
KWS	Kenya Wildlife Service
LCRP	Lee and Colley Review Package
LM	Leopold Matrix
LTWP	Lake Turkana Wind Power Project
MoE	Ministry of Energy
MS	Microsoft
MW	Mega watts
NCA	Norwegian Church Aid
NEMA	National Environment Management Authority
NEPA	National Environmental Policy Act

NGO	Non-Governmental Organization
OD	Operational Directive
ODA	Overseas Development Administration
SIA	Social Impact Assessment
SPSS	Statistical Package for Social Sciences
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environmental Programme
VIF	Variance Inflation Factor
WCED	World Commission on Environment and Development

CHAPTER ONE
INTRODUCTION

1.1 Background to the study

Five decades have passed since the emergency, gradual rollout and progressive global adoption of Environmental Impact Assessment (EIA) systems now in all countries and jurisdictions (Yang, 2019). EIA which is 'the process of identifying, predicting, evaluating and mitigating the biophysical, social and other relevant effects of development proposals prior to major decisions being taken and commitments made' (International Association for Impact Assessment [IAIA], 2009, p.1), broadly covers assessment of proposed actions that range from plans, policies to projects and includes both biophysical and social components (Dendena & Corsi, 2015).

Increased interest in environmental sustainability and attempts to harmonize environmental developments and environmental management (World Commission on Environment and Development [WCED], 1987) coupled with development of appropriate policies, legislations and guidelines at national and international level to guide environmental developments (Glasson et al., 2012) has contributed to accelerated acceptance and uptake of environmental impact assessments. Environmental legislations were formulated at different times in different parts of the world as a mechanism to address the challenges emanating from development programmes. Chronologically, the USA pioneered in 1969 (O'Riordan & Sewell, 1981), followed in sequence by Australia in 1974 (Wood, 2003), China in 1979 (Moorman & Ge, 2007), European Community in 1985 (Commission of European Communities [CEC], 1985). The United Kingdom enacted a formal legislation on EIA in 1988 (Glasson et al., 2012). In Africa and the Middle East, Israel and Algeria pioneered in enactment and implementation of EIA legislations in 1982 and 1983 respectively (Economic Commission for Africa [ECA], 2005). In East Africa Uganda pioneered in enacting EIA legislation in 1998 while Kenya's EIA legislation was enacted in 2000, and implemented in 2003 (Morara et al., 2011).

EIA has received much emphasis and has been recommended at global level as part and parcel of efforts to strike a balance between development and environmental sustainability (WCED, 1987; Wood, 2014). Since its adoption in various parts of the world, EIA has progressively been adopted as an important tool in environmental management. Principle 17 of the 1992 Rio Declaration on Environment and Development (a set of principles which provide guidance on achieving sustainable development) and Agenda 21 (a global programme of action for achieving sustainable development to which countries are politically committed rather than legally obligated) both recognise the importance of EIA in contributing to sustainable development (United Nations Conference on Environment and Development [UNCED], 1992). Further, Article fourteen of the Convention of Biological Diversity requires that each contracting party introduce appropriate procedures requiring EIA for its proposed projects that are likely to have significant adverse effects on biological diversity (Chandra & Idrisova, 2011). EIA has emerged as a key component and policy tool for environmental management (Kolhoff et al., 2018; Morgan, 2012) to primary address implications of environmental changes brought about by human action (Morgan, 2012). The use and application of environmental impact assessment is increasing and significantly changing (Pope et al., 2013). Overtime application of EIA process has evolved, innovative, more elaborate and comprehensive (Byambaa & De-Vries, 2019). The changing needs of decision makers, the change in decision making process and experience of EIA practitioners is continually shaping the development and application of EIA (Morgan, 2012). Consequently, environmental impact assessment is becoming an established tool for the promotion of sustainable development (Loomis & Dziedzic, 2018).

Adoption and global application of EIA (Benson, 2003; Wood, 2014) has not been without criticism (Jay et al., 2007; Morgan, 2012; Pope et al., 2013) on its theoretical foundation, application and quality (Morgan, 2012; Retief, 2010). The extent to which it is effectively working has been questioned (Dendena & Corsi, 2015; Morgan, 2012) and the weight allocated when analysing social facets has been deemed marginal (Becker, 1997; Taylor et al., 2004; Vanclay, 1999). Its unpartisan role in decision making has been questioned (Cashmore et al., 2004), begging the question whether EIA remains fit for purpose (Retief et al., 2016). The urgency for a critical evaluation of EIA fundamentals remains (Alberts et al., 2019) in the scholarly discourse of what constitutes an effective EIA (Wood & Coppell, 1999). Whirls the effectiveness EIA in terms of the extent to which it works, achieves its intended aims, contribute to relevant environmentally-sound decisions, acceptance and satisfaction of stakeholders (Chanchitpricha & Bond, 2013; Sadler, 1996) has received considerable attention (Lyhne et al., 2015), it has equally been interrogated and criticised in equal measure (Morgan, 2012; Theophilou et al., 2010).

Challenges notwithstanding, application and global implementation of EIA has resulted in growth and development of the practice that has necessitated adjustments and improvements to cater for social facet of project implementation (Burge & Vanclay, 1996). Increased analysis of social impacts during EIA has strongly brought out the relevance of social dimension of a proposed development action (Corsi et al., 2015). Gradual integration and strengthening of social assessment in environmental impact assessment procedures has progressively highlighted the relevancy of social issues in the framework of environmental impact assessments (Dendena & Corsi, 2015) resulting in the emergency of environmental and social impact assessment (ESIA), which is an integrated form of impact assessment (Cloquell-Ballester et al., 2006; Corsi et al., 2015; Dendena & Corsi, 2015; Momtaz & Kabir, 2013; Ortiz et al., 2018). Whereas ESIA is an integrated approach in impact assessment which is increasingly being applied by international agencies, private lending institutions and multilateral donors (Dann & Riegner, 2019; Le, 2016), its thorough discourse within the scientific community is lacking (Dendena & Corsi, 2015), as a handful scientific publications on it have been released (Rosa & Sanchez, 2015).

As an integrated approach in assessing multifaceted impacts of projects, programs and policies (Dendena & Corsi, 2015), environmental and social impact assessment is increasing being accepted as a useful tool for identifying and evaluating effects of a wide range of activities (Ortiz, 2018) including measurement and management of local conflicts (Corsi et al., 2015). Whereas conflicts are underpinned by local impacts of proposed projects resulting from environmental, social and economic concerns (Oppio et al., 2015) environmental and social impact assessment provides pathways to resolving the conflicts (Peek, 2022; Sanggoro et al., 2021). When applied appropriately an integrated approach to impact assessment such as ESIA provides valuable insights that enable environmental conflict analysis with the aim of preventing conflicts during planning and implementation of projects and programs (Delgado & Romero, 2017; Prenzel &Vanclay, 2014).

A multifaceted approach of assessing impacts assessments is argued to be more effective in considering conflict related scenarios brought about by stakeholder uncertainty within its analysis (Delgado & Romero, 2017). Effectiveness is multidimensional (Loomis & Dziedzic, 2018) consequently different conceptual dimensions of the concept of effectiveness exists (Alberts et al., 2019). Impact assessment effectiveness thus encamps four main dimensions namely procedural, transactive, substantive and normative (Alberts et al., 2019; Baker & McLell, 2003; Chanchitpricha & Bond, 2013; Chanchitpricha et al., 2011; Pope et al., 2018; Sadler, 1996). It therefore follows that effectiveness of ESIA tool in conflict identification and prevention depends on how well and appropriate each of the dimensions are applied during impact assessment (Arts et al., 2012; Corsi et al., 2015; Dendena & Corsi, 2015).

Procedural effectiveness measures conformity of impact assessment to established procedures and adherence to principles (Cashmore et al., 2004; Loomis & Dziedzic, 2018;

Van *Doren* et al., 2013). Transactive effectiveness focuses on resources required and utilization during impact assessment, it measures whether outcomes of impact assessment are delivered at the least cost within minimum time (Byambaa & Vries, 2019; Loomis & Dziedzic, 2018). Substantive effectiveness measures to what extent impact assessment achieves its purposes of informing sound decision making and protecting the environment (Byambaa & Vries, 2019; Loomis & Dziedzic, 2018). Normative effectiveness measures achievement of individual and social norms (Baker & Mcleland, 2003), it therefore reflects on quality of impact assessment procedures with the aim of informing policy reform to improve procedural effectiveness (Loomis & Dziedzic, 2018).

Whereas ESIA can be a useful tool in identifying and evaluating effects of a proposed project (Ortiz et al., 2018), including potential conflicts (Corsi et al., 2015; Delgado & Romero, 2017), its effectiveness will depend on how well its microsystems works (Byambaa & Vries, 2019). ESIA microsystem covers specific process elements which individually and collectively contribute to the identification and resolution of conflicts (Glucker et al., 2013). Documented conflicts and public opposition arising from implementation of renewable energy projects include work by Thayer and Hansen (1991), Mariita (2002), Zografos and Martinez-Alier (2009), Swofford and Slattery (2010), Pasqualetti (2011), Temper et al. (2015), Avila-Calero (2017), Avila (2018), Ongoma (2018), Kazimierczuk (2019), Achiba (2019), Kombe and Munguthi (2019).

While acceptance of renewable energy projects in general is high, specific renewable energy projects including wind and geothermal energy projects are opposed (Renkens, 2019; Schilling et al., 2018; Swofford & Slattery, 2010.). Conflicts arise during implementation of renewable energy projects are due to various reasons such as loss of land (Achiba, 2019; Kazimierczuk, 2019; Renkens, 2019; Schilling et al., 2018; Temper et al., 2015), negative environmental and social impacts (Ongoma, 2018; Saidur, 2011; Swofford & Slattery, 2010) and loss of grazing fields (Achiba, 2019; Ongoma, 2018; Renkens, 2019). Other reasons include displacement of families (Renkens, 2019; Kombe & Munguthi, 2019), cultural affiliations (Achiba, 2019), lack of goodwill from local community (Ongoma, 2018, Renkens, 2019), poor application of environmental and social impact assessment procedures (Achiba, 2019) and loss of recreational and aesthetic value (Jaber, 2013).

Impacts such as relocation of families and lack of adequate compensation have contributed to conflicts during development of energy projects in Kenya (Kong'ani et al., 2020). Kenya has one of the highest potentials for wind energy (Kazimierczuk, 2019; Kiplagat et al., 2011) and geothermal energy generation (Kiplagat et al., 2011; Kombe &

Munguthi, 2019) in Africa. However, conflicts arising during implementation of geothermal and wind energy projects have resulted in development setbacks (Kazimierczuk, 2019; Schilling et al., 2018). Kenya has the largest wind farm in Africa with an installed capacity of 310 megawatts (Kazimierczuk, 2019; Schilling et al., 2018) and is a leader in Africa in developing her geothermal energy potential (Kombe & Munguthi, 2019). Nonetheless, the implementation of 60.8 megawatts Kinagop Wind Energy project (Kiplagat et al., 2011; Ongoma, 2018; Wambua, 2017) which had undertaken an ESIA and licenced by the National Environment Management Authority (NEMA) was cancelled in the year 2016 (Eberhard et al., 2016; Wambua, 2017) due to unresolved conflicts between the local community and the developer (Kazimierczuk, 2019; Wambua, 2017). Likewise, blockage of access roads near Sarima and South Horrt leading to Lake Turkana Wind Power project by local youths due to unmet demands including employment and water provision was witnessed during construction of the wind farm (Schilling et al., 2018). These unmet community demands were key conflict driver between the community and Lake Turkana Wind Power Project developers (Ongoma, 2018; Schilling et al., 2018). Development of geothermal energy projects in Kenya has in the past elicited conflicts (Kong'ani et al., 2020, 2021, 2022). Expansion of geothermal energy projects at Ol Karia area in Nakuru County has resulted in conflicts (Hughes & Rogei, 2020) between the project developers and project affected persons (Schade & Obergassel, 2014). Unrest witnessed during the geothermal energy development of Olkaria IV project almost derailed the implementation of the project (Kong'ani et al., 2021, 2022). Implementation of a 90MW Baharini Electra Wind Farm Project in Lamu County (Kazimierczuk, 2019; Tigabu, 2016), which had undertaken an environmental and social impact assessment study (Ongoma, 2018) was delayed due to conflicts between project developers and local community arising from disputes over land for wind power project (Temper et al., 2015).

Whereas Kinagop Wind Energy project (Eberhard et al., 2016; Ongoma, 2018; Wambua, 2017), Baharini Electra Wind Farm (Temper et al., 2015) and Lake Turkana Wind Power Project (Schilling et al., 2018) are documented as some of the wind energy sub-sector renewable energy projects that faced conflicts, the Kipeto wind energy project, and the Ngong wind farm (Ongoma, 2018) are examples of success cases of wind energy projects that have been launched and implemented without conflicts (Kazimierczuk, 2019; Ongoma, 2018). Successful implementation of these wind energy projects is partly attributed to the pro-activeness of the project proponents reaching out to project stakeholders and working with the stakeholders before and during implementation of the projects. For instance, KenGen the project proponent of Gong wind farm has put in place stakeholder coordination committees to address all key issues of concern through discussion with stakeholders (Ongoma, 2018). These stakeholder coordination committees provide a platform for community involvement and ownership of the projects and hence key elements of successful renewable energy projects (Rambo, 2013).

Besides renewable energy sector, conflicts and public opposition concerning proposed projects have been documented in other sectors such as mining (Abuya, 2016; Badera, 2015; Kemp at al., 2011) and water (Petersen-Perlman et al., 2017). Abuya (2016) observes that conflicts in the mining sector revolve around various issues including environmental degradation, human rights abuses, inequitable resource distribution, land ownership, mine-induced poverty and unfair' compensation. In the European Union Countries, one of the key reasons for local community opposition to mining projects is the phenomenon 'not in my backyard' (Badera, 2015). Causes of intense land use disputes between mine owners and surrounding communities is as a result of poor communications and highly preventable environmental accidents (Hilson, 2002). Inequitable distributions of risks, impacts, and benefits arising from mining projects contribute to resource conflicts in the mining sector (Kemp *at al*., 2011). In Peru conflicts in the mining sector are as a result of overall absence of clear, reliable, transparent, and independent information on the nature of the risks associated with mining projects (Anthony & Mark, 2008). Whereas water conflicts are brought about by various factors such as complexities within watersheds, trans-boundary water conflicts are likely to occur when competing interests clash and one stakeholder perceives wrongdoing by another stakeholder in a shared basin (Petersen-Perlman et al., 2017).

1.2 Statement of the Problem

Kenya is endowed with substantial renewable energy resources including geothermal and wind energy resources. The country is scaling up the development and utilization of these renewable energy resources to meet growing energy demand. However, implementation of environmental and social impact assessment procedures mainstreamed in the development of renewable energy resources, if inappropriately applied, has the potential to slow down development and exploitation trajectory of the resources. Whereas proposed renewable energy projects are subjected to environmental and social impact assessment (ESIA) process, in some instances ESIA license for proposed wind energy projects such as that of Kinagop Wind Energy project is cancelled due to conflicts between the developer and local community. The way ESIA tool is applied during impact assessment process directly affects its usefulness in the integrated assessment of multifaceted impacts of a proposed renewable energy project. Further, the way the tool is applied affects overall quality of impact assessment statement which in turn affects accuracy of decision made. Inappropriate application of the tool (procedural effectiveness) contributes to poor potential impact identification resulting in inadequate measures to mitigate potential negative impacts. Time spent to carry out impact assessment, financial resources allocated for the assessment and the training and experience of experts undertaking the assessment affect how the process is applied and its outcome (transactivene effectiveness). Whereas quality of impact statement is vital in arriving at a substantive decision (substantive effectiveness), inappropriate decisions made as a result of a poor-quality impact statement can trigger public opposition and fuel conflicts which in turn erode normative efficacy of environmental and social impact assessment (normative effectiveness), delay or halt project implementation. While procedural effectiveness is conspicuous in impact assessment literature, minimal research has been carried out on substantive, transactive and normative dimensions of ESIA tool effectiveness in identifying and preventing potential conflicts in renewable energy projects.

1.3 Objectives

1.3.1 Broad objective

To enhance the effectiveness of environmental and social impact assessment tool in conflict identification and prevention for sustainable management of renewable energy resources.

1.3.2 Specific Objectives

i. To determine how the application of the ESIA process affect conflict identification and prevention for proposed renewable energy projects.
ii. To ascertain how quality of the ESIA report affect conflict identification and prevention for proposed renewable energy projects.
iii. To find out how the cost of human resource and time invested during ESIA affect conflict identification and prevention for proposed renewable energy projects.
iv. To ascertain how individual and social norms affect conflict identification and prevention during ESIA for a proposed renewable energy projects.

1.4 Research Questions

i. How does the application of the ESIA process affect conflict identification and prevention for proposed renewable energy projects?

ii. How does the quality of ESIA report affect conflict identification and prevention for proposed renewable energy projects?
iii. How does the cost of human resource and time invested during ESIA affect conflict identification and prevention for proposed renewable energy projects?
iv. How do social and individual norms affect conflict identification and prevention during ESIA for proposed renewable energy projects?

1.5 Justification of the study

Kenya is endowed with significant renewable energy resources including geothermal and wind (Ongoma, 2018). The country has demonstrated significant progress in developing its geothermal and wind energy resources (Kabegi, 2019; Kazimierczuk, 2019). The country's geothermal and wind energy installed capacities are 663 MW and 346 MW respectively (International Renewable Energy Agency [IRENA], 2019) against a potential of 10, 000 MW for geothermal (Macharia et al., 2017) and 346 W/m^2 (Kazimierczuk, 2019) for wind. Energy generated from renewable sources not only is reliable, affordable and clean but also vital in mitigating climate change (Longa & Zwaan, 2017; Moomaw et al., 2011). In the development front, energy is a powerful multiplier of all Sustainable Development Goals (Nathwani & Kammen 2019) and hence critical in contributing to achieving Kenya's Vision 2030 (Longa & Zwaan, 2017).

Energy from renewable sources is indigenous and hence critical in contributing to energy independence for local economies by eliminating energy poverty (Ahuja & Tatsutani, 2009, Nathwani & Kammen 2019). It is inexhaustible as its reserves are infinite hence an essential element for a sustainable energy system. Energy from renewable sources is critical in reducing health risks associated with energy use. This is because 2.7 billion people (38% of global population) use conventional biomass for cooking, heating and lighting in their homes which places the users at serious risk to their health due to emissions (Čukić et al., 2021). Therefore, any bottlenecks in energy generation from renewable source will not only slowdown development, but will also negate efforts of addressing climate change, health risks associated with energy use and energy poverty at household level.

Stakeholder conflicts and social unrest associated with exploitation of renewable energy resources in the country impedes smooth generation of energy from renewable resources (Temper et al., 2015). The net result is costly delays in implementation of affected renewable energy resources projects, loss of lives and livelihoods and profound developmental setbacks (Kazimierczuk, 2019). This study contributes to scientific knowledge in addressing this profound challenge. The study provides insights on how the ESIA tool can be applied to identify and prevent potential conflicts likely to arise when exploiting renewable energy resources. The findings of this study could be used by ESIA practitioners to strengthen their practice in general and specifically in identifying and preventing potential conflicts which not only delay implementation of renewable energy projects but also affect availability of reliable, affordable and clean energy to Kenyans at household level. The findings will also be useful to the Ministry of Energy as it will provide variable insights on what the Ministry should strengthen when carrying out ESIA for their renewable energy projects.

1.6 Scope and limitation of the study

This study analysed the procedural, transactive, substantive and normative efficacy of the ESIA tool in identifying and preventing potential conflicts. Whereas there are six renewable energy resources in the country (hydro, geothermal, wind, solar, tidal and wave), the study only focused on two of the resources whose development is categorised as high risk in legal notice number 31 of 2019, and have been documented to elicit stakeholder conflicts during exploitation. The multidimensional effectiveness of the ESIA tool was evaluated based on feedback from impact assessment practitioners, lead agencies, civil society groups and quality of environmental and social impact assessment reports for geothermal and wind energy projects.

1.7 Definition of terms

Consultation refers to a two-way stakeholder engagement process between project developer and project affected and interested persons during the phases of project planning, implementation and monitoring (Glucker et al., 2013).

Cost of human resource refers to the financial resources required and utilized by the practitioners undertaking ESIA of a proposed project (Byambaa & Vries, 2019).

Environmental and social Impact Assessment effectiveness is the extent to which an impact assessment process works, achieves its intended aims; contribute to relevant environmentally-sound decisions, acceptance and satisfaction of stakeholders (Chanchitpricha & Bond, 2013; Sadler, 1996)

Environmental and social impact assessment refers to the integrated assessment of multifaceted impacts of projects, programmes and policy initiatives (Dendena & Corsi, 2015).

Geothermal energy refers to heat beneath the earth's surface; it originates from the outward flow of heat from the earth's core and decay of radioactive elements in the earth's crust (Glassley, 2014).

Individual norms refers to an individual's conviction to act in a certain way is right or wrong during ESIA for a proposed project (Bamberg et al., 2007).

Normative Effectiveness refers to the achievement of normative goals (Baker & McLelland, 2003). Normative goals are observed based on perceptions of stakeholders involved in the impact assessment process or in the implementation of the impact assessment tool (Chanchitpricha et al., 2011).

Procedural effectiveness refers to the conformity of impact assessment process to established provisions and principles governing the process (Sadler, 1996). It focuses on compliance to specific procedural steps. It includes how the procedures or policies of impact assessment process are implemented (Baker & McLelland, 2003).

Public participation refers to the involvement of individuals and groups that are positively or negatively affected by a proposed project (André et al., 2006)

Quality of ESIA report refers to the standard of data and information presented in an environmental impact assessment statement measured against environmental impact assessment national regulations and guidelines (Lee et al., 1999).

Social norms refer to practices displayed during EISA process that are widely accepted within a community of a proposed project (Bamberg et al., 2007).

Substantive effectiveness refers to whether outcome of impact assessment process support well informed decision-making and results in environmental protection (Sadler, 1996): This refers to finding out what normative goals are realised from outcome of impact assessment (Baker & McLelland, 2003).

Time invested refers to the period required and utilised by the practitioners undertaking the ESIA of a proposed project (Loomis & Dziedzic, 2018)

Transactive effectiveness refers to whether impact assessment process delivers its outcomes effectively and efficiently at the least cost in the minimum time possible (Sadler, 1996).

CHAPTER TWO
LITERATURE REVIEW

2.1 The Concept of Environmental Impact Assessment

Environmental Impact Assessment (EIA) is a tool used to assess potential impacts of any proposed project before the project is implemented (Shakil & Anaya, 2015). It considers environmental consequences of proposed development before implementation decisions are arrived (Wood, 2014; Young, 2019). First ever formal requirement and procedure for EIA was in the National Environmental Policy Act (NEPA), 1970 of the United States (Betey & Godfred, 2013; Bice & Fischer, 2020; Bond & Dusík, 2019; Kahangirwe & Vanclay, 2021; Young 2019). EIA is anticipatory, participatory and systematic in nature and relies on multidisciplinary input (Glasson et al., 1994). Methodologically, EIA is a multi-disciplinary task; it applies the tools, knowledge and expertise of a range of natural and social sciences (Glasson et al., 1994). EIA is a process of information gathering and analysis that are undertaken in support of decision making, embodied within legal and institutional frameworks, based upon the concepts and methods of interdisciplinary science, and open to public involvement and input by those who have a stake either by being directly and indirectly affected or interested in proposed developments (Sadler, 1999).

EIA is applied in a broad range of decision-making contexts, including international development and trade policy (Cashmore et al., 2009; Kirkpatrick & George, 2006), as well as disaster preparedness and post disaster recovery and reconstruction (Srinivas & Nakagawa, 2008). EIA is considered an essential tool for adequate consideration of environmental and broader sustainability concerns in a proposed development action (Pope et al., 2013). It has become a prerequisite to access to financing from World Bank (Mohamad et al., 2022), private sector financial institutions and bilateral funding for major projects (Morgan, 2012).

Whilst EIA is embedded in both national and international laws, in all countries and jurisdictions of the world (Kolhoff et al., 2018; Yang, 2019), there are significant gaps in its application especially in developing countries (Hirpe & Seo, 2021; Kahangirwe & Vanclay, 2021). While EIA is recognised in a number of international conventions, treaties, protocols and agreements (Morgan, 2012; Young, 2019), its regulatory frameworks in low- and middle-income countries is weak (Khosravi et al., 2019a; Kolhoff et al., 2018). Indeed, EIA legal requirements and general procedures have evolved significantly (Kahangirwe & Vanclay, 2021) however, upgrade of EIA process and practice to tackle environmental decline is lacking more so in low- and medium-income countries (Kahangirwe & Vanclay, 2021;

Rebelo & Guerreiro, 2017). Consequently, EIA procedures have been criticised as being less flexible (Rebelo & Guerreiro, 2017), less effective (Hirpe & Seo, 2021), less open to greater public and stakeholder involvement (Glucker et al., 2013; Hasan et al., 2018; Kanu et al., 2018; Rebelo & Guerreiro, 2017) and prawn to stakeholder manipulation (Enríquez-de-Salamanca, 2018). EIA process and reports as currently practised have several constraints and limitations that need to be addressed (Gulis et al., 2022).

Importance of EIA tool in ensuring environmental impacts of a proposed project are acknowledged in decision-making process is undisputable (Ijabadeniyi & Vanclay 2020; Joseph et al., 2019; Larsen et al., 2018; Loomis & Dziedzic, 2018) however, its ability to ensure better development outcomes is debatable (Ijabadeniyi & Vanclay 2020; Kahangirwe & Vanclay, 2021; Khosravi et al,. 2019) as it has been criticised for having limited influence on decision making (Chanchitpricha & Bond, 2019). EIA ability to deliver environmentally and socially acceptable projects is widely acknowledged in impact assessment discourse (Arts et al., 2012; Glasson & Therivel 2019; Momtaz & Kabir, 2013) however, its effectiveness has been a subject of debate (Chanchitpricha & Bond 2013; Chanchitpricha & Bond, 2019; Hanna et al., 2014; Kahangirwe & Vanclay, 2021; Loomis & Dziedzic 2018).

The EIA concept supports sustainable development through the evaluation of impacts arising from a proposed development that are likely to significantly affect the natural and manmade environment (Glasson et al., 2012). EIA tool not only promote sustainable development (Betey & Godfred, 2013; Joseph et al., 2019; Loomis & Dziedzic, 2018; Rebelo & Guerreiro, 2017), but also a vital policy tool for environmental management (Betey & Godfred, 2013; Kolhoff et al., 2018; Young, 2019). However, effective mainstreaming of environmental assessment procedures when operationalizing Sustainable Development Goals (SDGs) in national and local developmental processes remains a primary concern (Gulis et al., 2022) as in some instances EIAs have proven to be insufficient and ineffective in management of environmental risks (Messias et al., 2022). Whereas EIA is accepted as a tool for sustainable development (Betey & Godfred, 2013; Joseph et al., 2019; Loomis & Dziedzic, 2018; Rebelo & Guerreiro, 2016) its execution timing has been questioned (Harvey, 1994) as it is seen as a mere verification of environmental risks contained in projects whose implementation decision have already been taken (Messias et al., 2022). Studies on EIA contribution to sustainable development are few especially in low- and medium-income countries (Betey & Godfred, 2013). Whereas EIA is acknowledged by high-, middle- and low-income countries (Jha-Thakur & Fischer, 2016; Kolhoff et al., 2018), its performance is weak (Morgan, 2012) procedurally and substantively (Kolhoff et al., 2016) in most low- and medium-income countries (Kolhoff et al., 2016; Kolhoff et al., 2018; Loomis & Dziedzic, 2018).

2.1.1 Principles and objective of EIA

The principles of EIA seek to ensure accountability of environmental concerns in development activities, promote public participation, recognise traditionally used social and cultural aspects of environmental and natural resources management while incorporating international cooperation in the use and wise management of shared resources with emphasis on precaution and polluter pay principle (Glasson et al., 2012). Principles that guide environmental impact assessment practice and application include; EIA is; a planning tool, environmental centred, proponent is responsible (polluter pay principle), EIA is a rational scientific process, EIA should promote sustainable development, it should embrace natural justice, accountability, integrity, and credibility (Morrison-Saunders, 2011). The principle of EIA as a planning tool can be realised through consideration of alternatives. Consideration of alternatives allows selection of a development option that offers the greatest environmental protection opportunities. Whereas consideration of alternatives is important in EIA process (Glasson et al., 1999) in realizing the principle of EIA as a planning tool, scientific research on alternative consideration is limited (Jiricka-Pürrer et al., 2018).

Whereas alternatives consideration is a core element of EIA (Council on Environmental Quality’s Interagency Work Group, 2007; Jiricka-Pürrer et al., 2018; Kamijo & Huang, 2016) its development and consideration during EIA process is poor and weak (Benson, 2003; Steinemann, 2001) as most alternatives considered and assessed during EIA are of low environmental relevance (Jiricka-Pürrer et al., 2018). Timely identification and evaluation of alternatives in policies, plans and programmes can evade potential hitches at the project level (Benson, 2003). Determination and analysis of alternatives is important if impact assessment process has to remain relevant, creative and problem solving (Kamijo & Huang, 2016). Since alternatives provide a framework for successive decision-making by a competent authority (Glasson et al., 1999), thorough consideration should begin early in project planning phase before decisions are made on scale, type of development and project location (Glasson et al., 2012). Lack of adequate scientific data combined with inadequate expertise experience are some of the difficulties and challenges phased when considering and analysing alternatives (Glasson et al., 2012; Kamijo & Huang, 2016).

Environmental significance screening tests underpins the realization of the principle of EIA being environmental centred (Morrison-Saunders, 2011). Application of an environmental centred approach during EIA is realised when environmental considerations are explicitly addressed and incorporated into the development decision making process (International Association for Impact Assessment [IAIA] & Institute for Environmental Assessment [IEA], 1999). Polluter pay principle requires that the cost of environmental pollution is shouldered by the polluter who will bear the cost of containment, avoidance, or abatement (Bates, 1997). The principal underpinning EIA as a rational scientific process (IAIA & IEA, 1999) is based on the fact that EIA process is supposed to be rigorous that apply the best practicable science, employing methodologies and techniques that are appropriate to address the problems being investigated (Morrison-Saunders, 2011). Sustainability principle requires EIA to support and promoting equitable environmental protection now and for long term, (Betey & Godfred, 2013; Joseph et al., 2019; Loomis & Dziedzic, 2018; Rebelo & Guerreiro, 2016). The overall objective of EIA is to ensure that environmental concerns are integrated in all development activities in order to promote sustainable development (IAIA & IEA, 1999). Environmental and social sustainability is realised when impact assessment process results in more ecologically, socio-culturally and economically sustainable and equitable environment (Vanclay, 2003).

The principle of natural justice requires that that person likely to be affected by a proposed development action to be consulted first before a decision is taken (André et al., 2006). Stakeholder participation in EIA process is crucial as it provide adequate opportunities to stakeholders to raise their concerns, increase awareness, capture local and traditional knowledge, enhances transparency, builds trust, informs decision making and legitimises public decisions (Innes & Booher, 2004; O'Faircheallaigh, 2010; Stewart & Sinclair, 2007). Community involvement and participation is part of the compulsory stakeholder and public participation process (Ortolano & Shepherd, 1995) when undertaking EIA. The participation of all categories of stakeholders during impact assessment process should be rigorous, be sustained throughout and in all stages of the process including decision making stage (André et al., 2006). Civil society groups which include an array of Non-Governmental Organisations (NGOs) for example play a vital role in promoting public participation in environmental governance (Wang et al., 2020). NGOs contribute to improved public participation during impact assessment through advocacy, capacity building, mobilization and information sharing with other stakeholders especially local communities and project affected persons (Wang et al., 2020). Public participation during scoping ensures inclusion of potential impacts that are of greater concern to all stakeholders (Mora-Barrantes et al., 2018). Stakeholder consultation and participation adds value to developments and minimizes potential delays brought about by misunderstandings and opposition from stakeholders such as local communities or civil society groups (Barasa, 2015). Well planned and executed comprehensive and transparent public participation during impact assessment contributes to a more comprehensive and balanced Impact Statement that informs decisions (Kamijo & Huang, 2016). Elaborate stakeholder involvement during Impact Assessment process can contribute in improvement of quality of the impact statement (Peterson, 2010). Stakeholder issues and concerns including potential conflicts from a proposed development action are more likely to be identified during public participation process (Corsi et al., 2015; Dendena & Corsi, 2015). Difficulties and challenges phased when promoting public participation during impact assessment process include the way it is designed and implemented (André et al., 2006) as it is not initiated early nor is it sustained throughout the EIA process.

Transparent and open process with third party appeal rights during EIA process ensures that the principle of accountability is observed during EIA process (André et al., 2006; Hartley & Wood, 2005; IAIA & IEA, 1999; Morrison-Saunders, 2011; Rowe & Frewer, 2000; Slocum & Thomas-Slayter, 1995). This principle is designed to ensure EIA has clear, easily understood requirements for EIA content; there is public access to information; identification of factors that are to be taken into account in decision making; and acknowledge limitations and difficulties encountered (André et al., 2006). The principle of integrity during EIA is supported by a decision made by an unbiased or disinterested decision maker and the right to have that decision based on logically probative evidence' (Bates, 1997). An EIA process that is carried out with professionalism, rigor, fairness, objectivity, impartiality, balance and subject to independent checks and verification is said to have observed required integrity during the process and hence outcome of the process is considered credible (André et al., 2006; Bates, 1997; Morrison-Saunders, 2011).

2.1.2 Key elements in the EIA process

The environmental impact assessment process comprises of various interactive steps such as screening, scoping, consideration of alternatives, action design, preparation of the EIA report, reviewing or evaluating the report, decision making, and post decision activities such as monitoring and auditing (Glasson et al., 1994; Wood, 1995). The EIA process, while not uniform from country to country, generally consists of a set of procedural steps culminating in a written impact assessment report that will inform the decision-maker whether to approve or reject a proposed project (Environmental Law Alliance Worldwide [ELAW], 2010). Key elements in the EIA process are screening, scoping, impact analysis, mitigation, reporting, review, decision-making, follow up and public involvement (United Nations Environmental Programme [UNEP], 2002). The Kenya environmental impact assessment guidelines and administrative procedures state that environmental impact assessment process comprise of screening activities, scooping, environmental impact assessment study, report writing, consultation and public participation, submission and review of environmental impact assessment study report and decision making (Government of Kenya [GoK], 2002). ELAW (2010) on the other hand outlines stages of the EIA process as; identifying and defining the project or activity, screening, scooping, preparing terms of reference, preparing draft EIA report, public participation, preparing final EIA report, decision, administrative or judicial review, project implementation and monitoring. Typically, the EIA process begins with screening to ensure time and resources are directed at the proposals that matter environmentally and ends with some form of follow-up on the implementation of the decisions and actions taken as a result of an EIA report.

2. 1.3 Legislative framework that underpins EIA in Kenya

Requirement of Environmental Impact Assessment (EIA) for proposed development projects was legislated in Kenya in 1999 (Mwenda et al., 2012). Overtime, refinement of the EIA legislations and practice has resulted in the mainstreaming of social considerations in the assessment, effectively transforming EIA to ESIA highlighting the link between environmental and social impacts (Measham & Schandl, 2013). Legislation of national standards on air quality (GoK, 2014), noise and vibration (GoK, 2009), waste management (GoK, 2006a) and water quality (GoK, 2006b) have not only served to abate environmental pollution but are a vital social safeguard and constitutional right to a clean and health environment (GoK, 2010; Mwenda & Kibutu, 2012). Thus, over the years ESIA practice in the country has progressed as the procedures, standards and practice has been refined (Barasa, 2016b). These legislations combined with the legislation on conservation of biological diversity and resources (GoK, 2006c) underpin the need for comprehensive consideration of all impacts through in-depth understanding of all the biophysical and social changes arising from proposed project (Barasa, 2016b; Muse, 2016).

Prior to the establishment of legislations specific to EIA in Kenya, the assessment of the impacts of development projects in the country was based on sectorial laws and policies (Angwenyi, 2004; Kameri-Mbote, 2000). Impact evaluation also borrowed from appropriate international guidelines and procedures (Horberry, 1985). The Environmental Management and Coordination Act (EMCA) number 8 of 1999 amended in 2015 (GoK, 2015) and its first subsidiary legislation, Environmental Impact Assessment and Audit Regulations, 2003 (GoK, 2003) formally defined EIA in the Kenya context and established institutions for the EIA process. Constitutional archoring of environmental matters in Kenya is captured in articles 42, 60 and 69 of the Constitution of Kenya 2010. (GoK, 2010; Mwenda & Kibutu, 2012). The right to a clean and healthy environment is enshrined in Article 42 while principles of land management a key component of the environment are spelled out in article 60 (GoK, 2010). Requirements for environmental assessments, monitoring and audit are underpinned under article 69 which mandates the state to "establish systems of environmental impact assessment, environmental audit and environmental monitoring" (GoK, 2010, p. 35). Environmental Management and Coordination Act No. 8 of 1999 which was revised in 2015 "provide for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto" (GoK, 2015, p. 9). Section 58 of Environmental Management and Coordination Act No. 8 of 1999 requires that "EIA to be conducted for any project specified in the second schedule of the Act" (GoK, 2015, P. 39). This is further emphasised in regulation 2 of the Environmental Impact Assessment and Audit Regulations, 2003:

> No licensing authority under any law in force in Kenya shall issue a licence for any project for which an environmental impact assessment is required under the Act unless the applicant produces to the licensing authority a licence of environmental impact assessment issued by the Authority under these Regulations (GoK, 2003, P.7).

In line with the provisions of section 58 of Environmental Management and Coordination Act No. 8 of 1999, various sector specific legislations have embedded EIA as a prerequisite to licensing of projects in their respectful sectors. Section 98 (1) (b) of the Energy Act, 2019 requires that:

> When granting or rejecting an application of a license or permit take into consideration the need to protect the environment and to conserve the natural resources in accordance with the environmental, health, and maritime laws and international maritime treaties ratified by Kenya and other guidelines developed by the Authority (GoK, 2019a). The Mining Act 2016 emphasises the need for EIA for mining projects and states in part a mineral right shall not be granted to a person under this Act unless the person has obtained an environmental impact assessment licence, social heritage assessment and the environmental management plan has been approved (GoK, 2016a, pp. 78-79).

The requirement for EIA prior to obtaining concert to quarry in a forest is provided for in section 46 (1) (c) of the Forest Conservation and Management Act 2016 which requires ‘‘an independent Environmental Impact Assessment or Audit be carried out’’ (GoK, 2016b, p. 27). Section 75 (1), (2) and (3) of the Forest Conservation and Management Act 2016 stress the requirement to fulfil the provisions of the Environmental Management and Coordination Act, No. 8 of 1999 and states that:

> (1) Where a provision of this Act requires a person to conserve or protect the environment, the relevant provisions of the Environmental Management and Co-ordination Act, 1999, shall also apply with respect to the manner in which the conservation or protection shall proceed. (2) No user rights or other licence or permit granted under this Act shall exempt a person from complying with the relevant provisions of the Environmental Management and Co-ordination Act, 1999, or any other written law concerning the conservation and protection of the environment. (3) A user or other related right shall not be granted under this Act where the requirement for a strategic environmental, cultural, economic and social impact assessment licence under the Environmental Management and Co-ordination Act, 1999, has not been complied with GoK, 2016b, pp. 40-41).

Requirement of EIA is provided for in the Physical and Land Use Planning Act number 13 of 2019 when applying for development permission for a development activity likely to have injurious impact on the environment (GoK 2019b). Section 40 (4) of the Water Act, 2016 provides for EIA as a prerequisite for water permit application, it states in part ‘‘an application for a permit shall be the subject of public consultation and, where applicable, of environmental impact assessment in accordance with the requirements of the Environmental Management and Co-ordination Act, 1999 (No. 8 of 1999)’’ (GoK, 2016c. p. 25). Whereas the Environmental Management and Coordination Act, (EMCA) 1999 (Amended) 2015 and the Environmental (Impact Assessment and Audit) Regulation, 2003 provides for public participation during EIA process in Kenya (Mwenda & Kibutu, 2012), these legislations fall short of defining the threshold required for public participation during EIA process to be considered imputable, credible and acceptable (Barczewski, 2013; Gebreyesus et al., 2017; Kakonge, 1996; Morara et al., 2011; Okoth-Yogo, 2015; Walker et al., 2014)

2.2 The Concept of Environmental and Social Impact Assessment

Environmental and social impact assessment (ESIA) is an integrated assessment of multifaceted impacts of projects (Corsi et al., 2015; Dendena & Corsi, 2015). ESIA approach which is based on constructivism, participation and environmental justice (Aledo & Domínguez-Gómez, 2017) is a useful tool for identification and evaluation of effects of wide range of projects (Ortiz et al., 2018). ESIA thus mainstreams social consideration into environmental impact assessment process by analysing, monitoring and managing the social consequences of development (Barrow, 2010; Vanclay, 2003). Whilst ESIA is strategic in promoting sustainability while protecting people and resources (Mohamad at el., 2022), it has been criticized that is can be less detailed in the analysis of either or both environmental and social facets (Dendena & Corsi, 2015). ESIA is an important tool as it enables prioritization of potential impacts through support of further assessment and prediction of appropriate mitigation measures (Ortiz et al., 2018). ESIA is thus one of the environmental and social management tools that supplement other policy instruments (Kahangirwe & Vanclay, 2021) as it takes account of existing state of environment and quality of life (Nenković-Riznić, et al., 2016). While ESIA plays a vital role in environmental and social acceptability of projects (Mohamad et al., 2022) scholarly discourse of its effectiveness remains (Kahangirwe & Vanclay, 2021). Whereas evaluation of ESIA effectiveness is argued by some authors to be premature (Dendena & Corsi, 2015), it is largely underpinned by inadequate legal and administrative framework (Hirpe & Seo, 2021).

Although ESIA is an established international requirement (Kahangirwe & Vanclay, 2021), its practice in developing countries is driven by funding requirements by multilateral financial institutions (Dendena & Corsi, 2015; Kahangirwe & Vanclay, 2021), whirls application of its procedure vary (Hirpe & Seo, 2021). ESIA has been and remains a pre-requisite for infrastructure development projects (Chanthy & Grünbühel, 2015). Whereas ESIA is widely applied by multilateral donor agencies (Mohamad et al., 2022), it is argued by some scholars to be missing some scientific foundation (Dendena & Corsi, 2015). Only few scientific publications on ESIA have been released (Rosa & Sanchez, 2015) as the theoretical foundation, opportunities and limits of ESIA have not been extensively analysed (Dendena & Corsi, 2015). While ESIA procedures are similar around the world, there is a significant variation on the quality of process application (Suwansteep et al., 2016). Generally, there is a lack of information regarding specific requirements, positioning and role of ESIA in project implementation (Kahangirwe & Vanclay, 2021). ESIA faces challenges of weak enforcement and lack of regular monitoring and evaluation (Hirpe & Seo, 2021). This has contributed to the poor practice of implementations of projects before conclusion of ESIA process, approval and licensing (Kahangirwe & Vanclay, 2021).

Although ESIA supports new tendencies in spatial and environmental planning (Nenković-Riznić et al., 2016), its poor implementation is argued to be as a result of low-level capacity of ESIA practitioners, enforcement staff and ineffective procedures (Hirpe & Seo, 2021). Inadequate ESIA regulations which do not cover all issues relevant to ESIA contribute to its poor implementation especially in the low- and middle-income countries (Kahangirwe & Vanclay, 2021). This notwithstanding, ESIA is important in preventing project social conflicts (Mohamad et al., 2022) through its participatory techniques, distillation of large amount of complex information and facilitation of decision making (Ortiz et al., 2018).

2.2.1 Stakeholder consultation and public participation during ESIA

Requirement of public participation during environmental impact assessment process is embedded in most environmental impact assessment systems worldwide (Glucker et al., 2013; Marzuki, 2009; Morara et al., 2011; Morgan, 2012; Mwenda et al., 2012; Nadeem & Fischer, 2011; Rebelo & Guerreiro, 2017; Ruffeis et al., 2010). Whilst many definitions of public participation abound (Marzuki, 2009; Slocum & Thomas-Slayter, 1995), a scholarly discourse on the subject accentuate the rudiments of public participation as; public involvement, transparency, information sharing, consultative process, inclusiveness, and influencing outcome of decisions (Hartley & Wood, 2005; Rowe & Frewer, 2000; Slocum & Thomas-Slayter, 1995). Public participation is thus defined as ‘‘the involvement of individuals and groups that are positively or negatively affected by a proposed intervention (e.g., a project, a program, a plan, a policy) subject to a decision-making process or are interested in it’’ (André et al., 2006, p.2). Public participation requirement during EIA process is underpinned in an array of international legal instruments such as Principle 17 of the 1992 Rio Declaration on Environment and Development, the United Nation Conference on Environment and Development, the Aarhus Convention, the Convention on Environmental Impact Assessment in a Trans-boundary Context, North American Agreement on Environmental Cooperation, and Agenda 21 (Kolhoff et al., 2018; Morgan, 2012; Richardson & Razzaque, 2006). In Kenya, public participation during EIA process is a constitutional requirement (Faure & du Plessis, 2011; Mwenda & Kibutu, 2012). The Environmental Management and Coordination Act, 1999 (Amended) 2015 which gives effects to article 69 of the Kenya Constitution 2010, makes public participation during EIA a requirement (Kameri-Mbote, 2000; Kibutu & Mwenda, 2010; Mwenda & Kibutu, 2012; Okello et al., 2009, 2010). Public participation during EIA process is vital because it informs decision making, reduces conflicts, enhances transparency and accountability, builds trust, capture local and traditional knowledge, provide adequate opportunities to stakeholders to raise their concerns, educate stakeholders, increase awareness, build trust and legitimises public decisions (Innes & Booher, 2004; O'Faircheallaigh, 2010; Stewart & Sinclair, 2007). Whereas public participation in EIA process is viewed as a means of nurturing a new ethos of environmental responsibility (Engel, 1998) for sustainable development (Chi et al., 2013), scholarly discourse continues on how it should be conducted (Hartley & Wood, 2005). Notwithstanding its importance (Innes & Booher, 2004; Stewart & Sinclair, 2007) its design and implementation remain contentious (Hartley & Wood, 2005; O'Faircheallaigh, 2010; Stewart & Sinclair, 2007).

Stakeholder participation in ESIA process is crucial as it provide adequate opportunities to stakeholders to raise their concerns, increase awareness, capture local and traditional knowledge, enhances transparency, builds trust, informs decision making and legitimises public decisions (Innes & Booher, 2004; O'Faircheallaigh, 2010; Stewart & Sinclair, 2007). Involvement of the community during ESIA process is an important step in ESIA process. Community involvement and participation is part of the compulsory stakeholder and public participation process (Ortolano, 1995) when undertaking ESIA. The participation of all categories of stakeholders during impact assessment process should be rigorous, be sustained throughout and in all stages of the process including decision making stage (André et al., 2006). Civil society groups which include an array of Non-Governmental Organisations (NGOs) for example play a vital role in promoting public participation in environmental governance (Wang et al., 2020). NGOs contribute to improved public participation during impact assessment through advocacy, capacity building, mobilization and information sharing with other stakeholders especially local communities and project affected persons (Wang et al., 2020). Public participation during scoping ensures inclusion of potential impacts that are of greater concern to all stakeholders (Mora-Barrantes et al., 2018). Stakeholder consultation and participation adds value to developments and minimizes potential delays brought about by misunderstandings and opposition from stakeholders such as local communities or civil society groups (Barasa, 2015). Well planned and executed comprehensive and transparent public participation during impact assessment contributes to a more comprehensive and balanced Impact Statement that informs decisions (Kamijo & Huang, 2016). Elaborate stakeholder involvement during Impact Assessment process can contribute in improvement of quality of environmental and social impact assessment reports (Peterson, 2010). Stakeholder issues and concerns including potential conflicts from a proposed development action are more likely to be identified during public participation process (Corsi et al., 2015; Dendena & Corsi, 2015). Difficulties and challenges phased when promoting public participation during impact assessment process include the way it is designed and implemented (André et al., 2006) as it is not initiated early nor sustained throughout the ESIA process (Glucker et al., 2013; Nadeem & Fischer, 2011; Yao et al., 2020). Substantive contribution of public participation during ESIA process in environmental decision making is influenced by and depended on local information and knowledge, incorporating experimental and value-based knowledge and testing the robustness of information from other sources (Abaza, et al., 2004; Morrison-Saunders & Early, 2008; O'Faircheallaigh, 2010). Public participation is part of EIA process, poor public participation or lack of it amounts to unjust EIA procedures (Simpson & Basta, 2018).

2.3 Environmental conflicts and their impacts

Implementation of development projects especially those that results in negative environmental impacts have the potential to trigger conflicts and social disputes (Schilling et al., 2018; Yu & Leung, 2018). Economic and social interests in projects contribute to conflicts (Chan & Oppong, 2017; Sanggoro et al., 2021), just as interests of project affected communities (Sanggoro et al., 2022). Whereas conflicts in projects are contributed by various factors, characteristics of a project are one of the key factors that contribute to conflicts in projects (Min et al., 2018; Schilling et al., 2018). Conflicts are interaction between interdependent people who perceive incompatible goals and interference from each other with the aim of achieving individual goals (Folger et al., 2017). It is a perceived divergence of interests (Chan & Oppong, 2017) or belief that the various stakeholders' current aspirations cannot be achieved simultaneously (Persson, 2006; Pruitt *et. al.*, 2004). Stakeholder pursuant of social, environment and economic aspects of sustainable development (Wang et al., 2018) is argued to be major contributor to conflicts during implementation of a proposed project (Chan & Oppong, 2017; Silvius & Schipper, 2019; Xiahou et al., 2018; Zhuang, et al., 2017).

Local community where a project is to be domiciled always have interests in that project which affect implementation and performance of such a project (Archer, 2015; Wambua, 2017). Conflicts emerge when stakeholders have irreconcilable differences or incompatible interests, values, power, perceptions and goals (Castro & Nielson, 2003; Yasmi et al., 2006; Wambua, 2017). In a conflict situation each party attempts to destroy, injure, thwart, influence or control the behaviour of another party (Sidaway, 1996). Conflicts are thus context-specific, multidimensional and multi-causal (Adegbonmire, 2015). Conflicts manifest in diverse ways, they can be interpersonal, intergroup, inter-organizational and international levels (Wall & Callister, 1995). Conflicts can be nonviolent or violent but either can be damaging, results in withholding or cancellation of funding to a project or result in failed development (Barrow, 2010). Conflicts may disrupt economic activity, disrupt social activity, harm social relations and lead to property damage (Prenzel & Vanclay, 2014; Sanggoro et al., 2021, 2022; Schilling et al., 2018; Wambua, 2017). On the flipside, conflicts can prompt change and progress (Prenzel & Vanclay, 2014).

An environmental conflict can manifest as political, social, economic, ethnic, religious, territorial strife or discontent over resources, or national interests (Sanggoro et al., 2021, 2022). Causes of such conflicts include unwillingness of State and governments to respond to the economic, social and political needs of those affected by the exploration of natural resources, poor administration and distribution of proceeds from natural resources (Lujala et al., 2005) and inadequate stakeholder participation in natural resource management policies, programmes and projects (Matiru, 2000). Biodiversity conflicts are conflicts between people and wildlife or other aspects of biodiversity including conservation of protected areas (Okech, 2010; White et al., 2009), air quality conflicts are conflicts between people and industry investors who emit noxious pollutants from their industries thus denying citizens the right to live in a healthy environment (Jaggernath, 2011). The importance of land in conflicts relates to people's ability to make a living or make a profit, land scarcity or ambiguous property rights which contribute to violent conflict (Bob, 2011), when land contains valuable mineral resources, conflicts can arise between local communities and those who seek control over land for resource extraction if the local community is not adequately consulted and fully involved in the exploitation of the resources (Kok et al., 2009). Water conflicts can be as a result of increased demand for water resulting in intense competition for the finite water resource, (Gleditsch et al., 2006; Onuoha, 2008). Most conflicts are likely to emerge from a community or when the public feel deprived access to a resource or development creates conditions that have socio-economic, cultural and environmental implications and likely to impact on their quality of life to a large extent (Hellström, 2001; Matiru, 2000; Schilling et al., 2018; Wambua, 2017).

2.3.1 ESIA as a tool for conflict identification and prevention

When appropriately applied, ESIA is an important tool in aiding potential conflict identification and prevention (Corsi et al., 2015; Dendena & Corsi, 2015). Various studies have analysed the importance of ESIA in conflict identification and prevention including Barrow (2010), Arevalo et al. (2014), Prenzel and Vanclay (2014), Dendena and Corsi (2015), Corsi et al. (2015). The analyses are from different perspectives including social impact assessment (Prenzel & Vanclay, 2014), strategic impact assessment (Barrow, 2010) and environmental impact assessment (Arevalo et al., 2014; Morales et al., 2007). According to Prenzel and Vanclay (2014), social impact assessment is capable of preventing conflicts by evaluating and managing negative social impacts thus decreasing the conflict potential of a given project. Vanclay (2003) argues that social impact assessment enables one to understand the circumstances, and analyses the different positions and perceptions of stakeholders to promote equity and avoid conflicts.

Morales et al. (2007) observes that many environmental conflicts can be solved by means of EIA. Arevalo et al. (2014) argues that EIA is valuable tool in conflict mediation as it helps to analyse the conflict and improve the mutual understanding of the parties involved in the conflict. Prenzel and Vanclay (2014) emphasis that the methods of data collection employed in strategic impact assessment coupled with prediction of likely impacts and formulation of mitigation measures illustrates the potential of the assessment to prevent conflict. Vanclay (2002) notes that undertaking a social assessment from the perspective of the impacted stakeholders enables the assessor gain insights to potential conflict issues; the assessor's ability to address the mitigation of negative impacts allows stakeholders to solve issues prior to project implementation and hence avert potential conflicts. Through its ability of identifying underlying issues, strategic impact assessment becomes a valuable tool in conflict identification (Manring et al., 1990) farther strategic impact assessment also informs conflict management directly bay evaluating the social impacts of the conflict management strategy to be implemented (Manring et al., 1990).

2.3.2 Successifull project implementation withouth conflicts

Whereas various factors contribute to successiful planning and implementation of renewable energy projects, stakeholder co-operartion and public acceptance and inclusion are important (Ikejemba et al., 2017). While innovative solutions to social challenges faciling renewable energy projects is critical in successiful project implementation, energy equity, energy security and environmental impact must be first addressed (Budzianowski et al., 2018). Kipeto Wind Energy project in Kajiado County is one of the renewable energy projects that have been implemented sucessifully withouth conflicts (Sena, 2018). The successful implementation of the Kipeto wind energy project is attributed to various factors including readiness of the project to invest in social capital (Sena, 2018; Kanini, 2022), ensuring the local community maintained landownership by annual leasing of the land from the community instead of oneoff purchase (Sena, 2018).

2.4 Quality of ESIA reports

Environmental and Social Impact Assessment (ESIA) is vital for integration and evaluation of environmental and social concerns of a proposed development (Dendena & Corsi, 2015; Muse, 2016). The outcome of ESIA process is documented in an Environmental and Social Impact Assessment Report. An effective ESIA process translates to a good quality ESIA report which is vital in informing decision (Aung, 2017; Kamijo & Huang, 2016, 2017). Indicators of an effective ESIA include extent to which environmental awareness is raised and environmental values are incorporated into decision-making (Arts et al., 2012). Likewise, attributes such as early implementation (Andre et al., 2006; Barasa, 2015; Rowe & Frewer, 2000), comprehensive public consultation and stakeholder participation (Barasa, 2015) multiple alternatives analysis (Glasson et al., 2012; Kamijo & Huang, 2016) and information disclosure (World Bank [WB], 2006) are vital for an effective ESIA. Differing stakeholder locus on the need for a thorough and collaborative process to ensure overall good quality (Stookes, 2003), gives rise to the concern that ESIA process is often unnecessarily lengthy and an economic burden to proponents (Annandale & Taplin, 2003).

Quality of ESIA report is a major dimension of an effective ESIA system (Kamijo & Huang, 2016). An ESIA report for a proposed development action is vital in guiding decision makers arrive at an informed decision. Whereas the overall quality of an ESIA report is important, the significance of each section of the ESIA (review area) and subsections (subcategory) is not the same when informing decision on a proposed development action (Veronez & Montaño, 2018). Identification and evaluation of key impacts and the environmental management plan and follow-up are considered more important sections in and ESIA report than description of a proposed development, baseline conditions and presentation of environmental impact statement (Veronez & Montaño, 2018). These two ESIA report sections are considered more important in informing decision making because they not only incorporate study of the environment but also impact prediction based on scientific data combined with expertise and experience of the consulting team preparing the

ESIA report (Glasson et al., 2012). It is vital that identification of probable impacts should be aided by the scoping process (Ortolano & Shepherd, 1995) and manuals and computer programs (Fedra et al., 1991). Impact prediction should be based on reliable predictive models (Glasson et al., 1999; Steinemann, 2001), checklists and matrices (Muse, 2016). Matrices such as Leopold Matrix (LM) and Lohani and Thanh impact evaluation and analysis methods combined with baseline data and professional judgement can be vital in predicting cumulative impacts for proposed development actions (Muse, 2016). Evaluation of the predicted impacts perhaps is the most difficult aspect of impact assessment (Ortolano & Shepherd, 1995) as it is a complex and subjective process. In some instances, algorithms which combine predictions and the subjective values of affected parties are used (Ortolano & Shepherd, 1995). Therefore, an ESIA report should not only state the methods used for impact identification but also justification of its use. Use of appropriate methodologies will ensure comprehensive evaluation of significance of impacts on affected community and biophysical environment

It is argued that ESIA process is expensive in terms of required technical, financial and time resources (Machaka, 2020) as project proponents is expected to constitute a well remunerated multidisciplinary team of consultants with prerequisite experience to handle specifics of the assessment for realization of credible findings (Chanthy & Grünbühel, 2015). Additionally, it is imperative that sufficient time be allowed for an effective assessment and compilation of comprehensive ESIA report (Chanthy & Grünbühel, 2015). Insufficient resources, inappropriate process guide-posts and structure are flaws that are the underlying reasons of poor quality of ESIA reports (Chanthy & Grünbühel, 2015; Zhang et al., 2013). Moreover, a poorly constituted multidisciplinary consulting team is a fundamental problem in ESIA procedures (Androulidakis & Karakassis, 2006).

Inadequate baseline data, lack of experienced ESIA expertise (Kamijo & Huang, 2016), limited time to carry out ESIA (Chanthy & Grünbühel, 2015), limited published research (Kamijo & Huang, 2016), lack of independency of ESIA practitioners from project developers are some of the contributing factors for poor quality ESIA reports (Kamijo & Huang, 2016). Impact identification, analysis of alternatives and presentation of adequate mitigation measures are some of the documented areas of ESIA reports that are more often than not inadequately tackled and poorly presented (Kamijo & Huang, 2016; Ortolano & Shepherd, 1995) hence contributing to an overall poor quality of ESIA reports. This is compounded by inconsistencies in reporting, gaps in critical baseline information (Middle &

Middle, 2010), inadequate public participation (Ortolano & Shepherd, 1995; Mwenda et al., 2012) and little or poor consideration of multiple alternatives (Kamijo & Huang, 2016).

Proper ESIA process should provide for screening, scoping, public participation, examination of alternatives, mitigation and impacts management, evaluation of significance, preparation of ESIA report, review of ESIA report, decision making and follow-up (Glasson et al., 2012; Slootweg et al., 2001; UNEP, 2002). Whereas most countries have specific legal requirements regarding the content of an ESIA report; (Androulidakis & Karakassis, 2006; Machaka, 2020), consultants can boost quality of ESIA report by use of reliable predictive models and multiple alternatives (Glasson et al., 1999; Steinemann, 2001).

2.5 Environmental and social impacts of geothermal and wind energy projects

Holistic integration of economic, social and environmental concerns in energy development process is a prerequisite to sustainable development goals realization (ECA, 2005). Whereas energy is an enabler in economic development, its production and use present challenges to the quality of the environment (Goodstein, 2002). Because of their contribution to greenhouse gas reduction, energy security at household and national levels, renewable energy sources are desirable supply of energy (Jaber, 2013). Renewable energy sources such as geothermal, wind and solar are considered environmentally friendly source of energy (Barasa & Magut, 2018; Kabeyi, 2019; Merem et al., 2019). However, their development has negative environmental and social impacts such as noise, glare, surface disturbance, displacement of families, ecological disturbance (Kabeyi, 2019; Kombe & Muguthu, 2019; Mariita, 2002). While geothermal energy is considered a green and environmentally friendly source of energy, various research work has shown that its exploitation can result in adverse environmental impacts (Bayer et al., 2013; Chen et al., 2020; Dhar et al., 2020; Hunt, 2001; Kagel et al., 2007; Kristmannsdóttir & Ármannsson, 2003; Manzella et al., 2018; Mutia, 2016; Shortall et al., 2015; Soltani et al., 2021).

While energy is an important motor of macroeconomic growth, at the same time it is a source of environmental stress (Shortall et al., 2015). Negative environmental and social impacts associated with electricity generation from geothermal sources include air pollution (Holm et al., 2012) due to emission of carbon dioxide (CO_2), hydrogen sulfide (H_2S), ammonia (NH_3), volatile metals, minerals, silicates, carbonates, metal sulfides and sulfates (Bayer et al., 2013; Glassley, 2014; Kagel et al., 2007; Kristmannsdóttir & Ármannsson, 2003; Shortall et al., 2015). Water pollution (Berrizbeitia, 2014) due to geo-fluids which are a potential source of water contamination due to elevated total dissolved solids and toxic minerals, well casing failure, pipeline leakage and surface spills (Tester et al., 2006). Land subsidence due to mass fluid and steam withdrawal (Dhar et al., 2020) when reservoir pressure declines after fluid withdrawal resulting in a slow, downward sinking of the land surface (Glassley, 2014; Grasby et al., 2012; Kagel et al., 2007; Shortall et al., 2015).

Geothermal sites are home to rare and unique ecosystems due to their biological, chemical and geological conditions (Grasby et al., 2012; Grasby & Lepitzki, 2002; Manen & Reeves, 2012; Yurchenko, 2005). Such ecosystems are considered sensitive and hence development of geothermal energy plants in such ecosystems will directly negatively affect vegetation, wildlife, aquatic biota, special status species and their habitats (Dhar et al., 2020). Activities such as clearing, road construction and well drilling disturb habitats and degrade habitat quality for flora and fauna (Dhar et al., 2020). Seismic surveys and drilling not only result in noise pollution, surface runoff and soil erosion but also has a potential of disturbing wildlife, affect breeding, foraging and migrating of some species (Hunt, 2001). Decrease in local biodiversity as a result of soil disturbance from drilling contributes to local seed bank depletion resulting in decrease and or loss of native vegetation species (Dhar et al., 2018). In forested habitats, construction of geothermal plants and power evacuations line directly result in forest fragmentation which lower species number and contribute to change in community composition (Víquez, 2006).

Negative impacts to adjacent habitats can also be contributed by toxic emissions including mercury and H_2S release from geothermal energy development projects (Bayer et al., 2013; Kagel et al., 2007; Loppi et al., 2006). Construction of geothermal power plants including power evacuation lines change local aesthetic resulting in visual impacts (Oduor, 2010). Competition for land between geothermal energy power developers and local indigenous community; result in conflicts between local communities and the developers (Berrizbeitia, 2014; Odour, 2010). Water use in large quantities during drilling and construction of wells, pipelines and plant infrastructure; stimulating injection wells; and operating power plants (Bayer et al., 2013; Clark et al., 2012; Shortall et al., 2015; Sowiżdżał et al., 2017) result in overall increase and demand of water in the area that stains local supply sources (Clark, 2012; Oduor, 2010).

Geothermal energy development sites attract labour force outside the region that results in labour influx leading to erosion of local culture (Bw'Obuya, 2002). Drilling of geothermal wells produces highly corrosive brine which pollutes local environment when disposed (Kombe & Muguthu, 2019; Maniita, 2003). Drilling of geothermal wells and operation of geothermal power plants has a negative influence on physical and chemical properties of soils during construction phase due to soil compaction, (Dhar et al., 2020; Mutia et al., 2016; Yilmaz & Kaptan, 2017). Geothermal energy projects especially those in high temperature geothermal fields generate hazardous waste which is mainly in liquid form (Bayer et al., 2013). Drilling mud residues, drill cuttings, power plant and cooling tower chemical wastes and H_2S abatement wastes are the main sources of hazardous waste generated from a geothermal energy project (Bayer et al., 2013; Glassley, 2014; Kagel et al., 2007). Freshwater aquifers can be contaminated when contaminated geothermal fluids are re-injected (Aksoy et al., 2009; Heath, 2002).

Strict adherence to requirements of environmental regulation and social acceptance of geothermal energy projects (Barich et al., 2021; Gabo-Ratio & Fujimitsu, 2020; Payera, 2018; Payera et al., 2020; Popovski, 2003) is critical to avoid hindrances in implementation (Kombe & Muguthu, 2019). Environmental trade-offs are sometimes inevitable for a successful exploitation of renewables located in ecologically sensitive site such as geothermal energy resources within the Hell's Gate National Park in Kenya (Merem et al., 2019). Whilst significant resources have been committed to accelerate production of electricity from renewables such as geothermal, wind and solar in Kenya, the efforts are facing setbacks occasioned by lack of a robust planning energy system, inadequate stakeholder participation coupled with inadequate consideration of environmental and social issues (Barasa & Magut, 2018).

Geothermal energy development in Kenya is categorised as high risk (Aung, 2017) hence ESIA is mainstreamed in its development (Barasa, 2016b; GoK, 2018; Muse, 2016) before implementation for informed decision (Ngugi, 2012). Prior to constitutional and legislative underpinning of ESIA in Kenya, geothermal energy development had already been subjected to ESIA as part of the financiers' requirement (Barasa, 2016b; Mwangi, 2005, 2006) specifically World Bank Environmental Assessment (EA) policy, Operational Directive (OD) 4.00 (Baba, 2003). The first geothermal energy development project in Kenya to be subjected to a comprehensive ESIA was Olkaria II in 1994 (Mwangi, 2005, 2006) thereafter all other subsequent geothermal energy projects have been subjected to detailed ESIA (Kubo, 2003; Mwangi, 2005, 2006; Ngugi, 2012) ESIA for geothermal development in the country has a history; hence the quality of resulting ESIA reports for geothermal energy projects has evolved over time (Barasa, 2016b).

While it is generally accepted that generation of electrical energy from wind reduces adverse environmental impacts that are associated with other energy sources, such as atmospheric and water pollution, including greenhouse gases; degradation of landscapes due to mining activity; and damming of rivers (Jaber, 2013), wind energy generation still results in negative environmental and social impacts (Hoen et al., 2019; Kazimierczuk, 2019; Ongoma, 2018; Swofford & Slattery, 2010). Increased generation, transmission and use of energy from green sources such as wind will contribute to reducing the rise of global temperatures beyond fifteen degrees pre-industrial levels as envisaged in the Paris Accord (Alemzero et al., 2021). However, negative perceptions and attitudes of communities neighbouring wind farms and potential wind farm areas can potential slow development and utilization of wind energy resources (Achiba, 2019; Devine-Wright, 2005; Hoen et al., 2019; Ongoma, 2018; Swofford & Slattery, 2010). This social challenge can be exacerbated by grass root actors resistant to wind energy projects (Achiba, 2019; Breukers & Wolsink, 2007a; Breukers & Wolsink, 2007b; Gross, 2007; Jessup, 2010; Petrova, 2013; Simcock, 2016; Toke et al., 2008).

Whereas wind energy sources are regarded as clean, free, indigenous and inexhaustible, (Jabel, 2013) they are associated with a number of negative environmental and social impacts including potential interference with radar and communication facilities (Saidur et al., 2011). Other primary negative impacts that can be grouped into ecological, human and climate related (Mann & Teilmann, 2013) include wildlife safety, bio-system disturbance, noise, visual pollution, electromagnetic interference, and local climate change (Lima et al., 2013; Shortall et al., 2015; Tabassum-Abbasi et al., 2014). In addition, other issues of concern include noise from rotor blades, landscape change aesthetics associated visual impacts (Alvarez-Farizo & Hanley, 2002; Johansson & Laike, 2007; Pasqualetti, 2001, 2010), death of birds and birds (Arnett et al., 2008; Karydis, 2013; Kunz, 2007; Sobrinho et al., 2022). In additions large wind farms are reported to result in deforestation, soil erosion and noise pollution (Dai et al., 2015). Habitat loss occasioned by large scale wind farm construction displaces birds from areas within and surrounding wind farms due to visual intrusion and disturbance (Drewitt & Langston, 2006). Landscape change caused by large scale wind farms (Shortall et al., 2015) has an effect on the land surface, drainage systems and vegetation, resulting in changes in environmental dynamics which contribute to reduction in environmental quality together with quality of biodiversity (Mustafa & Al-Mahadin, 2018; Sobrinho et al., 2022). Large wind farms constructed along birds' flyways result in barrier effects (Kahlert et al., 2004) direct mortality of birds is not only brought about through bird collisions with rotors, but also with towers, nacelles and associated structures such as guy cables, power lines and meteorological masts (Drewitt & Langston, 2006). While the Global South is yet to develop its offshore wind potential, environmental concerns related to offshore wind developments include increased noise levels, risk of collisions, changes to benthic and pelagic habitats, alterations to food webs, and pollution from increased vessel traffic or release of contaminants from seabed sediments'' (Bailey et al., 2014).

Whirls Kenya ranks among the top seven African countries with large on-shore wind energy potential (Kazimierczuk, 2019; Mukasa et al., 2013; Wambua 2017), most of the wind energy resources just like most renewables remain untapped (Ongoma, 2018). While wind power potential in the country is documented as enormous, its exploitation has been minimal (Awour & Ouya, 2014). While it is argued that it takes long to develop a commercial wind power project (Dismukes et al., 2009), in more recent times, environmental and social issues have been the main course in delaying development of wind energy projects in the country (Barasa & Magut, 2018; Eberhard et al., 2016; Kazimierczuk, 2019; Kiplagat et al., 2011; Ongoma, 2018; Schilling et al., 2018; Temper et al., 2015; Tigabu, 2016; Wambua, 2017). These challenges notwithstanding, Kenya's installed wind energy capacity is 335MW (Alemzero et al., 2021). Environmental and social impact assessments for wind energy projects in Kenya begun in the early 1990s when the first large scale national grid-connected wind farm was established in the county (Ogoma, 2018). The Ngong Hills wind farm was the first to be established in the country in the year1993 (Oludhe, 2008; Ongoma, 2018; Tigabu, 2016) under the funding of the Belgium Government (Tigabu, 2016). In more recent times, a number of large-scale wind farms have been developed while other are being developed (Edwards et al., 2017; Hansen et al., 2018; Kazimierczuk, 2019). These farms include Lake Turkana Wind Power project (310 MW), Kipeto (100 MW), Isiolo (100 MW), Meru (60 MW), Ngong (51 MW) and the Baharini Electra Wind Farm project in Lamu (90 MW (Edwards et al., 2017; Hansen et al., 2018). All these wind energy projects have been subjected to ESIA process before commencement of implementation (Alemzero et al., 2021; Kazimierczuk, 2019; Ogoma, 2018; Wambua, 2017).

2.6 Gaps in Knowledge

A review of EIA literature showed that studies to improve EIA frameworks, upgrade EIA process and practice to tackle environmental decline in low- and medium-income countries were few (Kahangirwe & Vanclay, 2021; Khosravi et al., 2019; Kolhoff et al., 2018). Likewise, detailed analysis of environmental and social facets were lacking and that studies on ESIA effectiveness transactively, substantively and normatively were poor (Bond & Dusik, 2019; Chanchitpricha & Bond, 2013; Dendena & Corsi, 2015; Kahangirwe & Vanclay, 2021; Sadler, 1996). Studies on stakeholder consultation and public participation context based best practices and those on improvement of public participation in medium and low income countries were few (André et al., 2006; Morara et al., 2011; Mwenda & Kibutu, 2012; Simpson & Basta, 2018).

Studies documenting environmental conflicts and their impacts and how to avoid and or minimize conflicts before, during and after project implementation were limited (Chan & Oppong, 2017; Sanggoro et al., 2022; Wambua, 2017). Effectiveness of ESIA tool in conflict identification and prevention was poorly studied (Arevalo et al., 2014; Corsi et al., 2015; Prenzel & Vanclay, 2014). Only few studies focused on quality of ESIA reports in developing countries and that documented quality of ESIA reports mainly focused on qualitative methods with very limited statistical analysis (Aung, 2017; Kamijo & Huang, 2016; Kamijo & Huang, 2017; Middle & Middle, 2010).

2.7 Theoretical framework

Whereas Environmental and social impact assessment is dependent on scientific knowledge (Suter & Cormier, 2008), it is construed in some scholarly discourse to be lacking theoretical basis (Dendena & Corsi, 2015;) while other scholars argue that it is underpinned by planning theories (Lawrence, 2000) as it is associated with rationalistic planning (Elling, 2009). While environmental and social impact assessment approach is documented to be based on constructivism, participation and environmental justice (Aledo & Domínguez-Gómez, 2017), its theory and practice is argued to have taken a parallel but separate path to planning theories (Lawrence, 2000). Whereas the practice of environmental and social impact assessment can be viewed from the lens of planning theories (Richardson, 2005), its limited and sporadic interaction with planning theories has contributed to diminished benefits from the theories (Lawrence, 2000).

It is argued that theoretical foundation for environmental planning and management is founded on planning theories (Tang & Brody, 2009) since environmental and social impact assessment is an evaluation of the impacts of a planned action on the natural and social environment (Mohamad et al., 2022). Never the less, empirical results of factors that influence quality of environmental planning such as public participation, planning mandate, planning implementation and intergovernmental collaboration are delinked from planning theories (Tang & Brody, 2009). Theoretical underpinning of environmental and social impact assessment is documented to be based on planning theories of communications and collaboration, socio-ecological idealism, rationalism, pragmatism and political-economic mobilization (Lawrence, 2000; Richardson, 2005; Tang & Brody, 2009).

Stakeholder consultation and public participation capacity during environmental and social impact assessment is underpinned by the theory of communications and collaboration (Tang & Brody, 2009) which is based on discursive democracy and communicative rationality (Innes & Booher, 2004). The theory emphasizes the impotence of stakeholder dialogue during project planning and views project planning as a collaborative rather than unitary process (Lawrence, 2000). The theory contends that rational planning can be achieved through effective communication, collaboration and active stakeholder and public participation (Kamau & Khsiebi, 2022). Rationality in impact assessment is arguably threefold notably cognitive– instrumental, moral–practical and, aesthetic– expressive (Elling, 2009). Communicative rationality (Habermas, 2018) is a vital concept necessary for effective stakeholder consultation and public participation during ESIA to validate ESIA comprehensibility (Sager & Tuija Hilding-Rydevik, 2001). The theory of communications and collaboration thus underscores environmental and social impact assessment practices as an exercise of deliberative democracy (Sager & Tuija Hilding-Rydevik, 2001).

The theory of socio-ecological idealism is a transformative persuasive power that underpins the integration of social facets into environmental assessment (Richardson, 2005) for stronger impact assessment capacity (Tang & Brody, 2009) that supports amalgamation of critical elements into the final development plan (Lawrence, 2000). Whereas socio-ecological idealism supports reintegration of social and environmental substance into the planning process, it has been criticised for its shortfall of separation from substantive objective in rational planning (Lawrence, 2000).

The theory of rationalism supports stronger environmental planning through the use of sufficient qualified technical expertise, improving technical skills and regular plan updating (Brody, 2003; Tang & Brody, 2009). Rationalism views comprehensive planning through the lens of survey, analysis, and planning (Lawrence, 2000). The theory underpins transactive effectiveness in impact assessment in terms of availability of personnel, financial resources, technical expertise, and commitment (Tang & Brody, 2009) for high quality impact assessment.

Pragmatism is a normative planning theory that radiate from the foundation of knowledge based experience influenced through the approach of incrementalism (Lawrence, 2000). Pragmatism supports environmental assessment capacity through streamlined assessment scoping, procedural integration, information harmonization and management (Tang & Brody, 2009).

The theory of political-economic mobilization focuses on stakeholder conflicts, social equality, community empowerment, structural change needs, social, economic, and environmental justice (Tang & Brody, 2009). This theory thus seeks to address issues of unequal power relations, community empowerment, social, economic and environmental justice (Lawrence, 2000).

2.7.1 Theoretical framework for assessing ESIA effectiveness

There are four dimensions of assessing ESIA effectiveness namely procedural, substantive, transactive, and normative (Chanchitpricha & Bond, 2013). Procedural effeteness considers the principles and practice of the impact assessment process while focusing on compliance with procedures and expected good practice (Sadler, 1996). Substantive effectiveness evaluates whether the EIA influenced to include environmental aspects in decision-making and whether these decisions contributed to environmental protection (Baker & McLelland, 2003; Sadler, 1996). Transactive effectiveness focuses on costs in terms of financial and time resources invested and the outcomes of the process judged by the participants (Sadler, 1996). Normative effectiveness which is considered to be the perceptions or attitudes that lead people to react or to take action in impact assessment processes focuses on the extent to which normative goals are achieved (Bond et al., 2012). Each dimension has specific criteria for assessing its effectiveness (Chanchitpricha & Bond, 2013). The criterion used for the evaluation of each of the dimension is tabulated in Table 1.

Table 1 Evaluation criteria for assessing ESIA effectiveness for the four dimensions

Dimension	Evaluation criteria/Indicator	
Procedural effectiveness (P1-P7)	P1	Relevant policy framework and procedures for ESIA process
	P2	Institutional infrastructure such as environmental monitoring network (EMP implementation)
	P3	Integrating ESIA in planning process (mainstreaming)
	P4	Identification of financial funds for ESIA practice (funding)
	P5	Involvement of stakeholders in the process (stakeholder involvement)
	P6	Capacity of ESIA in presenting as a sound and clear, understandable evidence for decision-making process with validity of predictions, argumentation, and understandability (quality of ESIA report)
	P7	Delivering the report to participating stakeholders (public participation)
Substantive effectiveness	S1	Regulatory framework on implementing ESIA in decision-making (ambitious or tough policy requirements/mainstreaming)

Dimension		Evaluation criteria/Indicator
(S1-S10)	S2	Incorporation of proposed changes (adoption of best practices/feasibility or efficacy of proposed changes)
	S3	Informed decision-making (mainstreaming)
	S4	Close collaboration (collaboration)
	S5	Parallel development i.e., between ESIA process and policy/plan/programme developed alongside one other with considerable cross-cutting between the processes (parallel development)
	S6	Early start i.e., ESIA process was initiated at the very first stages to aid decision making (timing)
	S7	Institutional and other benefit i.e., there is strong evidence of better departmental relations, development of otherwise absent expertise, learning, new partnerships and better public– private– voluntary sector communication as a result of ESIA when it is implemented in decision making (institutional benefits)
	S8	Successful statutory consultation i.e., the statutory consultation bodies had a fair opportunity to contribute and their views and comments were taken on board (consultation)
	S9	Successful public consultation i.e., the public consultation bodies had a fair opportunity to contribute and their views and comments were taken on board (consultations)
	S10	Satisfactory/comments in using ESIA in decision-making process (mainstreaming)
Transactive effectiveness (T1-T4)	T1	Time i.e., ESIA was carried out within a reasonable time frame without undue delay or within a very short time period (time limitation)
	T2	Financial resources i.e., carrying out the ESIA did not entail excessive spending (financial limitations)
	T3	Skill i.e., the acquiring of skills and personnel required for the ESIA did not contribute a big burden and these were easily accessible. (Skills and capacity)
	T4	Specifications of roles i.e., responsibilities were clearly defined and allocated and tasks were undertaken by the most appropriate subject.

Dimension		Evaluation criteria/Indicator
		(Definition of tasks or roles)
Normative effectiveness (N1-N4)	N1	Adjustment of relevant policy framework concerning the normative goal achieved in term of changes of views. (mainstreaming)
	N2	Learning process, perception, and lesson learnt from ESIA (lessons learnt)
	N3	Development or changes in relevant institutional policies and policy choices(mainstreaming)
	N4	Improvement of health and quality of life (sustainable development)

Source: Chanchitpricha & Bond, 2013

To establish whether conflicts can been identified during the ESIA, indicators for conflict identification were measured. Likewise, to establish whether conflicts could be prevented indicators for conflict prevention were measured. Table 2 tabulates indicators for conflict identification and those for conflict prevention (Iojă et al., 2016).

Table 2 Indicators for conflict identification and prevention

Conflict Aspect	Indicator
Conflict identification	- Policy issues and their implementation (identification of sectorial government policy that affect the project) - Project cycle management issues (identification of project cycle management issues) - Historic context (identification of historical issues surrounding the project) - Social context (identification and consultation of stakeholders' groups that may have interests in the project)
Conflict prevention	- Stakeholder profile (the identification of all stakeholders' groups is a measure of informed consensus) - Public consultation (public consultation sessions are a measure of collaboration and dialogue) - Involvement of a neutral party (A neutral party will bring stakeholders' different views together and reach a shared agreement

Source: Iojă et al., 2016

2.8 Conceptual framework

In this study an evaluation of the effectiveness of ESIA as a tool to identify and prevent conflicts that may arise from implementation of selected projects in renewable energy specifically geothermal energy and wind energy was carried out. The independent variables determining the effectiveness of the ESIA tool in identification and prevention of potential conflicts arising from the selected projects were procedural effectiveness, substantive effectiveness, transactive effectiveness and normative effectiveness. The indicators of each of the independent variables about which data was collected are as tabulated in table 1. The outcome brought by these independent variables is ESIA effectiveness in conflict identification and conflict prevention. The indicators of the dependent variables about which data was collected were as tabulated in table 2. Enforcement by lead agencies and decisions of licensing authority were the intervening variables linking the cause-effect relationship between independent variables and the dependent variable. Figure 1 is the conceptual framework for the study.

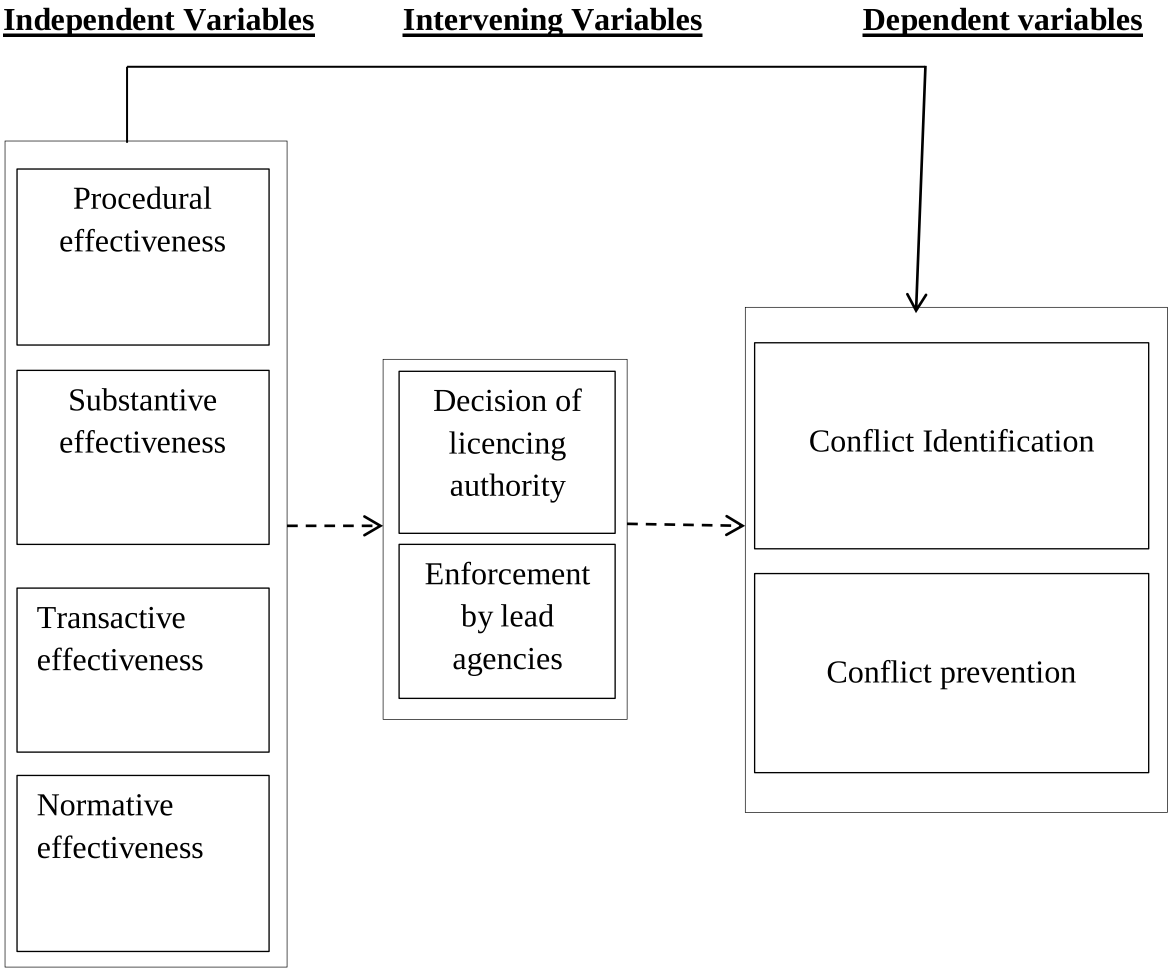


Figure 1 Conceptual framework

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Description of the study area

3.1.1 Location of geothermal energy projects

Kenya's geothermal resources are hosted within volcanic centres which are located along the axis of the Kenyan Rift Valley (Mangi, 2017). The geothermal resources are thus located in the Rift Valley region (Mangi, 2018) which is environmentally and culturally sensitive (Marriita, 2002). The Olkaria volcanic complex is the main geothermal area in Kenya (Omenda et al**.,** 2020); it lies on the axis of the rift but with a bias towards the Mau escarpment (Mangi, 2016). Olkaria geothermal field is located approximately 120 km west of Nairobi, in Naivasha Sub-County, Nakuru County (Koissaba, 2017) part of the concession area lies within Hell's Gate National Park (HGNP) (Barasa, 2016b). The Olkaria geothermal fields are located within and adjacent to natural and manmade sensitive ecosystems such as Hell's Gate National Park, Lake Naivasha, flourishing large-scale flower farms, (Barasa, 2016b; Marriita, 2002). Akiira geothermal field which is surrounded by the Suswa and Longonot volcanoes is located approximately 10km south of the Olkaria IV Domes geothermal field (Mangi, 2017). Menengai geothermal field which is a quaternary caldera volcano within the axis of the central segment of the rift (Mangi, 2016) is located near Nakuru town, about 160 km from Nairobi (Omenda et al**.,** 2020). Menengai west geothermal field falls on the western side of the Menengai caldera floor. It extends around Boita, Menengai Station, Ngata Farm and Kabarak Estate (Muse, 2016). Figure 2 is a map showing location of geothermal energy projects.

Annual maximum temperature at Olkaria area ranges from 21^0C to 29° C, and annual minimum temperature ranges from 11^0C to 15 ° C (Knight & Partners, 1994). Winds are generally south-easterly, except in February to April, when they tend to have a noticeable north-easterly component. The area is characterised by volcanic rocks of Pleistocene to Recent age, the last eruption in the area dated some 200 years ago (Omenda, 1998). The Pleistocene Mau tuffs consisting of ignimbritic tuffs intercalated with rhyolitic lava flows, trachytes, and basalts form the reservoir rocks. Overlying this is a trachyte unit, followed by the uppermost rocks consisting of rhyolite intercalated with pyroclastics (Omenda, 2000). The subsurface geology of the Olkaria geothermal field is dissevered into six broad lithostratigraphic groups based on age, tectono-stratigraphy, and lithology (Omenda, 1998).

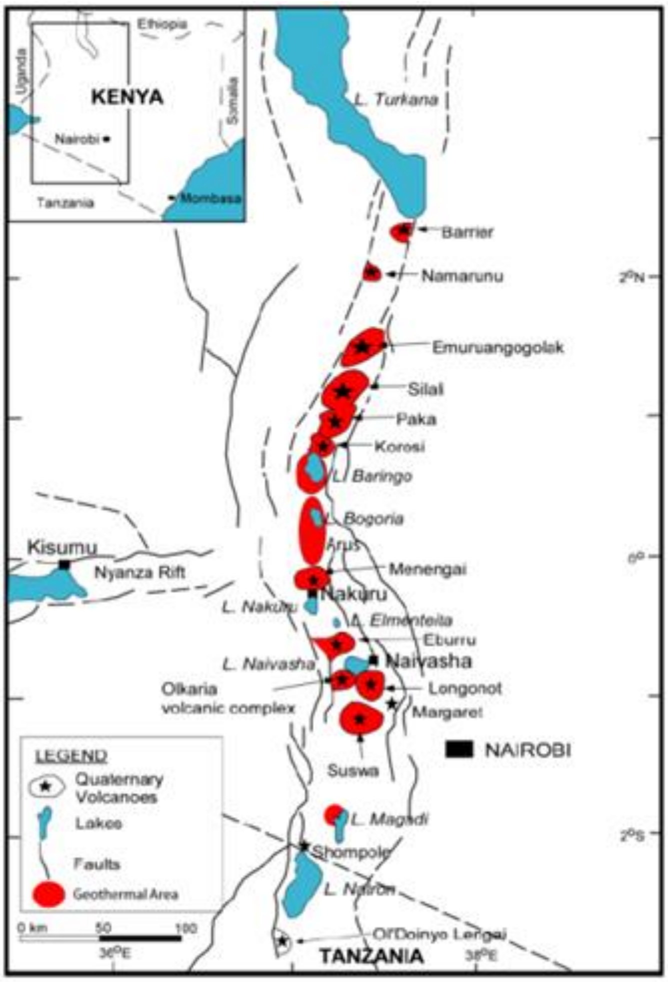


Figure 2 Locations of geothermal energy projects

Source: Omenda & Mangi, 2016

The formations in chrono-stratigraphy order from the oldest to the youngest include the Proterozoic "basement" formations, pre-Mau volcanics, Mau Tuffs, Plateau Trachytes, Olkaria Basalts and Upper Olkaria Volcanics (Kipngok et al., 2014). Generally, the surface outcrops in Olkara are mainly comendite lavas and their pyroclastic equivalents, ashes from Suswa and Longonot volcanoes with minor trachytes and basalts. Well lithological logs indicate the presence of a basalt (Olkaria basalt) underling the Upper Olkaria volcanics in the area to the east of Olkaria Hill (Kipngok et al., 2014). The Olkaria geothermal area is divided into seven sectors namely; Olkaria East, Olkaria West, Olkaria Northwest, Olkaria Northeast, Olkaria Central, Olkaria Domes and Olkaria Southwest for management purposes.

3.1.2 Location of wind energy projects

There many locations in Kenya that possess relatively strong and persistent wind speeds with considerable wind power potential throughout the year (Nyasani et al., 2018; Oludhe, 2008). These include Marsabit region, Turkana region, area, Kajiado area, Isiolo, Meru, Lamu (Edwards et al., 2017; Hansen et al., 2018; Nyasani et al., 2018). Wind energy projects that were part of the study were mainly located North West of the country (Isiolo, Marsabit and Turkana Counties), Eastern part of the country mainly Meru County, the Rift Valley area mainly Kajiado County as well as the coastal area specifically Kilifi and Lamu Counties (Barasa & Aganda, 2016; Kazimierczuk, 2019; Ministry of Energy, 2013; Tigabu, 2016). Large-scale wind power projects that formed part of this study included Lake Turkana Wind Power project (310 MW), Kipeto (100 MW), Isiolo (100 MW), Meru (60 MW), Ngong (51 MW) and the Baharini Electra Wind Farm project in Lamu (90 MW), Oolesayeti Ridges, Kajiado (50MW), Kalacha location, Marsabit (50MW), Mombasa Cement, Vipingo (36MW) and Kinangop (60.8MW) (Alemzero et al., 2021; Kazimierczuk, 2019; Ndirangu et al., 2017; Nyasani et al., 2018; Ongoma, 2018). Figure 3 is a map showing location of wind energy projects.

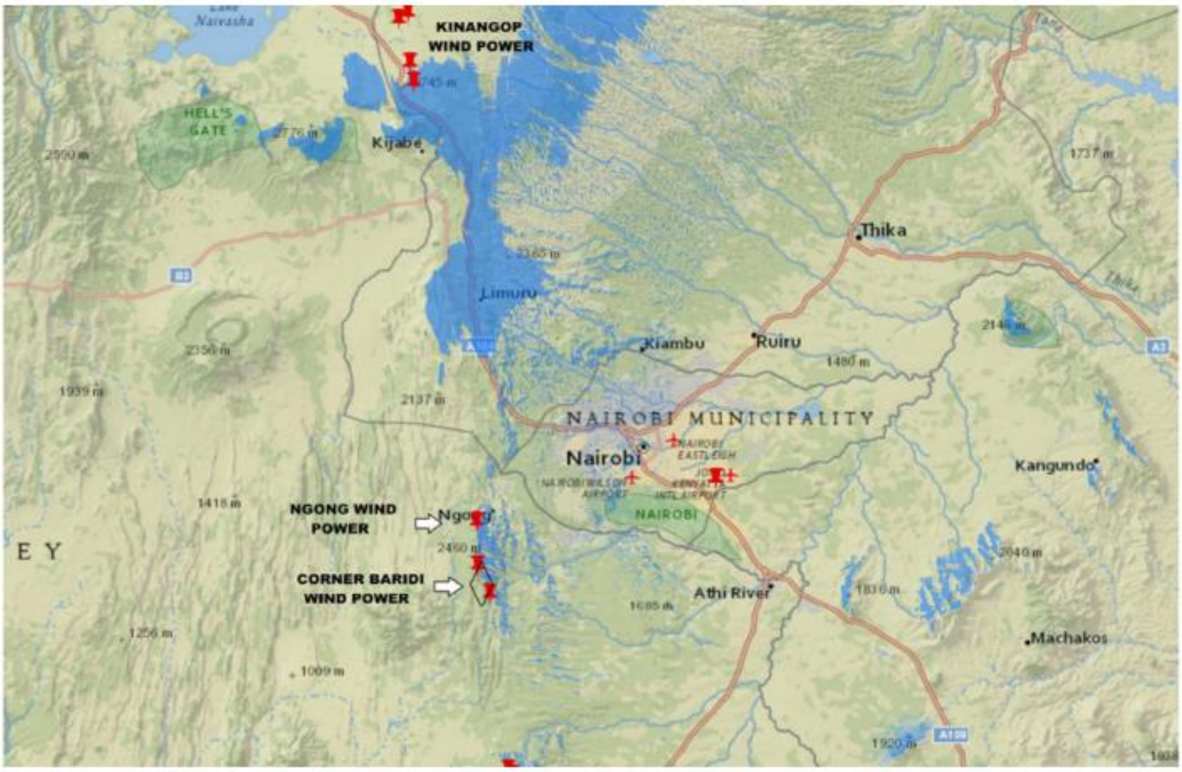


Figure 3 Locations of wind energy projects

Source: Ndirangu et al., 2017

Lake Turkana Wind Power Project (LTWP) is located near the shore of Lake Turkana in the Laisamis Constituency of Marsabit County, approximately 50 km from the Sub-County of Loyangalani in north-western Kenya (Olsen & Westergaard-Kabelmann, 2018). The Project area lies between 450 meters at the shore of Lake Turkana to 2,300 meters above sea level. Topographical features of the project area include plains, foot slopes, plateaus, hills and minor scarps and foot ridges. The location of this wind farm is 8km from the edge of Lake Turkana, which harbours a variety of aquatic animals, including crocodiles, hippos, fish and birds. Lake Turkana is internationally recognised as an Important Bird Area and is known in particular for its water birds (Bennun & Njoroge, 1999). The wind farm site which is located at the south eastern end of Lake Turkana runs south easterly from the south eastern shores of the lake and passes between Mount Kulal and Mount Nyiru. The location of the wind farm is characterised by strong predictable wind streams which accelerates to speeds up to 15m/s. Winds in this wind farm site are very strong. The winds are generated by a low-level jet called the Turkana Channel jet (Nyasani et al., 2018). The winds are accelerated locally between Mt. Kulal and Mt Nyiru Range. The main communities within the wider catchment of the wind farm are nomadic and they include Turkana, Samburu, Rendille and El Molo. These communities depend on pastoralism as their primary livelihood (Schilling et al., 2018).

Kipeto wind farm is located in the foothills of Ngong Hills within Esilanke area, Oloiyangani (Kipeto) sub-location, south Keekonyokei location in Kiserian, Kajiado County (Nyasani et al., 2018; Sena, 2015). The wind farm is located approximately 18km North-West of Kajiado Town in the Rift Valley region. Kipeto is a plateau with two main ridges on it. The Kipeto Wind Power Project area is inhabited by the Maasai, a semi nomadic indigenous community whose main livelihood system is livestock keeping (Ongoma, 2018). Kinangop Wind energy project was to be located in in the central Kenyan Highlands on the Kinangop plateau, in Karati, Magumu Ward, South Kinangop Division, and Heni Sub-locations, Kinangop Constituency of Nyandarua County (Kazimierczuk et al., 2019; Nyasani et al., 2018; Ongoma, 2018; Tigabu, 2016; Wambua, 2017). The Kinangop Plateau lies between the Kenyan Rift Valley to the west and the Aberdare Range to the east (Muchai et al., 2002; Ndang'ang'a et al., 2002; Were & Kooiman, 2010). It takes its name from Kinangop Mountain, which rises in the Aberdare Ranges to the east. The plateau is relatively flat, sloping gradually upwards towards the foothills of the Aberdare Ranges. Communities settled at the site where the wind farm project was to be located are mainly small holder Kikuyu farming community (Muchai et al., 2002; Nyandat, 1984; Were & Kooiman, 2010). Their livelihood is mainly small-scale crop farming of vegetables, wheat, barley, pyrethrum, maize, beans and potatoes and livestock rearing mainly cattle, sheep and goats (Muchai et al., 2002).

The location of the 60 MW Meru wind farm project is in Kithima, Kirirwo and Mugae sub locations of Rwarera Location, Buuri Constituency, Meru County. The location of this wind farm is about 8 km south of Isiolo town and 25km north of Meru town. The location is generally a flat area and is on the leeward side of Mount Kenya. The site boarders Nyambene hills to the East and other hills to the south and West. Land us within the catchment of the site is farmland mainly maize and livestock farmers. Other land use in the catchment includes pasture land including pastoral activities. Lower areas of the wind farm are designated as the Northern Grazing Areas. The location of this wind farm is at close proximity the Lewa Conservancy and Meru National Park. Due to this the site is home to different types of bird species (Zimmerman et al., 1996). Bird species in the area include those of global conservation concern occurring, ecological important birds of prey and threatened species (Bennun & Njoroge, 1999; Habel et al., 2014).

The Ngong Wind Farm which was one of the first wind farms to be established in the 1990s is situated on Ngong Hills, in Kajiado County (Barasa & Aganda, 2016; Ongoma, 2018). The wind farm is approximately 20 km from Nairobi (Mwangi et al., 2017) lies on the edge of the rift valley and forms a ridge approximately thirteen kilometres long and five kilometres wide. The site is within the wider Ngong Hills Forest ecosystem and is located in the northern foothills of Ngong Hills, near the town of Ngong. Wind speeds in Ngong Hills are favourable for the wind farm. Areas of conservation importance within the catchment of the wind farm include Ngong Hills Forest Reserve. The site of the location of Mombasa Cement wind farm is at Takaungu /Mavueni Location at Vipingo off Mombasa-Kilifi Road within Kikambala Sub-County in Kilifi County. The location is onshore adjacent to stiff cliff on its edge facing the ocean. Wind speeds on this site are favourable for wind energy power generation. The site for the 90 MW Baharini Electra Wind Farm power project is in Mpeketoni Division, Lamu County.

3.1.3 Socioeconomic and demographic characteristics

Nakuru County population is 2,161,935 people with a population growth rate of 28.4% (Kenya National Bureau of Statistics, 2022). The proportion of working age population is estimated at 63.35% (County Government of Nakuru, 2018). Unemployed people in active labour force are estimated at 10% while economically inactive people in total labour force are estimated to be 21.5% (Kenya National Bureau of Statistics, 2015). Projected population for the County as at the year 2022 was 2,479,311 with a labour force aged between 15-64 years of 1,314,225 people consisting of 657,121 males and 657,104 females (County Government of Nakuru, 2018). Projected population of four Sub-Counties hosting geothermal energy projects namely Naivasha, Gilgi, Rongai and Nakuru Town East as at the year 2022 was 333,211; 226,117; 193,456 and 233,647 respectively with population densities of 197; 167; 184 and 901 respectively (County Government of Nakuru, 2018). Poverty index for the county is 33.5 which is lower compared to 45.2 the national index (Kenya National Bureau of Statistics, 2015).

Marsabit County's total land mass is 70,961km^2 of which only 15,828Km^2 is arable and 51,008Km^2 is rangeland (County Government of Marsabit, 2018). The County's total population is 459,785 consisting of 243,548 males and 216,219 females with population density of 6 (Kenya National Bureau of Statistics, 2019). It is projected that the population of Laisamis Sub-County were Lake Turkana Wind Energy project is located will be 77,756 with a population density of 3.83, the percentage of population within the working age (16-64 years) will be 49.3, dependency ration will be114.7 while poverty rate is 42.2% (County Government of Marsabit, 2018). The County's Human Development Index (HDI) is 0.44 against a national HDI of 0.52 (Kenya Human Development Indices per County, 2015). The major economic activity for communities within the vicinity of LTWP is nomadic pastoralism (Schilling et al., 2018). Sarima area where the wind turbines are located is an important animal grazing and watering point jointly utilised by Samburu, Turkana and Rendille pastoralists (Cormack & Kurewa, 2018). Due to the nature of nomadic pastoralism, population distribution is space and the density is low (Hashimshony-Yaffe & Segal-Klein, 2023).

Kajiado County were the find wind farms of Ngong and Kipeto are located has a total population of 1,117,840 consisting of 557,098 males and 560,704 female with population density of 51 (Kenya National Bureau of Statistics, 2019). With a projected annual growth rate of 5.5%, the County's population at the end of 2022 could have grown to 1,306,723 consisting of 656, 194 males and 650, 529 females with a labour force population being 773, 254 consisting of 387,110 male and 386,144 females (County Government of Kajiado, 2018). This will exert pressure on social facilities, increase competition for available employment opportunities and reduce availability of land for settlement. The County's HDI is 0.59 (Kenya Human Development Indices per County, 2015). Population distribution around in the vicinity of Ngong wind farm is moderate (Ongoma, 2018) but will increase due projected annual population growth rate.

Meru County were the Meru wind farm project is located has a total population 1,545,714 consisting of 767,698 males and 777,975 females with population density of 221 (Kenya National Bureau of Statistics, 2019). The County's annual poplation growth rate is projected at 2.1% translating to a total population of 1,775,511 consisting of 877,945 males and 897,566 female (County Government of Meru, 2018). It is anticipated that population growth will result in a strain in available resources. Lamu County were Baharini Electra Wind Farm power project is located has a total population 143,920 consisting of 76,103 males and 67,813 females with population density of 23 (Kenya National Bureau of Statistics, 2019). The County's annual population growth is projected at 3.3% translating to 155,031 of which 80,599 are male and 74,432 female (County Government of Lamu, 2018). The labourforce population as at 2022 is projected to be 89,948 consisting of 47,415 male and 42,533 female (County Government of Lamu, 2018).

3.2 Research design

This study adopted a descriptive research design (Kothari, 2004). Under this design, a cross-sectional survey study was used to collect data from a selected sample that represented the population of practicing ESIA Experts, civil society groups, Ministry of Energy and the National Environment Management Authority at a specific point in time (Kumar, 2011). ESIA experts included in the study were those licensed to practice and had experience in assessment of renewable energy projects. Civil society groups that participated in the study were of diverse backgrounds specifically those involved in environmental conservation, promotion and adaption of policies favourable to biodiversity conservation, sustainable protection of birds and habitats, renewable energy, natural resource governance, ecosystem restoration, wildlife and wild lands conservation, land, human rights, and livelihoods improvement. Ministry of Energy participants in the study were only those drawn from the Directorates of Geo-Exploration and Renewable Energy. National Environment Management Authority participants who participated in the study were only those who had worked in counties hosting renewable energy projects and participated in review of ESIA reports of renewable energy projects. The design was appropriate for this study because it easily compared responses from different population groups and study variables at a single point in time (Hoyle, 2002). A cross-sectional study under the descriptive design was used because it would result in an unbiased representation of the stated populations of interest, besides standardized measurements as the same information was collected from different respondents (Lewis, 2003). Further the research design allowed complimenting of collected primary survey data with secondary data (Nassaji, 2015; Sandelowski, 2000). The subject of interest was application of environmental and social impact assessment procedures. The study assumed that all the respondents had relevant information and or experience in environmental and social impact assessment for renewable energy projects, and its effectiveness in conflict identification and prevention.

3.3 Sampling design

A total of 242 respondents for primary data were sampled comprising of 200 practicing ESIA Experts, 15 civil society groups, 14 Officers of Ministry of Energy and 13 Officers of National Environment Management Authority. The sapling was random for practicing ESIA Experts and purposeful for civil society groups, Ministry of Energy and National Environment Management Authority. This ensured the sample was representative and eliminated bias (Bluman, 2004).

A total of 26 ESIA reports for renewable energy projects were purposefully sampled consisting of 15 reports of geothermal energy projects and 11 reports of wind energy projects each. Based on the information the research had acquired from the National Environment Management Authority and the Ministry of Energy on geothermal and wind energy projects that had undertaken ESIA as at the year 2019, the researcher purposefully sampled all the ESIA reports of geothermal and wind energy projects to ensure the sample was representative, sufficient and that it reflected variations in study population ((Krejcie & Morgan 1970).

3.4 Sample size determination

In determining sample size, the desired precision, acceptable confidence level for estimation, and variance in the primary variables of interest in the study was defined (Bartlett et al., 2001). Error estimation was defined by the margin of error (the error the researcher was willing to accept) or the alpha level also known as Type I Error (the level of acceptable risk the researcher was willing to accept that the true margin of error exceeds the acceptable margin of error) (Bartlett et al., 2001). An acceptable margin of error in social research for categorical data of 5% (Krejcie & Morgan, 1970) was adopted. An alpha level of 0.05 was acceptable for the research (Bartlett et al., 2001) and a variance estimation of 0.05 was accepted as an estimate of the population proportion for ordinal variables (Krejcie & Morgan, 1970) for this research.

3.4.1 Sample size determination for primary data sources

The sample size (n) from primary data sources was 242 stakeholder respondents from a study population (N) of 650 stakeholders. The modified Cochran formula for sample size calculation in small populations (Cochran & Cochran, 1977) was used to determine the sample size. Sample calculation was in two stages first determination of Cochran's sample size then calculation of study sample (Cochran & Cochran, 1977). The choice of Cochran's formula was informed by study variables which were ordinal and categorical hence generated categorical data requiring sample size determination formula for categorical data (Bartlett et al., 2001). Cochran's sample size was determined using the following formula: -

$$\underline{\mathbf{n}}\boldsymbol{o} = \frac{\underline{\boldsymbol{t}}^{2} * (\boldsymbol{p})(\boldsymbol{q})}{(\underline{\boldsymbol{d}})^{2}} \tag{1}$$

Where:

$\underline{\mathbf{n}}\boldsymbol{o}$ is Cochran's sample size

$\underline{\boldsymbol{t}}^{2}$ is the value for selected alpha level of 0.025 in each tail (1.96)

$(\boldsymbol{p})(\boldsymbol{q})$ is the estimate of variance (0.25) {maximum possible proportion (0.5) * 1-maximum possible proportion (0.5) produces maximum possible sample size}

$\underline{\boldsymbol{d}}$ is the acceptable margin of error for proportion being estimated (0.05).

Therefore the Cochran's sample size was calculated as follows:

$$\underline{\boldsymbol{n}}\boldsymbol{o} = \frac{\underline{\boldsymbol{t}}^{2} * (\boldsymbol{p})(\boldsymbol{q})}{(\underline{\boldsymbol{d}})^{2}} = \frac{(\mathbf{1.96})^{2}\ (\mathbf{0.5})(\mathbf{0.5})}{(\mathbf{0.05})^{2}} = 384 \text{ stakeholder respondents}$$

The study sample from primary data sources was determined using the modified Cochran formula for sample size calculation in small population is as follows:

$$\underline{\boldsymbol{n}}_{\mathbf{1}} = \frac{\boldsymbol{n}_{\mathbf{0}}}{\mathbf{1}+\frac{(\boldsymbol{n}_{\mathbf{0}}-\mathbf{1})}{\boldsymbol{N}}} \tag{2}$$

Where:

$\underline{n}_1$ is the new adjusted sample size

$\underline{n}_0$ is Cochran's sample size

N is the population size

Therefore the sample size was calculated as follows:

$$\underline{\boldsymbol{n}}_{\mathbf{1}} = \frac{\boldsymbol{n}_{\mathbf{0}}}{\mathbf{1}+\frac{(\boldsymbol{n}_{\mathbf{0}}-\mathbf{1})}{\boldsymbol{N}}} = \frac{\mathbf{384}}{\mathbf{1}+\frac{(\mathbf{384}-\mathbf{1})}{\mathbf{650}}} = 242 \text{ stakeholder respondents}$$

3.4.2 Sample size determination for secondary data sources

The sample size (*n*) from secondary data sources was 26 ESIA reports from geothermal and wind energy projects. This sample size was the entire study population (*N*) for secondary data sources. Since *N* was small that is less than 100 items, the entire study population was sampled (*n*) to ensure it reflected variations in the study population (Krejcie

& Morgan, 1970) while allowing use of intensive method of data extraction such as content analysis that generate enormous amount of qualitative data (Isaac & Michael, 1995).

3.5 Data sources

Primary sources were stakeholders in the sectors of environment, energy and civil society who participated in the questionnaire survey. Stakeholders from the environmental sectors were Environmental Impact Assessment Practitioners, Lead and Associate Experts and Officers from National Environment Management Authority County offices. Stakeholders from the energy sector were Officers from Ministry of Energy Headquarters while the civil society groups were NGOs active in counties hosting geothermal and wind energy projects. The list of registered and licenced practitioners in the year 2018 was accessed from NEMA website (www.nema.go.ke) while that of relevant NGOs was identified by the help of Ministry of Energy. Secondary data sources were environmental and social impact assessment reports for geothermal and wind energy projects. Hard copies of the reports were accessed from the NEMA Headquarters while softcopies were retrieved from the NEMA website.

3.6 Data collection tools

3.6.1 Primary data collection

Primary data was collected using structured questionnaires. Two separate questionnaires were administered one to ESIA Practitioners (Appendix A) and the other to NEMA Officers, Ministry of Energy Officers and NGOs (Appendix B). Questionnaire administration method was both by e-mail and in-person contact. The administering was carried out by the Principal Investigator with assistance from two trained Assistants. Follow-up was via e-mail, telephone and physical contact to trigger a response when prolonged delays were noted.

3.6.2 Secondary data collection

Instruments used to collect and record relevant data from secondary sources were tally sheets and collation templates (Appendix C). Tally sheets (Table C1) were used to record review findings of each ESIA report reviewed in terms of reviewed subcategory, category and area. Collation template (Table C 2) was used to collate data from the tally sheets. Fifteen ESIA reports for geothermal energy projects (Appendix D) and eleven ESIA reports for wind energy projects (Appendix E) were reviewed based on the Lee and Colley Review Package (LCRP) as per Lee et al. (1999). The review covered 40 subcategories, 13 categories, 4 areas and overall report quality. The forty subcategories were collapsed into four clusters namely project description and baseline information, impact identification and analysis of alternatives, consultation and public participation (CPP) and environmental and social management plan (ESMP) and communication of findings.

The study preferred LCRP because it is based on international best practice besides its wide use as a quality review tool for ESIA reports (Anifowose et al., 2016; Aung et al., 2018; Gwimbi & Nhamo 2016; Kabir & Momtaz 2014; Kamijo & Huang 2016; Mounir 2015). The LCRP criterion consisted of multiple criteria hierarchically structured in review areas, categories and subcategories (Lee et al., 1999). The lowest level was subcategories, second in hierarchy from the bottom review categories, followed by review areas and overall report grade at the top of the hierarchy.

Starting from the lowest level and moving systematically up the hierarchy, the review involved evaluating how well a number of assessment tasks were performed. The quality of each review subcategory within a particular category was assessed. The subcategory assessment results and relevant impression gained from the ESIA report was then used to assess the review category. The result of the assessment of the review category was used to assess each review area of the ESIA report. The overall quality of the ESIA report was derived from the outcome of the assessment of each of the review areas by considering the main strengths and weaknesses. Based on the quality of information presented in each of the four areas, assessment grades were assigned to each ESIA report as defined in Table 3.

Table 3 Quality review assessment grades for ESIA reports

Grade	Definition	Explanation
A	Excellent	Relevant tasks well performed; no important tasks left incomplete
B	Good	Generally satisfactory and complete, only minor omissions and inadequacies
C	Acceptable	Considered just satisfactory despite omissions and or inadequacies
D	Poor	Parts attempted but as a whole considered just unsatisfactory because of omissions and inadequacies
E	Very poor	Not satisfactory, significant omissions and inadequacies
F	Unsatisfactory	Very unsatisfactory, important tasks poorly done or not attempted

Source: Lee et al., 1999

3.6.3 Reliability of research tools

Reliability was a measurement of the extent to which a research tool provided stable and consistent result (Carmines & Zeller, 1979). It measured the degree to which assessment tools used in the research produced stable and consistent results (Chakrabartty, 2013). Testing of reliability was important as it provided information on the consistency across the parts of the measuring instrument (Huck, 2008). Reliability coefficient ranged between 0 and 1, perfect reliability equalled 1, no reliability equalled 0 (Downing, 2004). Cronbach Alpha coefficient was selected to measure reliability as it was commonly used for questionnaires with multiple Likert questions that formed Likert scales (Whitley et al., 2012).

Coefficients above 0.7 were considered acceptable (Sim & Wright, 2005). In this study primary data collection tools had multiple Likert questions measured on a five-point Likert scale. Testing of reliability of the tools involved piloting twenty questionnaires among the target population (who were later excluded from the study sample) to determine how much the items on the Likert scale were measuring the same underlying dimension. Twenty pilot questionnaires were used in the pre-test to ensure sufficiency in identifying problems with a questionnaire (Perneger et al., 2014). The pilot data was then subjected to reliability test using Cronbach's alpha in IMB SPSS Statistic version 22. Result was Cronbach's alpha of 0.77 implying the scale was of acceptable level of internal consistency (Sim & Wright, 2005).

3.6.4 Validity of research tools

Research instruments such as questionnaires should correctly measure study concepts (Pallant, 2011). An assessment of the accuracy of a research instrument in measuring what it is designed to measure is the validity of that instrument (Robson, 2011). Validity of a research tool is therefore a measure of how well the collected data covers the actual area of investigation (Ghauri & Gronhaug, 2005). There are three major types of validity notably content validity, construct validity and criterion validity (Souza et al., 2017). Content validity measures the extent to which the items that comprise the scale accurately measure the information that is being assessed (Polit, 2015). Construct validity is the measure of the degree to which a group of variables really represents the construct to be measured (Souza et al., 2017). Criterion validity is the relation between the score of a certain instrument and some external criterion (Kimberlin & Winterstein, 2008). Content validity was used to ensure closeness and generalizability (Neuman, 1997).

3.7 Ethical considerations

Approval of the study protocol involved clearance from Egerton University Graduate School and obtaining a research permit from National Commission for Science Technology and Innovation (Appendix F). Permission was also obtained from NEMA and MoE to access secondary data sources and administer questionnaire to their staff (Appendix G). Respondents participated voluntarily and their responses were analysed anonymously.

3.8 Data management

Questionnaires were screened for errors such as incomplete answering of questions. Such errors once detected were rectified were possible. In situations not possible to rectify detected errors such a questionnaire was excluded from data entry and analysis. Collected qualitative data was then entered into the International Business Machines (IBM) SPSS Statistics Version 22.0 for analysis.

3.9 Data analysis

Statistical Package for Social Sciences (SPSS) statistics version 22.0 (IBM Corp) and Microsoft (MS) Excel for windows 2010 were used for data analysis. Statistical tests used were descriptive statistics, ordinal logistic regression and measure of association. Descriptive statistics was performed on MS Excel while ordinal logistic regression and measure of association were performed on SPSS Statistics.

3.9.1 Descriptive statistics

Stakeholder characterization, datasets on the quality of ESIA reports generated from secondary data sources were analysed using descriptive statistics. Descriptive statistical analysis generated both qualitative and quantitative information such as percentages, frequencies, means and sum and presented in the form of tables and graphs. Pie charts were derived from ESIA report quality review data to show contribution of each quality review assessment grade obtained to the overall assessment grade for all the ESIA reports reviewed. Clustered columns were derived from data of ESIA report quality to compare contribution of each review area to the overall assessment grade of the review areas. Stacked columns charts were derived from ESIA report quality data and compared contributions of each ESIA report to subcategory and category assessment grades.

3.9.2 Measure of Association

Measurement of association was between the ordinal indipendent variable ‘public participation comprehensiveness’ and the ordinal dependent variable ‘quality of ESIA reports'. The measurement of association was done to establish if public participation during ESIA affected quality of ESIA report and how it affected the quality. The measurement was done by first categorising, ordering and ranking both the independent and dependent variables of study before running a Somers' delta test in SPSS. Stakeholder participation comprehensiveness categories were ranked based on a combination of stakeholder types in each group as follows; general public; general public and lead agencies; general public, lead agencies and civil society; general public, lead agencies, civil society and other interested parties. The ranking of stakeholder groups was based on the number of stakeholder types in the group. The group with the lowest number of stakeholder types assumed the lowest rank while the group with the highest number of stakeholder types assumed the highest rank. Categorization and ranking of the valiable 'quality of ESIA reports' was derived from qualitative data of each ESIA report which was generated after review of each report based on Lee and Colley Review Package. Categories of the dependent variable 'quality of ESIA reports' were as as per Lee et al. (1999) as follows; very poor; poor; acceptable, good; and excellent. Somers' delta test (Somers'd) was run on SPSS to analyse the strength and direction of association between the independent variable 'public participation comprehensiveness' and dependent variable 'quality of ESIA reports'. Somers'd measured the association between public participation comprehensiveness and quality of ESIA reports. The population value of Somers'd (Somers, 1962) was defined as follows:

$$\mathbf{d_{yx}} = \frac{\mathbf{t_{xy}}}{\mathbf{t_{xx}}} \tag{3}$$

Where:

(i) d_{yx} is a measure of the effect of x, on y, given predictor variable x, and outcome variable y,

(ii) t_{xy} is the difference between two probabilities, namely, the probability that the larger of the two values of the predictor variable x, is associated with the larger of the two values of the outcome variable y, and the probability that the larger value of the predictor variable x, is associated with the smaller value of the outcome variable y.

Somers'd was asymmetric measure (asymmetric meant a distinction was made between a dependent and independent variable) of association between two ordinal variables (Newson, 2006). Somers'd value ranged from -1 to +1. A value of -1 indicated that all pairs of observations were discordant and a value of +1 indicated that all pairs of observations were concordant. A value of zero indicated no association between all pairs of observation (Liebetrau, 1983; Somers, 1962). The absolute value of Somers'd indicated the strength of the relationship while the sign (positive or negative) indicated the direction of the relationship. Somers'd tending towards -1 or +1 suggested the model had good predictive ability while values tending towards zero in either direction indicated the model was a poor predictor.

To ensure validity of results obtained, data analysis procedure had to conform to Somers' delta test assumptions. The first assumption required that two variables of study be tested at a time, one variable to be dependent and the other independent and both variables to be measured on an ordinal scale. This assumption was observed for every test as two of the variables were independent while one was dependent. Likewise, only one of independent variable was tested at a time against the dependent variable. The second assumption required that a monotonic relationship to exists between dependent and independent variable. A monotonic relationship was said to exist when the variables increase in value together; or when one variable value increased, the other variable value decreased. This assumption was observed from the ordering of the independent variables into four to five categories of the number of attributes in each category of the independent variables, likewise from the ordering and ranking of the dependent variable on a five to six-point Likert scale. Cross tabulation was used to examine statistical relationship between the ordinal independent variable and ordinal dependent variables. Cross tabulations between two ordinal variables showed patterns of association and the direction of the relationship between the variables. A summary of statistical methods used to analyse the data is provided in Table 4.

Table 4 Summary of methods used for data analysis

Objective	Variable		Data analysis
	Indipendent	Dependent	
To determine how the application of the ESIA process affect conflict identification and prevention and the resulting effect on procedural effectiveness for proposed renewable energy projects	Procedural effectiveness	Conflict identification and prevention	Descriptive statistics Linear regression (collinearity statistics) Binomial logistic regression (Full likelihood ratio test) Ordinal logistic regression (Full likelihood ratio test, Wald test statistic) Cumulative odds ordinal logistic regression (odds ration)
To ascertain how consultation, public participation and quality of the ESIA report affect conflict identification and prevention and the resulting effect on substantive effectiveness for proposed renewable energy projects	Substantive effectiveness	Conflict identification and prevention	Descriptive statistics Comparative analysis Somers' delta test (asymmetric measure of association) Cross tabulation
To find out how the cost of human resource and time invested during EIA affect conflict identification and prevention and the resulting effect on transactive effectiveness for	Transactive effectiveness	Conflict identification and prevention	Linear regression (collinearity statistics) Binomial logistic regression (Full likelihood ratio test) Ordinal logistic regression (Full likelihood ratio test, Wald test statistic) Cumulative odds ordinal logistic regression (odds

Objective	Variable		Data analysis
	Indipendent	Dependent	
proposed renewable energy projects			ration) Somers' delta test (asymmetric measure of association) Cross tabulation
To ascertain how social and individual norms affect conflict identification and prevention during EIA and the resulting effect on normative effectiveness for proposed renewable energy projects	Normative effectiveness	Conflict identification and prevention	Descriptive statistics Linear regression (collinearity statistics) Binomial logistic regression (Full likelihood ratio test) Ordinal logistic regression (Full likelihood ratio test, Wald test statistic) Cumulative odds ordinal logistic regression (odds ration)

3.9.3 Ordinal logistic regression

Ordinal logistic regression was carried out for ordinal variables to determine the effect of ESIA's procedural, transactive and normative effectiveness in potential conflict identification and prevention. More specifically, cumulative odds ordinal logistic regression analysed the effect of independent variables on dependent variable (Agresti, 2012) in three ESIA effectiveness categories. Since the independent variables were polytomous i.e., ordinal and categorical with three groups while the dependent variable was ordinal, ordered and ranked on a 5-point Likert scale, cumulative odds ordinal logistic regression with proportional odds was preferred (McCullagh, 1980). While all the variables were coded, the ordinal independent categorical variables were recoded (indicator variables) in order to correctly run a linear regression procedure in SPSS. The recoding took the form of indicator coding or effect cording. The recording 'split' the categorical variable into separate parameters (coefficients) that number one less than the number of categories of the categorical variable. The category with the 'missing' indicator variable became the reference category. SPSS Statistics by default used the last category as the reference category. The number of indicator variable categories created for each categorical variable was one less than the number of its categories. Therefore, for each independent indicator variable the recoding generated two indicator variables categories while for the dependent variable the recoding generated four indicator variable categories (Hardy, 1993).

Checking and testing each dataset for conformity to all four assumptions for ordinal logistic regression analysis ensured validity of results (Agresti, 2012). Requirement of dependent variable to be ordinal and one or more independent variables to be continuous, ordinal or categorical was supported by the study research design. A linear regression for each set of independent indicator variables and corresponding dependent indicator variables analysed the assumption of 'no multicollinearity' (Weisberg, 2013). Multicollinearity occurs when two or more independent indicator variables are highly correlated with each other. Multicollinearity is problematic when determining which independent indicator variable is contributing to explaining the dependent variable hence technical issues in calculating an ordinal logistic regression (Midi et al., 2010). Binomial logistic regression (a full likelihood ratio test comparing the fit of the proportional odds model to a model with varying location parameters) analysed 'proportional odds' assumption for each indicator variable (Agresti, 2012; McCullagh, 1980). The 'proportional odds' assumption for modelling ordinal data suggests that the cut point specific odds ratios are homogeneous (Norris et al., 2006). Each indicator variable has the same effect for each cumulative logit (Norris et al., 2006).

Three cumulative odds ordinal logistic regression models were run with ‘logit’ as the link function. Three ESIA effectiveness categories namely procedural, transactive and normative effectiveness were the independent variables while conflict identification and prevention was the dependent variable. Indicators of each independent variable were specified as the model location (Table 5). The category order of the dependent variable was ascending while parameter estimation was by Fischer method. Exponential parameter estimation generated the odds ratios at 95% confidence. In overall the output from the ordinal logistic regression: (a) determined which independent indicator variable had a statistically significant effect on dependent variable; and (b) how well the ordinal logistic regression model predicted the dependent variable. The generalised model was as follows:

$$\text{Link}\left(y_{ij}\right) = \theta_j - \{\beta_1 x_{i1} + \beta_2 x_{i2} + \cdots + \beta_k x_{ik}\} \quad (4)$$

Where:

i) Link () is the link function.
ii) Link $\left(y_{ij}\right)$ is the cumulative probability for the j^{th} category for the i^{th} case.
iii) θ_j is the threshold for the j^{th} category.
iv) k is the number of regression coefficients.
v) $B_{1,} \beta_{2,} \ldots \beta_k$ are the regression coefficients.
vi) X_{i1}, X_{i2},…, X_{ik}, are values of the predictors for the i^{th} case.

Table 5 Variables considered in the regression equestion

Indipendent Variable	Indicators
Procedural effectiveness	- Project identification
	- Screening
	- Scoping
	- Public participation
	- Decision making
	- Project implementation
	- Judicial review
	- Monitoring
Transactive effectiveness	- Time taken to undertake ESIA
	- Financial resource allocation and spending during ESIA

Normative effectiveness	- Skill and experience of ESIA practitioner - Specification of roles for ESIA team member - Health and quality of life - Institutional policy choices - Learning and perceptions change - Adjustment of relevant policy concerning normative goals

3.9.4 Ordinal logistic regression output interpretation

Variance Inflation Factor (VIF) a reciprocal of 'Tolerance' tested the assumption of 'no multicollinearity' by examining collinearity statistics. Assumption of 'no multicollinearity' was met when VIF factor was $\leq$ 10 or Tolerance value of > 0.1. Assumption of 'no multicollinearity' was not met when VIF was $\geq$ 10 or Tolerance value was < 0.1. Proportional odds assumption was tested by the Full likelihood ratio test using χ^2 statistics (chi-squire) by examining the test of parallel lines. Assumption of proportional odds was tenable when $p > 0.05$ and not tenable when $p \leq 0.05$. Overall goodness of fit of the ordinal logistic regression model for ESIA effectiveness category was tested by Likelihood-ratio test. Likelihood-ratio test looked at the change in model fit when comparing the full model to the intercept-only model. The difference in the -2-log likelihood between these two models (full model and intercept-only model) had a χ^2 distributed with degrees of freedom equal to the difference in the number of parameters. The smaller the -2-log likelihood value, the better the fit (i.e., $p \leq 0.05$). Overall test of significance for each independent indicator variable entered into the logistic regression model was tested using the Wald test statistic by examining Tests of Model Effects, when $p \leq 0.05$ the variable was statistically significant. Interpretation of results of the ordinal (logit) regression equation was by examining overall parameter estimates which consist of thresholds and slope coefficients. Thresholds parameter estimates were used to predict dependent variable category probabilities for given values of the independent variables while slope coefficients were interpreted in terms of log odds.

CHAPTER FOUR
RESULTS

4.1 Introduction

The results in this chapter address the effectiveness of ESIA in identifying and preventing potential conflicts from occurring before and during implementation of a proposed project. Information on effectiveness of ESIA procedurally, substantively, transactively and normatively is presented. The highlights of this chapter include ESIA procedural steps that underpin conflict identification and prevention, substantive contribution of stakeholder consultation, public participation and quality of ESIA report in conflict identification and prevention. Additionally, effect of invested time and human resources during ESIA and individual and social norms in identifying and preventing potential conflicts is also presented.

4.2 Stakeholder composition

Out of a sample size of 242 respondents who satisfactorily responded to the questionnaires 82.4%, were ESIA practitioners, 6.2% were from NGOs, 5.8% were from MoE while 5.4% were from NEMA. Practitioners, who had experience in ESIA for geothermal energy projects constituted 10% while 8.5%, had experience in wind energy projects (Table 6). The relatively low percentage in ESIA experiences for geothermal and wind energy projects was attributed to few numbers of geothermal and wind energy projects in the country.

Table 6 ESIA practitioners' experience in geothermal and wind energy subsectors

Subsector	Frequency	Percentage
Geothermal energy	20	10.0
Wind energy	17	8.5
Solar Energy	12	6.0
Hydro energy	3	1.5
Biomass energy	2	1.0
Mining	22	11.0
Housing	31	15.5
Construction	45	22.5
Manufacturing	35	17.5
Urban development	8	4.0
Conservation	5	2.5
Total	200	100

4.3 Effect of ESIA procedural effectiveness in conflict identification and prevention

Procedural effectiveness of ESIA in identifying and preventing potential conflicts focused on compliance with approved ESIA procedures and expected good practice by ESIA practitioners. This effectiveness dimension considered the principles and practice of the impact assessment process implemented by NEMA and other Lead Agencies while civil society groups offered critical oversight.

4.3.1 Potential of ESIA in conflict identification and prevention

Majority of sampled ESIA practitioners 51.5% considered ESIA as a tool for identifying potential conflicts that could arise from implementation of a proposed project (Table 7). The statistics largely confirm literature underpinning of ESIA as an important tool that if appropriately applied can identify conflicts that could arise from implementing a proposed project.

Table 7 Consideration of ESIA tool in potential conflict identification by practitioners

Certainty of consideration	Frequency	Percentage
Always	103	51.5
Never	49	24.5
Rarely	31	15.5
Not sure	17	8.5

Majority of the practitioners 64.5% acknowledged there are situations when ESIA tool fails to prevent identified potential conflicts when a project is being implemented. A small proportion 8% of the practitioners however said there are no instances when ESIA tool has failed to prevent identified potential conflict. While 12.5% of the practitioners where not certain if the ESIA tool could fail to prevent identified potential conflicts., a minority 7.5% did not know if the tool could actually fail to prevent identified potential conflicts when implementing projects. A majority of respondents from MoE (64.4%), civil society (53.3%) and NEMA (53.8%) were of the opinion that ESIA tool can identify potential conflicts when applied appropriately. A minority of the respondents from MoE (14.3%, civil society (26.7%) and NEMA (30.8%) were of a contrary opinion. A small fraction of the respondents (civil society 20%, MoE 21.4% and NEMA 15.4%) were not sure if the tool can be useful in identifying potential conflicts.

4.3.2 Multicollinearity analysis for the independent variable procedural effectiveness and dependent variable conflict identification and prevention

A linear regression analysed multicollinearity between the independent variable indicators of procedural effectiveness and dependent variable indicators of conflict identification and prevention. Variance Inflation Factor (VIF) a reciprocal of 'Tolerance' tested multicollinearity by examining collinearity statistics. Multicollinearity occured when two or more procedural effectiveness variable indicators were highly correlated with each other. Multicollinearity could be problematic when determining which procedural effectiveness variable indicator was contributing to explaining the dependent variable conflict identification and prevention. Interpretation of results was as follows; there was no multicollinearity when VIF factor was ≤ 10 or Tolerance value of > 0.1 however, there was multicollinearity when VIF was ≥ 10 or Tolerance value was < 0.1. A linear regression for the independent variable procedural effectiveness that predicted the dependent variable conflict identification and prevention showed that there was no multicollinearity between two or more of the procedural effectiveness variable indicators in the regression model. The VIF was < 10 the highest being 7.06 while Tolerance value was > 0.1 the lowest being 0.14 (Table 8). This meant no challenge in determining which procedural effectiveness variable indicators in the model were contributing to explaining the dependent variable conflict identification and prevention. The result was an indication that no technical issues could be encountered in calculating an ordinal logistic regression between the indicator variables of procedural effectiveness and indicator variables of conflict identification and prevention. The linear regression result was thus supporting the validity of final result of the cumulative odds ordinal logistic regression for the procedural effectiveness variable.

Table 8 Multicollinearity diagnostic linear regression model for the procedural effectiveness variable

Variable Indicators	Variable Atributes	Collinearity Statistics	
		Tolerance	**VIF**
Project identification	I don't know	0.80	1.23
	No	0.93	1.07
Screening	Irrelevant	0.81	1.23
	Relevant	0.86	1.16
Scoping	Not useful	0.91	1.08

Variable Indicators	Variable Atributes	Collinearity Statistics	
		Tolerance	VIF
	Useful	0.88	1.12
Public participation	Workshops	0.84	1.17
	Public meetings/*Barazas*	0.84	1.18
Decision making	Project cycle	0.41	2.41
	Historical context	0.40	2.46
Project implementation	Early	0.14	6.98
	Midway	0.14	7.06
Judicial review	Never useful	0.92	1.08
	Sometimes useful	0.93	1.06
Monitoring	Baseline monitoring	0.94	1.05
	Periodic monitoring	0.88	1.13

4.3.3 Analysis of proportional odds for procedural effectiveness variable

Binomial logistic regression (a full likelihood ratio test comparing the fit of the proportional odds model to a model with varying location parameters) analysed proportional odds for procedural effectiveness variable. Proportional odds were tested by the full likelihood ratio test using χ^2 statistics by examining the test of parallel lines. Proportional odds was tenable when $p \geq 0.05$ and not tenable when $p \leq 0.05$. Results of binomial logistic regression for the procedural effectiveness variable showed that assumption of proportional odds was tenable as assessed by a full likelihood ratio test comparing the fit of the proportional odds model to a model with varying location parameters, χ^2 (48) = 51.22, p = 0.34 (Table 9). This result meant that the cut point specific odds ratios were homogeneous hence each procedural effectiveness variable indicator in the model had the same effect for each cumulative logit. The result further supported validity of final cumulative odds ordinal logistic regression for the procedural effectiveness variable.

Table 9 Proportional odds for procedural effectiveness variable

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	459.04			
General	407.82	51.22	48	0.34

The odds ratio is the exponential of the log odds. Odds ration for procedural effectiveness variable indicators showed that the most significant independent variable indicators for procedural effectiveness were public participation, decision making, project implmenetaion and monitoring (Table 10).

Table 10 Odds ration of the most significant procedural effectiveness variable indicators

Indipendent variable indicator	Log odds	Odds ratio
Public participation	1.93	6.93
Decision making	-0.89	0.40
Project implementaion	1.03	2.81
Monitoring	-0.65	0.51

4.3.4 Model fit for procedural effectiveness variable

Overall goodness of fit of the ordinal logistic regression model for the procedural effectiveness independent varable indicators was tested by likelihood ratio test. Likelihood ratio test looked at the change in model fit when comparing the full model to the intercept-only model. The difference in the -2-log likelihood between the two models; (full model and intercept-only model) had a χ^2 distributed with degrees of freedom equal to the difference in the number of parameters. The smaller the -2-log likelihood value, the better the fit (i.e., $p \leq 0.05$). Model fit as shown in Table 11 was tested at 95% confidence. The model fit was assessed by likelihood-ratio test. Result showed that the final model statistically significantly predicted the dependent variable conflict identification and prevention over and above the intercept-only model, $\chi^2(16) = 29.79$, $p = 0.02$ (Table 11).

Table 11 Model fit for procedural effectiveness variable

Model	-2log likelihood	Chi-square	df	Sig.
Intercept only	470.18			
Final	440.39	29.79	16	0.02

This result on model fit implied that procedural effectiveness variable indicators were of statistical significance to the model. This meant that atleast one of the procedural effectiveness variable indicators in the model was statistically significant and hence added to the correct prediction of the dependent variable conflict identification and prevention.

4.3.5 Overall significance of procedural effectiveness variable

Test of overall significance for procedural effectiveness variable indicators in the logistic regression model was by Wald test statistic by examining ‘tests of model effects’, when $p \leq 0.05$ the variable indicator was statistically significant. Overall effect of two procedural effectiveness variable indicators in the model namely public participation and monitoring were statistically significant, χ^2 (2) = 9.12, p=0.01 and χ^2 (2) = 6.29, p=0.04 respectively. This meant that public participation and monitoring had a statistically significant effect on the prediction of the effectiveness of ESIA process in conflict identification and prevention, Wald χ^2 (2) = 9.12, p = 0.01 and Wald χ^2 (2) = 6.29, p = 0.04 respectively. Table 12 tabulates overall significancy of procedural effectiveness variable indicators while Table 13 is the frequency distribution of each variable attribute.

Table 12 Overal significance for the procedural effectiveness variable

Source	**Type III**		
	Wald Chi-Square	**df**	**Sig.**
Project identification	0.29	2	0.86
Screening	0.33	2	0.84
Scoping	0.27	2	0.87
Public participation	9.12	2	0.01
Decision making	4.88	2	0.08
Judicial review	3.54	2	0.17
Project implementation	4.74	2	0.09
Monitoring	6.29	2	0.04

Table 13 Frequency distribution **for procedural effectiveness variable attributes**

Variable indicators	**Variable attributes**	**Frequency**	**Percentage**
Project identification	I don’t know	13	6.5
	No	139	69.5
	Yes	48	24.0
	Total	242	100
Screening	Irrelevant	37	18.5
	Relevant	39	19.5

Variable indicators	Variable attributes	Frequency	Percentage
	Very relevant	124	62.0
	Total	242	100
Scoping	Not useful	77	38.5
	Useful	68	34.0
	Very useful	55	27.5
	Total	242	100
Public participation	workshops	11	5.5
	Public meeting (baraza)	161	80.5
	Public hearing	28	14.0
	Total	242	100
Decision making	Project cycle	23	11.5
	Historical context	33	16.5
	Social context	144	72.0
Judicial review	Never useful	52	26.0
	Sometimes useful	84	42.0
	Always useful	64	32.0
	Total	242	100
Project implementation	Not possible	17	8.5
	Sometimes No	30	15.0
	Sometimes yes	153	76.5
	Total	242	100
Monitoring	I don’t know	20	10.0
	No	28	14.0
	Yes	152	76.0
	Total	242	100

4.3.6 Statistically significant procedural effectiveness variable indicators

The ordinal regression equation result for procedural effectiveness variable was interpretated by examining overall parameter estimates which consist of thresholds and slope coefficients. Thresholds parameter estimates; were used to predict the dependent variable conflict identification and prevetion category probabilities for given values of the procedural effectiveness independent variable indicators while slope coefficients were interpreted in terms of log odds. Results of the cumulative odds ordinal logistic regression for the procedural effectiveness variable indicators showed that public participation, decision making, project implementation and monitoring were statistically significant χ^2 (1) = 9.12, p = 0.00; χ^2 (1) = 4.04, p = 0.04; χ^2 (1) = 3.64, p = 0.05 and χ^2 (1) = 3.31, p = 0.00 respectively.

4.3.7 Effect of procedural effectiveness on conflict identification and prevention

Thresholds parameter estimates were used to predict conflict identification and prevention based on procedural effectiveness values while slope coefficients were interpreted in terms of log odds. The odds ratio is the exponential of the log odds. The odds of potential conflicts identification and prevention when public participation was in workshops was 6.93 (95% CI, 1.97 to 24.35) times compared to when public participation was in the form of public hearing, a statistically significant effect, Wald χ^2 (1) = 9.12, p = 0.00. The odds of potential conflict identification and prevention when public participation was in the form of public meetings/barazas was similar to when public participation was in the form of public hearing {odds ratio of 1.41 (95% CI, 0.77 to 2.58)}, Wald χ^2 (1) = 1.28, p = 0.25. The odds of potential conflicts identification and prevention when decisions were based on historical context was 0.40 (95% CI, 0.17 to 0.97) times compared to when decisions are based on social context, a statistically significant effect, Wald χ^2 (1) = 4.04, p = 0.04. The odds of potential conflicts identification and prevention when decisions were based on project cycle was similar to when decisions were based on social context (odds ratio of {0.70 (95% CI, 0.31 to 1.55)}, Wald χ^2 (1) = 0.76, p = 0.38. The odds of potential conflicts identification and prevention in early stage of project implementation was 2.81 (95% CI, 0.97 to 8.17) times compared to the end of project implementation, a statistically significant effect, Wald χ^2 (1) = 3.64, p = 0.05. The odds of potential conflict identification and prevention midway of project implementation was similar to towards end of project implementation {odds ratio of1.58 (95% CI, 079 to 3.14)}, Wald χ^2 (1) = 1.71, p = 0.19. The odds of potential conflict identification and prevention during baseline monitoring was 0.51 (95% CI, 0.25 to1.05) times compared to periodic monitoring, a statistically significant effect, Wald χ^2 (1) = 3.31, p = 0.00. The odds of potential conflict identification and prevention during control monitoring was similar to periodic monitoring {odds ratio of 3.42 (95% CI, 073 to 16.04)}, Wald χ^2 (1) = 2.44, p = 0.11. A detailed output result of this analysis is tabulated in detail in Appendix H.

4.4 Effect of ESIA substantive effectiveness on conflict identification and prevention

Substantive effectiveness of ESIA in conflict identification and prevention measured whether ESIA was able to influence informed decisions that contribute to protecting the environment. Information gathered throughout the stakeholder consultation and public participation process during ESIA was critical in supporting decisions made. Information presented in an ESIA report for a proposed project was crucial as it guided the licensing authority in the decision-making process for that project.

4.4.1 Forms of public participation documented in ESIA reports

Six forms of stakeholder and public consultations were documented in the ESIA reports for geothermal and wind energy projects (Table 14). These consultation techniques were questionnaire survey (within project catchment), public meeting / *baraza* (targeting general public), focused group discussions (targeting special interest groups mainly women groups, youth groups and people with disability), key informant interviews (targeting local opinion leaders and civil society groups), door-to-door consultations (targeting project affected persons) and one-on-one interviews (targeting government agencies and project proponents). Public meetings/ barazas, a mandatory requirement form of public participation as captured in the Environmental (Impact Assessment/ Audit) Regulations, 2003 was the most widely used public participation method for both geothermal and wind energy projects.

Table 14 Percentage distributions of different forms of public participation used during esia study for geothermal and wind energy projects

Type of stakeholder consultation	**geothermal energy ESIA reports**		**Wind energy ESIA reports**	
	%	**n**	**%**	**n**
Questionnaire survey	87	13	82	9
Public meetings/baraza	100	15	100	11
Focused group discussions	100	15	91	10
Key informant interviews	100	15	82	9
Door-to-door consultations	53.3	5	45.5	5
One-on-one interviews	93.3	14	91	10

4.4.2 Comparison of local ESIA public participation practice vis-à-vis international best practice operating principles

Information used in the comparative analysis for local public participation during ESIA process was based on legal instruments underpinning public participation in Kenya including during ESIA process mainly the Constitution of Kenya 2010, Cap 387 the Environmental Management and Coordination Act, 1999 (Amended) 2015 and the Environmental Impact Assessment /Audit, Regulations, 2003. International best practice operating principles of public participation based on international legal instruments such as the Aarhus Convention, United Nation Conference on Environment and Development, Convention on Environmental Impact Assessment in a Trans-boundary Context, Principle 17 of the 1992 Rio Declaration on Environment and Development and Agenda 21. Seven principles that guide international best practice of public participation guided the comparative analysis. The analysis established point of convergence and divergence, established strengths and weakness in local practice vis-à-vis international best practice and flagged out loopholes that needed attention.

Result of the analysis identified the following shortcomings of Kenya's public participation during ESIA; public participation is not initiated early nor sustained throughout the ESIA process because stakeholders are mostly not involved in early project stages of design, determination of project location nor in project approval stage. The practice is not well planned and does not focus on negotiable issues because it is organisationally deficient of a clear outline of what its aim is, rules and procedure to be followed and the expected outcome. It does not identify issues that stakeholders will negotiate on in order to aid decision making as stakeholders are viewed as a recipient of project information as opposed to equals capable of influencing project decision.

Information diffusion on public participation and capacity building are both too limiting and prohibiting by design, location and language because capacity building for better public participation during ESIA process is not actualised. Language used in notices, posters and radio announcement is commonly English which locks out many stakeholders. Information access is prohibitive as one will require access to internet and the requisite technical capacity to retrieve required information from relevant databases. The practice is not context oriented as cultural, social, economic and political dimensions are mostly ignored nor is it credible and rigorous as facilitators are interested parties and hence not neutral. The detailed analysis is presented Table 15.

Table 15 Comparison of international best practice 0perating principles of public participation vis-a-vis local practice during esia process

International principles of best practice of public participation for ESIA process	**Local public participation practice during ESIA process**
Initiated early & sustained	Public is involved at scoping, report preparation and report review stages
Public to be involved before major decisions are made Public to be involved regularly in the ESIA process	Public is involved by making contributing in three public meetings, during public hearing and by sending written and oral submissions on the ESIA Study Report
Well planned & focussed on negotiable issues	Focus on methods of engaging the affected stakeholders
All impact assessment stakeholders should know the aims, rules, organization, procedure and expected outcomes of the public participation process undertaken	Focuses on explaining the project and its effects
Emphasise understanding and respect for the values and interests of participants	
Focus on negotiable issues relevant to decision making	
Supportive to participants Adequate diffusion of information on the proposal and on the public participation process	Information on a proposed renewable energy project is only available at the website of the environmental agency and at the national and County office of the environmental agency where the proposed project is to be located
Equitable access to funding or financial assistance Capacity-building, facilitation and assistance to groups who don't have the capacity to participate	Diffusion of information on public participation process is limited to what is provided in ESIA Regulations There is no provision for funding support to enable economically disadvantaged stakeholders satisfactorily participate in the EIA process

International principles of best practice of public participation for ESIA process	Local public participation practice during ESIA process
Tiered & optimised Public participation should occur at the most appropriate level of decision-making The public should be invited to participate regularly, with emphasis on appropriate time for involvement Optimization in time and space to ensure more willing participation	Public participate in public meetings before ESIA report is compiled, in public hearing and send comments once the ESIA report has been compiled Public invited by notices, posters and radio announcement
Open & transparent Access to all relevant information by all stakeholders Provision of information and facilitation to ensure participation	Information on public participation is available at NEMA, website, print and electronic media Information is in English language only
Context oriented Be adapted to the social organization of the impacted communities, including the cultural, social, economic and political dimensions	The social organization of the impacted people is mostly ignored
Credible & rigorous Adhere to established ethics, professional behaviour and moral obligations Facilitation by a neutral facilitator	Facilitation during public meeting/ baraza is by a Lead Expert while during public hearing is by an official from the regulator (NEMA), National Government Officer from hosting County or Region

4.4.3 Responses of ESIA stakeholders on substantive effectiveness of public participation

Substantive contribution of public participation in environmental decision making (substantive effectiveness) focuses on a number of issues including stakeholder participation during ESIA process. Perceptions of ESIA stakeholders in renewable energy subsector were sampled to establish how they perceive effectiveness of their participation in substantively contributing to environmental decisions (Figures 4-7). Results show majority of ESIA practitioners' respondents (48%) (Figure 4) and civil society (46%) (Fig. 6) and a significant percentage from NEMA (31%) (Figure 7) and Ministry of Energy (29%) (Fig. 5) perceive public participation during ESIA process as ineffective in substantively contributing to environmental decisions. Only a small percentage of between 6 to 8 of respondents from each category perceived public participation during ESIA process as being very effective in substantively contributing to environmental decisions.

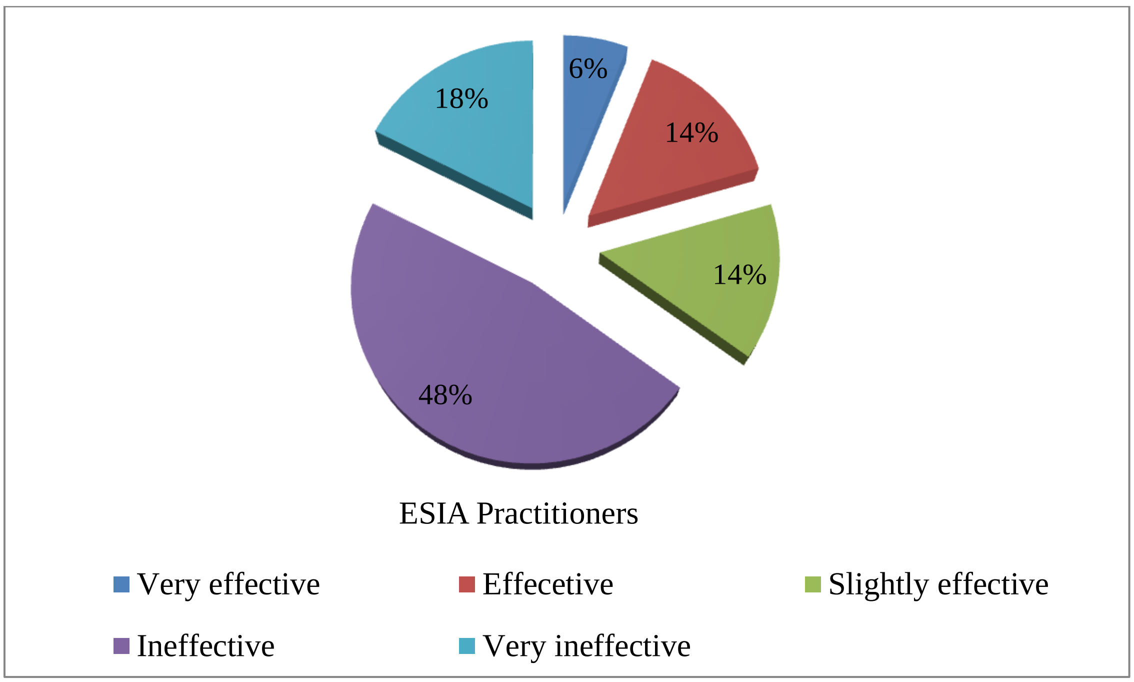


Figure 4 ESIA Practitioners' responce on substantive effectiveness of public participation

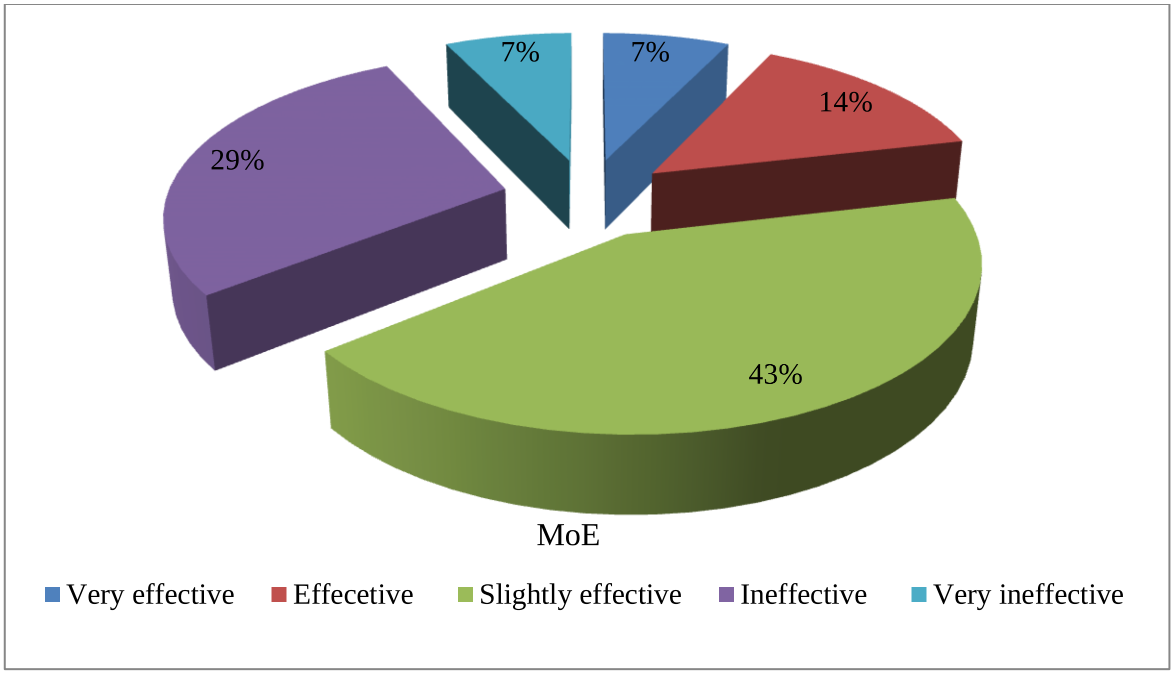


Figure 5 Responses of MoE respondents on substantive effectiveness of public participation

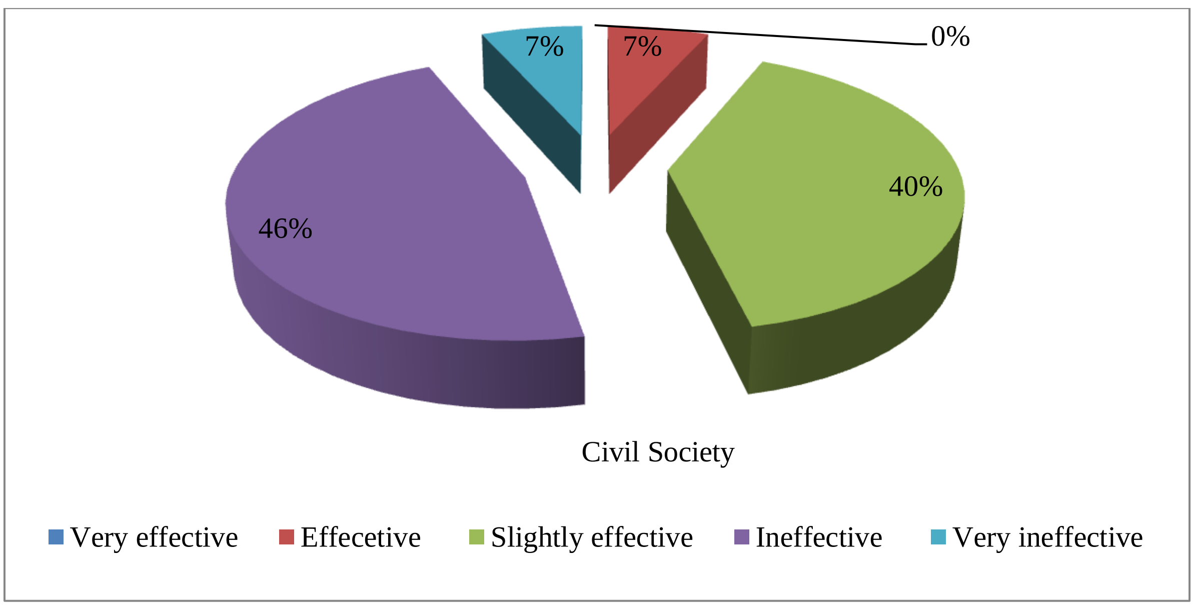


Figure 6 Responses of civil society respondents on substantive effectiveness of public participation

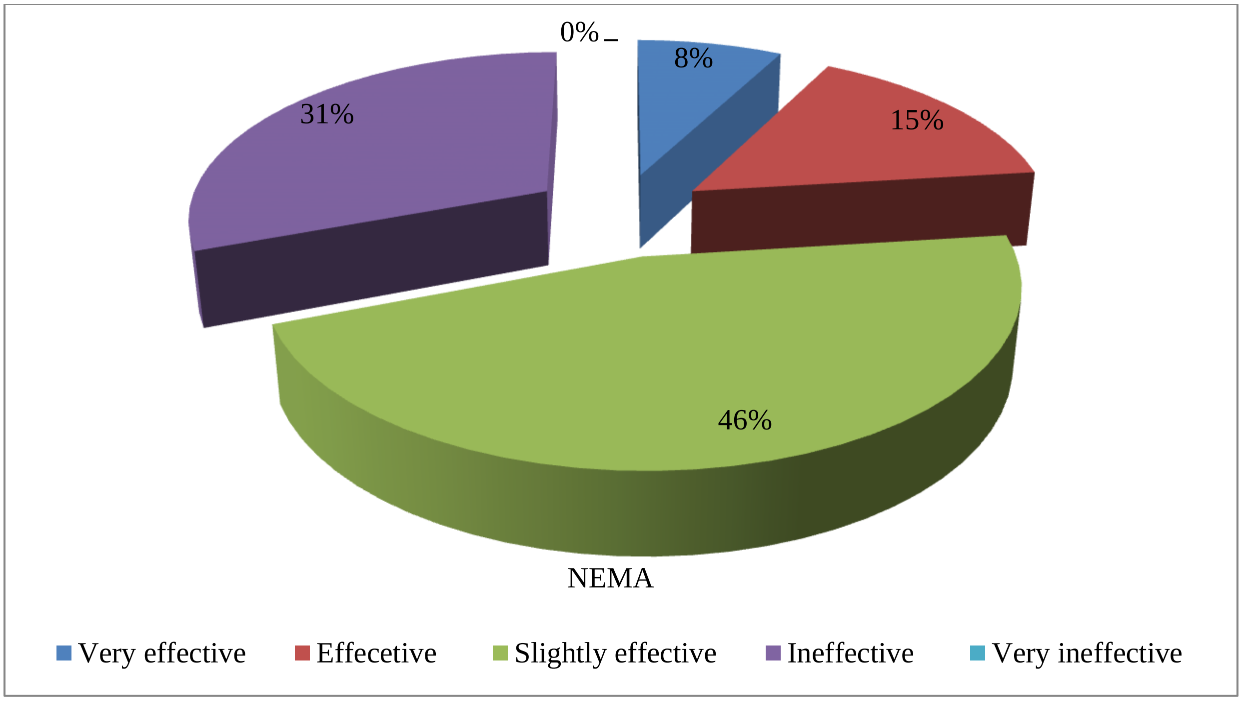


Figure 7 Responses of NEMA respondents on substantive effectiveness of public participation

4.4.4 Quality of ESIA reports for geothermal and wind energy projects

Environmental and Social Impact Assessments are vital for evaluation and integration of environmental and social concerns of a proposed development. Quality of ESIA reports is critical for informed decision making. Quality of ESIA reports for geothermal energy projects, *N*=15 and wind energy projects, *N*=11 was analysed. The review was hierarchically structured in review areas, categories and subcategories. It covered 4 areas, 13 categories and 40 subcategories. Lowest review level was subcategory, second in hierarchy from the bottom was review category, then review area and overall report grade at the top of the hierarchy.

The subcategories were clustered into four namely project description and baseline information, impact identification and analysis of alternatives, consultation public participation (CPP) and environmental and social management plan (ESMP) and communication of findings. Quality of geothermal and wind energy ESIA for subcategories clustered as project description and baseline information was good in eleven of the twelve subcategories for most of the reports. The worst performing subcategory in this cluster was sources of data with justification as shown in Figure 8. Quality of geothermal energy ESIA reports for subcategories clustered as impact identification and analysis of alternatives was good for most of the subcategories. However, that of wind energy reports was acceptable for most of the subcategories. The worst performing subcategory for both geothermal and wind energy reports in the cluster was risk and uncertainties as shown in Figure 9. Quality of geothermal and wind energy ESIA reports for subcategories clustered under consultation public participation and environmental and social management plan was acceptable for most subcategories. The worst performing subcategories in the cluster for both geothermal and wind energy reports were residual impacts and reporting and communication of monitoring results (Figure 10). Quality of geothermal and wind energy ESIA reports for subcategories clustered under communication of findings was generally good. The worst performing subcategory in this cluster was defining technical terms for both geothermal wind energy reports as shown in Figure 11.

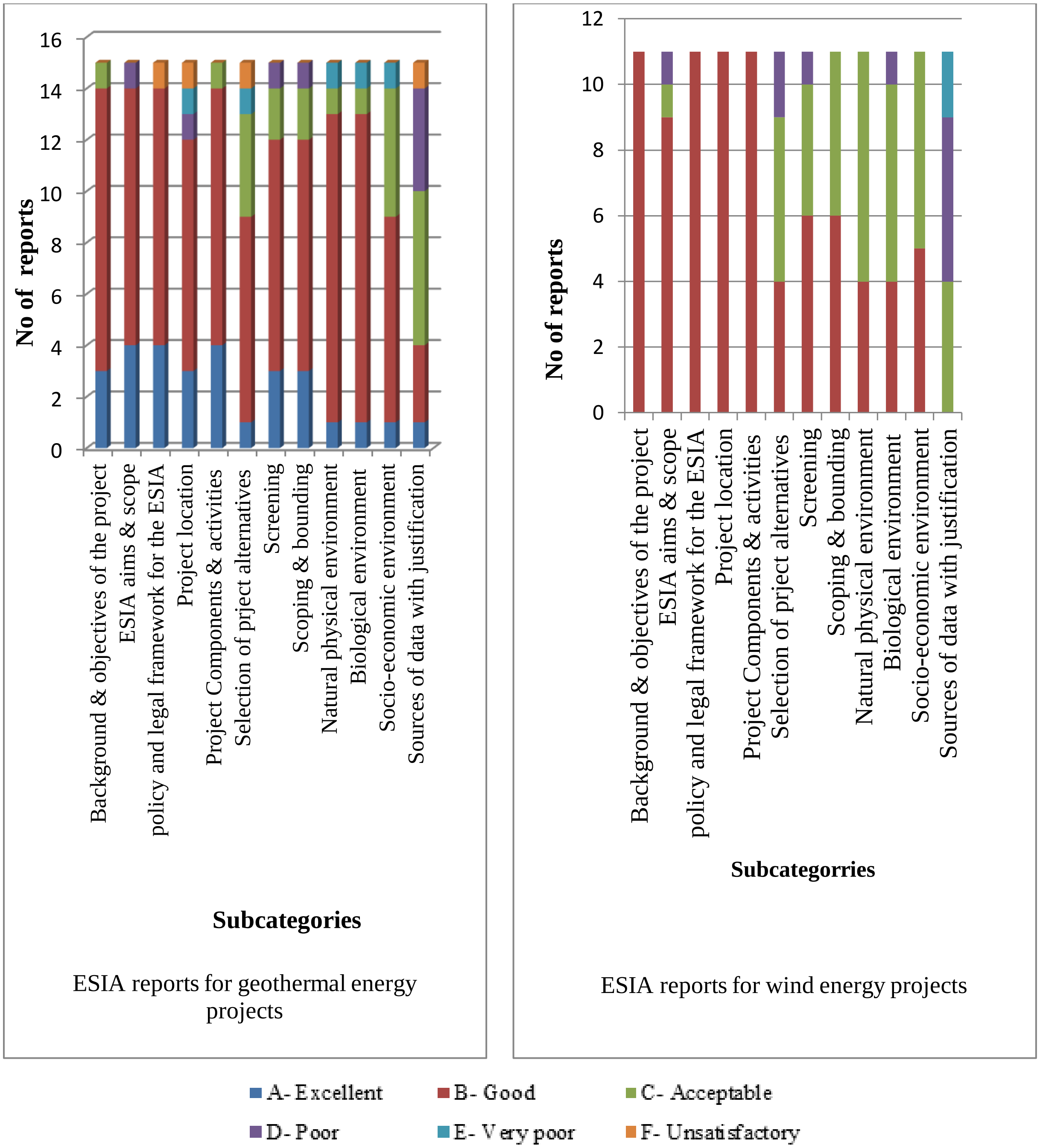


Figure 8 Comparison of quality of ESIA reports for geothermal and wind energy projects in subcategories clustered as description and baseline information

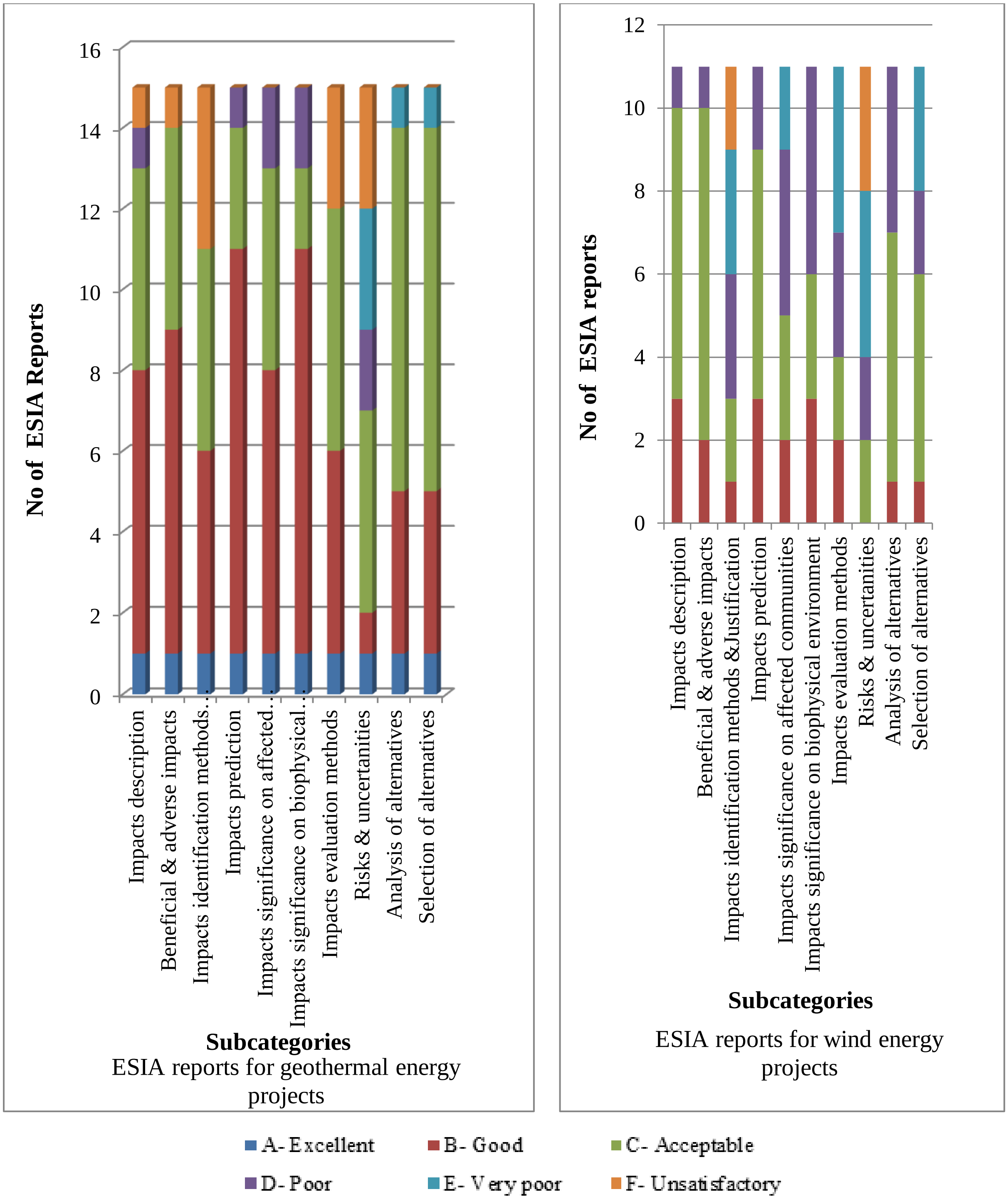


Figure 9 Comparison of quality of ESIA reports for geothermal and wind energy projects in subcategories clustered as impact identification and analysis of alternatives

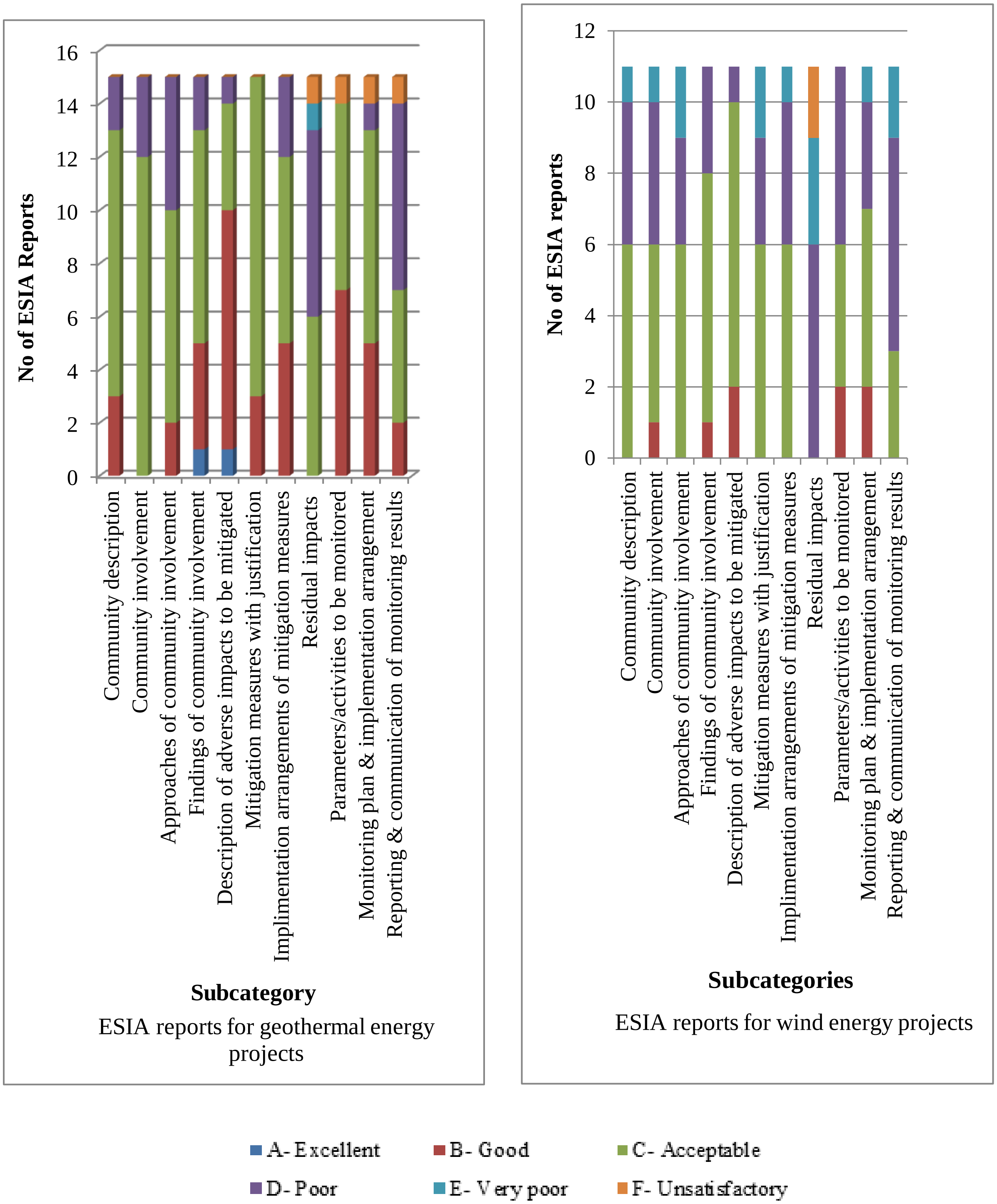


Figure 10 Comparison of quality of ESIA reports for geothermal and wind energy projects in subcategories clustered as CPP and ESMP

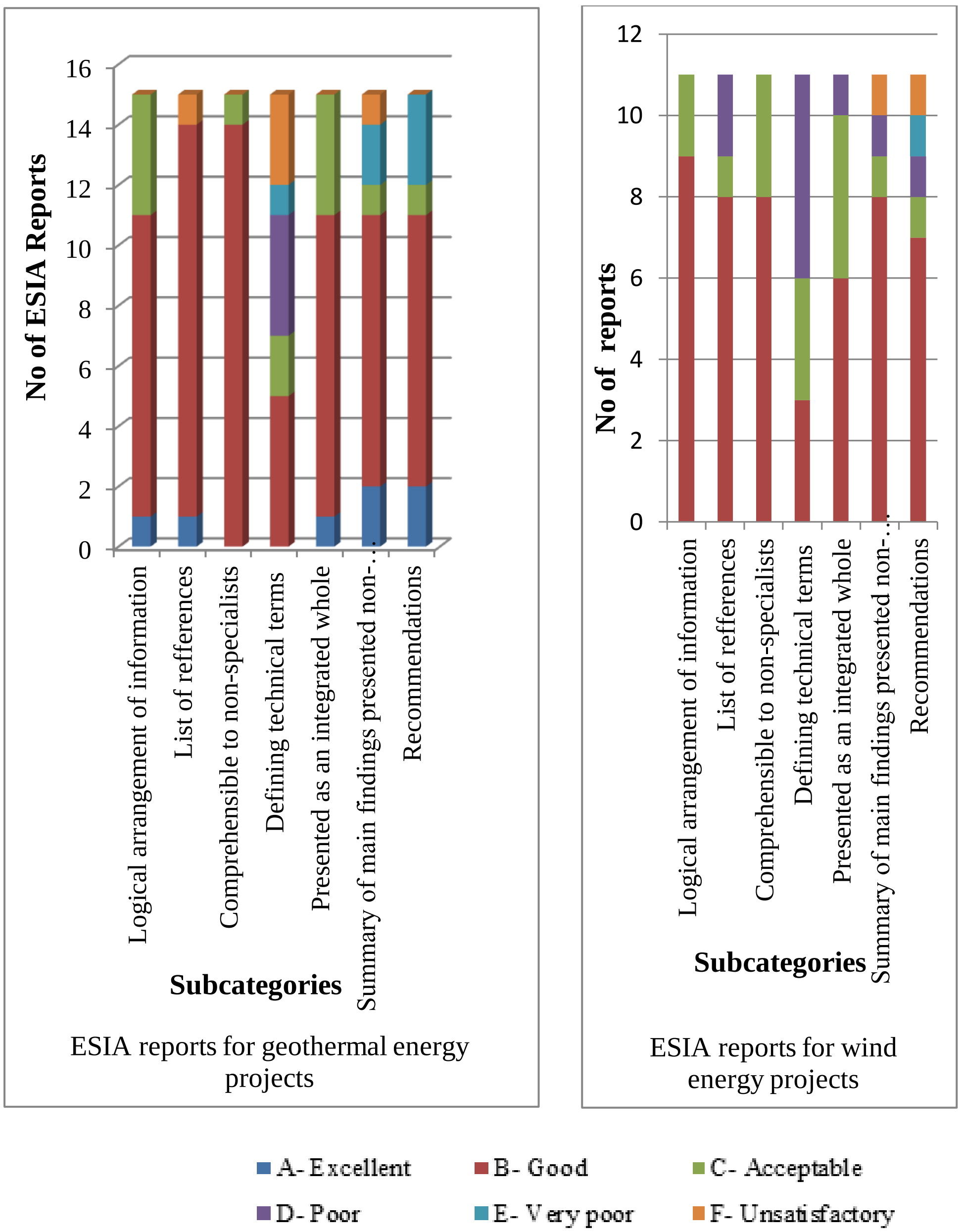


Figure 11 Comparison of quality of ESIA reports for geothermal and wind energy projects in subcategories clustered as communication of findings

Category review of ESIA reports for geothermal energy projects results showed that 1-3 (6-20%) of reports reviewed were of excellent quality in nine categories, poor and very poor quality in six categories. Quality of one report (7%) was unsatisfactory in one assessment category, 2-11 (13-73%) and 1-11 (6-73%) of the reports were of good quality in all the assessment categories. In the case of ESIA reports for wind energy projects, 9.1 (*n*=1) to 72.7% (*n*=8) of the ESIA reports were of good quality in eleven of thirteen review categories.

Acceptable quality of the reports was recorded in 18.2% (*n*=2) to 81.8% (*n*=9) across the thirteen categories reviewed. A small percentage range of 36.4% (*n*=4) to 54.5% (*n*=6) of the reports was of poor quality in five review categories. Only 9.1% (*n*=1) to 18.2% (*n*=2) of the reports were of very poor quality in two review categories (Figure 12).

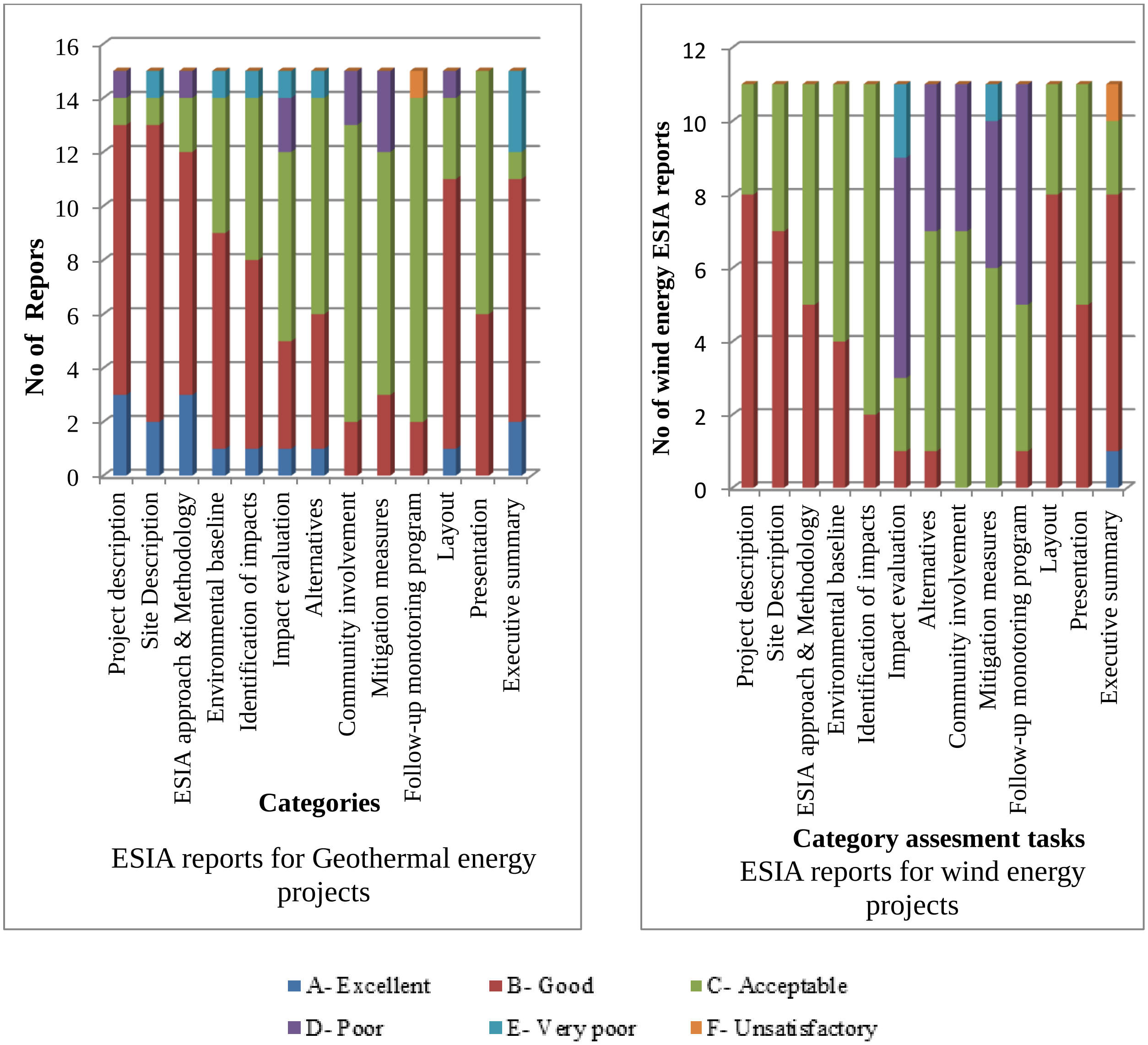


Figure 12 Comparison of quality of ESIA reports for geothermal and wind energy projects in assessment category

Eighty percent (*n*=12) and 66% (*n*=10) of the ESIA reports for geothermal energy projects reviewed were of good quality in two review areas of description of the development and baseline conditions and presentation of environmental impact statement, respectively. The quality only one ESIA report was excellent in three review areas of identification and evaluation of key impacts, presentation of environmental impact assessment statement and description of the development and baseline conditions. Likewise, the quality of 6% (*n*=1) ESIA report was very poor in one review area of environmental management plan and follow-up (Figure 13).

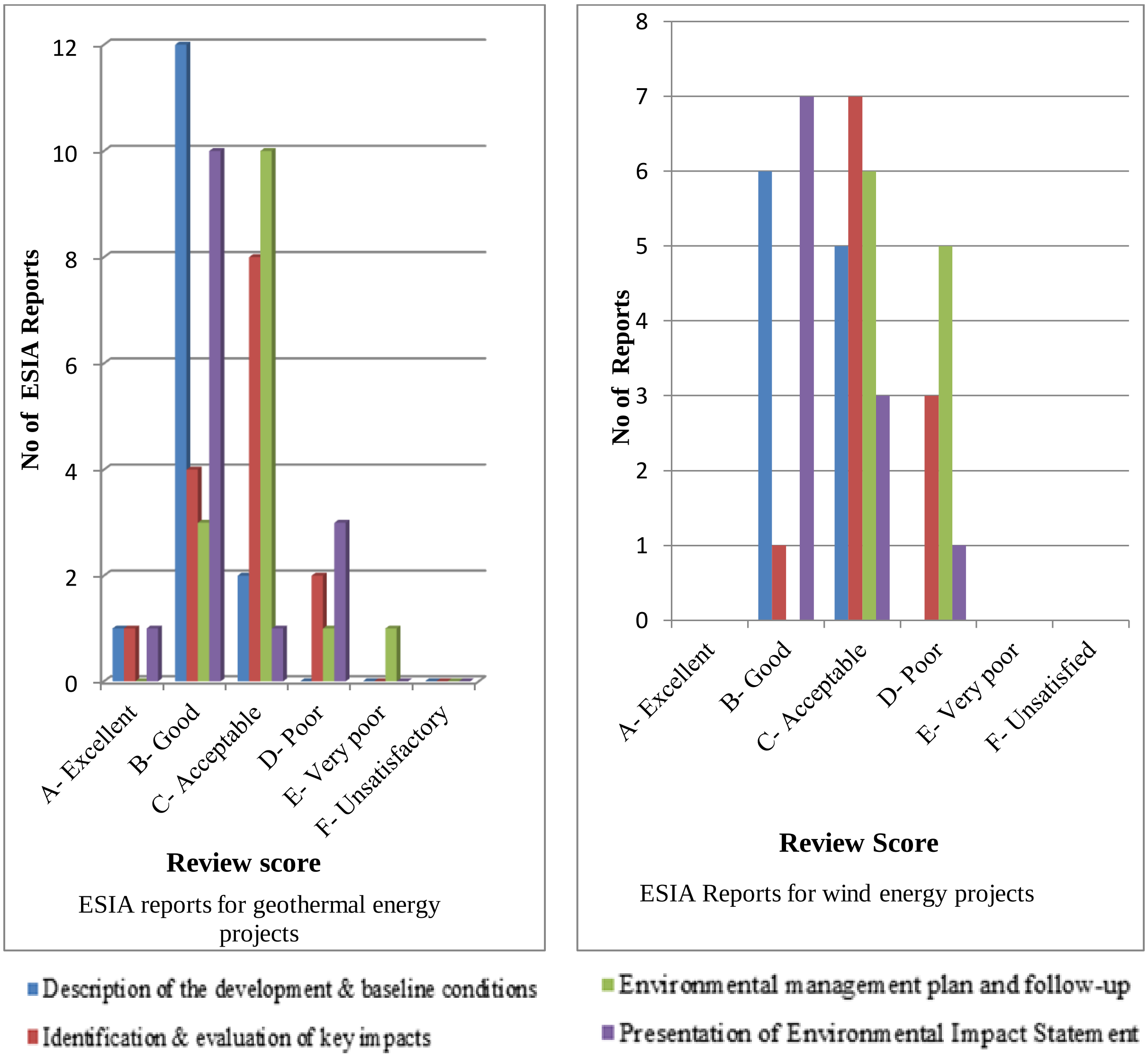
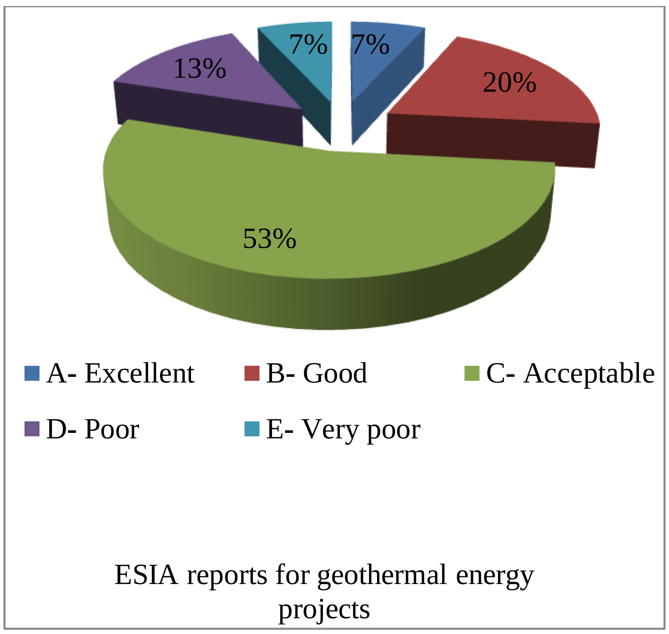


Figure 13 Comparison of review area quality of ESIA reports for geothermal and wind energy projects

Overall, a marginal 7%, *n*=1 of the ESIA reports for geothermal energy projects reviewed were of excellent quality with relevant tasks well performed and that no important task was left incomplete. However, overall quality of few of the ESIA reports 20%, *n*=3 were good where the reports were generally satisfactory and complete with only minor omissions and inadequacies. The overall quality of most of the reports (53%), *n*=8 was acceptable indicating satisfactory despite omissions and inadequacies. The overall quality of minimal percentage of the ESIA report (13%), *n*=3 was poor meaning that parts of the reports were well attempted, but in overall, considered unsatisfactory because of omissions and inadequacies. None of the ESIA reports reviewed for wind energy projects was of excellent quality as omissions and inadequacies was recorded in each of the reports. Overall quality of 18% (*n*=2) of the ESIA reports was good. The reports were generally satisfactory and complete with only minor omissions and inadequacies. Overall quality of 55% (*n*=6) of the ESIA reports was acceptable. Equally, overall quality of another 18% (*n*=2) of the ESIA reports was poor. Parts of the reports were well attempted, but in overall, considered unsatisfactory because of omissions and inadequacies. Figure 14 illustrates percentage distribution of the overall quality of reviewed ESIA reports for wind energy projects.



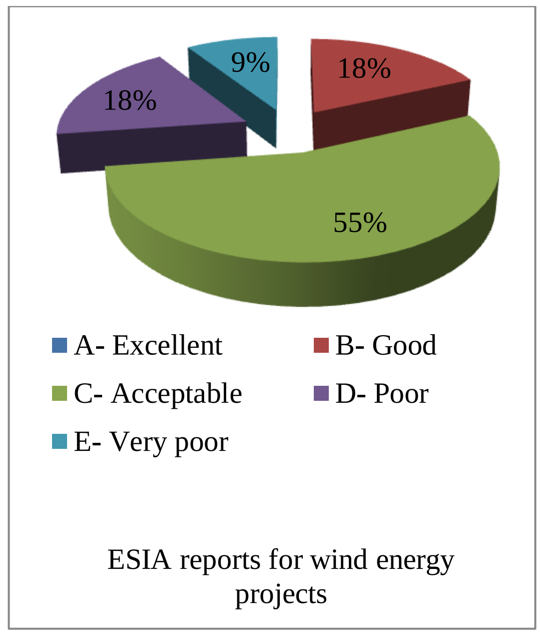


Figure 14 Percentage distribution of overall quality of reviewed ESIA reports for geothermal and wind energy projects

4.4.5 Association between public participation and quality of ESIA reports

Data of two variables namely public participation comprehensiveness (independent variable) and quality of ESIA reports (depended variable) obtained from qualitative analysis of the ESIA reports of geothermal and wind energy projects was statistically analysed. Result of the sample characteristics show that 100% of sample (*n*=26) was valid as tabulated in Table 16.

Table 16 Valid and missing cases of the sample 0f public participation and quality of esia reports

Valid		**Missing**		**Total**	
n	**Percent**	***n***	**Percent**	***n***	**Percent**
26	100.00	0	0.00	26	100.00

When only general public participated during consultation and public participation forums of ESIA, resulting ESIA report was likely to be of not of acceptable quality. As more stakeholder categories participated in the consultative process the quality of the resulting ESIA report was likely to improve to acceptable quality and beyond (Table 17).

Table 17 Cross tabulation of public participation comprehensiveness and quality of esia reports

Public participation comprehensiveness	**Quality of ESIA Reports**					
	Very poor	**Poor**	**Acceptable**	**Good**	**Excellent**	**Total**
No participation	0	0	0	0	0	0
General public	2	3	3	0	0	8
General public and lead agencies	0	1	4	4	0	9
General public, lead agencies and civil society	0	0	6	2	0	8
General public, lead agencies, civil society and other interested parties	0	0	0	0	1	1
Total	2	4	13	6	1	26

Somers' derivative was run to determine the association between public participation comprehensiveness and quality of ESIA reports among 26 ESIA reports of geothermal and wind energy projects. There was a strong, positive correlation between public participation comprehensiveness and quality of ESIA reports, which was statistically significant, $d = 0.49$, $p < 0.0005$. Table 18 is a presentation of Somers' derivative output.

Table 18 Somers' derivative directional measure of association between public participation and quality of ESAI reports

			Value	Asymp. Std. Error [a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Somers' d	Symmetric	0.50	0.12	3.52	0.00
		Public participation comprehensiveness	0.51	0.11	3.52	0.00
		Quality of ESIA Report	0.49	0.13	3.52	0.00

Note.

a. Not assuming the null hypothesis

b. Using the asymptotic standard error assuming the null hypothesis

4.4.6 Effect of language used in consultation forum

Language is vital for effective communication to a target audience. Language used in public participation forum should therefore be well understood by the target audience for them to actively, effectively and objectively participate in the consultation process. When the communication to the target audience is in a language that is well understood, then participants are able to contribute profoundly and bring out concerns, issues and suggestions that will contribute to informed decisions. The effect of language used during public participation was compared across clusters of stakeholders consulted to check if it had any significance on quality of ESIA report. Results show that use of local vernacular language alongside Kiswahili and English had a positive effect. Figure 15 show how language used during CPP contributed to quality of final ESIA reports.

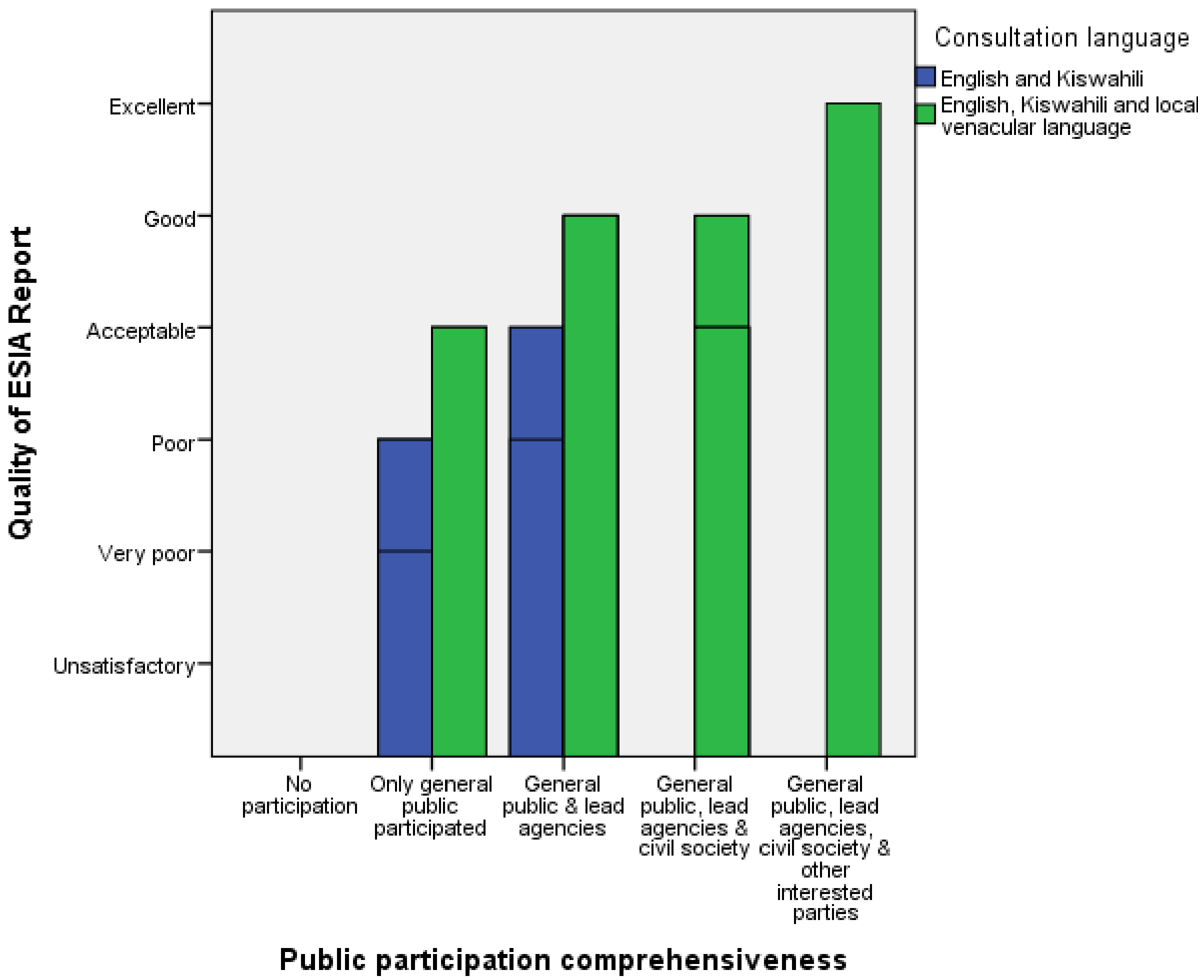


Figure 15 Significance of consultation language on quality of ESIA report

4.5 Effect of ESIA transactive effectiveness on conflict identification and prevention

Transactive effectiveness dimension of ESIA in conflict identification and prevention was measured based on proficiency in resources use and time consumed during ESIA. Based on this dimension, the outcome of the ESIA process in terms of identification and prevention of potential conflicts that could arise from a proposed project was influenced by training and experience of ESIA practitioners undertaking the assessment. Also, time and financial resourced availed for the execution of an ESIA for a proposed project had an effect on the outcome in terms of identifying and preventing potential conflicts for the proposed project.

4.5.1 Multicollinearity analysis for the independent variable transactive effectiveness and dependent variable conflict identification and prevention

A linear regression analysed multicollinearity between the independent variable indicators of transactive effectiveness and dependent variable indicators of conflict identification and prevention. Variance Inflation Factor (VIF) a reciprocal of 'Tolerance' tested multicollinearity by examining collinearity statistics. Multicollinearity occured when two or more transactive effectiveness variable indicators were highly correlated with each other. Multicollinearity could be problematic when determining which transactive effectiveness variable indicator was contributing to explaining the dependent variable conflict identification and prevention. Interpretation of results was as follows; there was no multicollinearity when VIF factor was ≤ 10 or Tolerance value of > 0.1 however there was multicollinearity when VIF was ≥ 10 or Tolerance value was < 0.1. A linear regression model for the independent variable transactive effectiveness that predicts the dependent variable conflict identification and prevention showed that there was no multicollinearity between two or more of the indicators of the transactive effectiveness variable in the regression model. The VIF was < 10 the highest being 2.46 while Tolerance value was > 0.1 the lowest being 0.41 (Table 19). This meant no challenge in determining which transactive effectiveness variable indicators in the model were contributing to explaining the dependent variable conflict identification and prevention. The result was an indication that no technical issues could be encountered in calculating an ordinal logistic regression between the indicator variables of transactive effectiveness and the indicator variables of conflict identification and prevention. The linear regression result was thus supporting the validity of final result of the cumulative odds ordinal logistic regression for transactive effectiveness variable.

Table 19 Multicollinearity diagnostic linear regression model for transactive effectiveness variable

Variable Indicators	**Variable Atributes**	**Collinearity Statistics**	
		Tolerance	**VIF**
Time taken to undertake ESIA	Sufficient time	0.41	2.46
	Insufficient time	0.56	1.78
Financial resource allocation and spending during ESIA	Sufficient allocation and prudent spending	0.65	1.55
	Sufficient allocation and economical spending	0.66	1.51

Skill and experience of ESIA practitioner	Graduate training, limited practical experience	0.49	2.01
	Undergraduate training, extensive practical experience	0.50	1.99
Specification of roles for ESIA team member	Restricted to area of specialization	0.45	2.21
	Flexible with limited restrictions	0.52	1.93

4.5.2 Analysis of proportional odds for transactive effectiveness variable

Binomial logistic regression (a full likelihood ratio test comparing the fit of the proportional odds model to a model with varying location parameters) analysed proportional odds for transactive ffectiveness variable. Proportional odds were tested by the full likelihood ratio test using χ^2 statistics by examining the test of parallel lines. Proportional odds was tenable when $p \geq 0.05$ and not tenable when $p \leq 0.05$. Results of binomial logistic regression for transactive effectiveness variable showed that assumption of proportional odds was tenable as assessed by a full likelihood ratio test comparing the fit of the proportional odds model to a model with varying location parameters, χ^2 (24) = 32.62, p = 0.11 (Table 20). This result indicated that the cut point specific odds ratios were homogeneous hence each transactive effectiveness variable indicator in the model had the same effect for each cumulative logit and that final cumulative odds ordinal logistic regression for the transactive effectiveness was valid.

Table 20 Proportional odds for transactive effectiveness variable

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	362.05			
General	329.43	32.62	24	0.11

Odds ration (receprical of log odds) for transactive effectiveness variable indicators showed that the most significant independent variable indicators for transactive effectiveness were time taken to undertake ESIA; financial resources availed for the ESIA process and specification of roles for each ESIA team member (Table 21).

Table 21 Odds ratio for most significant transactive effectiveness variable indicators

Indipendent variable indicator	Log odds	Odds ratio
Time taken to undertake ESIA	1.29	3.65
Financial resources availed for the ESIA process	1.11	3.03
Specification of roles for each ESIA team member	-0.70	0.49

4.5.3 Model fit for transactive effectiveness variable

Overall goodness of fit of the ordinal logistic regression model for the transactive effectiveness independent varable indicators was tested by likelihood ratio test. Likelihood ratio test looked at the change in model fit when comparing the full model to the intercept-only model. The difference in the -2-log likelihood between the two models; (full model and intercept-only model) had a χ^2 distributed with degrees of freedom equal to the difference in the number of parameters. The smaller the -2-log likelihood value, the better the fit (i.e., $p \leq 0.05$). Model fit as shown in Table 22 was tested at 95% confidence. The model fit was assessed by likelihood-ratio test. Results of model fit showed that the final model statistically significantly predicted the dependent variable conflict identification and prevention over and above the intercept-only model, $\chi^2(8) = 106.09$, $p = 0.00$.

Table 22 Model fit for transactive effectiveness variable

Model	-2log likelihood	Chi-square	df	Sig.
Intercept only	468.15			
Final	362.05	106.09	8	0.00

Result of model fit implied that transactive effectiveness variable indicators were of statistical significance to the model. This meant that atleast one of the transactive effectiveness variable indicators was statistically significant and hence added to the correct prediction of the dependent variable conflict identification and prevention.

4.5.4 Overall significance of transactive effectiveness variable

Test of overall significance for transactive effectiveness variable indicators in the logistic regression model was by Wald test statistic by examining ‘tests of model effects’, when $p \leq 0.05$ the variable indicator was statistically significant. Overall effect of three of the four transactive effectiveness variable indicators in the model namely time taken to undertake ESIA, financial resource allocation and spending during ESIA and specification of roles for ESIA team member were statistically significant, χ^2 (2) = 13.49, p = 0.00, χ^2 (2) = 19.44, p = 0.00 and χ^2 (2) = 10.56, p = 0.00 respectively. This meant that time taken to undertake ESIA, financial resource allocation and spending during ESIA and specification of roles for each ESIA team member had a statistically significant effect on the prediction of the effectiveness of ESIA process in conflict identification and prevention, Wald χ^2 (2) = 13.49, p = 0.00, χ^2 (2) = 19.44, p = 0.00 and χ^2 (2) = 10.56, p = 0.00 respectively. Table 23 tabulates overall significancy of transactive effectiveness variable indicators while Table 24 is the frequency distribution of each variable attribute.

Table 23 Overal significance for the transactive effectiveness variable

Source	**Type III**		
	Wald Chi-Square	**df**	**Sig.**
Time taken to undertake ESIA	13.49	2	0.00
Financial resources availed for the ESIA process	19.44	2	0.00
Skill of the ESIA practitioner	3.79	2	0.15
Specification of roles for each ESIA team member	10.56	2	0.00

Table 24 Frequency distribution for transactive effectiveness variable

Variable indicator	**Variable attribute**	**Frequency**	**Percentage**
Time taken to undertake ESIA	Definitely yes	106	43.8
	To some extent no	86	35.5
	Never	50	20.7
	Total	242	100.0
Financial resources availed for the ESIA	Yes	105	43.4
	No	67	27.7
	Not sure	70	28.9
	Total	242	100.0

Variable indicator	Variable attribute	Frequency	Percentage
Skill of the ESIA practitioner	Substantial contribution	106	43.8
	Slight contribution	90	37.2
	No contribution	46	19.0
	Total	242	100.0
Specification of roles for each ESIA team member	Very significant	108	44.6
	Slightly significant	87	36.0
	Not significant	47	19.4
	Total	242	100.0

4.5.5 Statistically significant transactive effectiveness variable indicators

The ordinal regression equation result for transactive effectiveness variable was interpretated by examining overall parameter estimates which consist of thresholds and slope coefficients. Thresholds parameter estimates; were used to predict the dependent variable conflict identification and prevetion category probabilities for given values of the transactive effectiveness independent variable indicators while slope coefficients were interpreted in terms of log odds. Results of the cumulative odds ordinal logistic regression for transactive effectiveness variable indicators showed that, time taken to undertake ESIA, financial resource allocation and spending during ESIA, skill and experience of ESIA practitioners and specification of roles for ESIA team member were statistically significant $\chi2$ (1) = 11.14, p = 0.00; $\chi2$ (1) = 12.29, p = 0.00; $\chi2$ (1) = 3.77, p = 0.05 and χ^2 (1) = 3.59, p = 0.05 respectively.

4.5.6 Effect of transactive effectiveness on conflict identification and prevention

Thresholds parameter estimates were used to predict conflict identification and prevention based on transactive effectiveness values while slope coefficients were interpreted in terms of log odds. The odds ratio is the exponential of the log odds. The odds of potential conflicts identification and prevention when sufficient time was taken to undertake ESIA was 3.65 (95% CI, 1.71 to 7.79) times compared to when little time was spent, a statistically significant effect, Wald χ^2 (1) = 11.14, p = 0.00. The odds of potential conflict identification and prevention when insufficient time was spent to execute ESIA process was similar to when little time was spent in the process {odds ratio of 1.16 (95% CI, 0.61 to 2.21)}, Wald χ^2 (1) = 0.21, p = 0.65. The odds of potential conflicts identification and prevention when financial resources were sufficiently allocated and prudently spent during ESIA process was 3.03 (95% CI, 1.63 to 5.63) times compared to when financial resources were insufficiently allocated and poorly spent, a statistically significant effect, Wald χ^2 (1) = 12.29, p = 0.00. The odds of potential conflict identification and prevention when sufficient finances were allocated but spent poorly was similar to when the allocation was insufficient while spending was economical {odds ratio of 0.79 (95% CI, 0.42 to 1.51)}, Wald χ^2 (1) = 0.49, p = 0.48. The odds of potential conflicts identification and prevention when ESIA was carried out by an experienced undergraduate practitioner was 0.49 (95% CI, 0.24 to 1.01) times compared to an inexperienced postgraduate practitioner, a statistically significant effect, Wald χ^2 (1) = 3.77, p = 0.05.

The odds of potential conflict identification and prevention when ESIA practitioner undertaking the study was a graduate with limited practical experience was similar to when the practitioner was a postgraduate with limited practical experience {odds ratio of 0.67 (95% CI, 0.33 to 1.37)}, Wald χ^2 (1) = 1.21, p = 0.27. The odds of potential conflicts identification and prevention when role allocation of ESIA team members was restricted to area of specialization was 2.00 (95% CI, 0.98 to 4.09) times compared to general role allocation without restrictions, a statistically significant effect, Wald χ^2 (1) = 3.59, p = 0.05. The odds of potential conflict identification and prevention when allocation of roles to ESIA team members was flexible with limited restrictions was similar to when it was general without restrictions {odds ratio of 0.65 (95% CI, 0.33 to 1.28)}, Wald χ^2(1) = 1.57, p = 0.21. A detailed output result of this analysis is tabulated in detail in Appendix I.

4.5.7 Association between cost and availability of human resource expertise and conflict identification and prevention

Statistical analysis of responses obtained from respondents (n=242) on how availability and affordability of required expertise to undertake ESIA in the subsector of geothermal and wind energy affect potential conflict identification and prevention during implementation of a proposed project was done. Result of the sample characteristics show that 100% of sample was valid as tabulated in Table 25.

Table 25 Valid and missing cases of the sample of cost and availability of human resource expertise and conflict identification and prevention

Valid		Missing		Total	
N	**Percent**	***N***	**Percent**	***N***	**Percent**
242	100.0%	0	0.0%	242	100.0%

Effectiveness of conflict identification and prevention improved with availability and affordability of required expertise as shown in Table 26.

Table 26 Cross tabulation of cost and availability of human resource expertise and conflict identification and prevention

Cost and availability of human resource expertise	**Conflict identification and prevention**				**Total**
	Ineffective	**Slightly ineffective**	**Effective**	**Very effective**	
Not affordable but easily available	16	31	18	0	65
Affordable but not easily available	0	5	41	39	85
Affordable and easily available	0	0	59	33	92
Total	16	36	118	72	242

Somers' derivative was run to determine the association between cost and availability of required human resource expertise to undertake ESIA for geothermal and wind energy projects and potential conflict identification and prevention during implementation of proposed geothermal and wind energy projects. There was a strong, positive correlation between cost and availability of human resource expertise and potential conflict identification and prevention, which was statistically significant, $d = 0.46$, $p < 0.0005$. Table 27 is a presentation of Somers' derivative output.

Table 27 Somers' derivative directional measure of association between cost and availability of required human resource expertise and potential conflict identification and prevention

Ordinal by Ordinal		Symmetric	Asymp. Std. Error [a]	Approx. T[b]	Approx. Sig.
	Somers' d	0.46	0.04	9.28	0.00
	Cost and availability of human resource expertise	0.47	0.04	9.28	0.00
	Conflict identification and prevention	0.46	0.04	9.28	0.00

4.6 Effect of ESIA normative effectiveness on conflict identification and prevention

Normative effectiveness measured to what extent normative goals in terms of combination of social and individual norms were achieved as a result of a given project implementation. Identification and prevention of potential conflicts when implementing a project in the society positively contributed to improvement of health and quality of life in the society, continuous learning individually and collectively, distinctive and communal change of perception and contribution to sustainable development in general.

4.6.1 Improvement of health and quality of life

Only 34.7%, *n*= 84 of all the sampled respondents (*n*=242) across all categories were of the opinion that ESIA was contributing to improvement of health and quality of life when comparing project implementation with and without ESIA. However, 18.6 %, *n*= 45 were of a contrary opinion, 30.6%, *n*= 74 were not sure while 16.1%, *n*=39 had no idea. A significant majority of respondents from MoE, NEMA and civil society representing 64%, *n*=9, 100%, *n*=14 and 60%, *n*=9 respectively was of the opinion that ESIA was contributing to improvement of health and quality of life. However only 26.5%, *n*=53 of the practitioners was of a similar opinion while majority of them 34.5%, *n*=69 was not sure if ESIA was contributing to improvement of health and quality of life. Figure 16 is a graphical presentation of perceptions of sampled respondents.

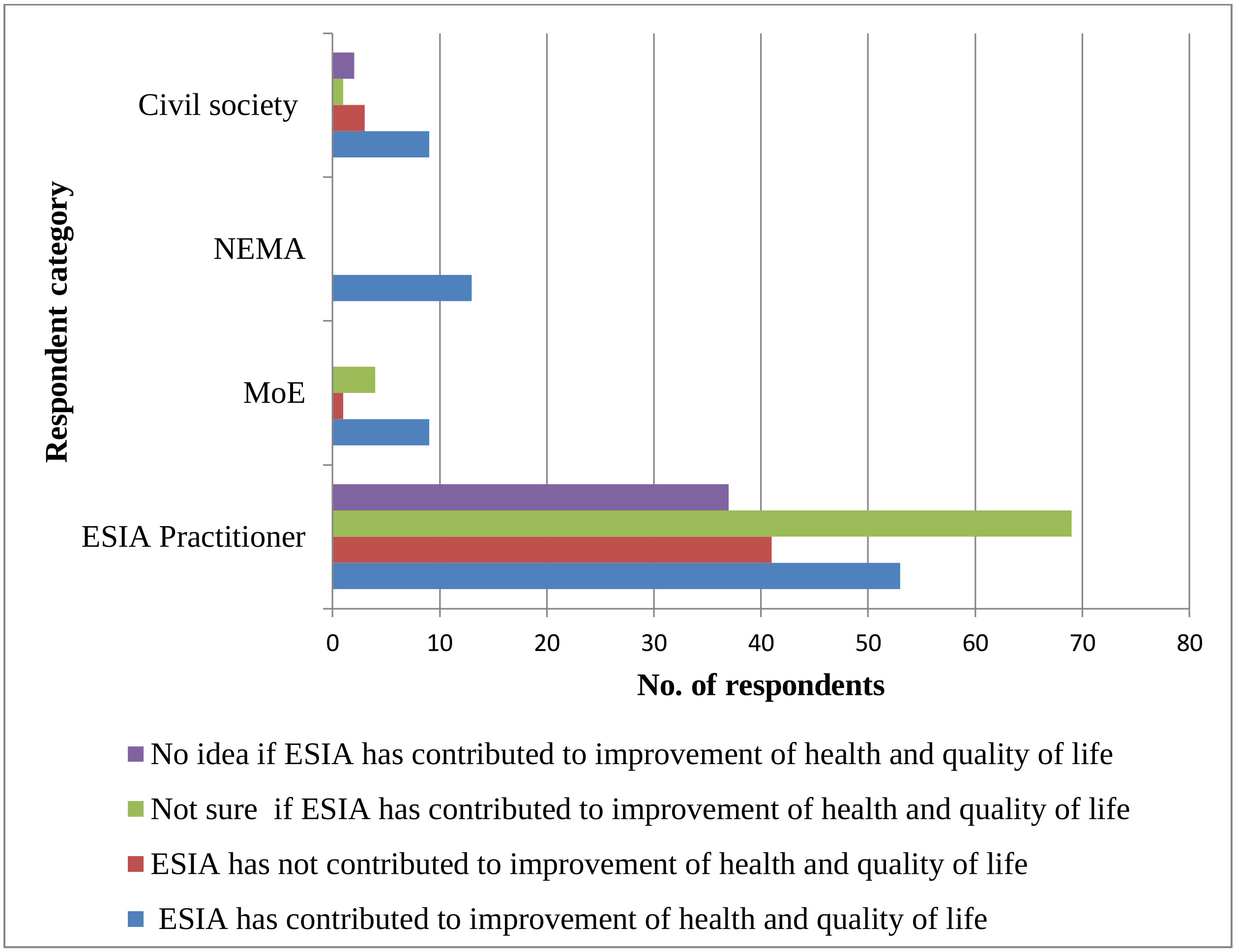


Figure 16 ESIA's contribution to improvement of health and quality of life

4.6.2 Change in institutional policy choices towards sustainable development

Majority of all the respondents 65.7%, *n*=159 responded that ESIA has contributed to sustainable development through institutional policy changes while a small minority of the respondents 4.1%, *n*= 10 were of a contrary opinion. However, 17.4%, *n*= 42 and 12.8%, *n*= 31 of sampled respondents were not sure or did not know ESIA's contribution to sustainable development through institutional policy changes respectively. A significant majority of respondents from ESIA practitioners, MoE, NEMA and civil society representing 66%, *n*=132, 80%, *n*=12, 69%, *n*=9 and 46%, *n*=6 respectively was of the opinion that ESIA has contributed to development and change in institutional policy choices towards sustainable development. Figure 17 is a graphical presentation of perceptions of sampled respondents

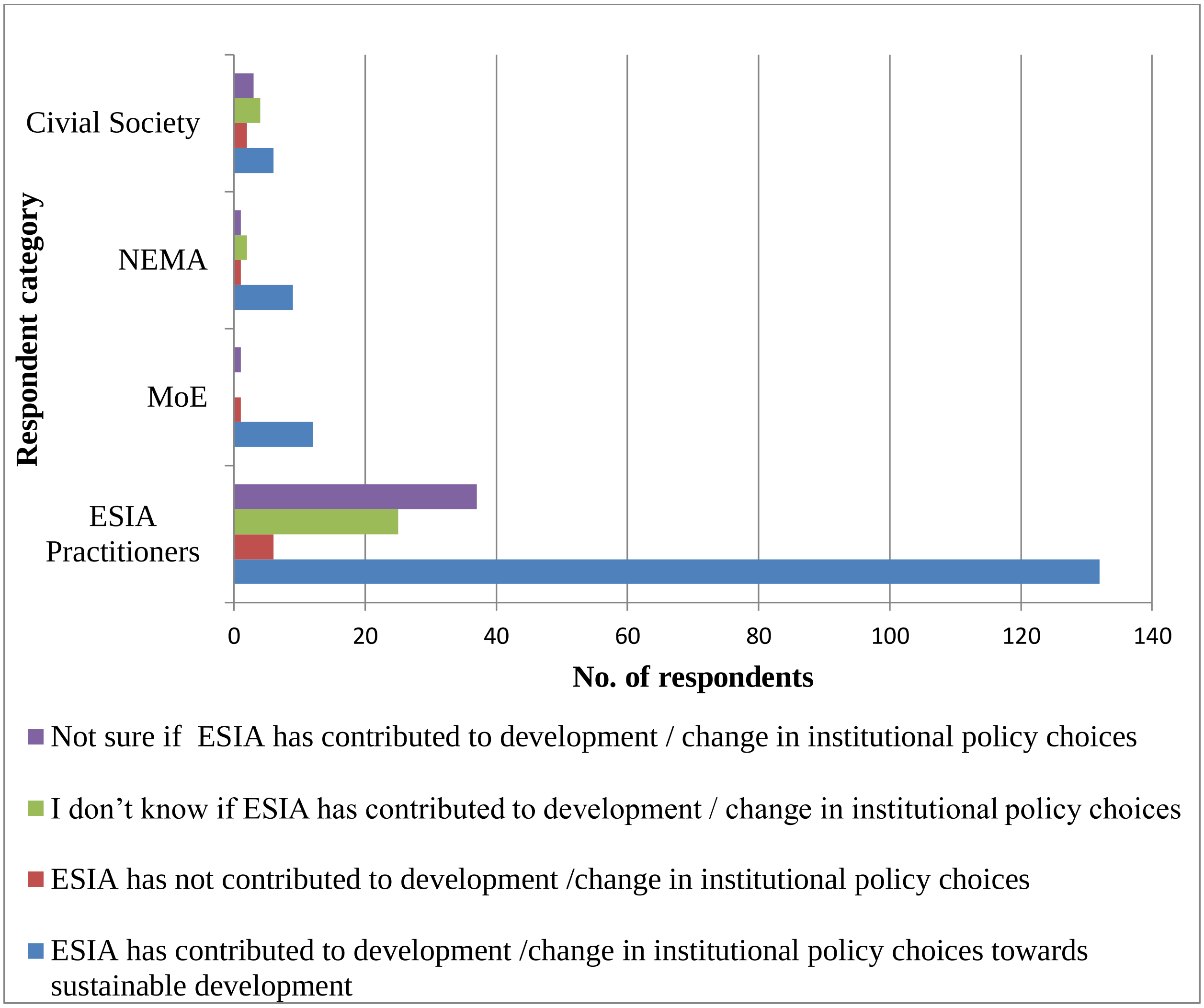


Figure 17 ESIA's contribution changes in institutional policy choices towards sustainable development

4.6.3 Learning process and change in perception

Forty-two-point two percent (42.2%) of all sampled respondents (*n*=102) responded that ESIA had contributed to learning process and change in perception resulting in new perspectives and pattern of knowledge on how impact assessment process can help improve quality of life. Twenty-three-point one percent (*n*=56) were of a contrary opinion, 21.5% (*n*=52) were not sure while 13.2% (*n*=32) did not know. Majority of respondents 39.5% *n*=79 (ESIA practitioners), 43% *n*=6 (MoE), 61.5% *n*=8 (NEMA) and 60% *n*=6 (civil society) was of the opinion that ESIA has contributed to learning process and change in perception. Figure 18 is a line graph presentation of perceptions of sampled respondents.

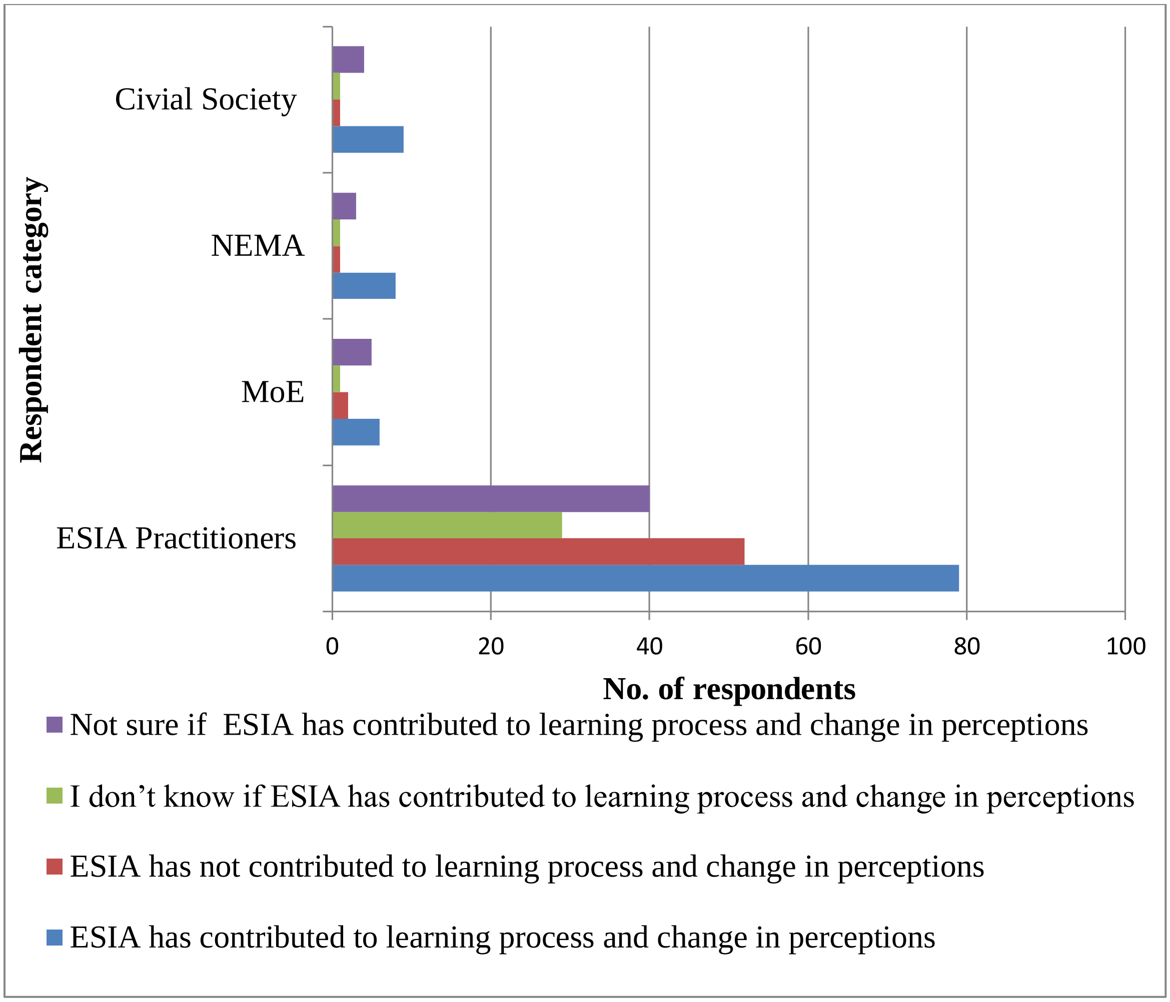


Figure 18 ESIA’s contribution to learning process and change in perception

4.6.4 Adjustment of relevant policy framework concerning normative goals

Only a small percentage of sampled respondents (23.6%, *n*=57) responded that ESIA process had contributed to adjustment of relevant framework (incremental changes in institutions, organisations, philosophy, science and culture) concerning normative goals (combination of social and individual norms) that impacted on consent and decision making concerning a proposed project. Twenty four percent (*n*=58) were of a contrary opinion, 15.7% *n*= 38 were not sure while 36.7% *n*=89 did not know. Only 20.5% *n*=41 of the ESIA practitioners sampled, 43% *n*=6 from MoE, 54% *n*=7 from NEMA and 20% *n*=3 from civil society were of the opinion that ESIA had contributed to the adjustment of relevant policy framework concerning normative goals. Figure 19 is a line graph presentation of perceptions of sampled respondents.

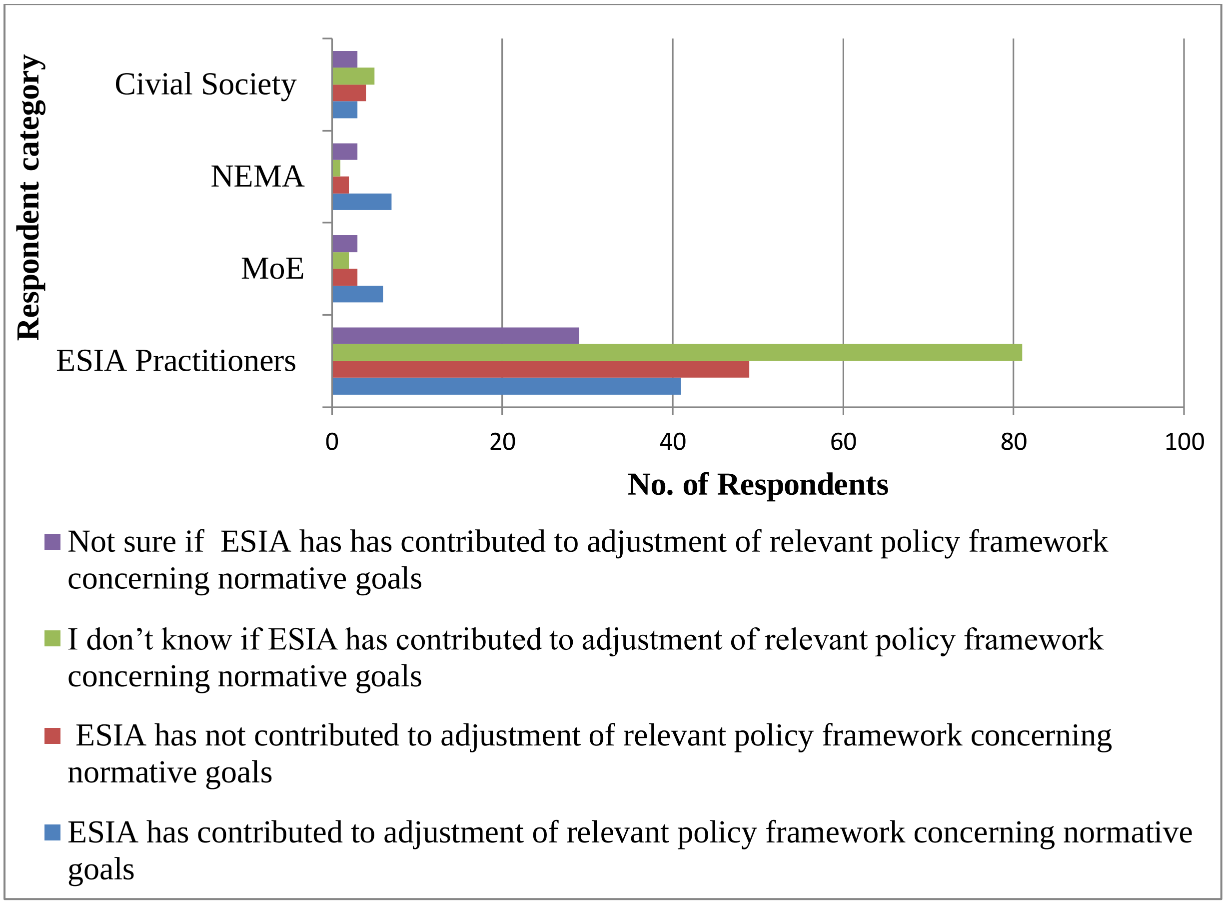


Figure 19 ESIA's contribution to adjustments of relevant policy framework concerning normative goals

4.6.5 Multicollinearity analysis for the independent variable normative effectiveness and dependent variable conflict identification and prevention

A linear regression analysed multicollinearity between the independent indicator variables of normative effectiveness and dependent indicator variables of conflict identification and prevention. Variance Inflation Factor (VIF) a reciprocal of 'Tolerance' tested multicollinearity by examining collinearity statistics. Multicollinearity occured when two or more normative effectiveness indicator variables were highly correlated with each other. Multicollinearity becomes problematic when determining which normative effectiveness indicator variable was contributing to explaining the variable conflict identification and prevention. Interpretation of results was as follows; there was no multicollinearity when VIF factor was ≤ 10 or Tolerance value of > 0.1 however, there was multicollinearity when VIF was ≥ 10 or Tolerance value was < 0.1. A linear regression model for the variable normative effectiveness that predicted the variable conflict identification and prevention showed that there was no multicollinearity between two or more of the normative effectiveness indicator variable in the regression model. The VIF was < 10 the highest being 1.81 while Tolerance value was > 0.1 the lowest being 0.55 (Table 28). This meant no challenge in determining which inormative effectiveness indicator variables in the model were contributing to explaining the dependent variable conflict identification and prevention. The result was an indication that no technical issues could be encountered in calculating an ordinal logistic regression between the indicator variables of normative effectiveness and indicator variables of conflict identification and prevention. The linear regression result was thus supporting the validity of final result of the cumulative odds ordinal logistic regression for normative effectiveness indicator variables.

Table 28 Multicollinearity diagnostic linear regression model for normative effectiveness variable

Variable Indicators	Variable Atributes	Collinearity Statistics	
		Tolerance	**VIF**
Health and quality of life	Incremental improvement throughout project cycle	0.55	1.81
	Better than before project implementation	0.60	1.64
Institutional policy choices	Continuous consultative and participatory policy changes	0.70	1.42
	Continuous policy changes	0.77	1.29
Learning and perceptions change	Direct involvement in project implementation	0.64	1.55
	Continuous consultation during project implementation	0.78	1.27
Adjustment of relevant policy concerning normative goals	Complete implementation of ESMP for project host community	0.55	1.81
	Host community involvement in project implementation	0.73	1.36

Binomial logistic regression (a full likelihood ratio test comparing the fit of the proportional odds model to a model with varying location parameters) analysed proportional odds for normative effectiveness indicator variables. Proportional odds were tested by the full likelihood ratio test using χ^2 statistics by examining the test of parallel lines. Proportional odds was tenable when $p \geq 0.05$ and not tenable when $p \leq 0.05$. Results of binomial logistic regression for normative effectiveness indicator variables showed that assumption of 'proportional odds' was tenable as assessed by a full likelihood ratio test comparing the fit of the proportional odds model to a model with varying location parameters, χ^2 (24) = 35.34, p = 0.06 (Table 29). This result meant that the cut point specific odds ratios were homogeneous hence each normative effectiveness indicator variable in the model had the same effect for each cumulative logit. The result further supported validity of final cumulative odds ordinal logistic regression for the normative effectiveness indicator variables.

Table 29 Propotional odds for normative effectiveness variable

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	377.00			
General	341.65	35.34	24	0.06

Odds ration (receprical of log odds) for normative effectiveness variable indicators showed that the most significant independent variable indicators for normative effectiveness were health quality life, institutional policy choices and adjustment of policy on normative goal (Table 30).

Table 30 Odds ratio for most significant normative effectiveness variable indicators

Indipendent variable indicator	Log odds	Odds ratio
Health quality life	1.37	3.96
Institutional policy choices	1.07	2.93
Adjustment of policy on normative goal	-0.64	0.52

Overall goodness of fit of the ordinal logistic regression model for normative effectiveness independent variable indicators was tested by likelihood ratio test. Likelihood ratio test looked at the change in model fit when comparing the full model to the intercept-only model.

The difference in the -2-log likelihood between the two models; (full model and intercept-only model) have a χ^2 distributed with degrees of freedom equal to the difference in the number of parameters. The smaller the -2-log likelihood value, the better the fit (i.e., $p \leq 0.05$). Model fit was tested at 95% confidence. Results of model fit as assessed by likelihood-ratio test showed that the final model statistically significantly predicted the dependent variable conflict identification and prevention over and above the intercept-only model, $\chi^2(8) = 106.720$, $p = 0.00$ (Table 31).

Table 31 Model fit for normative effectiveness variable

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	483.72			
Final	377.00	106.72	8	0.00

This result on model fit implied that normative effectiveness indicator variables were of statistical significance to the model. This meant that atleast one of the normative effectiveness indicator variables in the model was statistically significant and hence added to the correct prediction of the dependent variable conflict identification and prevention. Overall test of significance for normative effectiveness variable indicators in the logistic regression model was tested using the Wald test statistic by examining 'tests of model effects', when $p \leq 0.05$ the variable indicator was statistically significant. Overall effect of three normative effectiveness variable indicators in the model namely health quality life, institutional policy choices and adjustment of policy on normative goals were statistically significant, χ^2 (2) = 15.63, p=0.00, χ^2 (2) = 19.11, p=0.00 and χ^2 (2) = 10.83, p=0.00 respectively. This meant that health quality life, institutional policy choices and adjustment of policy on normative goals had a statistically significant effect on the prediction of the effectiveness of ESIA process in conflict identification and prevention, Wald χ^2 (2) = 15.63, p=0.00, χ^2 (2) = 19.11, p=0.00 and χ^2 (2) = 10.83, p=0.00 respectively. Table 32 tabulates overall significancy of normative effectiveness variable indicators while Table 33 is the frequency distribution of each variable attribute

Table 32 Overal significance for the normative effectiveness variable

Source	Type III		
	Wald Chi-Square	df	Sig.
Health quality life	15.63	2	0.00
Institutional policy choices	19.11	2	0.00
Learning perception changes	3.50	2	0.17
Adjustment of policy on normative goal	10.83	2	0.00

Table 33 Frequency distribution for normative effectiveness variable

Variable indicator	Variable attribute	Frequency	Percentange
Health and quality of life for project host community	Incremental improvement throughout project cycle	106	43.8
	Better than before project implementation	86	35.5
	Just as was before project implementation	50	20.7
	Total	242	100.0
Institutions' policy development	Continuous, consultative and participatory policy changes	104	43.0
	Continuous policy changes	67	27.7
	Once in a while policy change	71	29.3
	Total	242	100.0
Learning and perceptions change for	Direct involvement in project implementation	106	43.8
	Continuous consultation during project	89	36.8

Variable indicator	Variable attribute	Frequency	Percentange
host community	implementation		
	Indirect involvement in project implementation	47	19.4
	Total	242	100.0
Adjustment of relevant policy concerning normative goals	Complete implementation of ESMP for the project in host community	109	45.0
	Host community involvement in project implementation	87	36.0
	Implementation of corporate social responsibility projects for host community	46	19.0
	Total	242	100.0

4.6.6 Statistically significant normative effectiveness variable indicators

The ordinal regression equation result for normative effectiveness variable was interpretated by examining overall parameter estimates which consist of thresholds and slope coefficients. Thresholds parameter estimates; were used to predict the dependent variable conflict identification and prevetion category probabilities for given values of the normative effectiveness independent variable indicators while slope coefficients were interpreted in terms of log odds. Results of the cumulative odds ordinal logistic regression for normative effectiveness ivariable indicators showed that health quality life, institutional policy choices and adjustment of policy on normative goals were statistically significant χ^2 (1) = 12.48, p = 0.00; χ^2 (1) = 11.57, p = 0.00 and χ^2 (1) = 4.07, p = 0.04 respectively.

4.6.7 Effect of normative effectiveness on conflict identification and prevention

Thresholds parameter estimates were used to predict conflict identification and prevention based on normative effectiveness values while slope coefficients were interpreted in terms of log odds. The odds ratio is the exponential of the log odds. The odds of potential conflicts identification and prevention when there was incremental improvement of health and quality of life of host community throughout project cycle was 3.96 (95% CI, 1.84 to 8.52) times compared to when it remained as before project implementation, a statistically significant effect, Wald χ^2 (1) = 12.48, p = 0.00. The odds of potential conflict identification and prevention when health and quality of host community was better than before project implementation was similar to when it remained the same before project implementation {odds ratio of 1.12 (95% CI, 0.59 to 2.14)}, Wald χ^2 (1) = 0.13, p = 0.71. The odds of potential conflicts identification and prevention when policy change was continuous, consultative and participatory was 2.93 (95% CI, 1.57 to 5.46) times compared to when policy change was once in a while, a statistically significant effect, Wald χ^2 (1) = 11.57, p = 0.00. The odds of potential conflict identification and prevention when policy change development was continuous was similar to when it was once in a while {odds ratio of 0.75 (95% CI, 0.39 to 1.42)}, Wald χ^2 (1) = 0.77, p = 0.37. The odds of potential conflicts identification and prevention when implementation of environmental and social management plan was complete was 2.09 (95% CI, 1.02 to 4.29) times compared to implementation of corporate social responsibility (CSR) project, a statistically significant effect, Wald χ^2 (1) = 4.07, p = 0.04. The odds of potential conflict identification and prevention when host community was involved in project implementation was similar to when a CSR project was implemented for the host community {odds ratio of 0.67 (95% CI, 0.34 to 1.34)}, Wald χ^2 (1) = 1.25, p = 0.26.   A detailed analysis of the results is presented in Appendix J.

CHAPTER FIVE

DISCUSSION

5.1 Introduction

Results of this study are discussed by providing interpretations of the findings and meaning associated with procedural, substantive, transactive and normative effectiveness in potential conflict identification and prevention during environmental and social impact assessment. Validation of the research findings are compared with previous studies.

5.2 Procedural effectiveness of ESIA tool in conflict identification and prevention

Environmental and social impact assessment tool was generally agreed to be vital in identifying potential conflicts that could arise during implementation and subsequent operation of a proposed renewable energy project. This was demonstrated by the majority of the ESIA practitioners who attested that during impact assessment for a proposed project, ESIA process was critical in enabling the practitioners to predict and identify potential conflicts that could arise during implementation of a proposed project.

Development projects and more so those that were related to exploitation and utilization of natural resources could generate tension between individuals, groups of people, communities and project proponents. Information on social dynamics and socio-economic characteristics analysed during ESIA process could be used to identify critical environmental and social issues as perceived by the local community to address and avert potential conflicts (Corsi et al., 2015). This meant that ESIA was an important tool in the identification of potential conflicts likely to occur from implementation of a proposed project. Consequently; the conflicts could be avoided, reduced or controlled. Once a potential conflict was managed, project implementation was more likely to be fast trucked to achieve set targets. This finding was consistent with that of Nenković-Riznić et al. (2016), Corsi et al. (2015) and Manring et al. (1990). Environmental and social impact assessment provided alternative measures that either neutralized or reduced negative impacts resulting from planning solutions consequently solved planning conflicts (Nenković-Riznić et al., 2016). ESIA was an integrated approach to impact assessment which helped in potential conflict identification and prevention (Manring et al., 1990) by incorporating both social and environmental facets in the assessment process. Such integration enabled specific analysis of conflicts with the aim of addressing the potential conflicts hence reduced conflict management costs throughout the project cycle (Corsi et al., 2015).

The effectiveness of ESIA tool in conflict identification and prevention, however, was pegged on its appropriate application as attested by most respondents from NEMA, MoE and civil society. Proper application of ESIA tool implied that all the process steps of ESIA which were primarily interactive, namely; project screening, scoping, examination of alternatives, stakeholder identification, consultations and participation, environmental and social baseline data gathering, impact identification, prediction and analysis, impact mitigation and management, impact significance and residual impacts evaluation, reporting, review and decision making (Loomis & Dziedzic, 2018) and post decision activities such as project implementation, monitoring and auditing, were to be applied appropriately. Proper application of each of the process step was to ensure any inherent potential conflict was flagged out at the earliest opportune time. This also ensured that as decisions were made along the impact assessment process, such decisions did not result in conflicts. This finding was consistent with the findings of Achiba (2019) and Prenzel and Vanclay (2014). Achiba (2019) observed that poor procedural application of environmental and social impact assessment contributed to the Lake Turkana Wind Power Project contributed to local project resistance. Prenzel and Vanclay (2014) argued that when appropriately applied; social impact assessment (a subsidiary of environmental and social impact assessment) could prevent conflicts from occurring by spelling out appropriate mitigation measures.

Four ESIA process steps were found to be statistically significant in underpinning potential conflict identification namely public participation, decision making, project implementation and monitoring. Comparing three public participation approaches, namely, public *baraza*, workshops and public hearing, it was noted that an ESIA Practitioner was thrice more likely to identify potential conflicts from a proposed project when stakeholders were consulted in workshops compared to when the consultation was in public *baraza* or public hearing. There was reduced likelihood of identifying potential conflicts likely to result from a proposed renewable energy project when stakeholder consultation was either in a public *baraza* or in a public hearing. Workshops were found to be more effective as they were an interactive and collaborative method of public participation that ensured equal treatment was accorded to participants, public agencies, powerful private interests and disadvantaged citizens (Innes &

Boohe, 2004). In workshops, there was a greater degree of interaction among potentially opposing interests, hence a greater opportunity for reducing conflict among stakeholders (Beierle, 1998). Interactive stakeholder participation was critical in enhancing potential conflict identification and prevention when it was applied early and sustained throughout project cycle (Ambole et al., 2021). Public hearing was less effective method of identifying potential conflicts owing to the fact that public hearings were open forum where the public voiced their opinion but had no direct impact on implementation of discussed recommendations (Rowe & Frewer, 2000). Public hearing contributed to antagonising the public, did not satisfy the pubic as it did not result in genuine participation, as it rarely contributed to improved decision making (Innes & Boohe, 2004) and hence an ineffective form of public participation in potential confliction and prevention.

Public *barazas* were also not effective in potential conflict identification as they were mainly forums for sharing information concerning a proposed project. Information sharing form of public participation was less effective in conflict identification because it was passive public participation; it was viewed as non-participation, manipulative, depicted by therapy as it was subsequent to decisions that had already been taken without inputs from the stakeholders (Cornwall, 2008; Pretty, 1995). This finding concurs with the study of Ambole et al. (2021) who found out that inclusive and participatory approaches, such as, workshops method of consultation we superior to other methods of public participation, because they provided public input based on a relatively high level of information besides embracing a co-design approach that brought together all stakeholders to deliberate on a proposed project. Workshops as a form of stakeholder consultation have been documented to be more effective because they were more likely to follow best practices of public participation including focussing on negotiable issues besides being effective in changing audience perceptions (McKenney & Terry, 1995).

Potential conflict identification during decision making stage was compared based on three scenarios namely historical context, social context and project cycle. Potential conflicts were three times more likely to be identified when decision making was based on historical context compared to social context. However, chances of identifying potential conflicts reduced when the decision was made on the basis of either social context or project cycle. When making decisions concerning suitability of a proposed location of a project, technology to be used, suitability of preferred alternatives or trade-offs required, it was important that the historical context of projects in that sector be considered. This could be helpful in determining whether such projects when implemented would likely result in conflict situations or not. Decision making based on social context or project cycle could lock out important sector specific historical information that could give critical insights of potential conflicts of projects in that sector. Such critical historical insights could not be flagged out from decisions made based on social or project cycle context. Wind energy projects, for example, had a history of social opposition that sometimes culminated in conflicts due to concerns over privatization of indigenous lands without adequate consultations, landscape changes, alteration of local aesthetics and negative effects on wildlife conservation (Avila, 2018).

Equally, geothermal energy projects also had a history of community opposition and conflicts due to potential negative environmental and social impacts resulting from their development including noise impacts, visual impacts surface disturbance and displacement of families (Kombe & Muguthu, 2019). Lake Turkana Wind Energy project in Kenya was an example of a wind energy project that encountered opposition from local pastoral community on the basis of land rights (Achiba, 2019**)**. Eburru wellhead geothermal power plant was an example of geothermal project that had witnessed opposition from local community due to perceived risks associated with such a project (Barasa & Magut, 2018). Sector specific historical knowledge of development projects thus provided useful guide in identifying and addressing unexpected adverse impacts during project implementation that if not mitigated could trigger conflicts. This finding was consistent with the findings of Carmona and Silva (2020) who observed that ignoring and disregarding historical local knowledge for sector specific projects not only denied the opportunity to identify potential conflicts associated which such projects during impact assessment stage, but also was a recipe for actual manifestation of conflicts during project implementation phase.

Comparison of potential conflict identification and prevention at three stages of project implementation, namely, early stage, mid stage and towards the end of the project showed that it was three times more likely to identify and prevent a potential conflict at the early stage of project implementation compared to mid or towards the end of the project. Environmental and Social Management Plan (ESMP) which was the main output of the ESIA process was implemented during Project implementation stage. Implementation of the ESMP at the early stage of project implementation avoided potential conflicts from occurring as potential negative impacts were addressed timely by implementing all proposed mitigation measures. Early implementation of the ESMP was critical in establishing the efficacy and adequacy of the ESMP in mitigating predicted negative impacts. An adequate ESMP of high efficacy would adequately mitigate potential negative impacts and hence prevent any potential conflicts from occurring as the project was being implemented. Delayed implementation of the ESMP to later stages of project implementation could trigger conflicts as identified negative impacts could not be mitigated timely. Implementation of ESMP required adequate resources in terms of finances, manpower and time that project proponents had to plan for and provide. Enforcement from relevant lead agencies including NEMA was critical as it ensured project proponent provided required resources for ESMP implementation. Feedback from local community, including, advocacy from civil society groups working in the project area was important as it ensured the ESMP was implemented timely and comprehensively.

In absence of strict monitoring and enforcement, project proponents could intentionally delay ESMP implementation to cut on costs. In such circumstances, implementation of mitigation measures spelled out in the ESMP was considered nonessential but instead seen as peripheral works (Kabir & Momtaz, 2011). ESMP was always a living document, hence was constantly revised and improved on throughout project implementation period which ensured effective mitigation of negative impacts was achieved (Rashidi et al., 2014) hence averted potential conflicts (Corsi et al., 2015). Early implementation of ESMP during the early stages of project implementation ensured early and timely compensation of residual impacts hence prevented potential conflicts that could arise from such residual impacts from occurring. Adequate and equitable compensation of project affected persons before implementation of proposed project prevented potential conflicts from occurring. Unfair or insufficient compensation of project affected persons including affected communities within the project catchment area triggered conflicts (Carmona & Silva, 2020).

Monitoring stage was one of the ESIA process step that was of statistically significant in conflict identification and prevention. Comparison was done between baseline monitoring, periodic monitoring and control monitoring. It was three times more likely to identify and prevent potential conflict during baseline motoring compared to periodic monitoring. Further, there was no difference in likelihood of potential conflict identification during control monitoring compared to periodic monitoring. The likelihood of conflict identification and prevention during baseline motoring was three times more because during baseline monitoring shift of site conditions relative to established baseline conditions was monitored. It was therefore easy to establish any consequence that could likely result from the shift from established baseline conditions. Monitoring was critical as it kept track in change of project conditions that could be of interest to stakeholders especially when such change significantly altered expectations and interest of the affected stakeholders more so the local community (Sanggoro et al., 2021). Monitoring ensured assessment of a project implementation performance and provided feedback on project implementation. It assisted in identifying potential constraints that in turn facilitated timely decisions that prevented forestalling of the project under implementation. Baseline monitoring assessed changes in project condition from established baseline and required compliance levels (Rashidi et al., 2014) which if adverse could trigger a conflict (Sanggoro et al., 2021).

Inability of the ESIA tool to aid in potential conflict identification and prevention during project implementation was attested to by a few practitioners. This was mainly in cases where practitioners undertaking impact assessment for a proposed project never considered identifying potential conflicts likely to arise from a proposed project but just conducted the assessment as a matter of mere procedure rather than a potential conflict identification and possible problem-solving process. ESIA practitioner who did not utilise ESIA tool in identifying potential conflicts lost the opportunity to measure and manage potential local conflicts that could arise during implementation of such a project (Corsi et al., 2015). Failure to identify and prevent social and environmental conflicts during environmental impact assessment process was an indication of deficient ESIA implementation (Carmona & Silva, 2020). This meant that such practitioners did not appropriately apply each of the ESIA process steps in a manner that potential environmental and social conflicts could be brought out in the course of the assessment. Inappropriate application of stakeholder consultation and public participation procedures during ESIA process contributed to poor potential conflict identification for a proposed project (Chi et al., 2013). Other similar cases where ESIA has been documented to have failed to identify potential conflict from a proposed development was due to ESIA practitioner’s poor framing of identified potential social problems that were likely to result in social conflicts as susceptible to be solved technically ignoring that social impacts of a proposed project were social facts with meaning and representation (Castillo & Silva, 2020).

5. 3 Substantive effectiveness

The discussion of results of substantive effectiveness encompassed a comparison of public participation process during ESIA process in Kenyan with international best practice. Further the discussion also covered how quality of ESIA reports affects substantive effectiveness.

5.3.1 Public participation practice during ESIA in Kenya and its adherence to international best practice operating principles

Public participation during environmental impact assessment process in Kenya was mainly carried out during scoping, reporting and review stages. The first two stages were mainly sharing of proposed project information with the public while the third stage was mainly consultative in nature. Results of this research showed that public participation during environmental impact assessment process in Kenya was not initiated early nor sustained throughout the impact assessment. This was shown by lack of participation of stakeholders such as community members of the proposed project site in early project stages of design and determination of project location (Ortolano & Shepherd, 1995). Also, stakeholders did not directly participate in project approval stage. The practice was not well planned and did not focus on negotiable issues because it was organisationally deficient of a clear outline of what its aim were, rules and procedure to be followed and the expected outcome. It did not identify issues that stakeholders could negotiate on in order to aid decision making as stakeholders were viewed as a recipient of project information as opposed to equals who influenced project decision. Information diffusion on public participation and capacity building were both too limiting and prohibiting by design, location and language because capacity building for better public participation during environmental impact assessment process was not actualised. Language used in notices, posters and radio announcement was commonly English which locked out many stakeholders. Information access was prohibitive as one required access to internet and the requisite technical capacity to retrieve required information from relevant databases.

The practice was not context oriented as cultural, social, economic and political dimensions were mostly ignored nor was it credible and rigorous since facilitators were interested parties and hence not neutral. The results concur with Gulis et al. (2022) who concluded that current public hearing practice is least productive and not helpful toward environmental decision making. Other studies with similar findings include Okello et al. (2010)

who concluded that public participation in Kenya's EIA process was poor, particularly during the scoping, report review and follow-up stages Mwenda et al. (2012), in studying trends in consultation and public participation within the practice of environmental impact assessment in Kenya, concluded that public participation within EIA process in Kenya was relatively low. Kakonge (2015) observed that environmental impact assessment failed in Kenya because public participation in Kenya's EIA process was inadequate. Enríquez-de-Salamanca (2018) who evaluated stakeholder manipulation during impact assessment concluded that project developers never favoured public participation, because they never saw the positive side of the process as a result, they hide information including data considered controversial.

Public participation in environmental decision making was both shaped by and, in many cases, constrained by the ways in which environmental issues, problems, and solutions were defined or framed through the strategic communication practices of the participants (Depoe et al., 2004). Exhaustive, inclusive and satisfactory public participation integrated local knowledge (Ocampo-Melgar et al., 2019), broadened potential solutions (Hartley & Wood, 2005), improved process outcomes (Sinclair et al., 2008), and avoided costly and time-consuming conflicts (Diduck & Mitchell, 2003), hence guaranteed access to justices in matters environment (Hartley & Wood, 2005). In line with the principles of informative, proactive and early involvement, the public was to be involved as soon as value judgement became salient (Rowe & Frewer, 2000) in order to consider psychological and sociological understandings of risk (Renn, 1993). These two principles (the principles of informative, proactive and early involvement) underscored the importance of early public participation in the discourse of underlying assumptions and agenda setting as opposed to narrow predefined problems (Moffet, 1996). Effective public participation should be broad capturing representation of all affected public (Rowe & Frewer, 2000) for inclusivity, equitability, openness and transparency (Mwenda & Kibutu, 2012).

5.3.2 Substantive effectiveness of public participation

Substantive contribution of public participation during EIA process in environmental decision making was influenced by and depended on local information and knowledge, incorporating experimental and value-based knowledge and testing the robustness of information from other sources (O'Faircheallaigh, 2010). It could thus be argued that the observed perception of ineffectiveness of public participation's substantive contribution to environmental decisions could be attributed to inability of exhaustively harnessing local knowledge from local community stakeholders during public participation and incorporating the knowledge in environmental decisions. Poor application of environmental impact assessment procedures characterised by inequitable opportunity and freedom of affected communities to participate in the impact assessment process contributed to poor public participation of the affected stakeholders (Simpson & Basta, 2018). The outcomes of such an environmental impact assessment procedure could not support informed environmental decision but instead contributed to harming the environment. Public participation was part of environmental impact assessment process, poor public participation or lack of it amounted to unjust environmental impact assessment procedures. Such unjust environmental impact assessment procedures negated the substantive rationale of ESIA which was to inform decision-making in order to mitigate negative environmental impacts (Loomis & Dziedzic, 2018) which could in turn contribute to environmental protection.

Whereas progress had been made in constitutionally and legislatively underpinning public participation in Kenya's environmental impact assessment process, there was scanty information on actual execution. Constitutional and legislative loopholes were evident in Kenya's legal framework on public participations during environmental impact assessment process. The constitution of Kenya 2010 fell short of making public participation mandatory in managing, conserving and protecting the environment but instead required the state to encourage public participation in the management, protection and conservation of the environment as captured in article 69 (1) (d) (GoK, 2010). Dictionary meaning of to encourage meant to give support, courage or hope (Hornby, 2005). This watered down what could otherwise have been a mandatory constitutional requirement. The Environmental Management and Coordination Act (EMCA) 1999 (Amended) 2015 and the Environmental (Impact Assessment and Audit) Regulation, 2003 provided for public participation during EIA process in Kenya (Mwenda & Kibutu, 2012). These legislations fell short of defining the threshold required for public participation during EIA process to be considered imputable, credible and acceptable. Section 59 of EMCA provided for advertising an already prepared ESIA study report in a newspaper, Kenya Gazette and radio and in the website of the National Environment Management Authority (GoK, 2015) as a form of public participation, this was passive participation. The EIA Regulation, 2003, which could have spelled out the nitty-gritties of public participation during EIA process to ensure that public participation was rigorous, exhaustive and all inclusive, instead reduced the process to three public meetings at strategic locations of the proposed project site (GoK, 2003). The regulations only attempted to define how the public could be informed of the location and timings of the public meetings but failed to state how the process could be conducted to ensure credibility.

5.3.3 Quality of environmental and social impact assessment reports

Quality of ESIA reports was critical in arriving at an informed decision (Kamijo & Huang, 2016) as it was an important factor in the effectiveness of environmental impact assessment (Arts et al., 2012). Comparatively, the worst performing sub-categories for ESIA reports reviewed were residual impacts prediction, reporting and communication of monitoring results, evaluation of risk and uncertainties, approaches of community involvement, and impacts identification methods and justification. In all these sub-categories, there were omissions and inadequacies as important tasks were poorly attempted. However, in the category section, the categories of description of the project, study site and methodologies, layout presentation and executive summary were of better quality than the categories of identification and impact evaluation, community involvement and impact mitigation. In the review area section, there were variations in the quality of ESIA reports in each of the four areas reviewed. Overall, area 1 (description of the development and baseline conditions) had the best quality followed by area 4 (presentation of Environmental Impact Statement). The lowest quality was recorded in area 3 (environmental management plan and follow-up) followed by area 2 (Identification and evaluation of key impacts). The findings concurred with those of Mounir (2015) who also concluded that area 1 and area 4 is better performed than area 2 and area 3. These findings are also in line with those of Kamijo and Huang (2016), who conclude that area 1 is better performed compared to area 2 and area 4. The findings, however, slightly differed with those of Chanthy and Grünbühel (2015), who concluded that the ESIA reports were inadequate with omissions noted in the executive summaries (area 4) and economic assessment chapters (area 2).

Considering overall quality of the reviewed ESIA reports, a significant majority of the reports were of acceptable quality. The quality of this category of reports was excellent, good or acceptable distributed as follows; 7%, 20% and 53% respectively. These findings are in line with previous studies of Aung et al. (2018), Chanthy and Grünbühel (2015), Mounir (2015), Omondi (2008) and Peterson (2010) but differ with the findings of Kamijo and Huang (2016). A review by Aung et al. (2018) of a sample of 10 Chinese environmental impact assessment reports produced in the natural resources sector between 2010 and 2017, found 33% of the reports were of a satisfactory quality, 40% were unsatisfactory and 27% were borderline. Chanthy and Grünbühel (2015) reviewed a sample of 39 environmental impact assessment reports for development projects in Cambodia prepared in the period 2007-2011, and found 69% of the reports' overall quality was satisfactory. Mounir (2015) reviewed a sample of 15 environmental impact assessment reports in the water and industry sectors in Niger Republic, 60% of the overall quality was satisfactory while that of 40% was unsatisfactory. Peterson (2010) reviewed a sample of 50 environmental impact assessment reports in Estonia prepared in the period 2001–2005, the overall quality of the sample was satisfactory, 68% of the sample was of satisfactory quality while 32% of the sample was of poor quality. In his study on improving Kenya's environmental impact assessment and strategic environmental assessment for sustainable development, Omondi (2008) concluded that the overall quality of the environmental impact statements was considered satisfactory at 60.8%. Kamijo and Huang (2016) reviewed a sample of 120 JICA environmental impact assessment reports prepared in the period 2001 to 2012, the overall quality of 35% of the reports was satisfactory, the dominant quality was 'poor', followed by 'acceptable' and then 'Good'.

Significant gaps were identified in sub-categories that constitute consultation and public participation, impact identification and analysis of alternatives and environmental and social management plan. There were gaps in the description of potentially affected communities, approaches in community involvement and details of involvement. Information on residual or unmitigated impacts was scanty and, in some cases, lacked completely. In scenarios where residue impacts were identified, justification why they should not be mitigated lacked. Whereas methods used to identify impacts were stated, their justification was lacking. Description of impacts was adequately done except for lack of information on interactions between identified impacts. Inadequacies in impacts description was also noted in the lack of definitions for qualitative descriptions used such as significant, insignificant, and minimum. Whereas impacts significance on affected communities was assessed, there was no clear distinction between the significance and magnitude. Description of significance of impacts remaining after mitigation lacked. There was clear lack of justification of standards, assumptions and values systems used to assess impacts significance. Alternatives considerations were well attempted but there were gaps in the discussions around environmental and social advantages and disadvantages of the alternative and justification of preferred alternative.

Provision of mitigation measures was well documented; however, there were gaps as to what extent the mitigation measures will be effective when implemented. Whereas a monitoring plan was outlined, there were gaps in the determination of effectiveness of the monitoring in relation to predicted impacts. Conspicuously missing in most reports was a communication plan on the disclosure on the progress of implementation of the monitoring plan and the monitoring results. The finding concurs with the findings of Kahangirwe and Vanclay (2021), Peterson (2010) and Omondi (2008). Kahangirwe and Vanclay (2021) in their study that evaluated the effectiveness of Uganda's national environmental and social impact assessment system concluded that there were information gaps in screening, public participation and consideration of alternatives. Peterson (2010) identified most gaps in three categories of the impact assessment statements, notably; project description, mitigation measures and consideration of alternatives. In his study, Omondi (2008) found out that there were gaps in environmental impact statements in review area 1 section of project location (which lacked reference to district or regional plans), review area 3 section of consideration of monitoring and cumulative impacts**,** and review area 2 on consideration of alternatives and significance evaluation.

Quality of ESIA reports was a major dimension of an effective ESIA system (Kamijo & Huang, 2016). ESIA report for a proposed development action was vital in guiding decision makers arrive at an informed decision. Whereas the overall quality of the report was important, the significance of each review area and sub-category was not the same when informing decision on a proposed development action (Veronez & Montaño, 2018). A decision based on an ESIA report could have a significant implication to a peoples' way of life, existence of communities, social, built and natural environment systems beyond the catchment of a proposed development. This was tenable when findings in the ESIA and its review were the main determinant of a decision on a proposed development action. In light of the importance of ESIA report in decision making, ESIA process was to be based on impact assessment methodologies with thorough structures and implementation to ensure accurate assessment results (Caro & Toro, 2016). Area 2 and 3 of an ESIA report were considered more important than area 1 and 4 (Veronez & Montaño, 2018) as impact prediction and evaluation was at the heart of environmental and social impact assessment. These two areas (2 and 3) were more complex as they not only incorporated study of the environment but also impact prediction based on scientific data combined with expertise and experience of the consulting team who prepared the environmental impact assessment report (Glasson et al., 2012).

Appropriate, comprehensive and accurate identification of probable impacts worthy of study was to be aided by the scoping process (Ortolano & Shepherd, 1995), manuals and computer programs (Fedra et al., 1991). Impact prediction was to be based on reliable predictive models (Glasson et al., 1999; Steinemann, 2001), checklists and matrices (Muse, 2016). Therefore, the ESIA reports should not have only stated the methods used for impact identification but also justification of used methods. Use of appropriate methodologies could have ensured comprehensive evaluation of significance of impacts on affected community and biophysical environment. Determination and analysis of alternatives was important if ESIA process had to remain a relevant creative problem-solving process (Kamijo & Huang, 2016). An Environmental and Social Management Plan (ESMP) was to be a vital component of an ESIA report if it outlined scientifically underpinned logically reasoned and stakeholder supported measures to mitigate identified potential negative impacts of a proposed development action. Further such an ESMP should have included a monitoring schedule complete with measurable indicators (Chanthy & Grünbühel, 2015), responsible persons, timeframe and resources for its implementation (Gupta et al., 2005). Additionally, the ESMP should have outlined a communication plan that indicated how progress of its implementation was to be disclosed.

5.3.4 Public participation and quality of ESIA report

Public participation strongly influenced quality of ESIA reports as indicated by the strong positive association between the dependent variable (quality of ESIA report) and independent variable (public participation). Somers'd value of 0.676 implied that comprehensive public participation contributed to improving quality of ESIA report by 67.6%. Comprehensiveness of public participation was a function of the number of categories of stakeholders consulted and actively participated in the ESIA process. Therefore, participation of diverse number of stakeholders was likely to contribute to improved quality of ESIA report. Contribution of public participation in improving quality of the ESIA report was very poor when only one category of stakeholder participated. However, contribution to improving quality of the reports improved with increased number of stakeholder groups and categories participated in the ESIA process. These findings are consistent with other studies that have documented public participation to be contributing to improvement of quality of impact statements specifically; Kamijo and Huang (2016), Mora-Barrantes et al. (2018) and Ulibari et al. (2019). Each stakeholder category had a unique role to play during impact assessment as they brought on board unique yet diverse knowledge, experiences and interests.

Involvement of the community was an important step in the ESIA process as it was part of the stakeholder and public participation process (Ortolano & Shepherd, 1995). The participation of the community in the ESIA process was supposed to be very rigorous as it was to be sustained throughout and in all stages of the process including decision making stage. Public participation during scoping stage ensured inclusion of potential impacts that were of greater concern to all stakeholders (Mora-Barrantes et al., 2018). It added value to developments and minimized potential delays brought about by misunderstandings and opposition from communities or civil society groups. Well planned and executed comprehensive and transparent public participation during ESIA process was vital in contributing to a more comprehensive and balanced ESIA report for informed decision. The higher the number of stakeholders consulted during public participation during ESIA process, the better was the quality of ESIA report (Peterson, 2010). Weighty stakeholder issues and concerns including potential conflicts from a proposed development action were identifiable during public participation process. Whereas community involvement was viewed as costly in terms of financial, time and human resource, community contributions during public participation substantially contributed to a better quality ESIA report and better-informed decision was likely to be arrived at.

5.4 Transactive effectiveness

Four attributes of transactive effectiveness were found to be statistically significant in underpinning conflict identification and prevention. These attributes were as follows, time taken to undertake ESIA, financial resource allocation and spending during ESIA, skill and experience of ESIA practitioners and specification of roles for ESIA team members. Sufficiency of time spent during ESIA process was found to be critical in ensuring potential conflicts are identified during the process and appropriate mitigation measures are proposed to prevent the potential conflicts from occurring during project implementation stage. A comparison of results of three scenarios of time spent during ESIA namely sufficient time, little time and insufficient time and how each likely to affected potential conflict identification was discussed.

Results showed that there was an increase of two and half times in the probability of identifying potential conflicts likely to result during implementation of a proposed project when sufficient time was taken in executing ESIA process compared to when only little or insufficient time was spent in the process. ESIA process was lengthy; it required detailed baseline studies to be carried out, in-depth consultation of all stakeholders, in-depth consideration of alternatives, impact prediction and analysis in order to come up with a comprehensive environmental and social management plan for the project. Exhaustive coverage of each of these process steps was to ensure any potential conflicting scenarios (for any proposed project) was brought out and appropriately addressed. Compiling a detailed, comprehensive and balanced ESIA report that could inform appropriate decision required sufficient time. Hurriedly compiled ESIA report was likely to have glaring gaps that if not addressed before a decision was made could result in a poor decision. Such poor decision could be challenged by affected stakeholders resulting in a conflict.

Allocation and spending of finances during ESIA had an effect on potential conflict identification and prevention. The probability of potential conflict identification was two and half times more when finances were sufficiently allocated and prudently spent during ESIA process compared to when the resources were insufficiently allocated and poorly spent. ESIA being multifaceted in nature required a multidisciplinary team of experts to address unique discipline requirements of a proposed project. Scaling down representation of required disciplines due to insufficient finances could contribute to poor coverage of issues and concerns of some disciplines. Potential conflicts from such poorly covered and addressed disciplines could not be brought out during the process for appropriate mitigation measures to be proposed and appropriately applied to avert conflicts. Critical techniques that could inform potential conflicts such as simulation analysis and dispersion modelling to determine extent of dispersion of potential pollutants (which could result in conflicts if not mitigated) from a proposed project required sufficient finances hence the need of sufficient financial allocations. When such techniques ware appropriately carried out, they provided important insights to identifying potential conflicts that could arise from project implementation and provided leads to important recommendation for their mitigation to prevent such conflicts from occurring.

Skill and experience of ESIA practitioner had an effect on potential conflict identification. Appropriately trained and experienced practitioners were more likely to identify potential conflicts anticipated during implementation of a proposed project compared to inexperienced practitioners. Experience of the practitioners appeared to have a significant influence for such a practitioner's likelihood to identify potential conflicts that could likely occur during implementation of a proposed project because an experienced practitioner was more likely to apply the ESIA process correctly compared to an inexperienced one. Experience was not only the number of years of a practitioner's experience but actual practice in a particular field. Whereas training (undergraduate, graduate or post graduate training) of the practitioner had an effect on the ability of the practitioner to identify potential conflict, the accompanying experience of the trained practitioner appeared to play a bigger role. Highly trained (graduate or post graduate) Practitioners with minimal experience in ESIA practice were less likely to identify potential conflicts likely to result during implementation of a proposed project compared to those will minimal training (undergraduate) but with extensive ESIA practice experience. The Environmental (Impact Assessment and Audit) Regulations, 2003 placed minimum requirement for registration to practice as a Lead Expert at seven years for undergraduate, five years for Masters and three years for Doctorate degree holder. This categorization clearly showed the importance of practical experience vis-à-vis level of education.

Besides education level and experience in ESIA practice, definition of roles of each member of the ESIA team was found to have an effect in potential conflict identification. Potential conflicts were more likely to be identified when there was a clear definition of roles of the team members compared to scenario where roles were not clearly defined. The probability of identifying likely potential conflicts from a proposed project was two and half times more when roles of each ESIA team member were clearly specified compared to when they were not specific. Specification of roles of ESIA team members ensured that each team member had roles restricted to area of specialization. Non specification of ESIA team member roles meant that their roles were general with no restrictions. ESIA team members whose roles were restricted to their area of specialization were more likely to identify potential conflicts likely to result from implementation of a proposed project because they appropriate used their knowledge and expertise. An ecologist undertaking baseline ecological study for a proposed project could therefore be in a better position to identify a potential ecological conflict (likely to be flagged out by conservationist) that could occur compared to when such a study is carried out by a non-ecologist. Socio-economic baseline study carried out by a socio-economist could more likely identify potential socio-economic conflicts that could occur compared to when socio-economic baseline was carried out by a non-socio-economist. These findings of transactive effectiveness attributes (time, financial resource, skill/experience and specification of roles) concur with those of Amombo (2006), Omondi (2008) and Wood (2003). In his study, Omondi (2008) found out that the most limiting resources during environmental impact assessment in Kenya were knowledge followed by finances and then time. Wood (2003) study of environmental impact assessment in developing countries observed that the prerequisite for effective implementation of environmental impact assessment in developing countries included provision of sufficient resources (finances, personnel and time) and trained and experienced personnel (personnel capacity). Amombo (2006) in his study recommended that environmental impact assessment practitioners in Kenya required capacity building in different aspects of environmental assessments.

5.5 Normative effectiveness

Attributes of normative effectiveness that were statistically significant in underpinning conflict prevention during project implementation were a healthy quality life, institutional policy choices and adjustment of policy on normative goals. Considering healthy quality life attribute, there was a high probability of preventing potential conflicts that could arise during project implementations when there was incremental improvement on health and quality of life for project host community throughout project cycle compared to when it remained as was before project implementation. Incremental improvement of health and quality of life could be achieved when predicted potential negative impacts from a proposed project that were likely to affect the health of host community were either eliminated or mitigated to acceptable legal limits. Such potential negative impacts could include those related to air emission, effluent discharge, noise and vibration (Kombe & Muguthu, 2019).

Elimination and or mitigation of such impacts could only achieve when the environmental and social management plan developed for the project under implementation was fully and completely implemented as envisaged in the ESIA report. Incremental improvement of quality of life of host community was further achieved when implementation of the proposed project enhanced and not jeopardised livelihoods of local community (Barasa & Magut, 2018). This could be achieved for example through complete implementation of proposed mitigation measures that ensured continuous and unrestricted access to communal land, water sources and grazing grounds that supported livelihoods of local communities. Full implementation of environmental and social management plan during project implementation was more likely to contribute to project sustainability as the project could be implemented without hiccups. Such projects were more likely to be a sustainable source of direct and indirect employment to local community besides supporting local livelihoods. In this way the current needs of the local community were more likely to be met without compromising those of the future and hence contribution to the realization of sustainable development.

The attribute institutional policy choices result showed that it was two and half times more likely to prevent potential conflicts likely to result during implementation of a proposed project when policy development were continuous, consultative and participatory compared to when policy change was once in a while. Regular policy review in a consultative and participatory manner ensured that the policy was continuously updated and captured the current needs of all stakeholders. It therefore implied that potential conflicts that could arise during implementation of a proposed project was over two and half times more likely to be prevented when institutional policy changes were continuous, consultative and participatory. It was therefore important to continuously update renewable energy policies as it provided appropriate pathways and opportunities to address emerging challenges and expectations among stakeholders of newly discovered natural resources in the country, particularly, those related to energy sector such as geothermal and wind. The National Energy Policy of Kenya documented that the discovery of various natural resources in the country particularly those related to energy sector such as geothermal had resulted in high expectations, confrontations and conflicts among communities where these resources had been discovered, potential conflicts and social unrest associated with exploitation of these resources caused costly delays to projects and operations in some cases, these situations lead to loss of lives and livelihoods among local populations, employees or contractors, and brought about profound developmental set-backs (Ministry of Energy [MoE] 2018). Continuous, consultative and participatory policy development ensures inclusion of policy targets for continuous environmental improvement while addressing social expectations and implications for the target community (Chapman et al., 2016). Effective sustainable energy policies when reviewed regularly addressed challenges of sustainable development such as expanding access to affordable, reliable, and adequate energy supplies while addressing environmental and social impacts (Lu et al., 2020). These findings concur with

Ongoma (2018), who states that formulated and effected policies managing Kenya's energy sector are revised from time to time whenever there is a need.

The attribute of adjustment of relevant policy concerning normative goals results showed that potential conflicts that could arise from implementation of a proposed project was over two and half times more likely to be prevented when the project's Environmental and Social Management Plan (ESMP) was completely implemented compared to implementation of a Corporate social responsibility (CSR) project. ESMP implementation required a substantial budget an expense a project proponent could try to minimise or avoid where possible to reduce project implementation cost. In an effort to minimise project implementation costs, proponents in some cases tried to substitute ESMP implementation with a CSR project. Poor or inadequate implementation of ESMP was brought about when implementation of mitigation measures was considered by project proponents as periphery works ignoring environmental and social cost associated with such a decision (Kabir & Momtaz, 2011). Some proponents tended to minimise costs of ESMP implementations by replacing of implementation of some mitigation measures with CSR projects as was found out by Carmona and Silva (2020). Such replacement was a recipe for conflict as poor implementation of ESMP more often than not triggered conflicts as documented by Corsi et al. *(*2015).

CHAPTER SIX
CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Environmental and social impact assessment is an important tool that can aid in early identification and prevention of potential conflicts that could arise during implementation of a proposed project. Whereas potential conflicts that could arise from implementation of a proposed project are identified during environmental and social impact assessment process, conflicts prevention is realized once the project's environmental and social management plan is fully implemented. This study evaluated the effectiveness of environmental and social impact assessment in conflict identification and prevention for licenced projects in Kenya and concludes as follows:

i. The effectiveness of ESIA tool in identifying and preventing potential conflicts that could arise during implementation of a proposed project is dependent on appropriate application of ESIA procedures during ESIA process. When environmental and social impact assessment procedures are strictly applied, all issues of contention are brought out and appropriate safeguards measures to mitigate issues of concern are proposed. During project implementation, proposed safeguards measures are implemented and hence prevent any conflict. On the flipside, poor application of ESIA procedures result in incomplete identification of all issues of concern, consequently identified safeguards measures to mitigate potential issues of concern are inconclusive. In such a scenario, potential conflicts arise when the project is being implemented as the safeguard measures put in place are incomplete.

ii. Stakeholder and public participation process is useful in identifying and preventing potential conflicts that could arise during project implementation when all stakeholders participate actively. During consultation and public participation stage of ESIA process, issues of concern that can trigger a potential conflict when a project is implemented are identified. Stakeholders of a proposed project play a key role in identifying, discussing and proposing relevant safeguards measures to be implemented to address contentious issues to prevent conflicts.

iii. A high quality ESIA report is a product of a well applied ESIA process that ensures each process step is professionally, scientifically and ethically executed, results accurately documented and professionally communicated. Implementations of a proposed project legally start once a substantive decision to license the project is arrived and communicated in writing. If such a decision is based on a high quality ESIA report, chances of project stakeholders contesting such a decision are minimal.

iv. Environmental and social impact assessment is multidisciplinary in nature requiring diverse expertise across disciplines relevant to the needs of a proposed project. Adequately trained and highly experienced individual experts are required to successfully execute an environmental and social impact assessment process professionally, scientifically and ethically to avoid gaps that could later trigger conflicts. Implementation of a proposed project in a particular locality should result in progressive improvement of quality of life of project host community. This will avoid conflicts as appropriate safeguards measures are implemented progressively.

6.2 Recommendations

The study makes the following recommendations

i. A review of the Environmental (Impact Assessment and Audit) Regulations, 2003 should be done to align public participation during ESIA to international best practices.

ii. A review of Kenya's environmental and social impact assessment system as currently applied to establish challenges faced and available opportunities for improvement.

iii. The National Environmental Management Authority and the Environmental Institute of Kenya should ensure continuous, relevant and focused training is mandatory for all carder of ESIA practitioners. This will ensure practitioners are informed of current industry practices while at the same time gain discipline specific knowledge to better their practice for quality reporting.

iv. The National Environmental Management Authority should develop guidelines to guide project proponents, project financiers and ESIA practitioners on sector specific ESIA timelines.

v. The National Environmental Management Authority in consultation with the Environmental Institute of Kenya and other relevant stakeholders should develop guidelines that will ensure all project stakeholders are actively involved in the implementation of the projects' environmental and social management plan to ensure sustainability of projects and livelihoods of host community.

6.3 Areas for further research

Further research can be carried in the following areas:

i) How the ESIA process can be designed in such a way that some normative advice can emerge from the process that contribute in developing pathways for proponents of projects and the community to find common ground.

ii) Common missing links in ESIA reports whose projects have been subjected to litigations and how the identified loopholes can be addressed.

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APPENDICES

Appendix A

Structured Questionnaire Administered to ESIA Practitioners

Introduction

My name is Philip Manyi Omenge, a PhD student from the Department of Natural Resources, in the Faculty of Environment and Resource Development at Egerton University, Njoro. I am undertaking research for my thesis focusing on the effectiveness of Environmental and Social Impact Assessment (ESIA) in conflict identification and prevention for renewable projects in Kenya. The study is for academic purposes only and will be used to enhance the understanding of the contribution of ESIA in conflict identification and prevention.

My contacts:

E-mail philipomenge@gmail.com, Tel. 0722493772

Thank you

.

1. **Background information**

How could you best define your role within ESIA practice? **(Tick one).**

Lead Expert ☐ Associate Expert ☐ Firm of Experts ☐

i) Do you have ESIA experience in the following sectors? **(Tick the ones you have experience)**

Mining ☐ Housing ☐ Manufacturing ☐ Geothermal energy ☐

Construction ☐ wind energy ☐ urban development ☐ Conservation ☐

2. **Application of ESIA in conflict identification and resulting effect on procedural effectiveness**

i. In your ESIA practice how often do you consider ESIA as a tool for identifying potential conflicts likely to arise from implementation of a proposed project? **(Tick one)**

Always ☐ Rarely ☐ Never ☐ Not Sure ☐

ii. In a measure of 5-1 (5-most effective, 4-effective, 3-least effective, 2-ineffective, 1- most ineffective) rank how effective the following stages of the ESIA process can be in conflict identification.

- [ ] Project identification
- [ ] Screening
- [ ] Scooping
- [ ] Public participation
- [ ] Decision making
- [ ] Administration/judicial review
- [ ] Project implementation
- [ ] Monitoring

iii. Can potential conflicts be identified at the project identification stage of EISA process?
Yes ☐ No ☐ I don't know ☐

iv. How relevant is the screening stage of ESIA process in conflict identification?
Very relevant ☐ Irrelevant ☐ Relevant ☐

v. How useful is the scoping stage of ESIA process in conflict identification?
Very useful ☐ useful ☐ not useful

vi. What form of public participation during ESIA process is best in conflict identification?
Workshops ☐ public meetings / baraza ☐ public hearing

vii. What should inform the decision-making stage of ESIA process for it to be relevant in conflict identification? Project cycle ☐ Historical context ☐social context ☐

viii. At what stage of project implementation can potential conflicts be identified?
Early ☐ midway ☐ towards the end ☐

ix. In your opinion is judicial review stage of ESIA useful in conflict identification?
Never useful ☐ sometimes useful ☐ always useful ☐

x. When can potential conflict be identified at the monitoring stage of ESIA process?
Baseline monitoring ☐ control monitoring ☐ periodic monitoring

3. **Time, skill and financial resources invested in ESIA are vital in contributing to the outcome of the ESIA (transactive effectiveness).** In a scale of 5-1 (5-most effective, 4-

effective, 3-least effective, 2-ineffective, 1- most ineffective) rank the effectiveness of the following in achieving transactive effectiveness **(write rank number in each box)**

☐ Time taken to undertake ESIA (T1)
☐ Financial resources availed for the ESIA (T2)
☐ Skill of the ESIA practitioner (T3)
☐ Specification of roles for each involved ESIA practitioners (T4)

i) How much time needed to be spent during ESIA for it to aid in identifying and preventing potential conflicts likely from a proposed project? (Tick 1)
☐ Sufficient time ☐ insufficient time ☐ little time

ii) How should financial resource allocation and spending be when executing ESIA process? (Tick1) ☐ Sufficient allocation and prudent spending ☐ sufficient allocation and economical spending insuffi☐nt allocation and economical spending.

iii) What are the required skills and experience for ESIA practitioners that can contribute in identification and prevention of potential conflicts from a proposed project during ESIA process? (Tick 1) Graduate t☐ning with limited practical experience
Undergradu☐ training with extensive practical experience
☐ Postgraduate training with limited practical experience

iv) How should roles of ESIA team members be allocated to ensure maximum productive of the team? (Tick 1) Restric☐ to area of specialization
☐ Flexible with limited restrictions ☐ General with no restrictions

4. Role of ESIA in conflict identification

i. From your experience in ESIA practice is it possible to identify potential conflicts likely to result from implementation of a proposed project when undertaking ESIA? (Tick one).

Yes ☐ No ☐
Not sure ☐ Impossible ☐

ii. In the table below please indicative the level of relevancy of the elements in the third schedule of the ESIA Regulations General Guidelines in conflict identification **(tick appropriate level against each element)**

Elements in the third schedule of the ESIA Regulations General Guidelines for carrying out ESIA	Relevancy in conflict indemnification				
	Very relevant (5)	Relevant (4)	Slightly relevant (3)	Slightly irrelevant (2)	Very irrelevant (1)
Sources of impact					
Project inputs					
Project activities					
Areas of impact on the natural and human environment					
General impacts on the natural and human environment					
Environmental guidelines and standards					
Mitigation measures					
Environmental Management Plan					
Environmental monitoring and auditing					

5. **Role of ESIA in conflict prevention**

i. Is ESIA capable of preventing conflicts likely to arise from implementation of a proposed project? **(Tick one)**

☐ Yes ☐ No ☐ Not sure ☐ Impossible

ii. Compliance with ESIA procedures and good practice (procedural effectiveness) is vital in ESIA practice. In table below please tick the level of relevancy of each aspect of procedural effectiveness in preventing conflicts **(tick appropriate level against each element)**

Steps in the ESIA process	**Relevancy in conflict prevention**				
	Very relevant (5)	Relevant (4)	Slightly relevant (3)	Slightly irrelevant (2)	Very irrelevant (1)
Relevant policy framework (P1)					
EMP implementation (P2)					
Integrating ESIA in planning process (P3)					
Setting a side separate ESIA budget (P4)					
Stakeholder involvement (P5)					
Quality of ESIA report (P6)					
Public participation (P7)					

iii. From your experience in ESIA practice, are there cases where ESIA has failed in conflict prevention? ☐ Yes ☐ No ☐ I don't know

iv. The outcome of an ESIA process for a proposed project in terms of its contribution to environmental protection (substantive effectiveness) is vital in conflict prevention. In a measure of 5-1 (5-highest contribution, 1-least contribution) rank how the following aspects contribute to effectiveness of ESIA in conflict prevention **(tick appropriately against each aspect)**

Substantive effectiveness	Relevancy in conflict prevention				
	5-most effective	4-effective	3-least effective	2- ineffective	1- most ineffective
Regulatory framework of implementing ESIA					
Incorporation of proposed changes					
Informed decision making					
Close collaboration					
ESIA process					
Timing (early start of ESIA)					
Institutional benefits					
Statutory consultations					
Public consultations					
Using ESIA in decision making					

6. **How social and individual norms affect conflict identification and prevention during ESIA and the resulting effect on normative effectiveness**

i) Has the application of the ESIA tool contributed to improvement of health and quality of life? **(tick only one)**

☐ Yes ☐ No ☐ I don't know ☐ Not sure

ii) Has the application of the ESIA tool contributed to development or changes in relevant institutional policies and policy choices? **(tick only one)**

☐ Yes ☐ No ☐ I don't know ☐ Not sure

iii) Has the application of the ESIA tool contributed to learning process and change in perceptions? **(tick only one)**

☐ Yes ☐ No ☐ I don't know ☐ Not sure

iv) Has the application of the ESIA tool contributed adjustment of relevant policy framework concerning normative goals? **(tick only one)**

☐ Yes ☐ No ☐ I don't know ☐ Not sure

v) How should the health and quality of life of host community of a renewable energy project be to prevent conflicts with the project? (Tick one)

☐ Incremental improvement throughout project cycle ☐ better than before Project implementation ☐ just as was before project implementation

vi) How should renewable energy institutions' policy development be done to prevent conflicts with host communities of a renewable energy project during its development? (Tick one) ☐ Continuous, consultative and participatory policy changes ☐ Continuous policy changes ☐ Once in a while policy change

vii) How can potential conflicts between project developers and host community best be avoided? (tick 1) ☐ Direct involvement of host community in project implementation ☐ continuous consultation during project implementation ☐ Indirect involvement of host community in project implementation

xi) Which one of the following is most likely to change negative perception of host community on a proposed renewable energy project to prevent potential conflicts? (**Tick 1**)

☐ Complete implementation of environmental and social management plan for the proposed project.

☐ Host community involvement in project implementation.

☐ Implementation of corporate social responsibility projects for host community.

Thank you so much for taking your time to complete the questionnaire

Appendix B

Structured Questionnaire administered to NEMA Officers, Ministry of Energy Officers and Civil Society Groups

Introduction

My name is Philip Manyi Omenge, a PhD student from the Department of Natural Resources, in the Faculty of Environment and Resource Development at Egerton University, Njoro. I am undertaking research for my thesis focusing on the effectiveness of Environmental and Social Impact Assessment (ESIA) in conflict identification and prevention for renewable energy projects in Kenya. The study is for academic purposes only and will be used to enhance the understanding of the contribution of ESIA in conflict identification and prevention.

My contacts:
E-mail philipomenge@gmail.com , Tel. 0722493772

Thank you.

1. **Background information**

ii) Tick the appropriate category that best defines you

- ☐ NEMA representative
- ☐ Ministry of Energy Representative
- ☐ Civil society representative
- ☐ Project proponent/Developer
- ☐ Project Financier
- ☐ Local community representative/opinion leader

2. **How application of the ESIA process affect conflict identification and prevention and the resulting effect on procedural effectiveness**

i. Procedural effectiveness of ESIA tool considers principles and practice of impact assessment, it focuses on compliance with procedures and expected good practice. In your opinion how has the ESIA practice in the sub-sector of geothermal energy and wind energy complied with expected ESIA procedures and good practice? **(Tick one only shaded box per sub-sector).**

Geothermal Energy sub-sector		**Wind Energy Sub-sector**	
	5=Very compliant		5=Very compliant
	4=Compliant		4=Compliant
	3=Partially compliant		3=Partially compliant
	2=Slightly compliant		2=Slightly compliant
	1=Not compliant		1=Not compliant

a) Various factors influence procedural effectiveness of the ESIA tool. In a scale of 1-5 (5=Very high influence, 4=High influence, 3=Moderate influence, 2=Low influence and 1=No influence; rank how each of the following factors influence procedural effectiveness of the ESIA tool. (**Write rank number in each box)**

	Policy framework
	Political context
	Availability of resources
	Active public participation
	Knowledge and experience of impact assessors

3. **How consultation, public participation and quality of the ESIA report affect conflict identification and prevention and the resulting effect on substantive effectiveness**

ii. Substantive effectiveness of ESIA relates to the outcome of ESIA in terms of the objectives it was developed for and evaluates whether the ESIA influences sound decisions that contribute to environmental protection. How effective are ESIAs carried out in the sub-sector of geothermal energy and wind in influencing sound decision that contribute to environmental protection? **(Tick one only shaded box per sub-sector).**

Geothermal Energy sub-sector		**Wind Energy Sub-sector**	
	5=Very effective		5=Very effective
	4=effective		4=effective
	3=slightly effective		3=slightly effective
	2=Ineffective		2=Ineffective
	1=Very ineffective		1=Very ineffective

b) Various factors influence substantive effectiveness of the ESIA tool. In a scale of 1-5 (5=Very high influence, 4=High influence, 3=Moderate influence, 2=Low influence and 1=No influence); rank how each of the following factors influence substantive effectiveness of the ESIAs in the sub-sector of geothermal energy and wind energy. (**Write rank number in each shaded box per sub-sector)**

Geothermal Energy sub-sector		**Wind Energy Sub-sector**	
	Regulatory framework		Regulatory framework
	Mechanisms in decision making		Mechanisms in decision making
	Public participation		Public participation
	Quality of ESIA report		Quality of ESIA report

4. How cost of human resource and time invested during ESIA affect conflict identification and prevention and the resulting effect on transactive effectiveness

v) Transactive effectiveness of an ESIA is assessed based on costs in terms of financial and time resources invested and the outcomes of the ESIA process judged by the participants. It is achieved when resources in term of human resources cost and time are invested at the minimum level to achieve the objectives set or efficient outcomes. In a scale of 4-1 (4= very cost effective, 3=cost effective, 2=slightly cost effective and 1= not cost effective) how cost-effective are ESIAs carried out in the sub-sector of geothermal energy and wind energy. **(Tick only 1 shaded box per sub-sector)**

Geothermal Energy Sub-sector		Wind Energy Sub-sector	
	Very cost effective		Very cost effective
	Cost effective		Cost effective
	Slightly cost effective		Slightly cost effective
	Not cost effective		Not cost effective

vi) Cost and availability of human resource expertise to undertake ESIA are important in determining the application of the ESIA tool and hence outcome of the ESIA process. In a scale of 4-1 (4= Affordable and easily available, 3=Affordable but not easily available, 2=Not affordable but easily available and 1= Not affordable and not easily available) how affordable and easily available are the required expertise to undertake ESIA in the sub-sector of geothermal energy and wind energy **(Tick only 1 shaded box per sub-sector)**

Geothermal Energy Sub-sector		Wind Energy Sub-sector	
	Affordable and easily available		Affordable and easily available
	Affordable but not easily available		Affordable but not easily available
	Not affordable but easily available		Not affordable but easily available
	Not affordable and not easily available		Not affordable and not easily available

vii) Time invested in ESIA and resulting financial cost are important in determining the application of the ESIA tool and hence outcome of the ESIA process. From your experience how can you describe time taken to undertake ESIA in the subsectors of geothermal energy and wind energy and resulting financial cost? **(Tick appropriate shaded box per sub-sector)**

Geothermal Energy Sub-sector		Wind Energy Sub-sector	
	ESIA done in reasonable time no delay		ESIA done in reasonable time
	ESIA done in a short time period		ESIA done in a short time period
	ESIA did not entail excessive spending		ESIA did not entail excessive spending
	ESIA entailed excessive spending		ESIA entailed excessive spending

viii) How much time needed to be spent during ESIA for it to aid in identifying and preventing potential conflicts likely from a proposed project? (Tick 1)

☐ Sufficient time ☐ insufficient time ☐ little time

ix) How should financial resource allocation and spending be when executing ESIA process? (Tick1) ☐ Sufficient allocation and prudent spending ☐ sufficient allocation and economical spending ☐ insufficient allocation and economical spending.

x) What are the required skills and experience for ESIA practitioners that can contribute in identification and prevention of potential conflicts from a proposed project during ESIA process? (Tick 1) ☐ Graduate training with limited practical experience

☐ Undergraduate training with extensive practical experience

☐ Postgraduate training with limited practical experience

xi) How should roles of ESIA team members be allocated to ensure maximum productive of the team? (Tick 1) ☐ Restricted to area of specialization

☐ Flexible with limited restrictions ☐ General with no restrictions

5. How social and individual norms affect conflict identification and prevention during ESIA and the resulting effect on normative effectiveness

viii) Normative effectiveness of an ESIA which is considered to be the perceptions or attitudes that lead people to react or to take action in impact assessment processes, such that they can learn from the experience; focuses on the extent to which normative goals i.e., combination of social and individual norms is achieved. In your opinion do what extent have ESIA undertaken in the geothermal sub-sector and wind energy subsector achieved normative effectiveness?

Geothermal Energy Sub-sector		**Wind Energy Sub-sector**	
	Fully achieved		Fully achieved
	Partially achieved		Partially achieved
	Not achieved at all		Not achieved at all

ix) Has the application of the ESIA tool contributed to improvement of health and quality of life? **(tick only one)**

☐ Yes ☐ No ☐ I don't know ☐ Not sure

x) Has the application of the ESIA tool contributed to development or changes in relevant institutional policies and policy choices? **(tick only one)**

☐ Yes ☐ No ☐ I don't know ☐ Not sure

xi) Has the application of the ESIA tool contributed to learning process and change in perceptions? **(tick only one)**

☐ Yes ☐ No ☐ I don't know ☐ Not sure

xii) Has the application of the ESIA tool contributed adjustment of relevant policy framework concerning normative goals? **(tick only one)**

☐ Yes ☐ No ☐ I don't know ☐ Not sure

xiii) How should the health and quality of life of host community of a renewable energy project be to prevent conflicts with the project? (Tick one)

☐ Incremental improvement throughout project cycle ☐ better than before Project implementation ☐ just as was before project implementation

xiv) How should renewable energy institutions' policy development be done to prevent conflicts with host communities of a renewable energy project during its development? (Tick one) ☐ Continuous, consultative and participatory policy changes Continu☐policy changes Once in ☐ile policy change

xv) How can potential conflicts between project developers and host community best be avoided? (tick 1) ☐ Direct involvement of host community in project implementation ☐ continuous consultation during project implementation ☐ Indirect involvement of host community in project implementation

xi) Which one of the following is most likely to change negative perception of host community on a proposed renewable energy project to prevent potential conflicts? (tick 1) ☐ Complete implementation of environmental and social management plan for the proposed project ☐ Host community involvement in project implementation ☐ Implementation of corporate social responsibility projects for host community

Thank you so much for taking time to complete the questionnaire

Appendix C

Tally Sheet and Collation Template

Table C1

Tally Sheet

Type of renewable energy project: (a) Geothermal energy ………… (b) Wind energy …………

ESIA Project Name: ………………………………………………………………………………

ESIA Project Code Number: ……………………………………………………………………

S/No	**Review area, category and sub-category**	**Review Score**						**Category Grade**
		A	B	C	D	E	F	
1	**Description of the development & baseline conditions**							
1.1	Project description							
1.1.1	Background and objectives of project							
1.1.2	ESIA aims & scope							
1.1.3	Policy & legal framework for ESIA							
	1.1 Category μ score (1.1.1,1.1.2&1.1.3)							
1.2	Site description							
1.2.1	Location of the project							
1.2.2	Project components & activities							
1.2.3	Selection of project alternatives							
	1.2 Category μ **score (1.2.1. 1.2.2 & 1.2.3)**							
1.3	ESIA approach & methodology							
1.3.1	Screening							
1.3.2	Scoping & bounding							
	1.3 Category μ score (1.3.1&1.3.2)							
1.4	Environmental baseline							
1.4.1	Natural physical environment							
1.4.2	Biological environment							
1.4.3	Socio-economic environment							
1.4.4	Sources of data with justification							

S/No	Review area, category and sub-category	Review Score						Category
1.4 Category μ score (1.4.1,1.4.2,1.4.3 & 1.4.4)								
Area 1 score (1.1,1.2,1.3 & 1.4)								
2	Identification & evaluation of key impacts							
2.1	Identification of impacts							
2.1.1	Description of impacts identified at different places							
2.1.2	Beneficial impacts & adverse impacts							
2.1.3	Methods used for impact identification with justification							
2.1 Category μ score (2.1.1, 2.1.2&2.1.3)								
2.2	Impact evaluation							
2.2.1	Prediction of impacts							
2.2.2	Significance of impacts on affected community							
2.2.3	Significance of impacts on biophysical environment							
2.2.4	Methods used for evaluation of impacts							
2.2.5	Risk and uncertainties							
2.2 Category μ score (2.2.1,2.2.2,2.2.3,2.2.4 and 2.2.5)								
2.3	Alternatives							
2.3.1	Analysis of alternative							
2.3.2	Selection of alternatives							
2.3 Category μ score (2.3.1 and 2.3.2)								
2.4	Community involvement							
2.4.1	Description of community							
2.4.2	Involvement of community at different stages							
2.4.3	Approaches of community involvement							
2.4.4	Findings of community involvement							
2.4 Category μ score (2.4.1, 2.4.2, 2.4.3 and 2.4.4)								
Area 2 score (2.1, 2.2,2.3 and 2.4)								
3	Environmental management plan and follow-up							
3.1	Mitigation measures							

S/No	Review area, category and sub-category	Review Score						Category
3.1.1	Description of adverse impacts to be mitigated							
3.1.2	Mitigation measures with justification							
3.1.3	Implementation arrangements of mitigation measures							
3.1.4	Residual impacts							
3.1 Category µ score (3.1.1, 3.1.2, 3.1.3 and 3.1.4)								
3.2	Follow-up monitoring program							
3.2.1	Parameters/ activities to be monitored							
3.2.2	Monitoring plan & implementation arrangements							
3.2.3	Reporting & communication of monitoring results							
3.2 Category µ score (3.2.1, 3.2.2 and 3.2.3)								
Area 3 score (3.1 and 3.2)								
4	Presentation of Environmental Impact Statement							
4.1	Layout							
4.1.1	Logical arrangement of information							
4.1.2	List of references							
4.1 Category µ score (4.1.1 and 4.1.2)								
4.2	Presentation							
4.2.1	Comprehensible to non-specialists							
4.2.2	Defining technical terms							
4.2.3	Presented as an integrated whole							
4.2 Category µ score (4.2.1, 4.2.2 and 4.2.3)								
4.3	Executive summary							
4.3.1	Summary of main findings presented non-technically							
4.3.2	Recommendations							
4.3 Category µ score (4.3.1 and 4.3.2)								
Area 4 score (4.1, 4.2 & 4.3)								
Overall ESIA score for the project (1, 2, 3 and 4)								

Note. Key for review score

A- Excellent: Relevant tasks well performed and that no important task is left incomplete

B- Good: Generally satisfactory and complete only minor omissions and inadequacies

C- Acceptable: Considered just satisfactory despite omissions and inadequacies

D- Poor: Parts well attempted, but in overall considered unsatisfactory because of omissions and inadequacies

E- Very poor: Not satisfactory, significant omissions and or inadequacies

F- Unsatisfied: Very unsatisfactory, important tasks poorly done or note attempted

Source: Lee et al., 1999

Table C2

Collation Template

Type of renewable energy projects (tick appropriately)

(a) Geothermal energy ……………………………….

(b) Wind energy …………………. ………………….

Overall Assessment

1	**.................**	**2**	**.................**	**3**	**................**	**4**	**................**
1.1	....	2.1	....	3.1	....	4.1	....
1.1.1	....	2.1.1	....	3.1.1	....	4.1.1	....
1.1.2	....	2.1.2	....	3.1.2	....	4.1.2	....
1.1.3	....	2.1.3	....	3.1.3	....		
				3.1.4	....		
1.2	**.................**	**2.2**	....	**3.2**	....	**4.2**	....
1.2.1	....	2.2.1	....	3.2.1	....	4.2.1	....
1.2.2	....	2.2.2	....	3.2.2	....	4.2.2	....
1.3	....	2.2.3	....	3.2.3	....	4.2.3	....
1.3.1	....	2.2.4	....				
1.3.2	....	2.2.5	....				
1.4	**.................**	**2.3**	....			**4.3**	....
1.4.1	....	2.3.1	....			4.3.1	....
1.4.2	....	2.3.2	....			4.3.2	....
1.4.3	....						
1.4.4	....						
		2.4	....				
		2.4.1	....				
		2.4.2	....				
		2.4.3	....				
		2.4.4	....				

Appendix D

List of Reviewed ESIA Reports for Geothermal Energy Projects

C/No	Name of the Project	Project Description	Year of ESIA
1	Sosian Energy (Menengai Geothermal Field in Nakuru)	35MW Geothermal Modular Power Plant	2019
2	Menengai West Geothermal Drilling Project	Drilling of geothermal exploration wells from the western side of the Menengai Caldera	2019
3	Quantum Power (Menengai Geothermal Power Development)	35MW modular geothermal power plant	2018
4	Modular Geothermal Power Project at Olkaria	61MWe Modular Geothermal Power plant	2017
5	Akiira Geothermal Power Plant in Naivasha	70MW geothermal plant	2016
6	Olkaria I	Rehabilitation of unit 1, 2 and 3 conventional power plant	2014
7	Suswa Geothermal Development Project	Detailed exploration and exploratory drilling of four geothermal wells and appraisal drilling.	2013
8	Olkaria V	Unit 1 and 2 (140MWe) conventional power plant	2013
9	Olkaria I	Unit 6 (70MWe) conventional power plant	2013
10	Menengai Caldera Project	Installation of 5-10 MW modular geothermal power plants at Menengai	2012
11	Olkaria IV	Unit 1 & 2 (140MWe)	2010
12	Olkaria I	Unit 4 and 5 conventional power plant (140MWe)	2009
13	Drilling of appraisal wells	Drilling of 6 appraisal wells at Olkaria	2004

		Domes	
14	Olkaria II	Unit 3 conventional power plant (35MWe)	2004
15	Olkaria II	Unit 1 and 2 conventional power plant (70MWe)	1994

Appendix E

List of Reviewed ESIA Reports for Wind Energy Projects

C/No	Project name	Description of the project	Year of ESIA
1	Wind farm along Oolesayeti Ridges, Kajiado County	50MW wind farm	2017
2	Wind power project in Kalacha location, Marsabit County	50MW wind farm	2016
3	Mombasa Cement wind farm, Vipingo Kilifi County	36MW wind farm	2016
4	Rea Vipingo Wind Farm, Vipingo, Kilifi County	48MW wind farm	2015
5	Wind power project in Rwarera location, Meru County	60MW wind farm	2015
6	Kipeto wind energy project, Kajiado County	100MW wind farm	2012
7	Baharini Electra winds Wind Farm, Mpeketoni, Lamu County	90MW wind farm	2012
8	Ngong Hills wind farm Phase II, Kajiado County	20.4MW wind farm	2012
9	Ngong Hills wind farm Phase I, Kajiado County	5.1 MW wind farm	2008
10	Lake Turkana wind power Project, Marsabit County	300MW wind farm	2008
11	Aeolu-Kinangop Wind Farm, Nyandarua County	60.8MW wind farm	2005

Appendix F

Research Permit

NATIONAL COMMISSION FORSCIENCE, TECHNOLOGY ANDINNOVATION

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/17/20473/18574**

Date: **23rd August, 2017**

Philip Manyi Omenge
Egerton University
P.O. Box 536-20115
EGERTON.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Evaluation of the effectiveness of environmental and social impact assessment in conflict identification and prevention for renewable energy projects in Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **selected Counties** for the period ending **22nd August, 2018.**

You are advised to report to **the County Commissioners and the County Directors of Education of the selected Counties** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioners
Selected Counties.

Appendix G

Authorization from NEMA and Ministry of Energy

nema

mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Tel: (254-020) 6005522/3/6/7, 6001945, 6008767, 6008687
Mbl: 0724-253398, 0723-363010, 0735-013046, 0735-010237
Telkom Wireless: 020-2101370
Fax: 254-020-6008997
Hotline:020-8077233, 020-6006041

P.O. Box 67839, 00200
Popo Road, Nairobi, Kenya
E-mail: dgnema@nema.go.ke
website: www.nema.go.ke

3rd October 2017

NEMA/7/35/VOL. I1

Mr. Philip Manyi Omenge
P.O. Box 569-80100
MOMBASA

RE: REQUEST TO ACCESS DATA AND INFORMATION FOR ACADEMIC RESEARCH

Following your request to access some data and information for your academic research, I am happy to extend to you the willingness of the Authority to give you permission to:-

1. Access Environmental and social Impact Assessment Study Reports for all Geothermal Energy projects in Kenya
2. Access Environmental and social Impact Assessment Study Reports for all Wind Energy projects in Kenya
3. Administer questionnaires to our county Directors of Environment (CDEs) and Environmental Officers (EOs) whose stations have wind and geothermal Energy projects.

By a copy of this letter the CDEs and EOs are requested to respond to the questionnaires issued to them by the student.

I wish you all the best in this study.

Ali Mwanzei
For: Director General

Our Environment, Our Life, Our Responsibilty

ISO 9001:2008 Certified

PHILIP MANYI OMENGE

P.O. BOX 569-80100

MOMBASA

Tel. 0722493772

E-Mail: philipomenge@gmail.com

PRINCIPAL SECRETARY RECEIVED 05 SEP 2017 MINISTRY OF ENERGY & PETROLEUM

Dr. Eng. Joseph K. Njoroge, CBS.

The Principal Secretary

State Department of Energy,

Ministry of Energy and Petroleum,

23rd Floor, Nyayo House

NAIROBI.

cc: Sec - GeoExpo
Sec - RE
Please facilitate the required data
5/9/17

Dear Sir,

RE. REQUEST TO ACCESS DATA AND INFORMATION FOR ACADEMIC RESEARCH

I am a PhD Student registered in Egerton University, Department of Natural Resources, Njoro undertaking a doctoral programme in **Natural Resources and Peace**. I am at the stage of collecting field data for my thesis. My research topic is **"Evaluation of the Effectiveness of Environmental and Social Impact Assessment in Conflict Identification and Prevention for Renewable Energy Projects in Kenya"**.

I am writing to seek permission to:-

1. Access Environmental and Social Impact Assessment Study Reports for all Geothermal Energy Projects in Kenya.
2. Access Environmental and Social Impact Assessment Study Reports for all Wind Energy Projects in Kenya.

3. Access maps of the locations of all the Geothermal Energy Projects and Wind Energy Projects in Kenya.
4. Access a list of all Investors in the Geothermal Energy Sector and Wind Energy Sector for all existing projects in Kenya.
5. Access a list of all Financiers of Geothermal Energy Sector and Wind Energy Sector existing projects in Kenya.
6. Access a list of Civil Society Groups operating in areas where there are Geothermal Energy Projects and Wind Energy Projects in Kenya.
7. Administer a questionnaire to Officers in the State Department of Energy specifically those in the Geothermal Energy Section and Wind Energy Section both at National level and at the Field Offices.
8. Administer a questionnaire to Project Proponents (investors) in the Geothermal Energy Sector and Wind Energy Sector for all existing projects.
9. Administer a questionnaire to Financiers of Geothermal Energy Sector and Wind Energy Sector existing projects in Kenya
10. Administer a questionnaire to Civil Society Groups operating in areas where there are Geothermal Energy Projects and Wind Energy Projects.

Information and data to be collected will be used for academic purpose only and that it will be analysed anonymously. I believe that the findings from the research will help the Ministry of Energy and Petroleum, and our country overall, in implementation of Geothermal and Wind Energy projects.

Attached please find my research permit, letter from Graduate School Egertonn University, my student ID and my admission letter from the University for your record and information.

Yours faithfully,

Philip Manyi Omenge

PhD Student Reg. No. ND11/14619/15

Appendix H

Cumulative Odds Ordinal Logistic Regression Model Output for Procedural Effectiveness Indicator Variables

			Hypothesis test				95% Wald confidence interval for Exp. (B)	
Parameter		**B**	**Wald Chi-Square**	**df**	**Sig.**	**Exp. (B)**	**Lower**	**Upper**
Threshold	[Conflict identification=0.00]	-4.49	20.46	1	0.00	0.01	0.00	0.07
	[Conflict identification=1.00]	-3.10	10.52	1	0.00	0.04	0.00	0.29
	[Conflict identification=2.00]	-0.94	1.01	1	0.31	0.39	0.06	2.44
	[Conflict identification=3.00]	0.42	0.20	1	0.64	1.53	0.024	9.54
[Public participation=0.00]		1.93	9.12	1	000	6.93	1.97	24.35
[Public participation=1.00]		0.34	1.28	1	0.25	1.41	0.077	2.58
[Public participation=2.00]		0	-	-	-	1	-	-
[Decision making=.00]		-0.35	0.76	1	0.38	0.70	0.31	1.55
[Decision making=1.00]		-0.89	4.04	1	0.04	0.40	0.17	0.97
[Decision making=2.00]		0	-	-	-	1	-	-
[Project implementation=0.00]		1.03	3.64	1	0.05	2.81	0.97	8.17
[Project implementation=1.00]		0.46	1.71	1	0.19	1.58	0.79	3.14
[Project implementation=2.00]		0	-	-	-	1	-	-
[Monitoring=0.00]		-0.65	3.31	1	0.00	0.51	0.25	1.05
[Monitoring=1.00]		1.23	2.44	1	0.11	3.42	0.73	16.04
[Monitoring=2.00]		0	-	-	-	1	-	-

(Scale)	1

Appendix I

Cumulative Odds Ordinal Logistic Regression Model Output for Transactive Effectiveness Indicator Variables

Parameter		**B**	**Hypothesis Test**			**Exp (B)**	**95% Wald Confidence Interval for Exp (B)**	
			Wald Chi-Square	**df**	**Sig.**		**Lower**	**Upper**
Threshold	[Conflict identification prevention=.00]	-2.93	29.13	1	0.00	0.05	0.02	0.16
	[Conflict identification prevention=1.00]	-0.62	1.79	1	0.18	0.54	0.22	1.34
	[Conflict identification prevention=2.00]	0.37	0.64	1	0.42	1.45	0.58	3.59
	[Conflict identification prevention=3.00]	1.13	5.78	1	0.02	3.09	1.23	7.76
[Time taken=.00]		1.29	11.14	1	0.00	3.65	1.71	7.79
[Time taken=1.00]		0.15	0.21	1	0.65	1.16	0.61	2.21
[Time taken=2.00]		0	.	.	.	1	.	.
[Financial resources=.00]		1.11	12.29	1	0.00	3.03	1.63	5.63
[Financial resources=1.00]		-0.23	0.49	1	0.48	0.79	0.42	1.51
[Financial resources=2.00]		0	.	.	.	1	.	.
[Practitioner skills=.00]		-0.40	1.21	1	0.27	0.67	0.33	1.37
[Practitioner skills=1.00]		-0.70	3.77	1	0.05	0.49	0.24	1.01
[Practitioner skills=2.00]		0	.	.	.	1	.	.

[Roles specification=.00]	0.69	3.59	1	0.05	2.00	0.98	4.09
[Roles specification=1.00]	-0.43	1.57	1	0.21	0.65	0.33	1.28
[Roles specification=2.00]	0	.	.	.	1	.	.
(Scale)	1						

Appendix J

Cumulative Odds Ordinal Logistic Regression Model Output for Normative Effectiveness Indicator Variables

Parameter		**B**	**Hypothesis Test**			**Exp (B)**	**95% Wald Confidence Interval for Exp(B)**	
			Wald Chi-Square	**df**	**Sig.**		**Lower**	**Upper**
Threshold	[Conflict prevention=.00]	-2.94	28.77	1	0.00	0.05	0.01	0.15
	[Conflict prevention=1.00]	-0.69	2.14	1	0.14	0.49	0.19	1.26
	[Conflict prevention=2.00]	0.31	0.45	1	0.49	1.37	0.54	3.47
	[Conflict prevention=3.00]	1.10	5.34	1	0.02	3.02	1.18	7.72
[Health quality life=.00]		1.37	12.48	1	0.00	3.96	1.84	8.52
[Health quality life=1.00]		0.11	0.13	1	0.71	1.12	0.59	2.14
[Health quality life=2.00]		0	.	.	.	1	.	.
[Institutional policy choices=.00]		1.07	11.57	1	0.00	2.93	1.57	5.46
[Institutional policy choices=1.00]		-0.28	0.77	1	0.37	0.75	0.39	1.42
[Institutional policy choices=2.00]		0	.	.	.	1	.	.
[Learning perception changes=.00]		-0.57	2.43	1	0.11	0.56	0.27	1.15
[Learning perception changes=1.00]		-0.64	3.17	1	0.07	0.52	0.26	1.06

[Learning perception changes=2.00]	0	.	.	.	1	.	.
[Adjustment policy normative goal=.00]	0.73	4.07	1	0.04	2.09	1.02	4.29
[Adjustment policy normative goal=1.00]	-0.38	1.25	1	0.26	0.67	0.34	1.34
[Adjustment policy normative goal=2.00]	0	.	.	.	1	.	.
(Scale)	1						

Appendix K

Abstracts of Published Papers

East African Journal of Environment and Natural Resources, Volume 5, Issue 2, 2022
Article DOI: https://doi.org/10.37284/eajenr.5.2.1027

East African Journal of Environment and Natural Resources
eajenr.eanso.org
Volume 5, Issue 2, 2022
Print ISSN: 2707-4234 | Online ISSN: 2707-4242
Title DOI: https://doi.org/10.37284/2707-4242

EANSO
EAST AFRICAN NATURE & SCIENCE ORGANIZATION

Original Article

A Review of the Quality of Environmental and Social Impact Statements: The Case of Geothermal Energy Projects in Kenya

Philip M. Omenge[1], Prof. Gilbert O. Obwoyere, PhD[1], Dr. George W. Eshiamwata, PhD[3] & Prof. Stanley M. Makindi, PhD[2]*

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Article DOI: https://doi.org/10.37284/eajenr.5.2.1027

Date Published:

27 December 2022

Keywords:

Environmental and Social Impacts Statements, Quality Review, Geothermal Energy, Lee and Colley Review Package, Kenya.

ABSTRACT

Evaluation of the quality of Environmental and Social Impact Statements (ESISs) for proposed development action is vital in ascertaining their fitness in informing critical decisions on a proposed development action. In this paper, we present findings of an evaluation of the quality of fifteen (15) ESISs for the geothermal energy resource projects in Kenya in the period 1994-2019. The review which was based on the Lee and Colley Review Package (LCRP), involved a systematic evaluation of how well a number of assessment tasks were performed in four (4) review areas, 13 categories and 40 subcategories. Starting from the lowest level and moving systematically up the hierarchy, the review involved evaluating how well a number of assessment tasks were performed. The quality of each review subcategory within a particular category was assessed. The subcategory assessment results and the relevant impression gained from the ESIS were then used to assess the review category. The result of the assessment of the review category was used to assess each review area of the ESIS. The overall quality of the ESIS was derived from the outcome of the assessment of each of the review areas by considering the main strengths and weaknesses. Results showed seven percent (7%) of the ESISs were of excellent quality, 20% were good, 53% were acceptable, and 13% were of poor quality. Six percent (6%) were of excellent quality in three (3) review areas of identification & evaluation of key impacts, presentation of impact statement and description of the development and baseline conditions. Eighty percent (80%) were of good quality in the review area of the description of the development and baseline conditions, while 60% were of good quality in the review area of the presentation of the impact statement. Six per cent (6%) were of very poor quality

Philip Manyi Omenge et al., Int. J. Environ. Impacts, Vol. 5, No. 2 (2022) 146–160

IMPROVING QUALITY OF ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORTS: A STATISTICAL ANALYSIS

PHILIP MANYI OMENGE[1], GILBERT ONACHA OBWOYERE[1], GEORGE WERE ESHIAMWATA[2], STANLEY MAINGI MAKINDI[3] & JATHIN NATHWANI[4]

[1]Faculty of Environment & Resources Development, Department of Natural Resources, Egerton University, Kenya

[2]Kenya National Commission for UNESCO, Kenya

[3]School of Environment & Natural Resources Management, Department of Environmental Sciences, Machakos University, Kenya

[4]Waterloo Institute for Sustainable Energy, University of Waterloo, Canada

ABSTRACT

Environmental and Social Impact Statement (ESIS) for a proposed development is vital in guiding decision makers arrive at an informed decision. Many studies have analysed ESIS quality using qualitative methods with limited statistical analysis. In this paper, we present findings of a statistical analysis of qualitative data of ESIS using Somers' delta test (Somers' *d*). We report on how public participation and analysis of alternatives influence the quality of ESIS. Results show that there is a strong and positive correlation between the quality of ESIS and public participation and also between the quality of ESIS and the analysis of alternatives, which is statistically significant, $p < 0.0005$, Somers' $d = 0.676$ and $p < 0.0005$, Somers' $d = 0.682$, respectively.

Keywords: alternatives analysis, environmental and social impact statements, public participation, Somers' delta test.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROCEDURAL STEPS THAT UNDERPIN CONFLICT IDENTIFICATION: REFERENCE TO RENEWABLE ENERGY RESOURCE DEVELOPMENT IN KENYA

PHILIP M. OMENGE[1], GILBERT O. OBWOYERE[1], GEORGE W. ESHIAMWATA[2], STANLEY M. MAKINDI[3] & JATIN NATHWANI[4]
[1] Egerton University, Kenya
[2] The Kenya National Commission for UNESCO, Kenya
[3] Machakos University, Kenya
[4] Waterloo Institute for Sustainable Energy University of Waterloo Canada

ABSTRACT

Environmental and Social Impact Assessment (ESIA) is a tool for an integrated assessment of multifaceted impacts of a proposed project. ESIA can identify areas of potential conflicts and prevent conflicts from occurring early through appropriate mitigation measures. This notwithstanding, conflicts and public opposition arising from implementation of proposed projects which have been subjected to ESIA have been observed in various sectors in different countries and jurisdictions. Kenya is one of the African countries endowed with substantial renewable energy resources including geothermal, wind and solar energy resources. The country is now scaling up the development and utilization of these resources to meet growing energy demand. However, implementation of environmental procedures mainstreamed in the development of renewable energy resources, if inappropriately applied, has the potential to slow down development and exploitation trajectory of these resources. While all proposed renewable energy projects are subjected to the ESIA process, in some instances challenges have emerged at implementation resulting in conflicts that could be avoided. There is a clear need to understand, empirically, which of the ESIA procedural steps is critical in underpinning conflict identification for appropriate application. To determine how each of the ESIA procedural steps is likely to influence conflict identification, a statistical analysis was carried out for ESIA procedures based on questionnaire survey responses from sampled ESIA practitioners in Kenya. This article presents findings on the effect of ESIA procedural steps in conflict identification using cumulative odds ordinal logistic regression with proportional odds. Results show that the overall effect (on the dependent variable conflict identification) of the variables, public participation and monitoring is statically significant, $\chi^2(2) = 9.12$, $p = 0.01$ and $\chi^2(2) = 6.29$, $p = 0.04$, respectively. Further, the exponential of the log odds of the slope coefficients indicate that the independent variables public participation, decision making, project implementation and monitoring are statistically significant [$\chi^2(1) = 9.12$, $p = 0.00$; $\chi^2(1) = 4.04$, $p = 0.04$; $\chi^2(1) = 3.64$, $p = 0.05$ and $\chi^2(1) = 3.31$, $p = 0.00$, respectively]. That is to say these independent variables have a statistically significant effect on the dependent variable conflict identification.

Keywords: conflict identification, decision making, Environmental and Social Impact Assessment, monitoring, public participation, renewable energy resources.

PUBLIC PARTICIPATION IN ENVIRONMENTAL IMPACT ASSESSMENT AND ITS SUBSTANTIVE CONTRIBUTION TO ENVIRONMENTAL RISK MANAGEMENT: INSIGHTS FROM EIA PRACTITIONERS AND OTHER STAKEHOLDERS IN KENYA'S RENEWABLE ENERGY SUB-SECTOR

PHILIP M. OMENGE[1], GEORGE W. ESHIAMWATA[2],
STANLEY M. MAKINDI[3] & GILBERT O. OBWOYERE[1]
[1]Egerton University, Kenya
[2]The Kenya National Commission for UNESCO, Kenya
[3]Machakos University, Kenya

ABSTRACT

Comprehensive and transparent public participation during Environmental Impact Assessment (EIA) processes for renewable energy projects is vital in identifying, addressing and mitigating potential environmental risks associated with such renewable energy projects. Public participation during EIA is a vital platform where all stakeholders of a given renewable energy project contribute to addressing the environmental concerns of renewable energy projects, thereby contributing positively to informed environmental decisions that mitigate negative environmental impacts. This paper presents a comparative analysis of public participation practice during an EIA process in Kenya's renewable energy sub-sector vis-à-vis the international best practice operating principles. Further, the paper presents insights on the substantive contribution of public participation in environmental risk management based on questionnaire survey responses from EIA Practitioners and other stakeholders in Kenya's renewable energy sub-sector. Results show that public participation practice during EIA in Kenya loosely adheres to the international best practice operating principles. An analysis of stakeholder responses shows that public participation during EIA processes in the renewable energy sub-sector seldom supports decisions that result in environmental protection. Factors that contribute to Kenya's poor adherence to international best practice operating principles are discussed. Suggestions and recommendations on how to achieve a substantive contribution of public participation during EIA in Kenya's renewable energy projects in order to contribute to environmental risk management are presented.

Keywords: public participation, Environmental Impact Assessment, renewable energy, Kenya.

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