INFLUENCE OF ENVIRONMENTAL IMPACT ASSESSMENT ON SUSTAINABILITY OF TRANSPORT INFRASTRUCTURE PROJECTS: A CASE OF STANDARD GAUGE RAILWAY PROJECT, KENYA

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A Research Project Report Submitted in Partial Fulfilment of the Requirements for the Award of the Degree of Master of Arts in Project Planning and Management of the University of Nairobi.

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DECLARATION

This research project report is my original work and has not been submitted for examination in any other University.

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

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DEDICATION

This project is dedicated to Almighty God who has taken me throughout the duration of the project. I also dedicate this work to my parents, family and friends.

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ABBREVIATIONS AND ACRONYMS

CRBC China Road and Bridge Corporation

DEP Draft Environmental Proclamation

EIA Environmental Impact Assessment

EMM Extended Metabolism Model

ESIA Environmental and Social Impact Assessment

FAO Food and Agricultural Organization

GoK Government of Kenya

NCA National Construction Authority

NEMA National Environmental Management Authority

NGOs Non-Governmental Organizations

NNP Nairobi National Park

SGR Standard Gauge Railway

SPSS Statistical Package for Social Sciences

TOR Terms of Reference

UNEP United Nations Environmental Programme

PMBOK Project Management Body of Knowledge

PRINCE Projects In Controlled Environments

ABSTRACT

Despite contributions of the infrastructure projects to the economy, infrastructure projects continue to encounter sustainability issues as a result of a lack of openness in how to mitigate and monitor project environmental impacts, discrepancies in EIA protocols, and an EIA process that can be difficult to comprehend or replicate. Lack of environmental screening, scoping, impact prediction, and post-project environmental impact evaluation can result in economic, social, and mortality concerns, as well as cumulative and intergenerational repercussions. This study used the Kenyan Standard Gauge Railway project to evaluate influence of environmental impact assessments on sustainability of transportation infrastructure projects. The study's topic is introduced in chapter one; literature review is covered in chapter two; and the research technique is covered in chapter three. Chapter five offers results summary, discussions, conclusions, and suggestions, whereas chapter four covers data analysis, presentations, and interpretations. Examining the impact of environmental screening, environmental scoping, environmental impact prediction, and post-EIA project review on the sustainability of transport infrastructure projects were the precise objectives that served as the basis for the work. Descriptive research approach was utilized. The study's target audience consisted of 141 respondents, including 27 Ministry of Roads and Infrastructure officials, 24 project managers, 28 project supervisors, 16 contractors, 33 environmental consultants, and 13 National Construction Authority officials. The size of sample for the investigation was determined using the Yamane's formula for a limited population. The sample size was 133 respondents, and to get samples of respondents from the various strata, stratified and simple random sampling were utilized. The main tool was a questionnaire. Peer review and evaluation by research experts, including the research supervisor, were used to evaluate the instrument's content validity and make sure that it was appropriate and pertinent to the study. In this inquiry, dependability was established by method of internal consistency. Cronbach's alpha coefficient was calculated to assess how the items connected with one another. Qualitative and quantitative data analysis approaches were employed because the research collected both types of data. Both descriptive and inferential statistics, including the regression model, were used for analysis. Descriptive statistics included frequencies, percentages, means, and standard deviation. A regression model was used to perform inferential statistics. The data presentation was done in tables. The aims of the study were taken into consideration when dominating themes emerged through analysis of qualitative data. The findings of the study demonstrated that there was a statistical significant positive correlation between environmental screening process on sustainability of the SGR project ($r=0.622$, $p<0.05$); there was a statistical significant positive effect of environmental scoping process on sustainability of the SGR project ($r=0.631$; $p<0.05$); there was a statistical significant positive effect of environmental impact prediction on sustainability of the SGR project ($r=0.411$; $p<0.05$) and there was a statistical significant positive effect of post environment impact assessment preview on sustainability of the SGR project ($r=0.597$; $p<0.05$). The study found that creating checklists helps with decision-making before a project is approved for execution; collecting baseline data is done for every project that will be performed; and identifying project impacts is done before the project even starts. Upon consideration of a project, environmental issues are brought up to ensure that all concerns are addressed as the project moves forward to execution. In order to attain sustainability, this research advises project managers to use adequate EIA in their individual future projects.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

A venture's sustainability is today a typical method to project, institution, program, individual, organization, and other entity management that requires successful and efficient service and product marketing, production, distribution, as well as delivery (Carvalho & Rabechini Jr, 2017). Most projects fail owing to a lack of a good sustainability strategy, which is a well-known fact (Aarseth et al., 2017). For project implementation, a detailed analysis of the social, economic, educational, political, legal, and cultural surroundings is necessary. Stakeholder and advocate engagement is critical since it allows for some logistical planning (Stanitsas, Kirytopoulos & Leopoulos, 2021). Beneficiary analysis, regulatory and legal framework studies, partnership building, marketing and competitive analysis, and institutional analysis all help to make certain that projects are executed successfully and efficiently. The project's viability, relevance, political expediency, adaptability and acceptability will all be determined by the sustainability study (Carvalho & Rabechini, 2017).

Sustainable infrastructure projects are those that are built, designed, operated, planned, and discharged in a manner that assures financial, economic, social, and environmental (including resilience of the climate), and institutional sustainability throughout the life cycle of the project (Sierra, Pellicer & Yepes, 2017). As a result, creating sustainable infrastructure also entails creating a service support system that is in tune with the environment and the surrounding terrain. During the building process, it involves respecting people, their labour, and their safety. It entails increasing life standards in societies and positively contributing to landscapes impacted by the construction. It also entails considering a maintenance and care system capable of maintaining huge infrastructure's ability to withstand, adapt, and develop through time (Sierra et al., 2017).

Environmental Impact Assessment (EIA) is in itself perhaps the greatest valuable method for managing and understanding the effects of a project (Sierra et al., 2017). The term "environmental impact assessment" refers to a process that must be followed before a project can be granted "progress agreement." The procedure is a method of systematically compiling a valuation of a venture's prospective substantial influence on the environment. Environment screening, scoping, impact projection, and post-EIA project assessment are the phases of the

procedure. EIA is an approach that pinpoints, anticipates, and analyzes the probable implications of the environment of a proposed activity or project, as well as labeling methods for reducing serious impacts, prior to key decisions or commitments. It offers an impartial, clear, and transparent foundation for decision-making that is efficient and avoids tripping obstacles that could have resulted from the project's unanticipated negative environmental implications (van Eldik et al., 2020).

Environmental Impact Assessments (EIA) have been used in a number of jurisdictions throughout the world, and it is anticipated that they will impact planning and policymaking in each one (Christensen & Krnv, 2017). EIA assessments frequently place a high priority on the "quality" of the EIA, with a particular focus on the quality and performance of Environmental Impact Statements (EIS), omitting any connection linking EIA processes and quality in addition to the role that EIA processes play in EIA's effectiveness (Pischke & Cashmore, 2016). The comprehensive EIA procedure travels down the same road as many other regulations. The EIA then goes through a number of stages, including screening and documentation. After settling on mitigation, the project is subjected to an EIA (Ahmad & Wood, 2019). The project will be completed, and when it has been monitored and evaluated, it will be maintained, followed by succession, or terminated. An EIA system is effective if it reduces the likelihood of projects with substantial environmental consequences being executed, by determining whether or not developmental consent should be granted, and by providing key information to decision-makers (Toro, Requena & Zamorano, 2010).

Environmental screening is a required examination of a proposed project with the goal of categorizing it based on projected environmental risks and consequences, weeding out projects that are extremely harmful to the environment, and identifying the proper scope and type of EIA to be conducted (Christensen & Krnv, 2017). Although it might be clearly contextualized as the foundation of a specific project EIA or the nature and logic of this instrument, this stage is ambiguous on its own. By preventing significant categories of acts from being excluded from the prerequisite for an assessed EIA, the screening step's effectiveness is amplified (Ahmad & Wood, 2019). To save time on ineffective projects with unclear environmental effects, a thorough screening process is necessary. The terminology used in the benchmarks and checklist ought to be flawless and quantitatively specified should varying elucidations be used to justify not conducting an EIA. Political will may have an impact on the screening decision when the threshold or criteria are not specifically stated. Timing and communication between project proponents, consultants, and regulators are essential for early project modification. Because

resolutions are anchored on altering the project, screening isn't just a gating strategy but also a more autonomous guiding tool (Pischke & Cashmore, 2016).

Environmental scoping is an approach used to identify the most vital environmental concerns in an EIA, and it is probably the most important step. Lack of specialized methodologies may obstruct the documentation of the secondary and the indirect impacts that influence EIS's complexity, resulting in the forfeiture of important evidence for decision-making (Toro et al., 2010). Early stakeholder involvement and consultation are thought to be beneficial in identifying major concerns early in the process (Pischke & Cashmore, 2016). This may help to evade delays in the next processes and ensuring that the information is of sufficient quality and completeness, and that it is delivered on time and in a timely manner. It is critical for various stakeholders to convey their apprehensions to the consideration of the competent authorities and the contractor, and for those issues to be represented in the terms of reference. While time and money are vital, scoping should also rely on professional judgment and local authority knowledge, as there is ambiguity about a lack of clarity and baseline data surrounding administration guidelines, both of which are limits for operative scoping (Christensen & Krnv, 2017). Last but not least, executing scope is always predicated on the existence of predefined roles and responsibilities.

Teams utilize environmental impact prediction to organize and arrange their personnel so that the tasks they need to perform are scheduled based on availability and capacity (Ahmad & Wood, 2019). Natural dynamics and the current status of a natural system must be considered when determining the potential cumulative impacts of plans and programs. Several approaches have been proposed for doing an initial review (Pischke & Cashmore, 2016). The official suggested approaches are sometimes out-of-date or incorrect for the perspective of a certain instance; hence tailored methods are often a blockage for predicting effects on the environment. Quantitative methods are used in prediction less frequently than qualitative methods. According to Christensen and Krnv (2017), the questionnaire checklist approach entails recognizing which concerns are essential and documenting how they are chosen for further technical investigation. It's critical to identify problems in terms of environmental components that are declining or approaching their threshold as part of a cumulative effects evaluation. Expert verdict somewhat shapes the conclusion as to whether there is over- or under-prediction, and both positive and negative consequences have received unequal emphasis (Pischke & Cashmore, 2016).

Post EIA project review includes public participation, EIA report commendations, and follow-up (Christensen & Krnv, 2017). The expertise in addition to the proficiency of the EIA expert possess an extensive influence on the value of an EIA report. Because of their financial reliance on the developer, the practitioner's subjectivity is an issue while serving as a developer's advocate, and they may create a biased report in an effort to influence the council to sign off on the project (Pischke & Cashmore, 2016). Because the EIS is accessible to persons from many backgrounds, review experts, including local governments, and the general public, it is critical to convey the findings in a logical and consistent manner. The three most important elements that lead to project alteration are scoping, prior engagement of experts, authorities, and minor stakeholders in scoping, and the amount to which the venture's influence is declared thus assessed in the EIS (Christensen & Kørnøv, 2017).

Development initiatives may have not just environmental but also social, cultural, and economic consequences, all of which can be evaluated using an Environmental Impact Assessment (EIA). EIA is frequently used by decision -makers, who define “environmental consequences” and “environment” broadly enough to cover cultural and social dimensions of development (Pope et al., 2019). EIA combines the welfares of private and public stakeholders, people, and societies in the planning and projects approval process from a social aspect (Kanu, Tyonum, & Uchegbu, 2018). The balanced incorporation of social, economic, together with environmental considerations in the process of development guarantees that sustainable development is achieved (Pham, Riley & Harris, 2018).

In Africa, all countries need to grow their economies (Mubanga & Kwarteng, 2020). However, history from other countries demonstrates that development without consideration for environmental damage is short-lived. Environment and developments are inextricably linked, and EIA is frequently utilized as a framework for policy for avoiding the adverse implications to the environment of development activities and fostering long-term development (Harelimana, Gao, Nyiranteziryayo & Nwankwegu, 2020). Eritrea's infrastructure, economic, and industrial rebuilding is beginning from the ground up, and this presents a country’s opportunity to avoid commencing development at the price of the situation, as many other nations have done. Many countries have undertaken an evaluation of national EIAs against global procedures and principles as a means of enhancing EIA application. However, there has never been a review of the EIA system in Africa. Therefore, if projects for development are to be supportable and countries are to remain dedicated to the global treaties to which they are

parties, it is essential to assess the efficacy of EIA implementation (Wylie, Bhattacharjee & Rampedi, 2018).

In Kenya, Environmental Impact Assessment (EIA) has been used to guarantee that environmental management is incorporated into project development and decision-making in order to achieve an environmentally-sustainable development (Ngetich & Ndiema, 2020). Best-practice Environmental impacts assessments detects environmental hazards, moderate resource use disputes by boosting community engagement, reduce adverse environmental consequences, enlighten policy-makers, and assist establish the preliminaries for environmentally viable enterprises. All stages of a project are considered in the integration of an EIA, from exploration and planning to building, operations, decommissioning, and site closure (Yeom, Ha & Jung, 2020).

An Environmental Impact Assessment (EIA), without a doubt, is a strong tool for guaranteeing that environment-related concerns are considered throughout project design, allowing the project's benefits to be maximized while minimizing the environmental and social costs of development when correctly developed and implemented (Nyumba, Sang, Olago, Marchant, Waruingi, Githiora, & Omangi, 2021). The Kenya Environmental Management and Coordination Act (2010), as well as World Bank principles, must be followed while conducting an EIA in Kenya. The National Environmental Management Authority (NEMA) provides an Environmental Impact Assessment License, together with a construction license based on an EIA document submitted to them (Ambani, 2017).

1.2 Statement of the Problem

Capacity of global earth system in meeting these needs can be unsustainable as the nation's population grows along with the need to support the linked development necessities, unless effective environmental planning and management methods are implemented (Sierra et al., 2017). For the country to attain long-term sustainability, the Environmental Impact Assessment (EIA) technique encourages a balanced amalgamation of environmental, economic, and social issues in development journey. Therefore, as the actual or prospective issues brought on by development projects turn out to be more prevalent and the demand for environmental sustainability rises, EIA’s use in form of the means to analysing the implications of a proposed venture has grown in popularity. To make certain that any effects are appropriately managed at the local level, EIA is tailored to each project as well as the local legal, environmental, and social factors. Ngetich and Ndiema (2020) note that Environmental challenges exist in Kenya

regardless of Environmental Impact Assessment and Environment Audit approaches being employed in environment managing for the past 20 years. Despite the economic benefits of infrastructure projects, they continue to confront sustainability issues due to a lack of clarity about how to alleviate and observe project environmental impacts, variations in EIA processes, and an EIA process that is tough to comprehend or replicate. The lack of EIA practice, which includes environmental screening, scoping, effect prediction, and post-project environmental impact evaluation, can result in economic, social, and environmental harm, other noteworthy illness and death risks, collective and intergenerational effects.

The SGR project was approved after two Environmental and Social Impact Assessments were completed, however scientists are sceptical about how well the suggestions were applied in the development, given the evidence of severe environmental damage in the area. A variety of good outcomes are envisaged as a result of the project. According to Murithi (2015), the SGR was to yield a momentous effect on land usage and development potential in and about places where passes through. The SGR was also use a "open access" concept once completed, allowing local entrepreneurs to participate in delivering railway transportation facilities by investing in rolling stock and locomotives (Murithi, 2015). Elsewhere, the initiative has the ability to have some adverse impacts, which must be adequately addressed. The natural ecosystem is one place where influence is expected. In light of this background, this work strives to evaluate influence of Environmental Impact Assessment on sustainability of the Standard Gauge Railway project in Kenya.

1.3 Purpose of the Study

The purpose of this study was to establish the influence of Environmental Impact Assessment on the sustainability of the Standard Gauge Railway (SGR) project in Kenya.

1.4 Research Objectives

This study was guided by the following specific objectives; -

i. To examine the influence of environmental screening process on the sustainability of the SGR project in Kenya.
ii. To determine the influence of environmental scoping process on the sustainability of the SGR project in Kenya.
iii. To investigate the influence of environmental impact prediction process on the sustainability of the SGR project in Kenya.

iv. To establish the influence of post environment impact assessment preview process on the sustainability of the SGR project in Kenya.

1.5 Research Questions

i. What is the influence of environmental screening on the sustainability of the SGR project in Kenya?
ii. To what extent does environmental scoping influence the sustainability of the SGR project in Kenya?
iii. How does environmental impact prediction influence the sustainability of the SGR project in Kenya?
iv. What is the influence of post EIA project review on the sustainability of the SGR project in Kenya?

1.6 Research Hypotheses

The following null hypotheses were tested for the study:

i. **H_{01}:** Environmental screening does not significantly influence the sustainability of the SGR project in Kenya.
ii. **H_{02}:** Environmental scoping does not significantly influence the sustainability of the SGR project in Kenya.
iii. **H_{03}:** Environmental impact prediction does not significantly influence the sustainability of the SGR project in Kenya.
iv. **H_{04}:** Post EIA project review does not significantly influence the sustainability of the SGR project in Kenya.

1.7 Significance of the Study

This study is imperative to staff and management of the Standard Gauge Railway project as it gives insight to the effect of Environmental Impact Assessment (EIA) in achieving sustainability of the great project. Outcomes of this scholarship will additionally help project managers of other related projects, agencies and institutions intending to implement Environmental Impact Assessment (EIA) process which encompasses the following key phases; environmental screening; environmental scoping; environmental impact prediction and post EIA project review. The outcomes of the work will be valuable to regulators, the government, and policymakers as a reference for policy recommendations on Environmental Impact Assessment (EIA) in infrastructure projects. They'll use the study's findings to create workable policy documents, which will help to ensure infrastructure projects' long-term

viability. These could be related to regulating features of infrastructure projects that could have a negative influence on their operations and long-term development. This work will be beneficial as a reference for academics and other scholars. The findings will add to the existing body of theoretical and empirical information about Environmental Impact Assessment (EIA) processes in transport infrastructure projects.

1.8 Basic Assumptions of the Study

The scholar made assumptions throughout the study as follows. Because anonymity and confidentiality was maintained, it is believed that the respondents would answer honestly, and that the participants were unpaid volunteers who can leave the research at any time with no consequences. Secondly, the study assumed that Environmental Impact Assessment had an influence on sustainability of SGR project; hence, environmental screening, environmental scoping, environmental impact prediction and post EIA project review had an influence on the sustainability of the SGR project. Lastly, it is assumed that the SGR project had clear and well documented sustainability measurements in place.

1.9 Limitations of the Study

While the contemporary investigation aims to discover the impact of the Environmental Impact Assessment on long-term viability of infrastructure ventures in Kenya, it is imperative to be keen that its findings and conclusions were hampered by participants who are unwilling to take part in the research or reveal confidential information due to SGR project's nature. The answerers were guaranteed of their confidentiality and informed that research is being undertaken solely for academics. The entire study was impacted by the corona virus pandemic since it disrupted the data collection process during the study. The scholar conducted the study in strict adherence to COVID-19 protocols outlined by the ministry of health and also prioritized use of online communication methods to minimize direct contact with respondents.

1.10 Delimitations of the Study

This work concentrated on the Environmental Impact Assessment on the sustainability of Kenya’s transport infrastructure projects. The study was delimited to these four variables; environmental screening; environmental scoping; environmental impact prediction and post EIA project review. The independent or input variable of the research was Environment Impact Assessment whereas the output or dependent variable was sustainability of transport infrastructure projects. Environmental impact assessment as the study’s independent variable was studied under the constructs of environmental scoping; environmental impact prediction

and post EIA project review whereas the sustainability of transport infrastructure projects were measured using; return on investment; revenue margin; environmental benefits; social and economic benefits. The infrastructure project selected for this project was phase 1A of the Standard Gauge Railway project (Mombasa to Nairobi). The 24 project managers, 28 project supervisors, 33 consultants, National Construction Authority (NCA) and 16 registered contractors who have been engaged in this infrastructure project were involved in this research.

1.11 Definitions of Significant Terms Used in the Study

Environmental Impact Assessments (EIA) is a methodical evaluation that is carried out to identify whether an activity, program, or project will have adverse environmental consequences. In this study, it particularly implies the process of EIA which comprises of these phases; environmental screening; environmental scoping; environmental impact prediction and post EIA project review.

Environmental impact prediction is an approach used by teams to position and structure their workforce so that the key tasks are planned in accordance to their capabilities and availabilities. In the study, it is used to refer to identification of impacts, prediction of impacts and assessment and evaluation of impacts.

Environmental scoping is the procedure of pinpointing the most relevant environmental concerns, and it is likely the most crucial phase in an EIA. In the current study, it denotes the review of available data and information; review of legal framework and guidelines and preparation of the checklists.

Environmental screening is a required examination of all proposed Investment Subprojects with the goal of categorizing them according to predicted environmental risks and consequences, weeding out projects that are clearly harmful to the environment, and identifying the proper scope and kind of EIA. Environmental screening in this study refers to the collection of baseline data, identification of interest groups and development of EIA techniques.

Infrastructure projects are projects that focus on the development and maintenance of services, facilities, and systems. In this study, infrastructure projects refer to physical structures facilitating the operations and utilization of the SGR project.

Sustainability refers to the development of an economic system that ensures a high standard of living while also replenishing the environment and its resources. It also entails considering how initiatives may influence future generations and ensuring that resources are not depleted.

Sustainability has been used in this study to imply return on investment; revenue margin; environmental benefits; social and economic benefits.

Transport Infrastructure: Is the fundamental public works system designed to enable movement. The physical constituents of transport infrastructure comprise of tunnels, bridges, rail tracks, pavements, wharfs, culverts, pipes and aprons.

1.12 Organization of the Study

The entire study's contextual information, its problem statement, its aims, its study's goal, its research questions, its hypotheses, its importance, its delimitations, its limits, its assumptions, and its definition of key terminology were provided in the first chapter. A review of the literature is presented in Chapter 2, research methodologies are discussed in Chapter 3, the study's findings are presented in Chapter 4, and the study's summary, conclusions, recommendations, and suggestions for further research are presented in Chapter 5.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section outlays the review of the vast existing and captivating literature done by other researchers in the area. It reviews literature based on the research themes; sustainability of transport infrastructure projects environmental screening; environmental scoping; resource allocation and the EIA project review on the sustainability of transport infrastructure projects. The section also details the theoretical framework, conceptual framework, gaps in literature, as well as a synopsis of the reviewed literature.

2.2 Sustainability of transport infrastructure projects

Sustainability, pollution prevention, control methods, as well as cleaner production as well as projects that back ecological features, such as building and structures architecture, could be included. In response to the constantly evolving developments, new phrases and concepts are coined as a result of the wide distribution and concomitant understandings of the notion of sustainability (Glavič & Lukman, 2017).

Researchers condense the most important aspects of sustainability into a concise synthesis of concepts that is aligned with project activities. Sustainability of a project is today a typical method to project, institution, program, individual, organization, and other entity management that requires successful and efficient service and product marketing, production, distribution, as well as delivery (Carvalho & Rabechini Jr, 2017). Most projects fail owing to a lack of a good sustainability strategy, which is a well-known fact (Aarseth et al., 2017). Sustainable infrastructure projects are those that are built, designed, operated, planned, and discharged such that it assures social, financial, environmental, and economic (including resilience of the climate), and institutional sustainability throughout the life cycle of the project (Brones et al., 2014), however, in general organization management discourse (Marcelino-Sádaba et al., 2015), sustainability as a concept is highly prevalent. This shows that corporations may regard sustainability as a corporate essential that may or may not encompass project activities as a means of achieving the intended long-term goals.

One key study (Marcelino-Sádaba et al., 2015) demonstrated how infrastructure projects are conducted so as to achieve further sustainable buildings and infrastructure. The concept of sustainable infrastructure frequently emphasizes on decreasing environmental impact and can

entail constituents such as waste reduction, reuse, and management, as well as direct societal benefits and a decreased emphasis on profitability (Shen et al., 2010). Therefore, an equilibrium point of long-term environment gains and short-term economic goals ought to be established as a means of achieving a mutually-beneficial balance. To acquire a harmonious result, a viability study including sustainability constituents ought to be carried out before the project begins, since the activity will directly affect the success of the project as a whole (Shen et al., 2010). Sustainability is a multi-step process that cannot be achieved in a single, universally effective approach (Bridson et al., 2020). According to the triple bottom line idea that was first put out in the year 1994, infrastructure sustainability may be achieved by giving equal weight to social, environmental, and economic performance while delivering projects (Bamgbade et al., 2017). Building an organized work order with a sustainability-focused element to it will thus open the door for project practices and processes in future to take into account and include a sustainable tool that functions towards the delivery of sustainable infrastructure outputs.

In a summary of the main discoveries from the literature, many factors that potentially impact the general sustainability of transportation infrastructure projects were identified. "Eco-design" is evidently among the most prominent and latest contributions to the sustainable infrastructure environment (Glavi & Lukman, 2017). The terminology "eco-design" was iteratively coined from the classical term, "green design," which generally describes product design that incorporates environmental issues, to the current iteration that includes terms like environmentally sensitive or environmentally sound designs, ecological designs, into the more common term "eco-design," despite the lack of an absolute and comprehensive definition. The terminology may be used to define infrastructure initiatives, in addition to the more recent terminology ecologically responsible design (Baumann, Boons & Bragd, 2012).

An approach for calculating the social sustainability of transportation infrastructure projects was examined in a research by Sierra et al. This research offers a methodology for calculating the enhancements to social sustainability by infrastructure projects. This approach assesses the relationship between infrastructure and its surroundings with respect to potential social value in the short- and long-term. Establishing long- and short thought possible indices; homogenization each set of criteria through value functions; undertaking an exploratory investigation to evaluate difference equation; and finally, contrasting adapting indices to identify communally selected alternative solutions and assigning a priority ranking. Six different road infrastructure enhancement ideas were evaluated using this technique. Based on immediate advantages and potential long-term equitable development, the study's findings

imply that the technique can separate the different infrastructure projects' contributions and location circumstances to social sustainability.

An examination by Zheng et al., (2018) looked at the long-term viability of public -private partnership infrastructure projects in China. In order to analyze private sector sustainable behaviors, the authors employed the adjusted theory of planned behavior and the structural equation model to undertake a survey questionnaire with 258 respondents. The findings established a significant association between behavioral attitude, perceived behavioral control, and subjective norm, according to the data. They have a direct positive influence on the intention, which subsequently has an indirect impact on actual behavior. The private sector's actual sustainable behaviors significantly beneficially shape city sustainability. On the basis of the findings, this provides theoretical and managerial for both the private and public industries in order to secure and encourage the long-term success of infrastructure projects.

A research on the viability of urban subterranean utility infrastructure projects was done by Hojjati et al (2017). When pipes and cables are installed improperly, street construction is prolonged, traffic is backed up, third-party utilities may be damaged, there is an increase in automobile emissions, and energy is wasted. Only by taking into account all streetwork-related economic (directly or otherwise), environmental, and social expenses can the whole influence of utility infrastructure projects be evaluated. It is necessary to use a particular tool to evaluate the long-term effects of utility street-works. This article establishes the framework for utility street-works sustainability evaluations, and consequently complete appraisal, by disparagingly appraising current sustainability evaluation methodologies and providing proposals for next steps for mounting a comprehensive sustainability indicator system and costing model.

2.3 Environmental Screening and Sustainability of transport infrastructure projects

Screening is done using a set of guidelines or criteria that have been developed. Examples of screening strategies are positive lists that highlight actions which need EIA, negative lists that pinpoint undertakings that don't, expertise decisions, or a mix of expert and lists judgments. Looking at the USA, where venture operations that have the potential to have significant negative repercussions are subject to Environmental Impact Assessments (EIA), screening might also involve an evaluation of impacts and dangers (World Bank, 2011). An ad hoc strategy where projects are subjected to or exempted from screening EIA outlined by laws and regulations; a tailored strategy where projects are assessed on an individual basis utilizing

indicative guidance; and a standard strategy, where ventures are subjected to or exempted from screening (UNEP, 2018).

Environmental screening identifies all projects that have no significant negative consequences. The criteria for determining if an EIA is a requirement varies across countries. However, the overall strategy also contains lists of projects which need or don't need an EIA, check lists of environments and projects that need more examination, and screening factors such project size, cost, or location (Roe et al., 2015). In reality, a lot of developing nations use an integrated strategy for screening measures (Wood, 2010). For instance, the World Bank (2019) classifies projects into the following four groups: Unlike Category C ventures that are less probable to yield substantial environment impacts and doesn't need an EA, Category A projects have a wide range of and substantial environmental effects, necessitating a comprehensive and complete environmental assessment (EA). The next classification is category B projects which have fewer and location-specific effects, necessitating environmental analysis but not a complete EA. The World Bank uses the following screening criteria: project scale, type, sensitivity, location and degree of project's probable social and environmental implications.

Screening of acts in poor nations is not satisfactory, excluding a few nations like South Africa, and it seems to be centered on the prerequisites of financial organizations (George, 201). Nonetheless, so as to evade the examination of an excessively high number of activities, adequate action filtering should be implemented in all EIA systems. The activity must thus pass a legal test to assess if it will have a major environmental impact (Lee & George, 2010). Therefore, to determine if an EIA is necessary, developing nations must have a straightforward and efficient screening process that comprises a list of projects and actions, as well as supporting criteria and thresholds. It is necessary to have a discretionary system in place to handle disputes of opinion and sporadic assignment concerns. Additionally, according to Modac and Biswas (2019), a number of minor projects can have worse impacts compared to bigger ones, and setting a quantifiable threshold for some metrics below which no EIA is necessary may result in an unreviewable exemption that some careless developers might employ. When assessing if a project needs an EIA, common sense and judgement must be used (Modac & Biswas, 2019).

Wood (2010) adds the following considerations for efficient screening: Whichever method is chosen, it must be stated, and specific information on criteria, actions, screening procedures,

and thresholds, must availed to the promoter and other stakeholders. The motives for that choice must be openly recorded so as to impart assurance to the public.

2.4 Environmental Scoping and Sustainability of transport infrastructure projects

The topic and scope of EIA studies are determined via scoping (Common Ground, 2015). In different states, scoping procedures may differ significantly. Scoping, for example, can be done to meet a legal need or as good EIA practice and it can be done by either the skilled authority or the project promoter (UNEP, 2018). It is widely agreed that scoping is the cornerstone of a successful EIA research, and it entails input from all important stakeholders. It is the developer's responsibility to do scoping through EIA specialists.

If the screening results indicate that an EIA is essential for a project, a scoping process will be conducted in order to recognize and capsulize the program's probable ecological impacts. This ensures that the evaluation is focused on the most important decision -making topics (Roe et al., 2015). Therefore, it can be said that scoping entails identifying the issues that should be investigated by policymakers, the general public, and the scientific community. Lack of specialized methodologies may obstruct the documentation of secondary and indirect impacts that influence the complexity of the EIS, resulting in forfeiture of important evidence to advise decisions (Toro et al., 2010). Early stakeholder involvement and consultation are thought to be beneficial in identifying major concerns at the earlier stages of the process (Pischke & Cashmore, 2016). This may help to escape delays in the next processes and ensuring that the information is of sufficient quality and completeness, and that it is delivered on time and in a timely manner (Roe et al., 2015).

Scoping is fully implemented in many developing countries when assistance agencies demand it. It is critical for various stakeholders to convey their apprehensions to the consideration of the competent authorities and the contractor, and for those issues to be represented in the terms of reference. While time and money are vital, scoping should also rely on professional judgment and local authority knowledge, as there is ambiguity about a lack of clarity and baseline data surrounding administration guidelines, both of which are limits for operative scoping (Christensen & Krnv, 2017). Last but not least, executing scope is always predicated on the existence of predefined roles and responsibilities (Republic of South Africa, 2017).

To aid scoping, the African Development Bank (2012) suggests using a combination of checklists and supporting questions. The World Bank (2019) has underlined communication

with local impacted groups and NGOs in order to concentrate on EIA on local concerns and take into consideration local perspectives.

2.5 Environmental Impact Prediction and Sustainability of transport infrastructure projects

The discovery, analysis, and forecast of the importance of the potential repercussions of the planned venture are all part of impact analysis. When possible, an EIA should approximate all likely ramifications, including those direct and indirect associated with the project, as well as influence on other projects or operations, as well as transboundary consequences (UNEP, 2018). The most significant part of impact analysis is determining the importance of environmental consequences. The way importance is interpreted has a direct impact on project approvals and conditions (Sadler, 2016). The project's potential environmental impacts, both positive and negative, should be assessed. As a result, impact analysis requires a multidisciplinary approach that encompasses various environmental and natural science disciplines (UNEP, 2018).

Natural dynamics and the current status of a natural system must be considered when determining the potential cumulative impacts of plans and programs. Several approaches have been proposed for doing an initial review (Pischke & Cashmore, 2016). The official suggested approaches are sometimes out-of-date or incorrect for the perspective of a certain instance; hence tailored methods are often a blockage for predicting effects on the environment. Quantitative methods are used in prediction less frequently than qualitative methods. According to Christensen and Krnv (2017), the questionnaire checklist approach entails recognizing which concerns are essential and documenting how they are chosen for further technical investigation. It's critical to identify problems in terms of environmental components that are declining or approaching their threshold as part of a cumulative effects evaluation. Expertise decision shapes the eventual direction of whether there is over-prediction or under-prediction, and both positive and negative consequences have received unequal emphasis.

A study by Zeleáková and Zvijáková (2017) investigated risk analysis as part of a proposed construction activity's environmental impact assessment. An environmental impact assessment is a critical step before the investment plan is approved, and it entails a comprehensive inspection of the probable and predicted environmental impacts of suggested housing construction. The focus of the research is to suggest a specialized approach for assessing and assessing the environmental consequences of selected structures – flood protection structures

– utilizing thee hazard assessment approaches. The employment of established methods for assessing environmental effect will result in the development of conventions for additional advancements or other effective performing system of this process.

2.6 Post EIA Project Review and Sustainability of transport infrastructure projects

The EIA report is typically reviewed by the following: EIA administrative institution's technical staff; Depending on the complexity of the research and the available expertise, a multi-stakeholder group, an international committee, and external reviewers may be used (Economic Commission for Africa, 2015). To decide if and how a project may be completed in an ecologically friendly way, the information acquired throughout the method should be adequate (Wiszniewska et al., 2012). Grounded on the EIA account, the scrutiny of participant issues, and comments out of cooperating agencies, the competent authority will decide on its own if to accept or turn down the proposed project. The competent legally-mandated officials may advise that the project be aborted for a variety of reasons, that the EIA is insufficient and that additional examination is necessary, in that instant the developer will be given a set amount of time to conduct that investigation before returning the EIA for further review. The appropriate organization will often set prerequisites if the project is given a go ahead, like alleviation measures, emission caps, or environmental standards that must be adhered to (UNEP, 2018).

An EIA review procedure includes a methodical evaluation of the EIA report's completeness and quality for decision-making, as well as taking into account the repercussions it brings to the project execution (Roe et al., 2015; Modac & Biswas, 2019). The authorized authorities, specialists, the general public are given an opportunity to remark on the EIA account and the activities or intiatives it recommends in advance of decision -making (Wood, 2015). Maintaining neutrality is essential while reviewing an EIA. Wood (2015) suggested methods to improve EIA reviewing's objectivity, including adopting review criteria, certifying the EIA report body, publicizing the review's findings, and including consultees and the general public.

In some developing nations, the environmental agency conducts EIA reviews; however, in most cases, the planning team and any keen stakeholders who are knowledgeable about the regulations, have a solid grasp of the EIA methodology, and are up to date on the most recent EIA best practices conduct EIA reviews (Modac & Biswas, 2019). The borrower must examine the EIA for World Bank-funded projects to make sure that consulting companies or agency staff adhered to the scope statement (TOR) and fulfilled both Bank and government criteria.

Staff at the Bank must also ensure that the EIA report is adequate by comparing it to the Bank's review criteria (World Bank, I999a). To additionally strengthen the EIA appraisal, a provision ought to be included that allows the promoter to be queried for extra information if the EIA reports are inadequate, as well as an appeal process against review decisions (Wood, 2015).

Soria-Lara et al., (2020) conducted a study on illuminating EIA process related obstacles in transport ventures: circumstances of Spain, Italy and Portugal. The outcomes were based on a virtual poll of 294 experts from 2 key interested party groups: consultants in environmental matters and transportation planners. The findings point to four significant process flaws that all three nations have in common: EIA timeliness, see how, remote monitoring, and public involvement. The most substantial variances are observed in Spain, where 42 percent of process -related hurdles are common globally, while 68 percent of procedure barriers are understood differently by Italian and Portuguese respondents. The key distinctions between the impediments cited by transportation planners and the experts in environmental matters have to do with their assessments of the necessity for more collaborative engagement among important actors.

2.7 Theoretical Framework

This scholarship was based on two theoretical underpinnings; the sustainability development theory and systems theory.

2.7.1 Sustainability Development Theory

This work was underpinned on the sustainability development theory spearheaded by Doctor Gro Harlem Brundtland in 1987. The theory contends that resources in the environment in which humans live are finite, and that population tends to rise faster than resources. This is still true today in an overpopulated world where resources are being depleted at an ever-increasing rate. There is no time for the planet to regenerate. The intention of sustainable development, according to the concept, is to start managing the change process rather than to designate a predefined end goal. It recognizes that there are unknown variables, demanding ongoing and flexible procedures. It also promotes differences and diversity within the local context. Concern of the social, financial, political, and ethnic relationships vital to the progress outline is inherent in this concept.

In accordance to this idea, sustainable development makes it necessary to take a big-picture approach to worldwide thinking and community action, in addition to a constant focus on and fine -tuning the little details of the interactions that eventually define the environment. Project

management makes three critical competencies necessary: technological, contextual, and behavioral knowledge. In terms of a sustainable approach to community development, project leads and teams demand a higher level of contextual competency, in addition to behavioral and technical competency (Beata, 2014).

Sustainability theory was applicable in this work since it suggested that the concept of sustainability is about individuals being capable of maintaining and preserve the program or project outcome utilizing their own resources or assets whereas not risking forthcoming generations' needs. The effective and efficient use of these resources benefits local communities in the long run. Following the environmental assessment process (environmental screening, environmental scoping, environmental impact prediction, and post-EIA project review) during project implementation would result in more sustainable infrastructure projects.

Projects must be grounded in sustainability theory in order to be sustainable and beneficial. The theory assists project developers in developing appropriate projects that are well thought out with respect to the needs to be methodically addressed and the project's environmental impact. The steps in the Environmental Impact Assessment are sequential, and the ideas behind each step are well defined, easily manage the project and sustain infrastructure projects. The theory of sustainable development is important in bringing about sustainable development because it is result-oriented, and project implementers must work hard to achieve good performance by applying EIA concepts correctly all through the project progression. The implementation of the environmental evaluation process should be emphasized.

2.7.2 Systems Theory

Systems theory is a scholarship of how interrelating progressions influence each other across time so as to uphold the continuity of a larger whole. Systems act so as to keep going. Systems change when their inner equilibriums are disrupted or when they are impacted by other systems. Van Bertalanffy and Miller are two authors who provide outstanding descriptions of these broad concepts. Roles are social system structures that are equivalent to organs in the human/physical system; they are prearranged means of ensuring that some crucial functions are carried out.

According to Von Bertalanffy, everything is interrelated, hence the need to study interconnectivity an approach to understanding the world. This approach of studying interconnectivity is different from the classical empirical methodologies, which look at individual constituents to examine phenomena. Global warming discussions are among the

most well -known ideas in systems theory. In effect, individuals warning us concerning global warming reiterate that all of our actions have an effect on each other and the environment, and that we ought to be cognizant of our acts or we will still do damage to everything on earth.

Instead of viewing solitary individuals or communication actions, the model targets to comprehend a fuller picture by considering several communication layers as interconnected. This paradigm's major pro is that it does not try to expect human behavior, but instead expounds it in a manner that gives emphasis to people's communication activities and interconnectedness. Individuals interconnect in various means that are contextually and culturally particular. This approach targets to expound the entireness of human interactions instead of making wide generalizations concerning human communication.

The interconnectedness of the Environmental Impact Assessment (EIA) as a process of appraising the plausible ripple effect on the environment of a planned venture, while accounting for interrelated human-health, cultural and socio-economic impacts, whether beneficial and/or adverse, was explained using systems theory in this study. The EIA process assists in establishing probable environmental ripple effect of a planned project and how the consequences might be addressed. The EIA process is designed to enlighten people in charge of making decisions and the general public about the environmental repercussions of a planned project.

2.8 Conceptual Framework

The conceptual framework is a suggested model that describes variables being studied. Borg, Gall, and Gall (2015), expound that a conceptual framework is an illustrative diagram of the variables' interactions in research or an assemblage of ideas drawn from relevant fields of study. A conceptual framework is made up of variables that are both independent and dependent. For this study, the independent variable is Environmental Impact Assessment while the dependent variable is sustainability of transport infrastructure projects. The conceptual framework is presented in Figure 2.1.

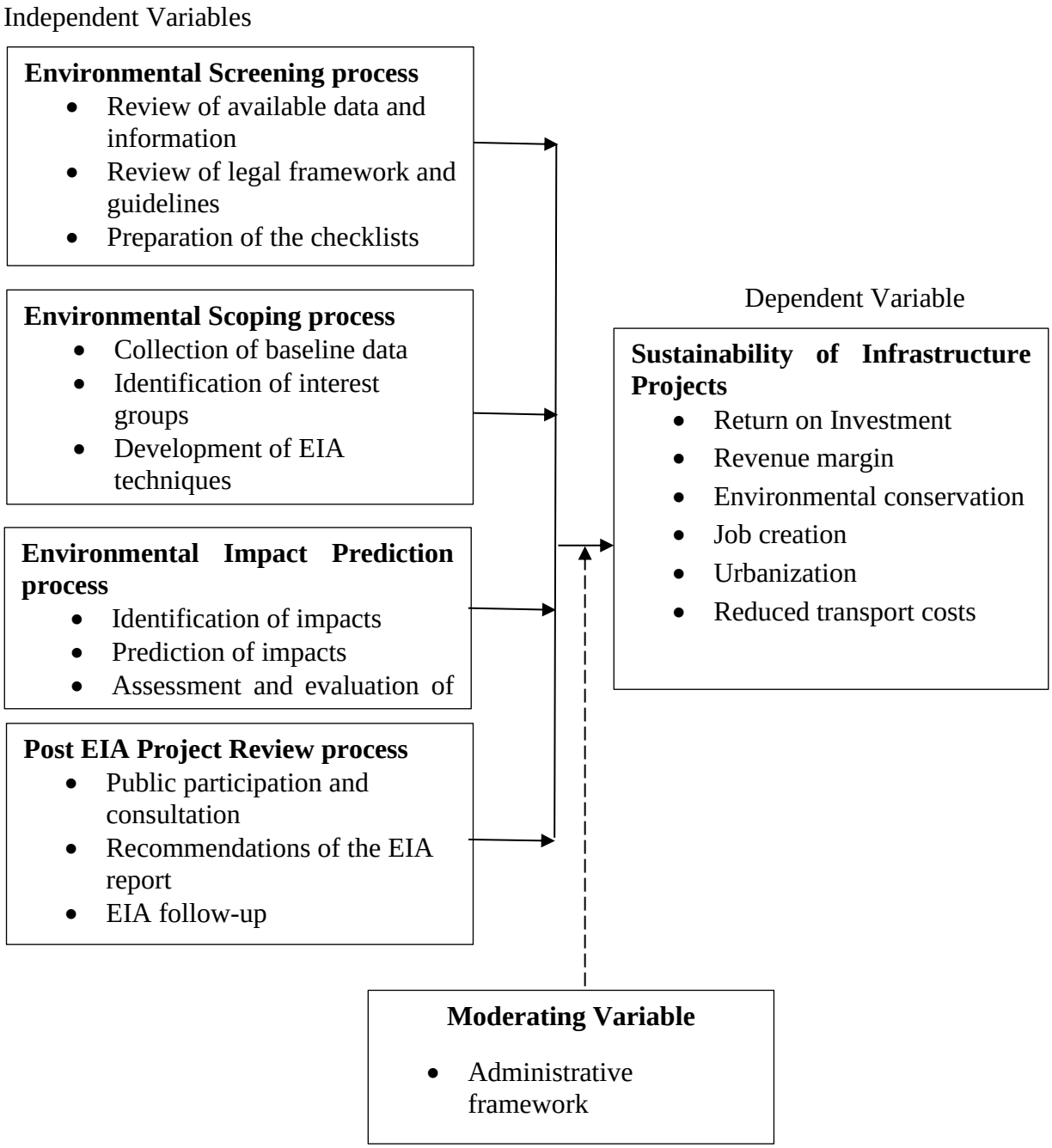

Figure 1: Conceptual Framework

The independent variable as environmental impact assessment was studied under the constructs of environmental screening; environmental scoping; environmental impact prediction and post EIA project review. The dependent variable as sustainability of transport infrastructure ventures was measured using the elements of return on investment, revenue margin, environmental benefits, social benefits and economic benefits.

2.10 Gaps in Literature Reviewed

There are no limits to environmental issues, and any human endeavor that is not properly overseen is potentially going to yield detrimental environmental effects. The planet's ability to fulfill human needs in the face of a growing population and a wide range of approaches will not be sustainable until everyone adopts EIA as a strategy for environmental management. Environmental challenges have continued in spite of the implementation of Environmental Impact Assessment as a methodical approach in Kenya's environmental management throughout the past two decades, as shown by projects carried out. The synopsis of the research gaps is as obtainable in Table 2.1 as follows.

Table 2.1 Gaps in Literature Reviewed

Variable·	Author·(s) (year·)	Title·	Findings·	Research Gap·	Focus of the current study
Environmental Screening process	Awang & Iranmanes, 2017.	Determinants and outcomes of environmental practices in Malaysian construction projects.	Implementing Environmental Screening has a progressive outcome on the environmental and economic functioning.	This research was limited to Malaysian construction projects.	The current study focuses on sustainability of transport infrastructure projects in Kenya
	Watt & Judson, 2018.	Uncertainty quantification in ToxCast high throughput screening.	Environmental Screening aids in quantification in ToxCast	This research concentrated on use of screening in quantification	The current research focuses on screening as an EIA process

Environmental Scoping process	Borioni et al., 2017.	Advancing scoping practice in environmental impact assessment: an examination of the Brazilian federal system	The procedure: (i) is enabled by inter- agency review but not by the public taking part in it, (ii) characterized by restricted emphasis on applicable concerns and impacts	The study was based on an assessment of Brazil's federal system	The current study will be based on Environmental Scoping on sustainability of transport infrastructure projects
	Kermanshachi et al., 2020.	Establishment of effective project scoping process for highway and bridge construction projects	Most suitable performs and tactics result in alleviating expensive changes in scope and avoid needless delays	The study was limited to construction ventures focused on bridge and highway projects	The current study will be focused on infrastructure projects

Environmental Impact Prediction process	Giunta, 2020.	Assessment of the environmental impact of road construction	Transportations on unpaved road, storage and crushing are the activities with the most impact	The study focused on environmental impact of road construction	The current study will be focused on impact prediction of on infrastructure projects
	Zeleňáková & Zvijáková, 2017	Risk analysis within environmental impact assessment of proposed construction activity	By using of risk analysis approaches in EIA, the preset targets have been attained.	The study delimited itself to risk analysis	The current study focuses on Environmental Impact Prediction

Post EIA Project Review process	Taako et al., 2020	An evaluation of the environmental impact assessment practice in Uganda	The study identified a gap between practice and the law. This was attributed to insufficient and unproductive public participation, and lack of a strong follow-up	This study was carried out in Uganda	The current study will be carried out in Kenya
	Soria-Lara et al., 2020	Revealing EIA process-related barriers in transport projects: The cases of Italy, Portugal, and Spain.	Four key categories of process problems identified: (i) EIA timing, (ii) evaluation of alternatives, (iii) public participation (iv) monitoring system	This research was based in Italy, Portugal, and Spain	The current research was implemented in Kenya

Sustainability of Projects	Sierra et al., 2017.	Method for estimating the social sustainability of transport infrastructure projects.	Distinguishes sustainability of transport infrastructure ventures from a social perspective in various locations	This study focused on social sustainability of transport infrastructure ventures	The current study will be limited to sustainability of transport infrastructure ventures
	Hojjati et al., 2017	Sustainability assessment for urban underground utility infrastructure projects	Infrastructure systems that are well-designed play a critical role in enhancing the cities' sustainability attributed to their critical function in urban environments.	The study was limited to Sustainability assessment for urban underground utility infrastructure projects.	The current study will be limited to sustainability of transport infrastructure projects; specifically, the Standard Gauge Railway project in Kenya

2.11 Summary of Literature Review

Environmental screening identifies all projects that have no significant negative consequences. The criteria for defining if an EIA is necessary or not vary by country. EIA is essential for a project; a scoping process will be conducted in order to pinpoint and narrow down the program's probable ecological impacts. This ensures that the evaluation is focused on the most important decision-making topics. Scoping entails identifying the issues that should be investigated by policymakers, the general public, and the scientific community. Lack of specialized methodologies may obstruct the documentation of secondary and indirect impacts that influence the complexity of the EIS, resulting in the forfeiture of important evidence for advising decisions. Early stakeholder involvement and consultation are thought to be beneficial in identifying major concerns early in the process. This can help to prevent increasing the turnaround times for the project in the next processes and ensuring that the information is of sufficient quality and completeness, and that it is delivered on time.

The most important part of impact analysis is determining the importance of environmental repercussions. The way importance is interpreted directly affects project approvals and conditions. It is necessary to assess the project's possible environmental effects, both good and bad. Impact analysis therefore requires an interdisciplinary strategy that incorporates a variety of natural and environmental scientific fields. Dependent on how complex the research is and the expertise available, the subject matter experts of the EIA administrative institution, an intergovernmental committee, a multi -stakeholder committee, and external reviewers often assess the EIA report. The information acquired during the method should be sufficient to make a conclusion on whether and how a particular project can be carried out in terms of environmental protection.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter includes the scholar's research design option for the study, as well as a definition and justification for why it is relevant to this particular research. The section discusses the population targeted, the sample design, and data collecting processes that were employed in the study in connection to the research's design, data analysis procedures and presentation, ethical concerns and finally, variables' operationalization.

3.2 Research Design

The work employed a descriptive research approach, which according to Kothari (2014), by examining the acquired data and making implications from the results, uses a conceptual structure to create particular predictions through delivery of questionnaires to study participants; the scholar was able to gather data from a greater population at a relatively lower cost and in less time. A research assistant assisted in collection of data.

3.3 Target Population

The population targeted in this work were 141 respondents including 13 National Construction Authority officials, 24 managers of project, 28 project supervisors, 16 contractors, 33 environmental consultants and 27 Ministry of Roads and Infrastructure officials. A population, according to Ngechu (2014), is a differentiating, individuals, events, and facilities, organizations of households, or things that are being studied. This study's population included project managers, experts, the National Construction Authority (NCA), and contractors registered under the SGR. The exploration entailed the managers of project, project supervisors, contractors, environmental consultants and ministry of roads and infrastructure officials as the target population as represented in Table 3.1.

Table 3.1: Target Population

Target· Group·	**Size of Target· Population·**
Project· Managers·	24
Project· Supervisors	28
Contractors and Engineers	16
NCA Officials	13
Ministry of Roads and Infrastructure Officials	27
Environmental Consultants	33
Total	**141**

Source: SGR – ESIA Study (2016)

3.4 Sample Size and Sampling Procedures

The sample size and sampling processes utilized in the exploration are described in this section.

3.4.1 Sample Size

One principle of sample size, in accordance with Quinlan (2011), is that the lesser the population, the larger the sample ratio must be for it to be a true representation of the population. According to Zikmund et al. (2010), the factors listed herein must be considered when determining sample size: acceptable error magnitude, population heterogeneity, and confidence level. For this study, the scholar determined the sample size with the help of Yamane's (1967) method for finite populations:

$$n = N / 1 + N\,(e)^2$$

$$\mathbf{n = N / 1 + N\,(e)^2 \quad n = 141 / 1 + 141\,(0.02)^2 \quad = 133}$$

Where n symbolizes the sample size, N characterizes the size of the population and *e* characterizes the sampling error at 98% confidence level. The computed sample size was 133 respondents as specified in Table 3.2.

Table 3.2: Sample Size

Target Group	Target Population	Procedure	Sample Size
Project Managers	24	24/141*133	23
Project Supervisors	28	28/141*133	26
Contractors and Engineers	16	16/141*133	15
NCA officials	13	13/141*133	12
Ministry of Roads and Infrastructure Officials	27	27/141*133	26
Environmental Consultants	33	33/141*133	31
Total	141		133

3.4.2 Sampling Procedures

The work utilized stratified random sampling procedure that involves division of the population into strata (sample with common characteristics*).* Random sampling is thereafter utilized to select respondents from the various strata. The population was divided according to the different bodies that participated in the SGR project as follows; project managers, project supervisors, contractors/engineers, NCA officials, Ministry of Roads and Infrastructure officials and environmental consultants totaling to 133 respondents. The respondents were then selected randomly from the strata.

3.5 Data Collection Instrument

The main tool utilized was a questionnaire that was methodically developed to entail the pertinent main points or themes of the research. A questionnaire is a study tool that is utilized in expounding what the researcher deserves to learn and to provoke fitting responses from the sampled individuals in the form of empirical evidence so as to comprehensively and adequately respond to the research questions. According to Debois (2016), a survey is a data collection tool that habitually entails asking a subject to give a response to a significant number of oral or written questions. Primary data was gathered through surveys, direct observations, and interviews, whereas ancillary information was collected from secondary sources. Furthermore, information was acquired through a critical examination of literary works, reports, and other applicable documentations.

3.5.1 Pilot Testing of the Instrument

The researcher conducted a pilot study to evaluate the validity and reliability of the research tools. This pilot study involved 13 people in NCA headquarters in Nairobi, Upper Hill. This based on Mugenda's (2003) reiteration that an experimental trial should be conducted on

between 10-20% of the computed sample size and hence, this research used 10% of the computed sample size of 133 respondents. The pilot study was executed to aid in the detection of errors in data collection instruments, allowing for required revisions to ensure that trustworthy and valid data is obtained.

3.5.2 Validity of the Instrument

The validity or the soundness or effectiveness of a research tool is crucial because it determines if the tool measures the expected outcomes. This provides evidence of the validity of the information gathered, and it is crucial that the questionnaire be created to gather information and ideas pertinent to the research issue. To make sure the information is appropriate and pertinent to the study, my supervisor and study specialists peer reviewed and closely examined the questionnaire to gauge its content validity. Based on the feedback from the review, the tool was adjusted as appropriate.

3.5.3 Reliability of the Instrument

Kothari (2014) claims that a measuring device is dependable if it produces reliable outcomes. This implies that if the tool is used frequently, the outcomes should be consistent. Questionnaires were used to conduct reliability tests. The internal consistency technique was used to establish reliability in this investigation. To establish how items correlated among themselves, Cronbach's alpha coefficient was computed. According to Sekaran (2016), the more the coefficient of reliability approaches 1.0, the better, and reliability values of less than 0.60 are poor, those between 0.70 and 0.80 are fair, and those above 0.80 are excellent. In most cases, a coefficient greater than or equal to 0.7 is considered adequate (Sreevidya & Sunitha, 2013).

3.6 Data Collection Procedures

Before kicking off the implementation phase of the actual research, the scholar requested an introduction letter from the university and National Commission for Science, Technology and Innovation (NACOSTI). Afterwards, the researcher then visited the SGR project site to establish rapport, obtain permission from the SGR management, and coordinate when the questionnaires were distributed. Once permission is granted, the researcher met with management to expound the study’s goal and bolster their belief in the anonymity aspect of the process and confidentiality. The researchers distributed the questionnaires themselves and arranged for them to be picked up at a central location within the management offices at a mutually agreed-upon time.

3.7 Data Analysis Techniques

To facilitate analytical process, the acquired information was cleaned, categorized, and coded. Second, the collected data was analysed using descriptive and inferential statistics. Because the study collected both qualitative and quantitative data, both inferential and descriptive statistical techniques were employed. Using SPSS, descriptive statistics (percentages, frequency, mean and standard deviation) were analysed from the cleaned data. Pearson correlation was also utilized to determine the associations linking the study variables. Inferential statistics (regression model -Anova) was employed to analyse the data (Version 23.0). A regression model was used to perform inferential statistics. Tables were used primarily to present quantitative data. The t-test was used to test hypotheses. A t-test is used in hypothesis testing, with a null hypothesis that the distinction in group means is zero and an alternative hypothesis is accepted that the difference is not zero. Content analysis was utilized during the analysis of qualitative data, and dominant elements were developed in accordance with the study's objectives.

$$\mathbf{Y}i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mathcal{E}$$

Where:

Y = the dependent variable (sustainability of transport infrastructure projects)

α- the constant term

$\mathbf{X_1}$ – environmental screening

$\mathbf{X_2}$ - environmental scoping

$\mathbf{X_3}$ – environmental impact prediction

X4 – post EIA project review

$\beta_1, \beta_2, \beta_3, \beta_4$ are the coefficients of independent variables

Ɛ - standard error term

3.8 Ethical Considerations

To make certain that the research complied with the ethical issues associated with research, authorization to conduct the study was requested and obtained from NACOSTI and the University. The principle of beneficence ensures that participants are not harmed physically,

psychologically, economically, or socially. This was reduced by: framing questions in a nonjudgmental manner. Respondents were informed that they may withdraw if they are uncomfortable, and interviews were rescheduled if possible. Before the interview, the approach to teaching and learning was clearly explained to the participants, and the agreement was followed to the end. The respondents were advised that the research did not provide them with any direct benefits.

Respect for human dignity: Participants in this research had freedom to participate in study, or not to without fear of punishment, as well as the right to make enquiries. Following full disclosure, participants of this study made more informed, suggest ways about study participation. This was clearly stated in the consent form, which was completed before the interview started. In this study, the four components of informed consent were used: Disclosure of critical information to participants; voluntary participation; ensuring that respondents understand the information; and the right to opt out at any time without prejudice. A written consent was used by the scholar. Participants signed as an indication of their willingness to take part in this study.

The study ensured fair treatment under the principle of justice by providing opportunities to participants who consent to take part in the study. Anonymity was achieved by making certain that respondents' identification details like name were not recorded anywhere on the research tools, but rather codes and signature of their name were used to achieve non - discriminatory selection of participants.

Regarding the principle of confidentiality, information concerning personal identifiers was evaded, and participants' information was restricted to the researchers only. The participants were assured that the report was shared with the University of Nairobi and SGR Project managers who were interested in the outcome of the report.

3.9 Operational Definition of the Variables

Herein is a table that illustrates the operationalization of variables under study.

Table 3.3: Operationalization of Variables

Objective·	Variable·	Indicators·	Measurement scale·	Research approach	Data analysis· techniques	Tools
To examine the influence of environmental screening on the sustainability of the Standard Gauge Railway project in Kenya.	**Environmental screening**	Review of available data and information Review of legal framework and guidelines Preparation of the checklists	Nominal	Quantitative	Frequencies, percentages, Mean and standard deviation	Questionnaire, interviews and observations
To determine the influence of environmental scoping on the sustainability of the Standard Gauge Railway project in Kenya.	**Environmental scoping**	Collection of baseline data Identification of interest groups Development of EIA techniques	Nominal	Quantitative	Frequencies, percentages, Mean and standard deviation	Questionnaire, interviews and observations
To investigate the influence of environmental impact prediction on the sustainabil	**Environmental impact prediction**	Identification of impacts Prediction of impacts Assessment and	Nominal	Quantitative	Frequencies, percentages, Mean and standard deviation	Questionnaire, interviews and observations

ity of the Standard Gauge Railway project in Kenya.		evaluation of impacts				
To establish the influence of post EIA project review on the sustainability of the Standard Gauge Railway project in Kenya.	**Post EIA project review**	Public participation and consultation Recommendations of the EIA report EIA follow-up	Nominal	Quantitative	Frequencies, percentages, Mean and standard deviation	Questionnaire, interviews and observations
Dependent variable	**Sustainability of transport infrastructure projects**	Return on Investment Revenue margin Environmental benefits Social benefits Economic benefits	Ordinal	Quantitative	Frequencies, percentages, mean, standard deviation and content analysis	Questionnaire, interviews and observations

CHAPTER FOUR

DATA ANALYSIS, PRESENTATIONS AND INTREPRETATIONS

4.1 Introduction

The findings of the scholarship undertaken to test both the conceptual model and research hypotheses are presented in this chapter. It first gives the research constructs' response rate, reliability, and validity. Second, it goes over the respondents' rudimentary contextual evidence as well as a descriptive analyses of the study variables. Lastly, the chapter offers the outcomes of the statistical analyses used to evaluate the hypotheses, as well as discussions of the findings and conclusions drawn from them.

4.2 Response Rate

The population targeted in this study were 141 respondents including 13 National Construction Authority officials, 24 managers of project, 28 project supervisors, 16 contractors, 33 environmental consultants and 27 Ministry of Roads and Infrastructure officials. The study took a random sample of 133 individuals and succeeded to get responses from 126 of them. The response number implied a response rate of 94.7 %. Saleh and Bista (2017) back this response rate, reiterating attaining greater than 75.0% is suitable for information processing.

4.3 Pilot Study Results

Pilot research was conducted to check the consistency or the reliability of the questionnaire tool. The Cronbach's alpha test was used to examine the internal consistency of the questionnaire items using the reliability command in SPSS. The piloted outcomes were as outlines;

Table 4.1 Reliability Results

Objective	**Number of items**	**Alpha value**
Sustainability of projects	4	0.781
Environmental screening process	4	0.826
Environmental scoping process	4	0.808
Environmental impact prediction process	4	0.745
Post environment impact assessment preview	4	0.833

The piloted outcomes demonstrated that the reliability of the sustainability of the SGR project was estimated as 0.781 using Cronbach's alpha test of reliability; the reliability of the environmental screening process was estimated 0.826; the reliability of the environmental scoping process was 0.808; the reliability of the environmental impact prediction process was 0.745 and that the reliability of the post environment impact assessment preview process was 0.833. All of the variables in the study had an alpha test of more than 0.70, indicating that they were entirely considered reliable and thus useable for data analyses.

4.4 Background Information

The purpose of the study was to determine the respondents' general information. Gender, years of experience, highest educational level, and respondent type were all investigated in the study. The study results were as follows;

4.4.1 Distribution of Respondents by Gender

This research, in line with the research questions, pursued to find out the respondents' gender distribution. These findings were as illustrated on Table 4.2.

Table 4.2 Gender of the Respondents

Gender·	**Frequency**(n)	**Percent**(%)
Male·	76	60.0
Female·	50	40.0
Total·	**126**·	**100.0**

The gender of the respondents sampled revealed that 50 (40.0 percent) were female and 76 (60.0 percent) were male. Therefore, this demonstrates that the research successfully acquired information from both gender and that their perspectives were taken into account. This means that the bulk of the people working on the SGR project are men.

4.4.2 Distribution of Respondents by Age Brackets

This research, in line with the research questions, pursued to find out the respondents' age group distribution. and the results were as presented on Table 4.3.

Table 4.3 Age Bracket of the Respondents

Age· Bracket·	Frequency(n)	Percent(%)
Less than 25· years·	3	2.0
25-35· years·	48	37.8
36-45· years·	54	42.9
46-55· years·	21	16.3
Total	**126**	**100**

The research outcomes reveal that a larger share of the answerers were in the age group of 36-45 years representing 54 (42.9%), 48 (37.8%) were aged between 25-35 years, 21 (16.3%) were aged 46-55 years while 3 (2.0%) were aged less than 25 years. This is an indication that the research successfully gathered information from individuals from all the age groups captured in the study.

4.4.3 Distribution of Respondents by Level of Education

Table 4.4 shows the outcomes of the study, which intended to establish the distribution of respondents by highest level of education.

Table 4.4 Highest Level of Education of the Respondents

Educational Level·	Frequency(n)	Percent(%)
Undergraduate	76	60.2
Post-graduate	50	39.8
Total	**126**	**100**

From the research outcomes, 76 (60.2 percent) of the respondents had received an undergraduate degree, while 50 (39.8%) had received a postgraduate degree. Therefore, there is a clear indication that the respondents were sufficiently literate concerning the research questions and therefore understood them, and it may be taken to imply that they delivered an fair and honest evaluation of the research questions.

4.4.4 Distribution of Respondents by Years of Work

This research pursued to find out the respondents' work experience distribution and results presented on the Table 4.5.

Table 4.5 Years of work

Years of work	Frequency(n)	Percent(%)
1-5 Years	14	10.8
6-10 Years	55	43.8
11-15 Years	57	45.4
Total	**126**	**100**

According to the study's findings, 14 (10.80 %) of the answerers had 1-5 years of experience, 55 (43.80 %) had 6-10 years of experience, and 57 (45.4 percent) had 11-15 years' experience. The finding means that the bulk of the answerers had between 11 to 15 years' experience, and that the study successfully collected information from all of the age categories considered.

4.5 Descriptive Findings

The key aspects of the information from the study are elaborated through employing descriptive statistics. They provide quick outlines of the samples and measurement. They are the underpinning of almost every quantitative data analysis, along with modest pictorial analysis (Kothari, 2014). This part includes the study's findings in the form of tables, as well as the descriptive analysis for each variable. On a Likert scale of 1 to 5, respondents were requested to indicate whether they are in agreement or disagreement with the statements using the following scale. 5=strongly agree, 4=agree, 3=neutral, 2=disagree, or 1=strongly disagree. Minimum, maximum, mean, and standard deviation were the statistics employed.

4.5.1 Environmental screening process and Sustainability of projects

In line with the research questions, this strived to find out the effect of environmental screening process on sustainability of SGR project. The findings are provided on Table 4.6.

Table 4.6 Environmental screening process and Sustainability of projects

Statement	SA	A	U	D	SD	Mean	StdDev

Before any project is implemented, there is review of available data and information.	F	27	42	13	9	5	3.80	1.047
	%	27.7	43.1	15	9.2	5		
Review of legal framework and guidelines is done prior to the commencement of the project.	F	30	38	9	14	5	3.79	1.074
	%	30.8	40	9.8	14.4	5		
Preparation of checklists aid in decision making before the project is given a go ahead for implementation.	F	21	59	15	1	0	4.04	0.342
	%	21.5	61.5	15.5	1.5	0		
Identifying the degree of effect of the planned project, development, or initiative is a crucial component of doing an EIA.	F	40	27	18	7	4	3.93	0.346
	%	40	27	18	7	4		

The findings of the study showed 69 (70.70%) of the answerers were in agreement that before any venture is implemented, there is review of available data and information (Mean = 3.800, SD = 1.0470) as paralleled to 14 (13.60%) who were in disagreement. The study also demonstrated that 68 (69.80%) were in agreement that Review of legal framework and guidelines is done prior to the commencement of the project (Mean=3.790, SD=1.0740) in comparison to 19 (19.40%) who were in disagreement with the statement. Additionally, the findings of study showed that 70 (83.00%) of the respondents were in agreement that preparation of checklists aid in decision making before the project is given a go ahead for implementation (Mean=4.040; SD=0.3420) in comparison to 1 (1.50%) who were in disagreement. Furthermore, the research findings showed that 67 (69.80 percent) of the sampled individuals were in agreement that determining the extent of an initiative's or project's effects is a key step in conducting an EIA (Mean=3.93; SD=0.346), while 11 (13.30 percent) disagreed. The outcomes (Table 4.6) also show that the majority of answerers said that creating checklists helps with decision-making before a project is approved for implementation.

4.5.2 Environmental scoping process and Sustainability of projects

In line with the research questions, this work strived to establish the influence of environmental scoping process on the sustainability of the SGR project. The study responses are as on Table 4.7.

Table 4.7 Environmental scoping process and Sustainability of projects

Statement		SA·	A·	U·	D·	SD·	Mean·	Std Dev·
	F	61	25	10	0	0	4.52	1.196

There exists a collection of baseline data for any project to be undertaken.	%	63.1	26.2	10.7	0	0		
We always identify groups that are interested in the project.	F	61	24	11	0	0	4.51	0.275
	%	63.1	25.2	11.7	0	0		
We usually develop EIA techniques relevant to the project to be undertaken.	F	59	28	9	0	0	4.48	0.450
	%	61	29.2	9.8	0	0		
Developing a project scope statement is so important for the rest of the project plan.	F	38	44	10	3	0	4.28	0.273
	%	40	46.2	10.9	3.1	0		

The research outcomes on the influence of environmental scoping process on sustainability of the SGR project demonstrated that 86 (89.3%) of the respondents agreed that there is collection of baseline data for any project to be undertaken (Mean=4.52; SD=1.115). None of the respondents was in disagreement with the particular claim. The findings of this work additionally show that 85 (88.30%) were in agreement that they always identify groups that are interested in the project (Mean = 4.510; SD=.275) comparing to none who were in disagreement. The study results demonstrated that 87 (89.2%) agreed that they usually develop EIA techniques relevant to the project to be undertaken (Mean =4.480; SD =.450) while none of the participants were in disagreement. On the final statement, the outcomes of the study indicated that 82 (89.40%) of the answerers were in agreement that creating a project scope statement is crucial for the project plan (Mean = 4.28; SD = 0.273) as compared 3 (3.10%) who were in disagreement. The outcome of the work on Table 4.7 demonstrated that most of the answerers were of the view that there is collection of baseline data for any project to be undertaken.

4.5.3 Environmental impact prediction process and Sustainability of projects

The strived to assess the effect of environmental impact prediction process on sustainability of the SGR project. The outcomes were illustrated in Table 4.8.

Table 4.8 Environmental impact prediction process and Sustainability of projects

Statement		**SA**·	**A**·	**U**·	**D**·	**SD**·	**Mean**·	**StdDev**·
	F	27	41	15	8	5	4.00	1.187

Identification of projects impacts is conducted prior to the commencement of the project.	%	28.1	42.4	15.9	8.6	5		
There is prediction of impacts of the project.	F	8	58	15	12	4	3.55	0.969
	%	7.9	60.4	15.2	12.2	4.3		
Projects' impacts are evaluated and assessed before the undertaking of the project.	F	58	7	14	13	5	3.55	0.764
	%	60.4	6.9	14.2	13.2	5.3		
Environmental impact prediction is key in any EIA undertaking.	F	10	48	19	16	2	3.16	0.606
	%	10.8	50.4	20.1	16.5	2.2		

The study results on the effect of environmental impact prediction process on sustainability of the SGR project uncovered that 68 (70.50%) of the respondents were in agreement that that identification of projects impacts is conducted prior to the commencement of the project (Mean = 4.00; SD = 1.187) while 13 (13.6%) were in disagreed. The study also showed that 66 (68.3%) were in agreement that that there exists a prediction of impacts of the project (Mean = 3.55; SD = 0.969) while 16 (16.50%) did not agree. The study also revealed that 65 (67.3%) agreed that projects' impacts are evaluated and assessed before the undertaking of the project (Mean = 3.550; SD = 0.7640) while 18 (18.50%) were in disagreement. Additionally, the research outcomes indicated that 58 (61.20%) of the answerers were in agreement that environmental impact prediction is key in any EIA undertaking (Mean = 3.120; SD = 0.6060) while 18 (18.7%) were in disagreement. The research outcomes revealed that most of the answerers were of the view that identification of projects impacts is conducted prior to the commencement of the project.

4.5.4 Post environment impact assessment preview process and Sustainability of projects

To complete the information gathering phase, this study finally strived to determine the influence of post environment impact assessment preview process and the SGR project's sustainability. The research outcomes were as tabulated in Table 4.9.

Table 4.9 Post environment impact assessment preview process and Sustainability of projects

Statement·		SA·	A·	U·	D·	SD·	Mean·	Std Dev·
	F	27	41	14	9	5	3.80	1.047

Public participation and consultation are always carried out in infrastructure projects	%	27.7	43.1	15	9.2	5		
Recommendations of the EIA report is taken into consideration during project implementation.	F	30	38	9	14	5	3.79	1.074
	%	30.8	40	9.8	14.4	5		
The original predictions made largely deviate from the actual outcomes	F	27	41	14	9	5	3.80	1.047
	%	27.7	43.1	15	9.2	5		
There is EIA follow up during project review.	F	21	59	15	1	0	4.04	0.342
	%	21.5	61.5	15.5	1.5	0		

The study's outcomes reveal that 68 (70.5%) of the respondents agreed that public participation and consultation is always carried out in infrastructure projects (Mean=3.80; SD=1.047) whereas 14 (14.20%) were in disagreement. The findings of the study further reveal that 68 (70.8.80%) of the respondents were in agreement that recommendations of the EIA report are taken into consideration during project implementation (Mean=3.79; SD=1.074) whereas 19 (19.40%) disagreed. Findings of the study unpacked that 68 (70.5%) of the respondents were in agreement that the original predictions made largely deviate from the actual outcomes (Mean = 3.80; SD = 1.047) whereas 14 (14.2%) disagreed. The study's results also showed that 70 (83.0%) of the respondents were in agreement that there is EIA follow up during project review (Mean = 4.04; SD = 0.342) in comparison to 1 (1.50%) who were in disagreement.

From the study's findings, the larger population of respondents believed that EIA monitoring occurs during project reviews. In an EIA review process, the EIA report's quality and completeness are systematically evaluated for decision-making purposes, and its consequences for project execution are taken into account.

4.5.5 Sustainability of the SGR project

The study finally strived to establish the indicators of sustainability of the SGR project. The study's outcomes were as listed in Table 4.10.

Table 4.10 Sustainability of the SGR project

Statement·		SA·	A·	U·	D·	SD·	Mean·	Std Dev·
Return on investment shows good sustainability of the SGR project.	F	44	43	7	5	0	4.52	0.764
	%	45.1	44.2	7.2	5.1	0		

Revenue margin is the main determinant of sustainability of the Standard Gauge Railway project.	F	42	45	9	3	0	4.49	0.606
	%	43.1	46.2	9.2	3.1	0		
Environmental benefits indicate sustainability of the SGR project.	F	53	33	12	0	0	4.52	1.446
	%	53.8	33.8	12.3	0	0		
Social and economic benefits determine the sustainability of the SGR project	F	21	59	15	1	0	4.04	0.342
	%	21.5	61.5	15.5	1.5	0		

The study results on indicators of sustainability of projects revealed that 87 (89.3%) of the respondents were in agreement that return on investment shows good sustainability of SGR project (Mean = 4.52; SD = 4.52) as compared to 5 (5.1%) who disagreed; 87 (89.4%) also agreed that revenue margin is the main determinant of sustainability of the Standard Gauge Railway project (Mean = 4.49, SD = 0.606) in comparison to 3 (3.1%) who were in disagreement. The study's outcomes reveal that 86 (87.6%) of the answerers aligned that environmental benefits indicate sustainability of the SGR project (Mean = 4.52; SD = 1.446) in comparison to none who did not align with the statement. The study results further indicated that 70 (83.00%) of the respondents agreed that Social and economic benefits determine the sustainability of the SGR project (Mean = 4.04; SD = 0.342) in comparison to 1 (1.50%).

4.6 Inferential Statistics

The link between the variables in the research was examined using Pearson correlation analysis. In order to establish the degree of correlation between the study's variables and to illustrate the magnitude of linear association between variables in the ranges between +1 and -1, Pearson correlation was used. Whereas r>0.7 denotes a robust positive relationship, r = +0.5 but less than 0.7 denotes a modest association, and r= +0.49 and below denotes a weak association between the study's variables. Where r =0 denotes a no relationship situation. The study's results were summarized in Table 4.11.

Table 4.11 Relationship between Study Variables

	Environmental screening process	Environmental scoping process	Environmental impact prediction process	Post environment impact assessment preview process
Pearson's Corr	1			

Environmental screening process	Sig. (two-tailed)				
Environmental scoping process	Pearson's Corr	.580**	1		
	Sig. (two-tailed)	0.000			
Environmental impact prediction process	Pearson's Corr	0.407	0.104	1	
	Sig. (two-tailed)	0.642	0.306		
Post environment impact assessment preview process	Pearson's Corr	.697	.853	.533	1
	Sig. (two-tailed)	0.200	0.190	0.302	
Sustainability of projects	Pearson's Corr	.622**	.631**	.411**	.597**
	Sig. (two-tailed)	0.000	0.000	0.000	0.000
	Pearson's Corr	126	126	126	126

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

The findings of the study demonstrated existence of positive correlation that is statistically significant between environmental screening process on sustainability of the SGR project (r=.622, *p*<.050). The statistical significance hints that a unit alteration in environmental screening process results in a 62.2% change in sustainability of the SGR project. The scholar carried out an analysis of the relationship between environmental scoping process and sustainability of projects and findings of study demonstrated presence of a statistical significant positive effect of environmental scoping process on sustainability of the SGR project (r =.631; *p*<.050), which shows a unit change in environmental scoping process results in a 63.1% change in sustainability of the SGR project.

The outcomes of the study demonstrated that there was a statistically significant positive effect of environmental impact prediction process on sustainability of the SGR project (r =.411; *p*<.050). The results mean a unit change in environmental impact prediction process results in a 41.1% variation in the SGR's project sustainability. The findings of the study demonstrated an existing statistically significant positive effect of post environment impact assessment preview process on sustainability of the SGR project (r =0.597; *p*<.050) which means that a

unit alteration in post environment impact evaluation preview process results in a 59.7% alteration in sustainability of the SGR project.

4.7 Multiple Regression Model Analysis

This research executed a multiple regression model analysis to quantify the associations between the study's variables on an estimate basis. The study's outcomes were as indicated in Table 4.12.

Table 4.12 Model Summary

·Model	·**R**	·**R Square**	·**Adj. R Square**	·**Std. Error of the Estimate**	·**F-value**	·**Sig.**(*p)*
1	.802[a]	0.8450	0.8790	0.08790	112.6680	0.000[b]

From the model, the simple correlation was 0.8020, which indicates that the variables correlate to some level. Environmental impact assessment accounted for 87.9% of the overall variance in the sustainability of the SGR project (adjusted R2 of the research model: 0.845; R2 = 0.879; standard error: 0.068). This indicates that 80.2% of the variations in the data is expounded by the linear regression model. This suggests that the data from the multiple linear regression did not exhibit first order linear auto-correlation which further implies that environmental impact assessment in the study accounts for 87.90% of the variation in project sustainability whereas other factors outside the study account for 12.1% of project sustainability.

4.7.1 Assessing the Fit of the Multiple Regression Model

To check if the multiple regression model suited the data, analysis of variance was utilized. The outcomes were displayed in Table 4.13.

Table 4.13 ANOVA Model

·**Model**		·**Sum of Squares**	·**df**	·**Mean Square**	·**F-value**	·**Sig.(*p)***
1	Residual	102.8820	4	19.0150	112.6680	0.000[b]
	Regression	9.2320	122	0.168930		
	Total	**112.1140**	**126**			

The null hypothesis of the F-test for linear regression is that the model accounts for no variance in the sustainability of projects (F =112.6680, p=0.000). Since the F -test is very significant,

the model can be considered as adequately described the variation in project sustainability. Accordingly, environmental screening, environmental scoping, environmental effect prediction, and the post-environmental impact assessment preview process have an impact on the SGR project's sustainability. This suggests that the multiple regression model was fit for the data.

The study's outcomes further showed that the model summary substantially and correctly predicted the SGR project's sustainability ($p \leq .050$). In general, the regression model statistically strongly predicted the sustainability of the SGR project, demonstrating the statistical relevance of the regression model that was performed (in other words, it was a good fit for the data).

4.7.2 Regression Coefficients

In order to calculate the beta that represents how significantly every independent variable affects the dependent variable, a T-test of statistical significance of individual regression coefficient was executed. Table 4.14 displays the study findings.

Table 4.14 Regression Coefficients

Model	**Unstandardized Coefficients**		**Standardized Coefficients**		
	B	**Std Error**	**Beta**	**t**	**Sig.**
(Constant)	0.3230	0.2240		1.6480	0.105
Environmental screening process	0.1820	0.0260	0.3190	6.6040	0.000
Environmental scoping process	0.2720	0.0240	0.5340	6.7450	0.000
Environmental impact prediction process	0.2290	0.0340	0.4760	8.8660	0.000
Post environment impact assessment preview process	0.2160	0.0460	0.2530	6.3540	0.000

The regression equation spawned for the study was as outlined.

Y (Sustainability of SGR project) = 0.3230 (Constant) + 0.1820 (Environmental screening process) + 0.2720 (Environmental scoping process) + 0.2290 (Environmental impact prediction process) + 0.2160 (post environment impact assessment preview process) + 0.2240 (Std Error).

Out of the regression equation, environmental scoping process to sustainability of the SGR project contributing 27.2% to sustainability of the SGR project while environmental screening process contributed 32.3%, environmental impact prediction process contributed 22.9% and that post environment impact assessment preview process contributed 21.6% to sustainability of the SGR project respectively.

The linear regression equation additionally reveal a statistically significant association between environmental screening process and sustainability of the SGR project (β=.182, $p \leq .050$); there was a statistically significant association between environmental scoping process and sustainability of the SGR project (β=.272, $p \leq .050$); there was a statistically significant association between environmental impact prediction process and sustainability of the SGR project (β =.229, $p \leq .050$) and that there was a statistically significant association between post environment impact assessment preview process and sustainability of the SGR project (β =.216, $p \leq .050$).

The regression function in equation 4.1 was used to explain the results of the regression model analysis.

$Y = 0.323 + 0.1820X_1 + 0.2720X_2 + 0.2290X_3 + 0.2160X_4$ ……………………...Equation 4.1

The environmental screening process coefficient parameter is 0.1820, which implies that while all other factors are kept constant, a unit alteration of the environmental screening process will yield a 0.1820 change in the sustainability of the SGR project. The environmental scoping process's coefficient parameter is 0.272, which means that, with all other factors held constant, an alteration in only one unit of the environmental scoping process would result in a change of 0.272 in the project's sustainability. The SGR project’s sustainability will be forecasted for every change in one unit of the environmental effect prediction process, with all other variables held constant, since the environmental impact prediction process coefficient parameter is 0.229. The post environment impact assessment preview process coefficient parameter is 0.216 implying that for every unit change of post environment impact assessment preview process, a 0.216 change in sustainability of the SGR project will be projected all other variables kept constant.

4.7.3 Hypotheses Testing

The scholar’s first claim was;

H_{01}: Environmental screening process has no significant effect on sustainability of the SGR project. The outcomes of the study demonstrated that there was a statistical significant association between environmental screening process and sustainability of the SGR project (p =0.000). Consequently, the research disproved the null hypothesis and supported the alternative hypothesis that demonstrated correlation between environmental screening process and sustainability of the SGR project.

The scholar's second claim was;

H_{02}: Environmental scoping process has no significant effect on sustainability of the SGR project. The outcomes of the study demonstrated that there was a statistically significant association between environmental scoping process and sustainability of the SGR project (p=0.000). Consequently, the research disproved the null hypothesis and supported the alternative hypothesis, which demonstrated correlation between environmental scoping process and sustainability of the SGR project.

The third hypothesis of the study was;

H_{03}: Environmental impact prediction process has no significant effect on sustainability of the SGR project. The outcomes of the research demonstrated that there was a statistical significant association between environmental impact prediction process and sustainability of the SGR project (p=0.000). Consequently, the study disproved the null hypothesis and supported the alternate hypothesis, which demonstrated correlation between environmental impact prediction process and sustainability of the SGR project.

The fourth hypothesis was;

H_{04}: Post environment impact assessment preview process have no significant effect on sustainability of the SGR project. The findings of the study demonstrated that there was a statistical significant association between post environment impact assessment preview process and sustainability of the SGR project (p=0.000). Consequently, the study disproved the null hypothesis and supported the alternative hypothesis that demonstrated correlation between post environment impact assessment preview process and sustainability of the SGR project.

Table 4.15 Summary of Test of Hypotheses

Hypotheses	Claims/Statements	Sig.(*p*)	Outcome

H_{01}:	Environmental screening process has no significant effect on sustainability of the SGR project.	0.000	The conjecture is Rejected
H_{02}:	Environmental scoping process has no significant effect on sustainability of the SGR project.	0.000	The conjecture is Rejected
H_{03}:	Environmental impact prediction process has no significant effect on sustainability of the SGR project.	0.000	The conjecture is Rejected
H_{04}:	Post environment impact assessment preview process has no significant effect on sustainability of the SGR project.	0.000	The conjecture is Rejected

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The aim of this research work was to assess the effect of environmental impact assessment on the sustainability of the SGR project. This chapter presents the summary of findings, conclusions, recommendations, and suggestions for further studies.

5.2 Summary of Findings

This section summarizes the findings of the study as per the particular objectives.

5.2.1 Environmental screening process and Sustainability of projects

The study's findings showed that 67 (69.8%) of respondents agreed that determining the extent of an initiative's or project's potential effects is a key step in conducting an EIA (Mean=3.93; SD=0.346), while 11 (13.3%) disagreed. Table 4.6 indicates, the larger share of respondents believed that creating checklists helped with decision-making before the project was approved for implementation. Environmental screening identifies all projects that have no significant negative consequences.

The parameters used to determine if an EIA is required differ from country to country. The method is used to examine whether a proposed project would have substantial environmental consequences. It should generally take place early in the project design process.

5.2.2 Environmental scoping process and Sustainability of projects

Outcomes of study showed that 82 (89.4%) of the answerers were in agreement that project scope statement is imperative for the project plan (Mean =4.28; SD =0.273) in comparison to 3 (3.1%) who were in disagreement. The findings of the study in Table 4.7 demonstrated most respondents agreed that there is collection of baseline data for any project to be undertaken.

It would be extremely difficult, if not impossible, to track a project's development and analyze its impact without baseline data. Even experts might mix it up with other project components like a needs assessment or a benchmark. Baseline data assists in the following ways: setting realistic goals and measuring progress toward them; sustaining answerability by enlightening on the difference that the project makes; informing and motivating stakeholders to be keen on

particular concerns and increase participation; providing rationalization for policymakers and donors for a project intercession; shaping anticipations and communication strategies

5.2.3 Environmental impact prediction process and Sustainability of projects

According to the survey, 58 respondents (61.2%) agreed that environmental effect prediction is essential to every EIA project (Mean=3.12; SD=0.606), whereas 18 respondents (18.7%) disagreed. The study's findings disclosed that the common theme from the respondents believed that a project's implications should be identified before it even starts. The project identification process has some effect on project completion within allocated budget, on schedule, and with the intended quality. It also has some influence on whether the project is completed with satisfied customers.

5.2.4 Post environment impact assessment preview process and Sustainability of projects

The study results also illustrated that 70 (83.0%) of the respondents were in agreement that there is EIA follow up during project review (Mean =4.04; SD =0.342) in comparison with 1 (1.50%) who were in disagreement with the notion. The study’s outcomes reveal that most of the respondents perceived that there is EIA following up during project review.

In practice, after project approval is granted, the EIA process frequently terminates with no follow-up. Although EIA is largely a prediction tool, it is required to conduct a follow-up stage in order to identify actual impacts, make corrective actions as needed, and learn from the experience gained. As a result, EIA follow-up may include the creation of an environmental management plan (EMP), which may be required by various EIA regimes.

5.3 Discussions of Findings

In the first objective, the study sought to institute the influence of environmental screening process on sustainability of the SGR project and uncovered that most of the respondents perceived that Preparation of checklists aid in decision making before the project is given a go ahead for implementation. These outcomes agree with the findings by Parsian (2013) who showed that a positive association exists between environmental screening process and sustainability of the SGR project.

In the second objective, the study targeted to determine the influence of environmental scoping process on sustainability of the SGR project. The outcomes of the study demonstrated that the larger share of the respondents was of the view that there is collection of baseline data for any

project to be undertaken. These findings are consistent with those of Enqvist (2013), who suggested that a baseline study be undertaken following the first needs assessment and project design before the project begins. However, in emergency situations where project execution must begin as soon as feasible owing to unforeseen circumstances (such as the distribution of food and non-food relief during armed conflicts), the baseline study might be completed after the project has already begun.

On the third goal, the research sought to examine the influence of environmental impact prediction on sustainability of the SGR project. Research outcomes showed majority of respondents perceived identification of projects impacts is conducted prior to the commencement of the project. These outcomes align with the results by Christensen and Krnv (2017), the questionnaire checklist approach entails recognizing which concerns are essential and documenting how they are chosen for further technical investigation. It's critical to identify problems in terms of environmental components that are declining or approaching their threshold as part of a cumulative effects evaluation. Judgment from individuals with expertise somewhat shapes the decision on whether there is over-prediction or under-prediction, and both positive and negative consequences have received an equal emphasis.

In the study's fourth objective, scholar sought to determine the influence of post environment impact assessment preview process and the SGR project's sustainability. The larger share of respondents, it was discovered, believed that EIA follow-up occurs during project review. In an EIA review process, the EIA report's quality and completeness are systematically evaluated for decision -making purposes, and its consequences for project execution are taken into account (Roe et al., 2015; Modac & Biswas , 2019). The main prerequisite for a review procedure is that, prior to a decision being made on the activity, the relevant authorities, experts, and the general public must have the opportunity to remark on EIA report and the action it describes (Wood, 2015). The key to doing an objective EIA evaluation is. For enhancing objectivity in EIA reviewing, Wood (2015) proposed techniques such as using review criteria, accrediting the EIA report body, publishing the outcomes of the review, and including consultees and the public.

5.4 Conclusions of the Study

This work concludes that preparation of checklists aid in decision making before the project is given a go ahead for implementation. Environmental screening identifies all projects that have no significant negative consequences. The parameters used to determine if an EIA is required

differ from country to country. The method is used to examine whether a proposed project would have substantial environmental consequences. It should generally take place early in the project design process.

For any project to begin, baseline data must be collected. Baseline data assists in the following ways: setting realistic goals and measuring progress toward them; sustaining answerability by enlightening the difference the project makes; informing and motivating stakeholders to be keen on particular concerns and increase the level of involvement; providing rationalization for policymakers and donors for a project intervention; shaping anticipations and communication strategies

The investigation came to the additional conclusion that the project's implications are identified before it starts. The project identification process has some effect on project completion within allocated budget, on schedule, and with the intended quality. It also has some influence on whether the project is completed with satisfied customers.

The study also concluded that an EIA review process should be done to ensure that the EIA statement report (recommendations, mitigation measures) was adhered to during the implementation phase of a project. The primary condition of a review procedure is that competent authorities, experts, and general public have the opportunity to remark on the EIA report and the activities it details before a decision is taken on the action. In EIA review, maintaining objectivity is key.

The EIA procedure makes certain that environmental issues are articulated at the beginning of a project or during the planning phase, ensuring all potential issues are tackled as the project continues even into the final stages. The EIA's recommendations can entail the re-design of a number of project constituents, propose modifications that change project's economic feasibility, require more studies, or cause a delay in project completion. It is critical to do an environmental evaluation at earlier stages of the project life-cycle to uncover noteworthy impacts so that recommendations can be included into the design without incurring severe delays or additional design costs.

5.5 Recommendations for the Study

The study made recommendations as follows:

5.5.1 Recommendations of the Study

This study recommends that transport infrastructure project managers to institute environmental screening in their respective projects. Whether or not an EIA is required will be decided by the legislation or standards being used in each country. The criteria for screening and full EIA are frequently outlined in laws.

The study also suggested that projects involving transportation infrastructure include an intuitive environmental scoping procedure. Scope is crucial for two reasons. Firstly, so that issues can be pinpointed in the earlier stages, which allows design adjustments to be executed before detailed work that is usually costly is done. Secondly, to guarantee that comprehensive projecting is only done for crucial concerns. The purpose of an EIA is not to carry out exhaustive analyses on all possible environment impacts for all projects. If crucial concerns are discovered and a full-scale EIA is deemed essential, terms of reference for these further studies should be included in the scoping.

Predicting environmental effect is another critical stage that should never be disregarded while managing projects. Devoid of assessing the degree of the impacts at the start of the projects, which ought to be done with respect to monetary value wherever possible, affordable and realistic alleviating measures cannot be provided. The impact of the proposed improvements must then be computed via supplementary projection work. Evidently, alternatives need to be abandoned following their unsuitability or other options deemed as being superior with respect to the economy, environment, or both.

Recommendations for mitigating measures is an essential outcome of this stage. The Environmental Impact Statement would include this information. The goal will be to implement steps that reduce any unwanted effects and increase favorable effects. Teams conducting feasibility studies must create formal and informal communication linkages so that recommendations can be considered in their work. In a similar manner, viability studies may reveal that some solutions are technically or commercially impracticable, precluding the need for environmental modeling for these options.

Finally, an EIA review should be conducted. This entails a systematic evaluation of the EIA report's quality and completeness for decision-making, as well as examination of its consequences for project implementation. Before a decision is made on the action, the appropriate authorities, experts, and the general public have the opportunity to comment on the EIA report and the action it specifies. To enhance objectivity at this stage, techniques such as

using review criteria, accrediting the EIA report body, publishing the outcomes of the review, and including consultees and the public should be used.

5.5.2 Recommendations for Policy and Practice

This study recommends the management of projects to ensure projects have adhered to appropriate environmental impact assessment that will enable effective management of sustainability in these projects. The steps of the process must be followed carefully from screening, scoping, impact prediction to post project assessment while adhering to the policies and legislation related to the project being undertaken. In addition, project managers should try and put in place environmental impact assessment where needed so as to ease in sustainability of entire life cycle of projects.

5.6 Contribution to the body of knowledge

Environmental difficulties continue despite the implementation of Environmental Impact Assessment and Environmental Audit methodologies in environmental management for the past two decades. Despite the economic benefits of infrastructure projects, they continue to face sustainability challenges due to a lack of clarity about how to mitigate and monitor project environmental impacts, variations in EIA processes, and a difficult to understand and replicate EIA process.

Economic, social, and environmental harm can come from a lack of EIA practice, which comprises environmental screening, scoping, effect prediction, and post-project environmental impact evaluation. The SGR project was permitted after two EIAs were completed; nevertheless, given the evidence of serious environmental harm in the area, scientists are sceptical about how successfully the ideas were implemented in the development. This indicates that EIA process, even if carried out correctly will not fully impact the project if the ideas and recommendations from the EIA report are not strictly followed.

Furthermore, designing and implementing resilient, inclusive, sustainable and inclusive infrastructure is essential to maximizing development benefits while minimizing ecosystem impacts. This requires a comprehensive assessment of the environmental effects of transportation infrastructure that involves extensive stakeholder engagement.

5.7 Suggestions for Further Research

This study mainly focused on EIA process and how it influences sustainability of transport infrastructure projects. The study recommends research on other components of environmental

impact assessment such as law, policies and institutional arrangements influencing sustainability of projects that were not analyzed in this study.

The consequences of environmental impact assessments in projects other than the SGR project should be the subject of further study in order to compare the outcomes. Sustainability of projects is related to return on investment, price variations, productivity and revenue, quality, human resources, brand awareness, image, and other less tangible and/or quantifiable factors that could be researched on. Sustainability of projects is not just a result of conducting a proper EIA.

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APPENDICES

APPENDIX I: QUESTIONNAIRE FOR PROJECT ENGINEERS, MANAGERS, SUPERVISORS AND CONTRACTORS

The sole intention of this research questionnaire is data collection for a study on impact of environmental impact assessment on the sustainability of Kenya's Standard Gauge Railway project. The study is solely for academic work. All data provided by respondents shall be kept completely confidential. Kindly answer as objectively and honestly. Avoid entering your name in any part of the survey.

BACKGROUND INFORMATION

SECTION A: Demographic Data (Tick as Appropriate)

1. What is your gender?
   a) Male [ ]
   b) Female [ ]

2. What is your age?
   a) Less than 25 years [ ]
   b) 25-35 years [ ]
   c) 36-45 years [ ]
   d) 46-55 years [ ]

3. What is your highest level of education?
   a) Undergraduate degree [ ]
   b) Postgraduate degree [ ]
   c) Others Specify

4. How long have you been involved in infrastructure projects in Kenya?

   a) 1-5 years [ ]
   b) 6-10 years [ ]
   c) 11-15 years [ ]
   d) Over 16 years [ ]

For Section B; Use the KEY: 1=SD- strongly disagrees; 2=D-Disagree, 3=U-Uncertain, 4=A- Agree, 5=SA-Strongly agree

SECTION B: SUSTAINABILITY OF THE STANDARD GAUGE RAILWAY PROJECT

Please rate how much you agree or disagree with the following assertion about sustainability of the Standard Gauge Railway project

	SA	A	U	D	SD
1. Return on investment shows good sustainability of the SGR project					
2. Revenue margin is the main determinant of sustainability of the Standard Gauge Railway project					
3. Environmental benefits indicate sustainability of the SGR project.					
4. Social and economic benefits determine the sustainability of the SGR project					

SECTION C: ENVIRONMENTAL SCREENING PROCESS

Please rate how much you agree or disagree with the following assertion about how environmental screening practices affect sustainability of the Standard Gauge Railway project

	SA	A	U	D	SD
5. Before any project is implemented, there is review of available data and information					
6. Review of legal framework and guidelines is done prior to the commencement of the project					
7. Preparation of checklists aid in decision making before the project is given a go ahead for implementation					
8. Identifying the degree of effect of the planned project, development, or initiative is a crucial component of doing an EIA.					

SECTION D: ENVIRONMENTAL SCOPING PROCESS

Please rate how much you agree or disagree with the following assertion about how environmental scoping influences sustainability of the Standard Gauge Railway project.

	SA	A	U	D	SD
9. There is collection of baseline data for any project to be undertaken					
10. We always identify groups that are interested in the project					
11. We usually develop EIA techniques relevant to the project to be undertaken					
12. Project scope statement development is crucial for the project plan.					

SECTION E: ENVIRONMENTAL IMPACT PREDICTION PROCESS

Please rate how much you agree or disagree with the following assertion about how Environmental impact prediction influences sustainability of the Standard Gauge Railway project

	SA	A	U	D	SD
13. Identification of projects impacts is conducted prior to the commencement of the project					
14. There is prediction of impacts of the project					
15. Projects' impacts are evaluated and assessed before the undertaking of the project					
16. Environmental impact prediction is key in any EIA undertaking					

SECTION E: POST EIA PROJECT REVIEW PROCESS

Please rate how much you agree or disagree with the following assertion about how post EIA project review influences sustainability of the Standard Gauge Railway project

	SA	A	U	D	SD
17. Public participation and consultation is always carried out in infrastructure projects					
18. Recommendations of the EIA report are taken into consideration during project implementation					
19. The original predictions made largely deviate from the actual outcomes.					
20. There is EIA follow up during project review					

The End

Thanks for Your Cooperation

APPENDIX II: QUESTIONNAIRE FOR ENVIRONMENTALISTS

The sole intention of this research questionnaire is data collection for a study on impact of environmental impact assessment on the sustainability of Kenya's Standard Gauge Railway project. The study is solely for academic work. All data provided by respondents shall be kept completely confidential. Kindly answer as objectively and honestly. Avoid entering your name in any part of the survey.

BACKGROUND INFORMATION

SECTION A: Demographic Data (Tick as Appropriate)

1. What is your gender?
   a) Male [ ]
   b) Female [ ]

2. What is your age?
   a) Less than 25 years [ ]
   b) 25-35 years [ ]
   c) 36-45 years [ ]
   d) 46-55 years [ ]

3. What is your highest level of education?
   a) Undergraduate degree [ ]
   b) Postgraduate degree [ ]
   c) Others Specify

4. How long have you been undertaking EIAs in Kenya?

   a) 1-5 years [ ]
   b) 6-10 years [ ]
   c) 11-15 years [ ]
   d) Over 16 years [ ]

SECTION B: SUSTAINABILITY OF THE STANDARD GAUGE RAILWAY PROJECT

Please rate the extent of agreement or disagreement with the following statements on sustainability of the Standard Gauge Railway project

	SA	A	U	D	SD
1. Return on investment shows good sustainability of the SGR project					
2. Revenue margin is the main determinant of sustainability of the Standard Gauge Railway project					
3. Environmental benefits indicate sustainability of the SGR project.					

4. Social and economic benefits determine the sustainability of the SGR project					

SECTION B: ENVIRONMENTAL SCREENING PROCESS

Please rate how much you agree or disagree with the following assertion about how environmental screening practices affect sustainability of the Standard Gauge Railway project

	SA	A	U	D	SD
5. Before any project implementation activity begins, baseline data is created, gathered, to represent project site condition.					
6. Evaluation of alternatives is done on: project, location, technology, and scale.					
7. It is critical that all individuals likely to be affected by the project be consulted about their concerns.					
8. Public views on environmental screening activities are included in the project report.					

SECTION C: ENVIRONMENTAL SCOPING PROCESS

Please rate how much you agree or disagree with the following assertion about how environmental scoping influences sustainability of the Standard Gauge Railway project.

	SA	A	U	D	SD
9. There are a number of significant difficulties that are linked to the proposed project that have been discovered.					
10. Scoping is the process of identifying, evaluating, organizing, and presenting relevant problems in order to improve decision-making.					
11. Impacts are projected using one or more methodologies based on the scoping exercise.					
12. Make the information available to those whose views are to obtained					

SECTION D: ENVIRONMENTAL IMPACT PREDICTION PROCESS

Please rate how much you agree or disagree with the following assertion about how Environmental impact prediction influences sustainability of the Standard Gauge Railway project

	SA	A	U	D	SD
13. Using checklists or questionnaires, project impact identification entails listing all impact sources, such as smoke emissions, water usage, and construction employment.					

14. Environment and the local communities' impacts are analyzed.					
15. Evaluation and comparison of impacts is done to ensure best option is selected.					
16. The complete report outlines all of the planned actions that will be taken to remedy the identified negative consequences.					

SECTION E: POST EIA PROJECT REVIEW PROCESS

Please rate how much you agree or disagree with the following assertion about how post EIA project review influences sustainability of the Standard Gauge Railway project

	SA	**A**	**U**	**D**	**SD**
17. To what extent does EIA study report cover the Terms of Reference that were stated at the start of the investigation					
18. To what extent have significant environmental concerns of concern to decision-makers been addressed					
19. The original predictions made largely deviate from the actual outcomes.					
20. The report's findings are technically and technologically sound, and they are arranged in a way that people making decisions together with the public at large can understand.					

The End

Thanks for Your Cooperation

APPENDIX III: QUESTIONNAIRE FOR MINISTRY OFFICIALS

The sole intention of this research questionnaire is data collection for a study on impact of environmental impact assessment on the sustainability of Kenya's Standard Gauge Railway project. The study is solely for academic work. All data provided by respondents shall be kept completely confidential. Kindly answer as objectively and honestly. Avoid entering your name in any part of the survey.

BACKGROUND INFORMATION

SECTION A - Demographic Data (Tick as Appropriate)

1. What is your gender?
   a) Male [ ]
   b) Female [ ]

2. What is your age?
   a) Less than 25 years [ ]
   b) 25-35 years [ ]
   c) 36-45 years [ ]
   d) 46-55 years [ ]

3. What is your highest level of education?
   a) Undergraduate degree [ ]
   b) Postgraduate degree [ ]
   c) Others Specify

4. How long have you been involved serving in the ministry of roads and infrastructure in Kenya?

   a) Less than 1 year [ ]
   b) 1-3 years [ ]
   c) 4-6 years [ ]
   d) Over 6 years [ ]

SECTION B: SUSTAINABILITY OF THE STANDARD GAUGE RAILWAY PROJECT

Please rate the extent of agreement or disagreement with the following statements on sustainability of the Standard Gauge Railway project

	SA	A	U	D	SD
1. Return on investment shows good sustainability of the SGR project					
2. Revenue margin is the main determinant of sustainability of the Standard Gauge Railway project					

3. Environmental benefits indicate sustainability of the SGR project.					
4. Social and economic benefits determine the sustainability of the SGR project					

SECTION B: ENVIRONMENTAL SCREENING PROCESS

Please rate how much you agree or disagree with the following assertion about how environmental screening practices affect sustainability of the SGR project

	SA	**A**	**U**	**D**	**SD**
5. Before any project is implemented, there is review of available data and information on the project					
6. Review of legal framework and guidelines is done prior to the commencement of the project					
7. Preparation of checklists aid in decision making before the project is given a go ahead for implementation					
8. Identifying the degree of effect of the planned project, development, or initiative is a crucial component of doing an EIA.					

SECTION C: ENVIRONMENTAL SCOPING PROCESS

Please rate how much you agree or disagree with the following assertion about how environmental scoping influences sustainability of the Standard Gauge Railway project.

	SA	**A**	**U**	**D**	**SD**
9. There is collection of baseline data for any project to be undertaken					
10. We always identify groups that are interested in the project					
11. We usually develop EIA techniques relevant to the project to be undertaken					
12. Project scope statement development is crucial for the project plan.					

SECTION D: ENVIRONMENTAL IMPACT PREDICTION PROCESS

Please indicate the extent of agreement or disagreement with the following statement on how Environmental impact prediction influences sustainability of the Standard Gauge Railway project

	SA	**A**	**U**	**D**	**SD**
13. Identification of projects impacts is conducted prior to the commencement of the project					
14. There is prediction of impacts of the project					

15. Projects' impacts are evaluated and assessed before the undertaking of the project					
16. Environmental impact prediction is key in any EIA undertaking					

SECTION E: POST EIA PROJECT REVIEW PROCESS

Please indicate the extent of agreement or disagreement with the following statement on how post EIA project review influences sustainability of the Standard Gauge Railway project

	SA	**A**	**U**	**D**	**SD**
17. Public participation and consultation are always carried out in infrastructure projects					
18. Recommendations of the EIA report are taken into consideration during project implementation					
19. The original predictions made largely deviate from the actual outcomes.					
20. There is EIA follow up during project review					

The End

Thanks for Your Cooperation

APPENDIX IV: INTERVIEW SCHEDULE

1. What is the influence of environmental screening on the sustainability of the SGR project in Kenya?

……
……
…….

2. What is the level of impact of environmental scoping on the sustainability of Kenya SGR project?

……
……
…….

3. How does environmental impact prediction affect the sustainability of Kenya SGR project?

……
……
…….

4. What is the influence of post EIA project review on sustainability of SGR project in Kenya?

……
……
…….

APPENDIX V: OBSERVATION CHECKLIST

Variable	Observation	Remarks
Environmental screening • Legal framework and guidelines		
Environmental scoping • EIA techniques used • Interest groups		
Environmental impact prediction • How the impacts predicted were managed		
Post EIA project review • Public participation • Recommendations of the EIA report.		
Sustainability • Environmental conservation • Job creation • Urbanization • Reduced transport costs		

APPENDIX VI: WORK PLAN

Period	**2021/22**				
Activity/Month	March-August 2021	Sept 2021-October 2022	Mar-April 2022	April-May 2022	Jun-August 2022
Topic selection					
Project writing					
1st Correction					
2nd Correction					
Project submission					
Piloting					
Data collection					
Analysis					
Preparation of 1st Draft					
2nd Correction					
Final submission					
Defense					

APPENDIX VII: RESEARCH BUDGET PLAN

ACTIVITY	COST (KSHS)
Project	15,000
Project printing	7,000
Pilot survey	6,000
Production of questionnaires	3,000
Data collection	15,000
Data analysis	15,000
Internet services	2,000
Research assistant	4,000
Project photocopying	2,000
Project binding	3,000
Contingencies	2,000
Total	72,000