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Determinants of successful delivery of Public-Private Partnership renewable energy projects in Kenya.

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DETERMINANTS OF SUCCESSFUL DELIVERY OF PUBLIC-PRIVATE PARTNERSHIP RENEWABLE ENERGY PROJECTS IN KENYA

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DECLARATION

I hereby declare that this whole work was done solely by myself, with assistance obtained only officially from the supervisor in terms of feedback and professional guidance. No part of this proposal, in part or in whole, has been submitted to any other institution for any award.

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ABSTRACT

This research aimed to identify determinants of the delivery of PPP-renewable energy projects in Kenya and propose a framework for improving project success. The research objectives were to establish the significant determining factors (both internal and external) necessary for the successful delivery of PPP renewable energy projects in Kenya, and the extent to which they impact successful project delivery; to develop a framework for the management and delivery of renewable energy (RE) public-private partnership (PPP) projects in Kenya; and to evaluate the impact of the proposed framework on the successful delivery of RE PPP projects in Kenya from a project management and societal benefits perspective. It employed a mixed-methods approach, including questionnaires and semi-structured interviews, to collect data from renewable energy stakeholders. Thematic analysis and statistical methods were used for data analysis. The study revealed that lack of government support and commitment, political, financial, management, and operational factors, and poor project management were key factors influencing the successful delivery of PPP renewable energy projects in Kenya. Political stability and support, financing access, reliable infrastructure, strong project management, skilled workforce, and clear regulatory framework were identified as critical for large-scale PPP-RE project success. The recommended framework includes policy development, effective project and program management, stakeholder engagement, project control, and continuous improvement. The findings were validated through stakeholder interviews, confirming the usefulness, effectiveness, and implementability of the proposed framework, with the suggestion to anchor it in law for operationalization.

Keywords: Public Private Partnership, Project success, Project management, Renewable energy projects, Project failure, Public participation, Kenya.

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LIST OF ABBREVIATIONS

GIZ	German Agency for International Cooperation
KenGen	Kenya Electricity Generating Company
KES	Kenyan Shilling
MW	Megawatt
MENA	Middle East and North Africa
NGO	Non-Governmental Organization
NPG	New Public Governance
NPM	New Public Management
LTWP	Lake Turkana Wind Power Project
OECD	Organization for Economic Co-operation and Development
PPP	Public-Private Partnership
RE	Renewable Energy
REPs	Renewable Energy Projects
RET	Renewable Energy Technology
SSA	Sub-Saharan Africa
SPV	Special-Purpose Vehicle
USD	United States Dollar

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CHAPTER ONE: INTRODUCTION TO THE RESEARCH

1.1. Introduction

This section provides context to the research topic, discussing the concept of public-private partnerships (PPPs), renewable energy (RE), and their related projects. It also explores the concept of successful PPP-RE projects and defines the problem which the research aims to address. Furthermore, the section outlines the overall research aim, specific objectives, research questions, and justifies the study by highlighting its significance, novelty and scope.

1.2. Background to the study

Renewable energy has gained significant attention worldwide as countries strive to transition to cleaner and more sustainable energy sources. Renewable energy projects play a vital role in addressing Kenya's energy needs. This includes fostering sustainable development and reducing greenhouse gas emissions. As per Kinyua *et al*. (2019), the Kenyan government has recognized the importance of renewable energy and has been actively promoting its development to meet the growing energy demands of the country. Public-private partnerships (PPPs) have emerged as a prominent model to facilitate the successful delivery of renewable energy projects in Kenya. Consequently, the Kenyan government has been actively pursuing public-private partnership (PPP) models to promote and implement renewable energy projects. The collaboration between public and private entities in the development and operation of renewable energy projects brings together the expertise, resources, and innovative approaches necessary to overcome various challenges. PPPs can help bridge the financing gap, mitigate risks, and accelerate the implementation of renewable energy initiatives (*ibid*, 2019). However, the successful delivery of PPP-RE projects requires careful consideration of various factors that influence their outcomes. Understanding the determinants of successful delivery in PPP-RE projects is crucial to optimize the benefits of renewable energy investments in Kenya. It is essential to identify the key factors that contribute to project success, such as effective project management, stakeholder engagement, regulatory frameworks, financial viability, technological innovation, and community participation.

By examining these determinants, this study aimed at providing valuable insights into the critical success factors for PPP-RE projects in Kenya. The findings are of value to policymakers, project developers, investors, and other stakeholders in making informed

decisions and formulating strategies to enhance the effectiveness and efficiency of renewable energy project delivery. Furthermore, this study sought to contribute to the existing body of knowledge by providing empirical evidence on the specific context of Kenya. While previous research has examined the determinants of successful PPP-RE projects in other countries, the unique characteristics, institutional frameworks, and socio-economic factors in Kenya warrant a dedicated investigation. The study sheds light on the nuances of the Kenyan context and identify any specific factors that may impact the successful delivery of PPP-RE projects in the country. The research adopted a comprehensive, mixed-methods research approach that combines both quantitative and qualitative methods to gather data and analyze the determinants of successful PPP-RE projects. The study's findings not only fill the existing research gap but also provide practical recommendations to stakeholders involved in renewable energy development and policymaking in Kenya.

1.2.1. Public-private partnerships

Public-private partnerships (PPPs) are collaborative arrangements between public and private sector entities, known as PPPs, P3, or 3Ps (The World Bank, 2020). These partnerships have gained importance globally as a means of efficiently delivering public services and infrastructure (Andrews-Speed & Dow, 2014). PPPs require careful planning, negotiation, and ongoing monitoring to achieve desired outcomes and balance public and private sector interests (*ibid*, 2020). In a Kenyan context, the government has implemented policy reforms to attract private investment in renewable energy projects through PPPs (Ndung'u, 2018). PPPs offer benefits such as improved efficiency, better risk management, enhanced quality of service, and access to private sector funding and resources (Rodriguez, 2019; *ibid*, 2020). However, concerns exist regarding cost, public control, and fair distribution of risks and benefits (The National Academies Press, 2009). Despite controversies, PPPs have become increasingly popular worldwide, including in the United States, Canada, Australia, and developing countries (Associated General Contractors of America, 2021). Policymakers face challenges in managing PPPs effectively and addressing budget constraints (Roehrich *et al*., 2014). These partnerships typically involve long-term contracts, risk sharing, and financing models that vary by country (The National Academies Press, 2009; Rodriguez, 2019; APMG International, 2022). Overall, understanding the dynamics of PPPs is crucial for successful

delivery of public services and infrastructure projects. From a global perspective, public-private partnerships (PPPs) have gained prominence as a means of addressing infrastructure and development challenges. According to Andrews-Speed and Dow (2014), PPPs are increasingly viewed as effective mechanisms for delivering public services and infrastructure, including renewable energy projects. The flexibility and potential for risk sharing between public and private entities make PPPs attractive for mobilizing private investment and expertise in the renewable energy sector (Dietz & Stern, 2016). Scholars such as Estache and Iimi (2013) have emphasized the importance of well-designed PPP frameworks and robust governance structures to ensure transparency, accountability, and efficiency in project delivery.

Public-private partnerships (PPPs) are increasingly utilized in Sub-Saharan Africa (SSA) to address the power problem and facilitate renewable energy projects (Silverstein, 2020). The lack of access to electricity in SSA is attributed to the limited ability of utilities to secure loans and investments, hindering infrastructure expansion and power distribution (*ibid*, 2020). To combat this issue, initiatives like Africa GreenCo collaborate with various partners to develop renewable energy programs and generate significant electricity capacity (Silverstein, 2020). However, despite the proliferation of renewable energy (RE) projects, public-funded endeavors often face challenges. Factors contributing to their failure include project award processes, political agendas, public acceptance and inclusion, planning and implementation, stakeholder cooperation, and maintenance (Ikejemba et al., 2017a). In SSA, the shift towards RE as the primary energy source is crucial for electrification, particularly through off-grid generation (Ikejemba et al., 2017b). PPPs have emerged as a vital instrument for sustainable development in Africa, enabling countries to leverage private sector resources and expertise in areas such as energy, transportation, and water management (Mabey & McNulty, 2013). Several studies highlight the potential of PPPs to drive renewable energy development in Africa (Sambo, 2015; Chakrabarti et al., 2016). However, scholars like Adam and Adenikinju (2018) caution that the success of PPPs in Africa depends on context-specific factors, including political stability, regulatory frameworks, and the capacity of public institutions to effectively manage partnerships.

In Kenya, PPPs have gained traction as a strategy to address the country's energy challenges and achieve sustainable development goals. According to Ndung'u (2018), the Kenyan government has implemented various policy and regulatory reforms to attract private investment in renewable energy projects through PPPs. A study by Obwona *et al*. (2015) examines the potential of PPPs in Kenya's renewable energy sector and highlights the importance of clear legal and institutional frameworks to foster investment and ensure project success. Additionally, Kinyua *et al*. (2019) emphasize the significance of stakeholder engagement, risk allocation, and financial viability in developing effective PPP-RE projects in Kenya. Kenya's government has effectively utilized the Public-Private Partnership (PPP) framework to develop high-quality infrastructure projects, particularly in the energy and road sectors (Directorate of Public-Private Partnerships, 2021). These projects have significantly contributed to the resilience and growth of the Kenyan economy, with 39 major projects completed under the PPP model, representing a total investment of $5.2 billion as of 2021 (World Bank PPP Knowledge Lab, 2022). Notable completed projects include the Grain Terminal at the Port of Mombasa, the Malindi Water Project, the JKIA Cargo Terminal, and the Kenya-Uganda Railway Concession (Muasya, 2014). Recent PPP initiatives in Kenya encompass the Lake Turkana Wind Farm, Olkaria III Geothermal Power Plant, Kipeto Project, Ngong Wind Project, and more (World Bank PPP Knowledge Lab, 2022). Kenya's Vision 2030 strategy aims to transform the country into a middle-income, industrialized economy and allocate approximately $60 billion for infrastructure development, relying on PPPs as a key strategy (Muasya, 2014). To facilitate PPP implementation, the government has established a favorable environment through legislation, including the 2013 Public Private Partnerships Act No. 15, which allows private sector participation in financing, construction, operation, and maintenance of government infrastructure projects (KN Law LLP, 2021).

Kenya's Public-Private Partnership (PPP) policy is strategically designed to attract foreign investors and address potential project disruptions caused by political instability or other uncontrollable factors. The policy ensures investor reimbursement, employs performance monitoring, and establishes risk mitigation measures like comfort/support letters, assurances, and subsidies (Adongo, 2012). Implementing PPP agreements in Kenya relieves taxpayers of financial burdens while promoting shared accountability, combating corruption, and stimulating local job creation (Suchman et al., 2018). PPPs enhance the government's capacity

to meet infrastructure demands, particularly in energy and infrastructure sectors, leading to mutual benefits for Kenya's energy sector and overall development (Njoroge et al., 2022). Some PPP renewable energy (RE) projects in Kenya have both advantages and drawbacks. While they aim to provide affordable green energy and environmental conservation, they impose significant costs on taxpayers. For instance, the Kenyan government paid a penalty of over KES seven billion to the Lake Turkana Wind Power Project (LTWP) investors, even though the project was operational and generating power that couldn't be utilized due to the absence of transmission lines (Herbling, 2020). The construction of a KES 28.9 billion, 430-kilometer high-voltage power connection was required to distribute power from the Lake Turkana wind turbines to the Suswa substation in Narok. Land disputes and displacement of local communities also pose societal challenges.

The LTWP, spanning 160 square kilometers in the Loiyangalani District of Marsabit County, boasts a capacity of 310 MW and consists of 365 wind turbines, each generating 850 kW (LTWP, 2022). With a total cost of KES 70 billion, LTWP is Kenya's largest private investment (*ibid*, 2020). The Power Purchase Agreement (PPA) between LTWP and Kenya Power mandates the utility to purchase all the generated electricity for 20 years, even if it is not needed or if cheaper electricity sources are available. However, the intermittent nature of wind power and the limitations of Kenya's transmission infrastructure hinder the effective absorption and distribution of the electricity (*ibid*, 2020). To overcome these challenges, the Kenyan government has provided guarantees to LTWP, ensuring the purchase of excess electricity if Kenya Power cannot absorb the entire output. These guarantees secure a steady revenue stream and promote private investment in the renewable energy sector. The government is also responsible for losses incurred due to project failure or delays caused by political factors, such as the incomplete electricity transmission line (*ibid*, 2020). Consequently, in addition to the costs associated with the transmission line, these expenses are expected to be borne by Kenyan taxpayers and electrical customers.

1.2.2. Renewable energy projects

Renewable energy refers to energy derived from resources that are renewable and are naturally renewed within a human timeline. Wind, sunlight, waves, biomass, tides, water (waterfalls), geothermal heat, and rain are all examples. Although most renewable sources of energy are

long-term, some are not (Adongo, 2012). Despite the increased use of public-private partnerships on a global scale, developing nations have not been able to attract the same amount of private investment as their developed counterparts. A study by Odhiambo *et al.* (2020) determined that market risks had a substantial impact on how well RE projects under PPPs performed. With the construction of multibillion-dollar clean energy infrastructure designed to facilitate the nation's shift to low-carbon energy sources from fossil fuels, investments in RE are gaining steam throughout Africa. Projects are gaining momentum, but indigenous tribes, whose land is frequently utilized to implement them, are also opposing them more and more. Kenya has a lot of renewable energy sources. At the moment, 73% of Kenya's energy comes from renewable energy sources, and with good investments in the sector, Kenya should be on track to get 100% of its electricity from renewable sources by 2030.Green energy sources like hydroelectric, wind, geothermal, and solar installations make up 90% of the capacity to make electricity.

Ayugi, Ochieng, and Maina (2019) analyzed the potential of solar photovoltaic (PV) technology for rural electrification in Kenya, highlighting its effectiveness in addressing energy access challenges. In another study, Kamau and Musango (2018) examined the barriers and opportunities for wind energy development in Kenya, emphasizing the need for policy support and investment to unlock the country's wind energy potential. Furthermore, Okello and Omenda (2020) conducted an assessment of the economic viability of geothermal energy in Kenya, highlighting its potential to contribute to sustainable development and energy security. These studies demonstrate the diverse range of renewable energy sources being explored and their potential to address energy needs in Kenya. Hydroelectric power has an installed capacity of 826 MW (19.3% of the total installed power capacity of 2819 MW); geothermal power has an installed capacity of 828 MW (29.4%); thermal (geothermal) power has a capacity of 749 MW (26.6%); wind power has a capacity of 331 MW (11.7%); and the remaining capacity (3%) comes from biomass and solar sources (Power Africa, 2018). Vision 2030 is a plan for Kenya's development that aims to move the country's economy to a middle-income level. This plan includes a plan for green energy.

Kenya is still Africa's biggest geothermal power producer (Barnes, 2018), and its Lake Turkana Wind Power Project (LTWPP) is the continent's biggest wind power project (Bhalla, 2019). LTWPP, Ormat-Olkaria III Geothermal Power Plant, Kwale Sugar Plantation, Kipeto

Project, Ngong Wind Power Project, and Rabai Power Plant are all examples of large renewable energy projects in Kenya that were financed using the PPP model, according to the World Bank Group. The renewable energy sector faces challenges such as political pressures, governmental restrictions, corporate influence, outdated infrastructure, and a lack of suitable battery storage, which hinder global acceptance (Kilinc-Ata & Dolmatov, 2022). High installation costs pose a significant obstacle, with large-scale solar power systems averaging $2,000 per kilowatt and small-scale home systems costing around $3,700 (Kilinc-Ata & Dolmatov, 2022). However, when considering lifetime costs, solar and wind energy can be advantageous investments. Existing infrastructure primarily supports nuclear and fossil fuel power facilities, limiting the growth of renewable energy sources. Renewable energy has the potential to address energy challenges, promote sustainable development goals, and drive economic progress, particularly in Africa (Odhiambo, 2022). Accessible and long-term energy sources like renewables can enhance agricultural production, food security, educational quality, gender equality, and reduce dependence on fuel imports. Financing renewable energy projects using the public-private partnership (PPP) model requires key success factors (KSFs), with political and legislative restrictions identified as the greatest risks globally (Othman & Khalaf, 2022). Other KSFs include expertise, efficiency, and well-written contract papers, though these factors vary across continents.

Ikejemba *et al.* (2017) say that the political narrative, project award procedures, project planning and implementation, cooperation between stakeholders, public acceptance, maintenance, and inclusion are all things that could cause a PPP-funded RE project to fail in any country. Based on international case studies, Othman and Khalif (2022) identified a number of things that are important for the successful implementation of RE projects using PPP. These include: 1) public support for renewable energy projects; 2) the presence of a policy framework and strategic plan that encourages investments by the private sector; and 3) effective management of the bidding process, which is important for reducing operating and implementation costs and winning the trust of investors. In a risk analysis of RE projects in China that were financed using the PPP model by Cao *et al* in 2012, the top 10 risks were found to be: revenue risk, payment risk, operating cost overrun, payment risk, local employment, local economic development, waste supply, local government succession, risks of price change, and rural appearance risk. Odhiambo*et al*. (2020) say that the fact that

developing countries don't get as many investment opportunities from the private sector as their developed counterparts hurts the ability of those countries to pay for infrastructure. Odhiambo *et al*. (2020) did primary quantitative research to find out how market risks affect the results of RE projects that use the PPP method to finance them. The study found that market risks have a big effect on the way RE-PPP projects work out.

Research has shown that political, policy, macroeconomic, social acceptance, market, and contract management risks are all bad for RE PPP projects in Kenya (Odhiambo, 2021). Indigenous communities in Kenya have been forced to leave their homes because of the switch to RE. For investors, it has resulted in protracted legal disputes, delayed projects, and financial loss. The county government in Lamu, a seaside town, canceled a wind farm project last year because the project did not follow the resettlement guidelines put forth by parliament. The 3,206 acres of land for the $210 million Baharini wind power project, managed by a partnership between Belgium's Elicio NV and Kenwind Limited Kenya, would house 38 wind turbines projected to produce 90 MW of electricity. The critical factors for the success of PPP projects include using effective project and program management strategies suitable for complex projects and the judicious management of clusters of project information, the private sector, and procurement processes (Hai, Toan, & Van Tam, 2021). The renewable energy projects present huge opportunities not only for diversifying the energy mix but also for attaining green energy status and providing significant cost reductions. However, these renewable energy (RE) projects have been anything but successful.

1.2.3. Factors necessary for successful project delivery

According to Putlitz (2019), projects are considered successful when they: 1) satisfy business needs; 2) are completed and kept within budget; 3) are completed and maintained within the specified duration (schedule); and 4) produce the anticipated value proposition and returns on investment. Project management addresses a number of important challenges for the organization in the context of processes occurring in the energy sector; effectiveness measurement is one of them. Based on the organization's objectives, business performance metrics should be taken into account. This contains the objectives that it hopes to accomplish both in the short and long term. The above depends on how long the analysis takes. Depending on the environment, such as the current digital economy or Industry 4.0, these objectives may

vary (Kinelski, 2020). According to Odhiambo (2021), the success of PPP projects depends on how well external risk factors such as policy, political, social acceptance, currency, and market risks are managed, implying that these external factors are significant contributors to the success of RE PPP projects. According to Assafet *et al.* (2014), there is a connection between the various aspects of good teamwork and total project performance; this association between team performance and project success, further argue Assafet *et al.* (2014), is a strong and positive one; this implies that internal project organization elements, such as teamwork, communication, planning, project monitoring and control, and risk management, are critical success factors for the successful implementation of RE PPP projects.

Another important factor for successful project delivery, specifically RE-PPP projects is effective program/ project management; effective project/program management is crucial for the timely and efficient execution of renewable energy projects. It involves strategic planning, resource allocation, risk assessment, and monitoring to ensure project objectives are met. Proper management helps streamline processes, optimize resource utilization, and mitigate potential risks, resulting in improved project outcomes (Korhonen et al., 2021). Government support is another important success factor; Government support plays a vital role in creating an enabling environment for renewable energy projects. Supportive policies, regulatory frameworks, and incentives encourage private sector participation, attract investments, and provide a stable market for renewable energy. Governments can facilitate project implementation by offering financial incentives, simplifying permitting processes, and establishing clear legal frameworks (Oliveira et al., 2020). In addition to effective project/program management, several elements are necessary for successful project and program management in renewable energy projects financed using the public-private partnership (PPP) model. These elements include team leadership, responsibilities and roles, and project objectives and goals. Team leadership is critical for guiding and motivating the project team towards achieving project success. A strong and capable leader ensures effective communication, coordination, and collaboration among team members. They provide clear direction, manage conflicts, and make timely decisions to keep the project on track. Defining responsibilities and roles is essential to establish a clear understanding of each team member's tasks and obligations. By clearly defining roles, project managers can ensure that the right people are assigned to appropriate tasks, leveraging their skills and expertise. This clarity

helps minimize confusion, enhances accountability, and facilitates efficient project execution. Assafet *et al.* (2014) posit that project objectives and goals provide a framework for the project's direction and purpose. Clearly defined objectives help align the project team's efforts and serve as a reference point for decision-making throughout the project lifecycle. Objectives and goals should be specific, measurable, attainable, relevant, and time-bound (SMART), providing a clear roadmap for the project's success.

1.3. Problem statement

Kenya has been working on big renewable energy projects, but many of them have run into serious problems and failed from a project management and functional (meeting their goals) point of view (Muasya, 2014). Also, Kenya has a lot of PPPs in the energy and infrastructure sectors, which help the energy sector of the country in many ways. The problems include:

Renewable energy infrastructure projects in Kenya frequently face challenges, resulting in delayed completion, exceeding budgetary limits, and occasional failure to achieve intended objectives. Factors such as inadequate project planning, limited technical expertise, insufficient funding, and regulatory complexities contribute to these issues (Mutai, 2021). Overcoming these challenges requires improved project management, enhanced coordination between stakeholders, strengthened financial mechanisms, and streamlined regulatory processes to ensure successful implementation of renewable energy projects in Kenya. A study by Omonyo (2017) that looked at twenty-seven projects found that many RE infrastructure projects in Kenya are often delivered over budget and late. The Lake Turkana Wind Power Project (LTWPP), the largest of its kind in Africa, continues to cost the Kenyan taxpayer money, to the tune of KES 18 billion (USD 155,911,649.40) in 2021, due to delays in connecting the project to the national power grid (Mutai, 2021).

Renewable energy projects that use the PPP model are often late, cost more money, and don't meet their economic and functional goals. For example, the LTWPP is finished and makes 300 MW of electricity, but the power can't be used because there aren't enough transmission lines to connect the power to the national grid. There are, in fact, other large renewable energy projects in Kenya that are having trouble getting started or running. For example, an ambitious solar energy project in Garissa is already behind schedule. Two solar farms are almost done, but two other projects haven't even started yet. Using the PPP model, if there are delays in

putting renewable energy projects into action, the benefits of these projects are delayed, which almost certainly causes an increase in costs. For example, building three geothermal power plants at Menengai in Nakuru County took more than two years longer than planned (Waitathu, 2015). The adverse effects that PPP RE energy projects have on local communities, such as the loss of jobs, the need to move, and the inevitable conflict that results. The LTWPP is hurting the communities around it, which shows that the post-project management failed (Cormack, 2019). In Turkana, a geothermal power project ran into a lot of problems that made it look like it might have to stop before it even started (Business Daily, 2015).

There are gaps in literature, further justifying the need for this proposed study; according to Odhiambo (2022), there is a dearth of research on the major causes of these projects failing or being poorly delivered. Further, there is a deficiency of research on remedies that can be applied to reduce the failures of the RE PPP projects in Kenya, and how to improve the delivery of the projects. While past research has been done on factors and issues bedeviling RE projects in Kenya, such as by Nyika (2010), Gitone (2010), Kwamboka, (2017), Kazimierczuk (2019), the studies focus on individual isolated projects such as (Kwamboka, 2017) or individual RE sectors, such as (Kazimierczuk, 2019). Further, the research findings consider just one aspect of RE-PPP project success factors, such as government policy and public participation; they fail to explore internal organizational factors, such as project/ program planning and management. Also, the research results don't go into detail about how the things that cause RE-PPP project problems can be fixed in a good way. It has also been shown (Adongo, 2012) that success in process or project management does not always mean success for the product or the organization. According to Nyika (2012), only 20.8 percent of projects were completed on schedule and on budget, while 79.2 percent of all projects failed in some way. Also, it was found that the implementing agents' management positions were too crowded with too many bureaucratic posts, which made it hard to give out authority. Key reasons for failure were found to be a lack of ability to put plans into action, bad project management, poor project design, and political interference (Nyika, 2012). With the growing popularity of PPPs and the high failure rate of RE PPP projects in Kenya, there is a strong case for more research into why RE PPP projects fail from a project management point of view. For example, many PPP projects in the energy sector fail to meet some of the expected benefits or deliverables. Also, there isn't much research in this area, further justifying the need

to undertake this study. The research not only fills the research gap, but also adds to what is already known about how factors affect RE projects in Kenya that use the PPP model.

1.4. Research objectives

This section describes the general and the specific objectives achieved in this study.

1.4.1. General objective

The general objective of the research was to evaluate factors that impact the successful delivery of public-private partnership -renewable energy projects in Kenya.

1.4.2. Specific objectives

The specific objectives of this study were to:

i. Establish the significant determining factors (both internal and external) necessary for the successful delivery of PPP renewable energy projects in Kenya.
ii. Develop a framework for the management and delivery of renewable energy (RE) public-private partnership (PPP) projects in Kenya.
iii. Evaluate the impact of the proposed framework on the successful delivery of RE PPP projects in Kenya from a project management and societal benefits perspective.

1.5. Research questions

i. What are the significant internal and external determining factors for the successful delivery of public-private partnership (PPP) renewable energy projects in Kenya?
ii. What are the key components that should be included in a framework for the management and delivery of RE PPP projects in Kenya?
iii. What is the impact of implementing the proposed framework on the successful delivery of RE PPP projects in Kenya, considering both project management outcomes and societal benefits?

1.6. Scope of the study

This research focused on renewable energy projects executed in Kenya; these included hydroelectric projects, solar, wind, geothermal projects, biomass, and cogeneration, and focused solely on the Republic of Kenya. The project also focused on projects executed in the

preceding two decades as its timeline of focus and considered renewable energy projects executed using the PPP framework. The context of 'failure' pertained to the project management perspective where the projects failed to meet set objectives, were delivered out of scope or experienced too many scope changes, were delivered later than planned, and exceeded the initially allocated budget. The project also sought to establish factors that adversely affected the successful delivery of RE PPP projects in Kenya by considering internal factors (such as project management perspectives) and external factors (such as politics) and proposed a framework defining processes and approaches to ensure RE PPP projects in Kenya are successful and achieve their objectives. External factors, as discussed in literature, such as policy, political acceptance, social acceptance, currency, and market factors (Odhiambo, 2022), were also identified.

1.7. Study significance

This study benefits policy makers in Kenya, mainly the government, by helping them understand the pitfalls facing renewable energy projects (REPs) financed using the PPP model in Kenya and plan better for future projects to ensure they are successful and meet their objectives. The findings are beneficial to investors in renewable energy projects in Kenya, such as those partnering with the government; they can better understand the dynamics in the sector, specifically factors affecting PPP REPs that can affect their success (or contribute to their failure). The findings are significant to scholars and researchers in renewable energy in developing suitable frameworks to ensure successful delivery of PPP REPs in Kenya and also provide new areas for future research based on the limitations of the present research and recommendations for future research. Stakeholders in Kenya's energy sector also benefit from the insights this research will highlight on factors affecting REPs financed through the PPP model.

1.8. Novelty of the study

The results of this study are novel because, in addition to identifying the factors contributing to the success of RE PPPs in Kenya, they also address the gaps left by previous similar studies. Using evidence from geothermal projects, authors like Odhiambo*et al.* (2022) looked at how macroeconomic risk factors affect renewable energy PPP projects in Kenya. They found that the interest rate, inflation, and debt were the most important macroeconomic factors, along

with development spending and foreign exchange. The study only looks at macroeconomic factors; it doesn't look at all factors as a whole. But it didn't take into account internal organizational factors like project and program planning and management, which, according to Müller-Mahn *et al.* (2021), are very important to the success (or failure) of mega infrastructure projects, which are usually very complicated in terms of logistics and management needs. Similar sentiments are shared by Caldas and Gupta (2017), who established that internal organizational factors have a significant bearing on the success of complex infrastructure projects. Omonyo (2017) studied factors associated with RE projects in Kenya delivered using the PPP model and established that these projects are routinely delivered over budget and behind schedule.

Tsagas and Willuhn (2019) established that RE projects executed using the PPP model in Kenya are often behind schedule, costing more resources, and not fulfilling their economic and functional objectives. Cormack (2019) established PPP RE energy projects to have adverse effects on local communities in terms of lost livelihoods, displacement, and inevitable conflict. However, the authors only identify the 'symptoms' of failed infrastructure projects; they do not identify what, for instance, causes RE infrastructure or other infrastructure projects financed using the PPP model to rarely succeed. In this context, this research seeks to fill the gap in past studies by undertaking a comprehensive evaluation of all factors responsible for the success of RE PPP projects in Kenya, considering both external factors such as politics and internal factors such as program and risk management. This study went further and unearthed the reasons for observations such as infrastructure projects being routinely behind schedule, over budget, and failing to fulfill their economic objectives. The research focused on the *"why"* and *"what"* types of questions; it went further to develop a novel model currently not in use or extensively studied in existing literature; past studies have not put forth a framework for managing project risks and factors contributing to its success effectively.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

This section provides an overview of works related to the research topic that have been previously published. Theories that underlie the research problem have been appraised in this chapter. A detailed empirical literature review, identified research gap(s), and the conceptual framework used for the research is also presented.

2.2. Theories underpinning review

This section discusses existing theories relevant to this study, specifically theories underpinning the research objectives and the relations between them; it also describes the originator of the theories, along with their limitations and applicability to this research.

2.2.1. New public management (NPM) theory

This is a theory on how public service operations are run in public service and government agencies and institutions at the national and sub-national levels. According to Juneja (2020), the New Public Management (NPM) theory was developed in the 1980s by UK and Australian scholars, with key contributions from Hood (1991) and Jackson and Hood (1991). The focus of the theory is on the centrality of citizens who are the recipients of public sector services, meaning they are customers of public sector services. The theory is underpinned by the elements of management: performance standards, output controls, and decentralization. With regard to management, it holds that privatizing government is important and beneficial and allows leaders free management while opening up discretion. With respect to performance standards, the theory posits that measures of execution and excess measures in the workforce should be preserved as a way of clarifying intent and goals, markers, and targets for improvement. Output controls hold that there should be a shift from bureaucratic internal control rules towards rules that rely on quantitative indicators of performance measures. Decentralization in NPM involves the transfer of decision-making authority and responsibility from central government entities to lower levels of government or other local actors. This shift aims to increase efficiency, responsiveness, and accountability by bringing decision-making closer to the citizens and communities affected by public services. Decentralization in NPM is often accompanied by measures such as devolution of power, delegation of authority, and

the introduction of market-based mechanisms to improve service delivery and resource allocation; the organizational restrictions are loosened while undertaking tasks that benefit the public (Fakhrul, 2015). The NPM theory introduces practices of private management into the public sector; in this context, NPM is relevant to PPPs and the theory of PPP in the renewable energy sector because governments can transfer most responsibilities and problems associated with them to private firms that are more skilled and capable, whose payment depends on their ability to avail the physical infrastructure that operates at the desired levels (Fakhrul, 2015). Further, Fakhrul (2015) argues that it's also relevant to the overall PPP framework since it enables private players to make reasonable returns due to the longevity of contracts and reduced operational and maintenance costs in the future.

2.2.2 The contingency theory

This is an organizational theory put forth by Fred Friedlier in the 1960s. The theory posits that there is no best way for organizing any organization or making decisions; instead, the optimal course of action is dependent (contingent) on the external and internal situation and factors. The main principles of contingency theory are that organizations are systems that are open and require to be managed carefully to balance and satisfy internal needs as well as adapt to circumstances in the environment. It also holds that there is no single best method to organize, and the focus of management must be achieving alignment with the best fit; further, different organization types are required in different environments. This theory is relevant to this proposed study and to the second objective (to identify the major causes for PPP renewable energy project failure in Kenya) from the perspective of project delivery. Project teams such as those handling complex projects such as large-scale renewable energy projects under the PPP framework are faced with significant constraints and changing project environments that force managers to make choices; the choices made, based on the contingency theory, result in projects failing because the wrong choices may be made in a given situation, with adverse rather than the intended results. The contingency theory has been used to explain the causes of a major project failure, the Mars Climate Orbiter, undertaken by NASA (Sauseret al., 2009), that suffered a catastrophic failure due to management choices and project constraints. The contingency theory has limitations related to its complexity, despite being intended to be used seemingly; a dearth of related literature; and difficulty for empirical testing (Chand, 2021). It

is also inflexible and time-consuming (when external factors change rapidly and dynamically), and the reliability of its variance is only 50% (Chand, 2021); further, it is a theory that is reactive rather than proactive.

2.2.3 New public governance (NPG) theory

The NPG theory, which Osborne developed in the 2000s, supports the long-term viability of organizations, public policies, and services, as well as societal and environmental issues. It is a more contemporary form of public operations management by providing transparent activities, processes, and open structures that are more socially responsive. The theory is based on the successful management of inter- and intra-organizational environmental factors that might allow or hinder policy execution in a pluralist structure to supply public services. Policy, social, administrative, political, economic, decentralization, contractual, meta, corporate, and networking are some of the management threads that the theory considers while managing public affairs (Casady et al., 2019). It is relevant to this study, and particularly Objective 3 (ascertain the main processes and strategies that can be utilized to minimize PPP renewable energy project failure in Kenya), because it is concerned with the proper management of public services and policies. In this perspective, PPPs are premised on governance-led networks and collaboration and are encouraged by NPG to enable genuine engagement, horizontal power relations, intimate organizational linkages, reciprocity, reputation, trust, collaborative decision-making, and mutual interdependence (Casady et al., 2019). Consequently, public-private partnerships (PPPs) have become a constant reorganization of political power. Its limitation is that it focuses more on political issues and cooperation than on public governance. The theory also has the tendency to emphasize meta-governing partnerships and networks, yet the contemporary management of change is inseparable from other public administration activities (Torfinget al., 2020).

In summary, the New Public Management (NPM) theory is an approach to public administration that emerged in the 1980s. It emphasizes the application of private sector management techniques and market-based principles to improve the efficiency and effectiveness of public sector organizations. NPM focuses on outcomes, performance measurement, decentralization, and the use of performance incentives to achieve desired results. The Contingency theory, on the other hand, suggests that the success of public

management practices depends on the fit between the specific context and the management approach adopted. It recognizes that different circumstances require different management strategies, and there is no one-size-fits-all solution. Contingency factors such as the political, economic, and social environment, organizational culture, and stakeholder dynamics influence the effectiveness of public management initiatives. Further, the New Public Governance (NPG) theory builds upon NPM and highlights the importance of collaboration, networks, and shared decision-making in the delivery of public services. NPG emphasizes the involvement of multiple actors, including government agencies, private organizations, and civil society, in the governance process. It emphasizes partnership and co-production of services, as well as the active engagement of citizens and stakeholders. In the context of the research topic and its objectives, these theories are relevant. NPM provides insights into the adoption of private sector management techniques and market-oriented approaches that can enhance the efficiency and effectiveness of public-private partnerships (PPPs) in the renewable energy sector. Contingency theory helps in understanding how contextual factors influence the success of PPPs and the importance of adapting management practices accordingly. NPG theory highlights the significance of collaboration, partnership, and stakeholder engagement in the delivery of PPP projects in the renewable energy sector in Kenya. The interrelationships between these theories contribute to a comprehensive understanding of the determinants of successful delivery in the context of PPP renewable energy projects.

2.3. Empirical review

One of the key factors making it difficult to raise living standards, expand enterprises, and reach the goals of the Millennium Declaration in developing nations is a lack of infrastructure (Kaygusuz, 2012; Sachs, 2012). This is especially true in the MENA region, where infrastructure needs have been growing for a long time because of population growth, rapid urbanization, and economic growth. The situation has gotten worse as historic transitions in the MENA region have put pressure on governments to improve living standards and the business environment (OECD, 2019). In many countries, only public money can't pay for the high levels of infrastructure investment that are needed. Private investment is an option that governments can't afford to ignore. There are various theoretical perspectives related to PPPs in renewable energy projects, including transaction cost economics, principal-agent theory, institutional theory, and resource dependency theory (Lo et al., 2020; Ansari et al., 2021). The application of these theories helps in understanding the dynamics, motivations, and challenges associated with PPPs in the renewable energy context. According to Boussena et al., (2020), and Nguyen et al. (2021), some of the significant factors that influence the success of PPPs in renewable energy projects include effective project governance and management, risk assessment and management strategies, stakeholder engagement and collaboration, regulatory and legal frameworks, financing mechanisms, and technological innovation. Understanding these factors is crucial for policymakers, practitioners, and investors to design and implement successful PPPs in the renewable energy sector.

Li et al. (2019; Ayieko et al., 2021) suggest that parameters such as project delivery time, cost efficiency, quality of infrastructure, environmental sustainability, energy access, and socio-economic benefits are the most important factors that affect the performance and impact of RE-PPP projects. Empirical evidence suggests that several key factors contribute to the successful delivery of PPP renewable energy projects in Kenya. These factors include effective project management practices, stakeholder collaboration and engagement, clear project objectives and goals, adequate risk management strategies, availability of skilled workforce and technical expertise, and supportive government policies and regulations (Kariuki et al., 2021; Muturi et al., 2020). Understanding and addressing these factors are crucial for ensuring the successful implementation and completion of PPP renewable energy projects in Kenya. To enhance the successful delivery of PPP renewable energy projects in

Kenya, the development of a comprehensive framework is necessary. The framework should incorporate elements such as project governance, risk assessment and mitigation strategies, stakeholder engagement and communication, performance monitoring and evaluation mechanisms, and sustainable financing models (Gitau et al., 2020; Okello et al., 2021). This framework will provide a structured approach to effectively manage and deliver RE PPP projects, ensuring their successful implementation and achieving desired societal and environmental benefits. Evaluating the impact of the proposed framework on the successful delivery of RE PPP projects in Kenya is essential. This assessment should consider project management effectiveness, adherence to timelines and budget constraints, achievement of renewable energy targets, environmental sustainability, socio-economic benefits, and stakeholder satisfaction (Kiplangat et al., 2020; Nzila et al., 2021). Understanding the impact of the framework will provide valuable insights into its effectiveness in promoting successful project outcomes and delivering positive societal benefits.

2.3.1 Theory and practice on PPPs with respect to renewable energy projects

Private investment leverages the private sector's resources and expertise for public benefit, yet failed infrastructure-based public-private partnerships (PPPs) underscore the challenges faced by policymakers. Complex and long-term infrastructure contracts necessitate financial viability and alignment with user needs and societal objectives (OECD, 2019). These challenges intensify with international investor involvement, particularly in larger projects. Global economic crises, efforts to reduce debt by commercial banks, perceived political risks in certain countries, and stricter bank regulations hinder private infrastructure investment. PPPs serve as a strategy to enhance economic value and facilitate infrastructure development, encompassing a wide range of projects (OECD, 2019; Cui et al., 2018). Renewable energy (RE) generation is expected to become Sub-Saharan Africa's primary energy source, but sustainability aspects are often insufficiently defined, leading to a high rate of project failure and hindering the adoption of renewable energy technology (Ikejemba et al., 2017). Consequently, Ikejemba *et al.* (2017) recommend openness, ownership, shared accountability, and community participation as approaches that can be employed to ensure the success of renewable energy PPP initiatives in SSA. However, the findings are limited because they only look at things like community participation and openness that are outside of RE

projects. They don't look at things like risk management that are part of how complex projects are run. In addition, the study findings do not consider other factors, such as macroeconomics, in a comprehensive manner. (Nsasira *et al*., 2013) say that public-private partnerships (PPPs) are becoming more popular and are used more and more by governments. However, their effectiveness varies, especially in Africa. Nsasira *et al*. (2013) focus on the use of public-private partnerships (PPPs) as a solution for addressing shortcomings in Uganda's energy sector and alleviating the country's power shortage when studying the implications of the Ugandan energy sector with respect to enhanced service delivery. The successful implementation of a PPP depends on the development of capability, strong legal procedures, agreements, and contracts that clearly describe the relationship between government agencies and private enterprises. But the study is limited because it only looks at factors that can improve the success of RE-PPP projects. It doesn't look at specific problems that the solutions solve, so the results are too general and generic for this research.

PPPs are popular in policy and political circles and are now prevalent across places and industries, even though they still account for a small percentage of overall global investments in physical and social infrastructure. Regarding the efficiency advantages afforded by PPPs, the jury is still out. However, whether PPPs succeed or fail in addressing service shortages in various sectors such as transportation, energy, and infrastructure is highly dependent on the institutional context in which they are implemented, the historical and political landscape in which they occur, and the specific regulatory and contract designs (Fabre & Straub, 2021). There is a paucity of knowledge on the optimum method to include PPPs in bigger sectoral reforms, as was the case with electricity in previous decades. Similarly, despite the widespread use of bureaucratic quality indices in cross-country research, a detailed understanding of how to structure the public part of PPPs and how to design the particulars of the public-private relationship remains lacking, particularly in high-risk and weak governance contexts (Fabre & Straub, 2021). Kenya is an appealing market for power project development, thanks to the Kenyan government's objective of universal access to electricity by 2020 and a business-friendly environment. However, community opposition to certain recent energy generation and other development projects has stopped or halted them due to concerns about project consequences, land ownership, a lack of consensus on benefit sharing, or a combination of these and other issues (Power Africa, 2018). More to the point, sometimes developers and

communities do not interact in meaningful, timely, or productive ways, causing otherwise good initiatives to be postponed or derailed entirely.

The research findings on the PPP model and the potential for renewable energy generation becoming the primary source of energy in Sub-Saharan Africa (SSA) are relevant to the Kenyan context. Kenya, as a country in SSA, has been actively promoting renewable energy projects, including those implemented through PPPs. The PPP model has been recognized as a means to increase the economic value of infrastructure products and facilitate infrastructure development, which aligns with Kenya's efforts to enhance its energy sector and expand renewable energy sources (Kinyua *et al.*, 2019). Moreover, the prediction that renewable energy generation will play a crucial role in SSA, including Kenya, reinforces the importance of focusing on renewable energy technologies in the country's energy planning. Kenya has been investing in various renewable energy projects, such as wind farms, solar power plants, and geothermal energy, to harness its potential and reduce reliance on fossil fuels (, 2019). The research findings also suggest the need to address the sustainability aspect of these initiatives, emphasizing the importance of incorporating sustainable practices and ensuring the long-term viability of renewable energy projects in Kenya. Furthermore, the mention of the high rate of project failure impacting the adoption of renewable energy technology is relevant to Kenya's context. Kenya has faced challenges in implementing some renewable energy projects, including delays, cost overruns, and performance issues. Understanding the factors contributing to project failure and addressing them is crucial for successful delivery of renewable energy projects in Kenya. In addition, the research findings provide valuable insights and considerations for Kenya's pursuit of successful delivery of public-private partnership renewable energy projects, aligning with the research topic's focus on the determinants of successful delivery of such projects in Kenya.

2.3.2 Why PPP renewable energy projects fail from a project management perspective

An evaluation of the main causes of failures in renewable energy projects financed through the PPP model in Sub-Saharan Africa was investigated by Ikejemba *et al.* (2017). The reasons identified for the failure of PPP projects include risks due to government decision-making, government credit risk, public opposition, revenue risks, change in market demand,

environmental risks, technical risks, delays in approvals for permits for the projects, exchange rate fluctuations, supply risks and delays for critical supplies, policy and legal risks, a lack of adequate supporting infrastructure, and payment risks. Eliminating the negative impact of these risks on PPP projects is an effective strategy to ensure their success. In Sub-Saharan Africa, including Kenya, several reasons contribute to the failure of PPP renewable energy projects from a project management perspective. Firstly, the absence of well-defined and legally binding contracts between public and private entities can lead to conflicts and project delays (Odhiambo, 2022). Secondly, inadequate strategic alliances and partnerships between project stakeholders can hinder effective project coordination and resource allocation (., 2022). Additionally, the lack of long-term agreements and sustainable financing mechanisms hampers project continuity and operational (Rao, 2018). These factors highlight the importance of robust contractual frameworks, strong strategic partnerships, and sustainable funding models in ensuring the successful delivery of PPP renewable energy projects in Sub-Saharan Africa, including Kenya. The remedies for government decision-making risks include authorizing the private sector to determine their obligations, optimizing public service and improving decision-making ability, and establishing proper project evaluation. However, the research findings are flawed in that they do not consider other factors critical to the success of re-PPP projects in Africa, such as effective management of complexity and organizational factors, such as effective communication and risk management, which have been established as critical factors for the success of complex energy and infrastructure projects (Petrova *et al*., 2019; Maqbool *et al*., 2022).

2.3.3 Processes and strategies that can be utilized to minimize PPP renewable energy projects failure

Tang *et al*. (2019) say that the best way to fix government credit risks is for governments to accept legal and economic losses caused by a change in local government leadership and to encourage financial institutions to fund PPP projects. For revenue and payment risks, one solution is to have the supervision department enforce contract evaluation and follow-up processes. This will stop payment obligations that aren't clear and contract terms that aren't followed by evaluating cost efficiency during the project recognition or preparation stage, creating a good environment for business investment, and coordinating market activities.

There are several options for dealing with public opposition and environmental dangers. By analyzing cost efficiency throughout the project recognition or preparation stage, the supervision department develops contract review and follow-up procedures to prevent non-specific duties for payment and violations of contract terms, offering a good business investment environment (Tang *et al*., 2019). Changes in market demand risk can be mitigated by doing the following: to obtain long-term economic revenue, governments should build a coordination structure accountable for project evaluation, department coordination, and oversight, as well as promote PPP energy projects. Solutions to technical concerns include enhancing the supply capacity and quality of public products as well as ensuring the private sector's technological capacity.

Supply risk and supporting infrastructure risk can be avoided by managing supply risks early on in the site selection process and by making sure the government is doing its job well, creating a great environment for investing, and making sure there isn't bad supporting infrastructure. Exchange rate risks will be mitigated by using financial tools in PPP projects to safeguard asset value and reduce risks from exchange rate fluctuations (Tang *et al*., 2019). Legal and policy risks can be lessened with PPP renewable energy projects by using specific investment legislation management strategies to avoid legal and policy risks and by making sure that local governments don't apply laws and policies in different ways. Patil and Laishram (2015) say that one way to fix the problems with PP renewable project delivery in India is to change the procurement process so that it fits with sustainable development principles. This could be done even through the PPP route. Patil and Laishram (2015) did a study to find out what strategies can be used to make PPP more sustainable, with a focus on how infrastructure projects are bought. The study's results show that SD can be promoted even through PPPs if the procurement process is improved in terms of stakeholder participation, environmental impact assessment, value for money analysis, user's charges and risk allocation policies, transaction and bid costs, and bid evaluation criteria by rethinking the PPP process from the perspective of SD concepts and principles. But the results only look at internal project factors and don't look at how internal and external factors affect each other or how they affect RE-PPP project delivery as a whole.

2.4. Research gaps

While there is a lot of interest in research as well as in contemporary media concerning renewable energy projects in Kenya and their contractual and financing models (Adongo, 2012; Nsasira*et al*., 2013; Omonyo, 2017; Power Africa, 2018), there is a dearth of research on the major causes of these projects failing or being poorly delivered (Odhiambo, 2022). Further, there is a dearth of research on remedies that can be applied to reduce the failures of the RE PPP projects in Kenya and how to improve the delivery of the projects. Past research Nyika (2010), Gitone (2010), Kwamboka (2017), Kazimierczuk (2019), and Kwamboka (2017)] only identifies the 'symptoms' of failed infrastructure projects; it does not identify what, for instance, causes RE infrastructure or other infrastructure projects financed using the PPP model to seldom succeed. Others also consider external factors such as uncertainty, community participation, market risks, and government support. Odhiambo (2022), Cormack (2019). However, the research findings are limited in that they only consider, with respect to this proposed research, external factors (macro-economic factors, government policies, market risks, unforeseen circumstances, local community involvement, and government policies), without considering internal factors such as the use of project management principles. Furthermore, the findings fail to comprehensively address how such challenges can be overcome; in other words, they fail to put forth actionable solutions to ensure RE-PPP projects in Kenya are successful and meet their objectives. The research gaps are captured as a summary, in the table 2.1;

Table 2.1: Summary of research gaps identified from the reviewed literature

Objectives	Past research studies	Gaps identified from the reviewed literature
To identify the major causes for PPP renewable energy project failure in Kenya from the perspective of internal factors such as project planning and delivery. and	(Adongo, 2012)	Looks only at contractual and financing models.
	(Adongo, 2012; Nsasira *et al*., 2013; Omonyo, 2017; Power Africa, 2018).	Research on factors causing RE-PPP projects not to be successful is limited, as alluded to by Odhiambo

external factors, such as the involvement of local communities and political factors.		(2022).
	Nyika (2010), Gitone (2010), Kwamboka (2017), Kazimierczuk (2019), and Kwamboka (2017); also Tang *et al*. (2019); Patil & Laishram (2015); and Odhiambo (2022).	Identify only external factors and mainly the symptoms of failures in RE-PPP projects, but do not identify exact factors; also, fail to consider internal project management factors that cause failures in RE-PPP projects. Fail to provide actionable solutions to solve the problems that RE-PPP projects face.
	Odhiambo (2022), Cormack (2019)	Fail to take into account internal project factors, such as risk and complexity management. Authors do not provide actionable solutions to solve the problems that RE-PPP projects face.
To propose a novel processes and strategies framework in the management and delivery of RE PPP projects in Kenya to enhance their successful delivery from a project	(Adongo, 2012; Nsasira *et al*., 2013; Omonyo, 2017; Power Africa, 2018) Nyika (2010), Gitone (2010), Kwamboka (2017),	The authors do not propose methods, techniques, or approaches to implement as a means of tackling the factors that adversely affect the successful delivery of

management and societal benefits perspective.	Kazimierczuk (2019), and Kwamboka (2017); also Tang *et al*. (2019); Patil & Laishram (2015); and Odhiambo (2022). Odhiambo (2022), Cormack (2019)	RE-PPP projects, in Kenya, regionally, or from a global perspective. Where solutions are provided, they are either too general or generic, failing to address specific issues.

Source: Author (2023)

2.5. Conceptual framework formulation

This shows the expected relationships between given variables:

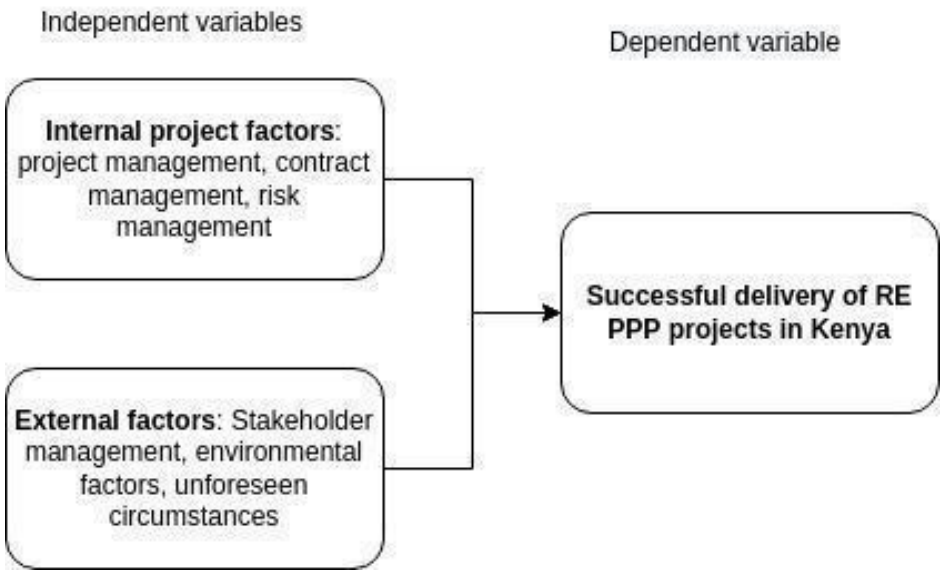

Figure 2.1: Conceptual framework

Source: Author (2023)

The independent variables include internal factors (project/program management, contract management, risk management, project planning, procurement, and quality management) (Maqbool *et al*., 2022). The dependent variable is the successful implementation (or otherwise) of renewable energy projects in Kenya executed using the PPP model. According

to Yu *et al*. (2018), to ensure sustainable construction and forecast project success for construction engineering projects, SPP (sustainable project planning) as a project planning approach should include three dimensions: risk response, management control, and work consensus. Due to their complexity, RES (renewable energy sources) project dynamics should be focused on effective communication between the subordinates of the project and the project manager for the correct synchronization of the three key parameters in project management: quality, time, and costs, from the project's inception to its conclusion. This is critical for completing projects on schedule and providing the requested quality while staying within the allocated budget (Petrova *et al*., 2019). The most important factors for the successful delivery of projects include having a competent project team, comprehensive project planning, open and effective communication, effective project risk management, and strong closure of projects (Maqbool *et al*., 2022). Internal factors such as management of contracts, organization of project teams, project planning and management, and resource availability; and external factors such as the business environment, politics, and unforeseen circumstances have an impact on the successful delivery of renewable energy PPP projects in Kenya (Odhiambo, 2022). The expected relationship is that proper management of the internal and external factors will have a strong and significant effect on the successful delivery of RE projects executed using the PPP model in Kenya. Employing project management factors, including having a well-defined risk management plan, monitoring and controlling project progress, managing procurement, controlling costs and risks, managing quality, contract management, effective communication, and managing change, is critical for the success of RE-PPP projects. Further, managing risks external to the project, including having an enabling government policy, consulting local communities, undertaking environmental impact assessments, effectively forecasting demand (business management), and managing external risks, are also critical for the success of RE-PPP projects in Kenya. These are operationalized in the table below.

Table 2.2: A summary of independent and dependent variables

Variable	Definition of variable	Indicators	Data category	Measure
Independent variables				
Internal project factors				
Project management	The process of setting up a team's work so that all of the project's goals can be met within the available time and money. This information is usually written up in the project documentation that is mad at the start of the project execution process. The three main restraints are time, budget, and scope.	The presence of a proje charter Project schedule (such a WBS or Gantt chart)	Ordinal	Likert
Contract management	This is the process of keeping track of contracts from the time they are made to the time they end or are renewed.	This is the process keeping track contracts from the tin they are made to the tin they end or are renewe	Ordinal	Likert
Risk management	Risk management is the identification, evaluation, and prioritization of risks followed by the coordinated and	A risk management plan (document) was developed. risk management team	Ordinal	Likert

	economical application of resources to minimize, monitor, and control the probability or impact of unfortunate events or to maximize the realization of opportunities..	monitoring process for risks		
External project factors				
Stakeholder management	This is the procedure you use to plan, keep an eye on, and enhance the interactions with the project's stakeholders. It involves figuring out who the stakeholders are, figuring out what they need and want, and planning and carrying out different actions to interact with them.	This is the procedure you use to plan, keep an eye on, and enhance the interactions with the project's stakeholders. It involves figuring out who the stakeholders are, figuring out what they need and want, and planning and carrying out different actions to interact with them.	Ordinal	Likert
Environmental factors	The legal, political, cultural, institutional, financial, technological, economic, physical, and	External factors analysis on factors affecting projects, such as using	Ordinal	Likert

	social infrastructure that affects a project's execution are called its environmental factors.	PESTEL, SWOT, and frameworks		
Unforeseen circumstances	Refer to unplanned events and risks that could affect the success of the project, such as wars, changes in government, and policy changes.	Risk management plan and mitigation measures	Ordinal	Likert
Dependent variables				
Successful delivery of RE PPP projects in Kenya	Projects that are successful meet the following conditions: 1) satisfy business needs; Projects that are successful meet the following conditions: 1) satisfy business needs; 2) are completed and managed on schedule; 3) are performed and operated under budget; and 4) Along with meeting	Metrics; All RE-PPP project objectives were met. delivered within budget. delivered on schedule provides the desired ROI and meets business and commercial needs.	Ordinal	Likert

	the project's goals, provide the expected return on investment (ROI) and business value.			

Source: Author (2023)

2.6. Chapter summary

The theoretical literature review identified theories underpinning the proposed research that are relevant to the research objectives as being the new public management (NPM) theory (relevant to the first objective), the contingency theory (relevant to the second objective), the new public governance (NPG) theory (relevant to the third objective), and the management as planning theory (relevant to the fourth objective). The empirical review establishes that in the next century, renewable energy (RE) generation will become the primary source of energy in Sub-Saharan Africa (SSA). However, in the majority of cases, the sustainability component of these initiatives is not well defined in terms of projects performed in SSA. The high rate of project failure has a negative impact on the adoption of renewable energy technology (RET). The main causes of RE PPP projects failure include risks due to government decision-making, government credit risk, public opposition, revenue risks, change in market demand, environmental risks, technical risks, delays in approvals for permits for the projects, exchange rate fluctuations, supply risks and delays for critical supplies, policy and legal risks, a lack of adequate supporting infrastructure, and payment risks. Openness, ownership, shared accountability, and community participation are some of the recommended ways of enhancing the success of the critical renewable energy projects delivered using the PPP model.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

This chapter delves on the research methodology used to meet the study objectives and answer the research questions. The chapter discusses the overall research design used in the study, the population sampled and how the sampling and sample size were determined. This section also details the data collection methods employed, with justification, and the analytical methods applied to the collected data; the ethical considerations for this study are also discussed.

3.2. Research design

3.2.1. Research philosophy

There are several philosophies of research, namely, epistemology, axiology, phenomenology, and ontology. The overall philosophical underpinning of this research is axiology, since it deals with the aims of research; it helped meet the aim of this research and fulfill the objectives in a focused way. Axiology is a philosophical research method that focuses on studying values, ethics, and judgments (Ganesha & Aithal, 2022). It was best suited for this particular research because it allows for an examination of the underlying values and ethical considerations involved in such projects. Axiology helped explore the moral, social, and economic aspects of PPP renewable energy projects and evaluate the impact of different factors on project success from a broader societal perspective. By considering values and ethical implications, axiology provided a comprehensive understanding of the determinants of success and aids in the development of a framework that aligns with the needs and values of stakeholders involved in these projects. It also contributed to evaluating the societal benefits of the proposed framework, ensuring that it addresses the ethical and moral concerns related to renewable energy projects in Kenya.

3.2.2. Research approach

The study used a descriptive research design. A descriptive research design is a type of study that tries to gather data in a systematic way to describe a phenomenon, condition, or population. It mostly aids in answering the what, when, where, and how questions about the research challenge rather than the why. This was chosen because it focuses on defining the

characteristics of a demographic segment rather than on "why" phenomena happen. Research can either be qualitative, quantitative, or mixed (involving both qualitative and quantitative methods) (Stlund *et al.,* 2011); the chosen method is the mixed-methods research methodology. The mixed methods research approach combines both quantitative and qualitative methods within a single study to provide a comprehensive understanding of a research topic. In this approach, quantitative methods such as questionnaires are used to gather numerical data from a large sample size, allowing for statistical analysis and generalizability of findings. On the other hand, qualitative methods such as semi-structured interviews provide in-depth insights and understanding of participants' experiences, perspectives, and subjective interpretations (Stlund *et al.,* 2011). By using both quantitative and qualitative methods, researchers can capture a broader range of data, validate and complement findings from each method, and gain a more comprehensive understanding of the research topic.

This approach enabled the author to explore complex phenomena, examine relationships between variables, and capture the richness and depth of participants' perspectives on determinants of success of RE-PPP projects in Kenya, ultimately enhancing the overall rigor and validity of the research findings. Mixed-methods research is research in which both qualitative and quantitative data are collected and used. The general goal and basic premise of mixed methods research is that combining qualitative and quantitative approaches yields a greater grasp of research difficulties and complicated phenomena than using either method alone (Molina-Azorin, 2016). The mixed methods research approach is well-suited for this study and developing a framework for their management and delivery. By combining quantitative methods, such as questionnaires, with qualitative methods, like semi-structured interviews, the author was able to capture both numerical data and in-depth insights from project stakeholders, including government officials, private investors, and community members. The quantitative component allows for the identification and analysis of key determining factors, while the qualitative component provides contextual understanding and explores the subjective experiences and perceptions of the stakeholders involved. This approach enabled a comprehensive exploration of the complex nature of PPP renewable energy projects and allows for a more nuanced understanding of the challenges, opportunities, and strategies for successful project delivery (Ganesha & Aithal, 2022). Furthermore, the mixed methods approach supported comprehensive examination of the research objectives,

incorporating both quantitative and qualitative data, theoretical frameworks, and diverse perspectives to generate robust and actionable findings for the successful delivery of PPP renewable energy projects in Kenya.

The descriptive-correlational design was chosen as the research method. This research design describes the research variables and the relationships that happen naturally between and among them. In collecting data, both quantitative and qualitative data and methods will be used. This approach was chosen because it will help in gaining a more complete picture of the research topic and objectives than would be possible if either qualitative or quantitative methods were used alone (Khaldi, 2017). The use of both quantitative and qualitative methods was also highly suited to the social and behavioral sciences and is aligned with the use of the descriptive research design. When the two approaches (quantitative and qualitative) were combined, the researcher benefited from the advantages of both: the qualitative method's rich, contextualized insights and the quantitative method's generally applicable and externally valid insights (Khaldi, 2017). The advantages of one form of data frequently outweigh the disadvantages of the other. Because this research collected qualitative (from interviews) and quantitative (from questionnaires) data, the use of both approaches was most suited for meeting the objectives of this research. This method approach gave a wider spectrum to understand factors affecting implementation of renewable energy projects in Kenya through a PPP model, which is a complex topic, better than would be possible using either qualitative or quantitative methods on their own.

3.3. Population and sampling

This section talks about the study population, which is the whole group that this research is trying to learn more about and draw conclusions about, as well as the sample that will be used to collect data from that population.

3.3.1. Population

The target population for this research were professionals such as consultants, partners or owners of RE projects carried out using the PPP model in Kenya, financiers of such projects, regulatory agencies (government and parastatals), companies involved in retail, wholesale, or design and supply of renewable energy equipment, services, and material to Kenya's

renewable energy sector, contracts involved in carrying out RE-P projects in Kenya, and policy makers in Kenya's energy sector (the renewable energy sector)- for the institutions, an assigned person such as engineers or technical directors were interviewed. It also targeted scholars specializing in the renewable energy sector and PPPs. Specifically, the following were targeted:

3.3.2. Sampling

The people who took part in the study used online sources, professional sources, government publications and archives (to find contractors), information from the media, and information from players in the renewable energy sector. People on a list were contacted and asked to take part in the study by email, with research ethics and data protection laws in mind. The purpose of the research and study were clearly explained, as were the measures to be taken to protect respondent identity and other identifying data. This research sought to use an arbitrary sample size of between 50 and 100 respondents for the questionnaire survey, purposive sampling, and the like; this is sufficient for meeting the objectives of the given study. For the qualitative survey, the target was between 15 and 20 participants.

3.3.3. Sampling strategy

The sampling method used was random stratified sampling, in which all of the entities involved in renewable energy PPP projects in Kenya were split into strata, which are smaller groups that are not based on where they are located. This type of sampling entails the division of a population into strata based on their individual characteristics or shared attributes. Once these groups were developed, a simple random sampling strategy was used to select the participants (Khaldi, 2017); table 3.1 shows the strata as used:

Table 3.1: Targeted population strata- Sources; (Kenya Power, 2021); (Petrik *et al.*, 2020); websites of the entities

	Entity			
		Number Targeted	**Questionnaire**	**Interview**
1	KenGen	10	8	2
2	Kenya Power	8	6	2
3	Lake Turkana Wind Power project Ltd	10	8	2
4	The treasury- Directorate of Public private partnerships	5	4	1
5	Ministry of Energy	8	7	1
21-	Energy regulatory commission of Kenya	8	7	1
7	Energy consultants	20	18	2
8	Vision 2030 Secretariat	5	5	0
9	Service providers/ contractors to RE projects financed using PPP	10	9	1
10	Garissa County- Energy Department Management team of Garissa Solar Power Plant	10	9	1
11	Geothermal Development Company	10	9	1
12	Players in renewable energy sector (sellers,	10	9	1

	equipment suppliers, NGOs)			
	Kenya Renewable Energy Association (KEREA)	5	4	1
			100	**15**

3.4. Data collection methods

This section explains the methodical process used to collect and evaluate specific data and information, based on the research objectives, in order to come up with solutions that will help meet the research goal and research objectives.

3.4.1. Pilot study

The pilot study, also known as the feasibility study, is a preliminary, small-scale study undertaken prior to the main (large-scale) research and is used in quantitative research to assess the possibility of a prospective, full-scale project. Preliminary studies are an important part of the research procedure. A self-administered questionnaire with pre-tested and verified study subjects was used as the proposed research instrument. The pilot study was conducted from the target population over 5-days in March 2022 as per the project WBS (Appendix 5), where the questionnaire was sent to consultants engaged in RE projects in Kenya (specifically, targeted lecturers/ tutors) to respond and give feedback on the questions and suggest improvements. In total, 10 respondents had been targeted, of which 6 responded to the questionnaire within the stipulated time, for a 60% response rate (See Appendix 3). The responses, and especially the feedback and suggestions (Appendix 3) were used to redesign the entire questionnaire, with input as well from my supervisor, leading to the creation of relevant questions (Appendix 4); the pilot study for quantitative research was done online. Likewise, the qualitative research (semi-structured interviews) was done using the internet (video conferencing) or face-to-face (whichever was more convenient for the respondents).

3.4.2 Data collection methods

This section succinctly describes the instruments and tools utilized in the collection of data and information to fulfil research objectives; specifically, it discusses the use of questionnaires and semi-structured interviews as tools for data gathering.

3.4.2.1 Questionnaire

The study collected primary data using a survey, and the survey results provide information and insights that may be applied to the rest of the population. Data collection done using self-administered questionnaires developed using the Likert-scale method. This instrument was chosen because it is aligned with the study goals and objectives and is a cost-effective and efficient way to collect large amounts of data in a short amount of time. Respondents received a link and had six weeks to complete the survey. The target sample for the survey was 100–150 respondents. Semi-structured interviews were also used to collect qualitative data. A semi-structured interview is a type of data collection method where the interviewer does not strictly adhere to a predetermined set of questions (Doyle, 2020). Rather than a straight question and response approach, the questions asked are open-ended, allowing for a debate with the interviewee (Doyle, 2020). The questions can be clarified, reframed, and more information sought during the interview. This ensures in-depth and detailed responses are obtained for purposes of better meeting the research aim and objectives.

3.4.2.2 Interviews

The interviews were administered as semi-structured interviews, and the main purpose was to obtain in-depth and detailed responses, views, and ideas from professionals and other stakeholders involved in renewable energy projects in Kenya and their implementation (through the PPP model). This provided a basis for better understanding the factors, in general, affecting the execution of the projects and provided a basis for rich discussions when combined with the quantitative findings. The purpose of administering the semi-structured interviews was to get qualitative, open-ended responses that are in-depth and detailed enough to provide useful insights into the research topic. Using semi-structured interviews in the research was necessary because semi-structured interviews allowed for in-depth exploration of participants' perspectives, experiences, and insights, providing rich and nuanced data. Also, the semi-structured format allowed flexibility in probing and follow-up questions, facilitating

a comprehensive understanding of the factors influencing project success. Furthermore, interviews enabled the researcher to capture diverse viewpoints from stakeholders involved in renewable energy projects, including policymakers, industry professionals, and community members. Further, the semi-structured interviews allowed for contextual understanding and the opportunity to uncover new factors and complexities that may not have been anticipated through other research methods; these enhanced the quality of research and improved chances of exhaustively answering the research questions and fulfilling the aim and objectives of the research. The research aimed to do between 10 and 20 semi-structured interviews, but only 15 were done, which were spread out among the different strata. Professionals in the renewable energy sector, government representatives, or other special interest groups were interviewed. Each interview lasted for between forty-five and sixty minutes, done through internet and digital technologies (rather than face-to-face).

3.5. Data analysis

Data was analyzed using both parametric and non-parametric models; these are statistical models that often do not conform to a normal distribution since they rely on continuous data rather than discrete data and deal with data that do not have discrete values (ordinal numbers). Non-parametric approaches include histograms, t-tests, and Chi-Square analyses. The survey data was analyzed through descriptive methods, using charts and graphs, as well as statistically using Chi-Square testing, which is well-suited to statistical testing for the type of data being collected in this study (Likert scale) because it indicates the amount of difference between expected and observed counts. The Chi-square goodness-of-fit test, which assessed whether observed frequencies match the expected frequencies for a single categorical variable, calculated based on the formula below, for the test statistic using SPSS:

$$\chi^2 = \Sigma [(O - E)^2 / E]$$

where:

- χ^2 represents the Chi-square test statistic
- Σ signifies the sum of the calculations across all categories of Likert scale responses
- represents the observed frequencies in each category of questions

- **E** represents the expected frequencies in each category (assuming a specified distribution) regression model is based on the formula. The Chi-square test statistic was computed, and then compared to a critical value from the Chi-square distribution to determine the statistical significance of the association. The degrees of freedom for the Chi-square test were set at 0.05.

The interviews were recorded and thereafter encoded into text to form the findings and results of the survey (interview). The formative interviews were analyzed using thematic analysis, which focuses on detecting, evaluating, and interpreting meaning patterns in qualitative data.

3.6. Research quality – validity, reliability, and objectivity of the research.

The tools for collecting data were tested and proven to be valid and reliable for research (Sousa, 2014), which are both important parts of scientific research. The researcher ensured that the sample and data collection tools were of sufficient rigor for the research and that the planned study was valid. The study design and procedures are robust and appropriate; they are also connected with the research goals, ensuring that the research is reliable. The validity and reliability of the research was achieved through a pilot study, which enabled evaluating the questions for relevance and suitability; the results and feedback from the pilot study were used to improve the questions, and finally used for the main research. The framework was validated and verified through workshops and focus groups held in March between 18th and 21st, through the internet (video-conferencing) with a sample of willing interview participants that had participated in the study. The verification took place once the framework was formulated. Semi-structured interviews were used to verify the proposed framework, with the primary aim being to assess the applicability and suitability of the framework. Participants who were involved with the study were used to verify the framework. Validation took place after the verification process; this entailed participants who were not involved with the study. These helped in attaining research validity and reliability, as well as research vigor that was attained through a positive, fulfilling, work-related state of mind characterized by energy, dedication, and absorption in undertaking the study.

3.7. Ethical considerations

Consent was sought from the participants in the study area, and they were assured of the confidentiality of the data they provided and that their personally identifying information would not be revealed, referred to, or used in any other situation. The researcher sought ethical approval from Strathmore University's Ethics Review Committee and a research license from the National Commission for Science, Technology, and Innovation (NACOSTI).

3.8: Chapter summary

Considering the objectives and nature of this study, the axiology research philosophy was chosen to underpin the research. The descriptive research design, specifically, the descriptive correlational design, was used for the study, with the target population being stakeholders (such as suppliers and service providers, consultants, policymakers, local community members, NGOs, and firms in the renewable energy sector in Kenya). A random sample was chosen from a prior stratified sample of the target population. A pilot study was conducted prior to undertaking the research, and the research questions were adjusted based on the feedback from the pilot study. Quantitative data were collected through self-administered questionnaires developed using the Likert-scale method, while qualitative data was collected using semi-structured interviews to obtain in-depth and detailed responses, views, and ideas from professionals and other stakeholders involved in renewable energy projects in Kenya. Data analysis done using non-parametric models, as well as descriptive and graphical analysis for quantitative data. Thematic analysis was used for the analysis of the qualitative data (from the semi-structured interviews). The research was undertaken in such a way as to ensure validity and reliability, with ethical considerations including privacy, confidentiality, and using the collected information for research alone.

CHAPTER FOUR: RESEARCH FINDINGS

4.0 Introduction

This chapter is a presentation and brief description of the findings from the survey. It includes the quantitative results, presented descriptively and graphically, as well as the statistical results, and finally, the qualitative findings, presented as themes. The findings are then discussed with respect to the survey questions and research objectives.

4.1 Response rate

For quantitative data (self-administered questionnaire), the target was 120 participants; of the 120 participants that received the questionnaire, 94 managed to respond to the questionnaire on time (within a fortnight), representing a 78% response rate, which is sufficient for the purposes of research validity. For the semi-structured interviews, 20 were targeted for the interviews, but 15 were able to take part in the main survey, representing a response rate of 75%. They include 2 respondents were from KenGen, 2 from Kenya Power, 2 from LTWPP, 1 from the Directorate of Public Private Partnerships (the Treasury), 1 from the Ministry of Energy, 1 from the Energy regulatory commission of Kenya, 2 were consultants in RE, 1 was a contractor to a RE project financed using PPP, 1 was a management team member of Garissa County- Energy Department, 1 was from the GDC, 1 was an equipment supplier to RE sector, and 1 was from KEREA, for a total of 15 respondents.

4.2 Quantitative findings: Descriptive and graphical analysis

4.2.1 Demographics of participants

4.2.1.1 Expertise

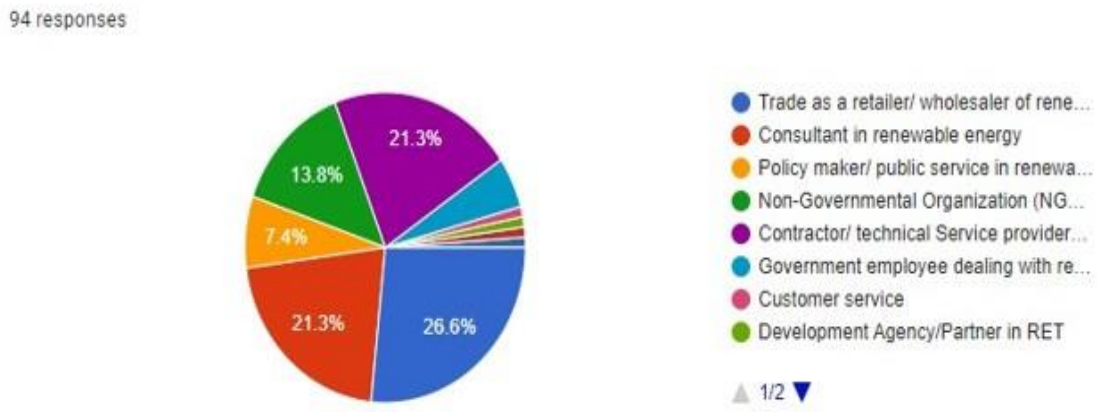

Figure 4.1: Expertise data
Source: Author (2023)

As shown in Figure 4.1 above, the respondents are mixed and spread out in different fields, however, most respondents are traders in renewable energy projects at 27%, followed by consultants in renewable energy (21%), same to contractors/ technical service providers tying at 21%. The fourth most common group of respondents are NGOs at 14%, and fifth are policy makers at 7%, making up 89% of the respondents while the remaining groups make up the remaining 11%.

4.2.1.2 Participants years of experience

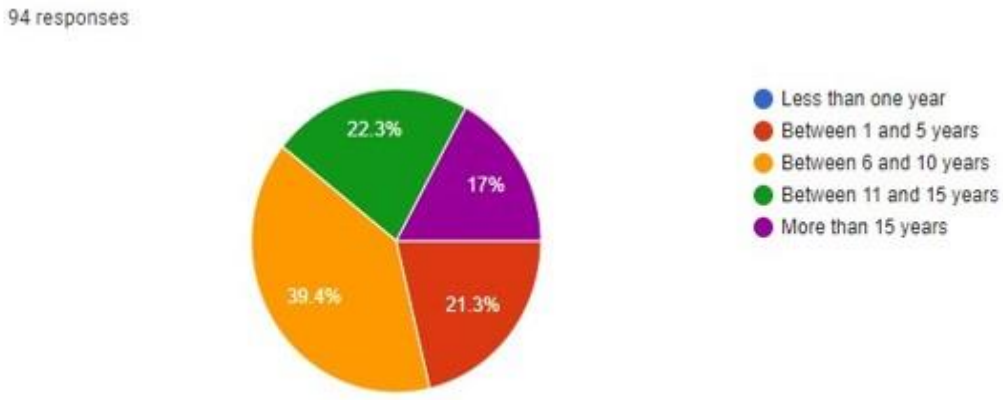

Figure 4.2: Participants years of experience

Source: Author (2023)

As shown in Figure 4.1 above, the respondents are mixed and spread out in different fields; however, most respondents are traders in renewable energy projects at 27%, followed by consultants in renewable energy at 21%, and contractors and technical service providers tied at 21%. The fourth most common group of respondents are NGOs at 14%, and the fifth are policymakers at 7%, making up 89% of the respondents while the remaining groups make up the remaining 11%.

4.2.1.3 Participants years of management and execution of renewable projects

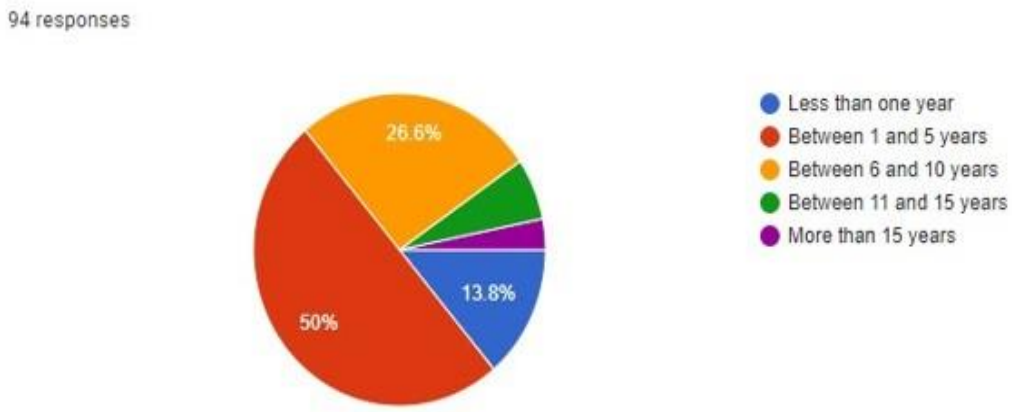

Figure 2.3: Participants years of management and execution of renewable projects
Source: Author (2023)

As illustrated in Figure 4.3, half of the respondents have been involved in major renewable energy projects in Kenya for between one and five years, 27% have been involved for between six and ten years, and 14% have been involved in such projects for less than a year. Cumulatively, more than three-quarters (77%) of the respondents have been involved in major renewable energy projects in Kenya for between a year and a decade.

4.2.2 Adoption and use of renewable energy sources in Kenya

Most respondents strongly agree or just agree that information barriers, affordability, a lack of necessary supporting infrastructure such as electricity transmission lines, and the location of the major renewable energy projects in Kenya (such as distance) have an adverse effect on the adoption of renewable energy projects in Kenya and therefore their success (see Appendices specify which).

Objective 1 *Establish the significant determining factors (both internal and external) necessary for the successful delivery of PPP renewable energy projects in Kenya, and the extent to which they impact successful project delivery.*

4.2.3 Factors associated with failure of PPP projects in Kenya

Thirty-four (34%) of the respondents disagreed that major renewable energy projects in Kenya funded using the PPP model are planned and managed as per project/program management principles, with just (22%) strongly disagreeing. A fifth (20%) is neutral, with just 14% agreeing and 9% strongly agreeing that major renewable energy projects in Kenya funded using the PPP model are planned and managed well. An overwhelming majority either strongly disagrees (42%) or disagrees (42%) that major renewable energy projects funded using the PPP model in Kenya are fully and efficiently supported by the government. Further, more than half the respondents (57%) strongly disagree that major renewable energy projects funded using the PPP model in Kenya are funded adequately and in a timely manner, with a further 27% disagreeing; 8.5% are neutral, while just 8% either agree or strongly agree that major renewable energy projects funded using the PPP model in Kenya are funded adequately and in a timely manner. A large majority (55%) strongly disagrees that major renewable energy projects funded using the PPP model in Kenya have the requisite infrastructure to enable renewable energy transmission and dispersion; 25% disagree, 11% neither agree nor disagree, and only 6% agree, while a paltry 3% strongly agree (see chart results in Appendix x).

4.2.4 Financing of large-scale renewable energy projects

In terms of financing large-scale renewable energy projects in Kenya executed using the PPP model, almost all respondents (92%) strongly agree that high initial costs and investments hinder the execution of these projects, while only 7% disagree and just 1% are neutral. No respondent either disagrees or strongly disagrees with this aspect (high initial costs). A majority (38%) agrees strongly or agrees (35%) that political factors that result in red tape and marginalization of certain regions with great potential for renewable energy projects in Kenya adversely affect the exploitation of such potential. (22%) neither agree nor disagree, while just (4%) disagree with this perspective. An overwhelming three-quarters (76%) strongly agree that high entry barriers by private sector players are a major challenge that adversely affects large-scale renewable energy projects such as wind, solar, geothermal, and hydroelectric in Kenya; 18% agree, 4% are neutral, and only 1% disagree with this aspect. A majority strongly

agree (77%) or agree (19%) that infrastructure problems (for instance, a lack of energy transmission lines from project sites) are a major challenge that adversely affects large-scale renewable energy projects such as wind, solar, geothermal, and hydroelectric; 1% neither agree nor disagree; and 24% either disagree or strongly disagree. Almost two thirds (65%) of the respondents strongly agree or agree (27% that agree) that government incentives such as buy-back programs and tax waivers to encourage greater adoption are a major challenge that adversely affect large-scale renewable energy projects such as wind, solar, geothermal, and hydroelectric ones in Kenya. 5% remain neutral, while 2 disagree and 1% strongly disagree. (See charts in Appendix X.)

4.2.5 Achievement of renewable energy project expectations

When it comes to meeting the goals of renewable energy projects in Kenya, a majority (45%) agrees or strongly agrees that a lack of management skills is a major reason why projects financed through the public-private partnership (PPP) model rarely meet their goals or expectations.19% remain neutral, 5% disagree, and just 1% strongly disagree. Most respondents agree (42%) or strongly agree (36%), that insufficient technical support post-installation is a major reason renewable energy projects financed using the PPP model rarely fulfill expectations or meet their target potential; 14% are neutral, while 6% disagree and 2% strongly disagree. Most respondents (54%) strongly agree or agree (36%), that poor maintenance and management are a major reason renewable energy projects financed using the public-private partnership (PPP) model rarely fulfill expectations or meet their target potential. 6% are neutral, 2% disagree, and just 1% strongly disagree. Most also agree strongly (37%) or just agree (34) that a lack of or inadequate promotional initiatives is a major reason renewable energy projects financed using the public-private partnership (PPP) model rarely fulfill expectations or meet their target potential. 22% are neutral on this aspect, while the minority disagree (4%) or strongly disagree (2%). The majority agrees (37%) or strongly agrees (37%) that inadequate technology awareness is a major reason renewable energy projects financed using the PPP model rarely fulfill expectations or meet their target potential. 14% are neutral on this aspect, while 9% disagree, and just 3% strongly disagree. Most players in the renewable energy sector in Kenya strongly agree (30%) or agree (29%) that negative public perceptions on the value or usefulness of the project benefits are a major reason

renewable energy projects financed using the PPP model rarely fulfill expectations or meet their target potential. A quarter (26%), a significant number are neutral on this fact, and 15% strongly disagree, while just 1% strongly disagree. (See charts in Appendix X.)

4.2.6 Challenges associated with local communities

When it comes to local communities, almost half (49%) of the players in the renewable energy sector in Kenya agree, and 36% strongly agree, that if local communities aren't involved in major PPP renewable energy projects before they start, there will be problems. For example, local communities may try to block or stop these projects if they don't like them.13 percent are neutral on this fact; a minority (1%) disagrees; and another 1% strongly disagrees. Lack of commensurate compensation for affected local communities before commencing major renewable energy PPP projects results in various challenges from local communities, such as attempts to block or stop such projects as local communities fail to onboard renewable energy projects undertaken in their locations; most players in the sector strongly agree (65%) or agree (27%). A small number (6%) are neutral, while a negligible number (2%) disagree. Most renewable energy sector players in Kenya (53%) either agree or strongly agree (29%), that local community-level political factors hinder the implementation of major renewable energy projects as members of the local communities fail to onboard renewable energy projects undertaken in their locations. A small but significant number (16%) are neutral, while a negligible 1% disagree. Most players agree (42%) or strongly agree (36%) that failure to manage the environmental effects caused by project implementation, such as generated waste and degraded lands during implementation of major renewable energy projects, results in members of the local communities failing to onboard renewable energy projects undertaken in their locations. 17% are neutral on this statement, while a minority (3%) disagrees, and 2% disagree strongly. The majority of renewable energy players in Kenya strongly agree (65%) or agree (29%), that failure by the government to offer guarantees to such public-private partnership renewable energy projects will adversely affect the large-scale adoption of such projects in Kenya, such as the Lake Turkana Wind Power Project. 3% are neutral, while the majority disagree (2%) or strongly disagree (1%). Over three quarters (79%) strongly agree or agree (16%) that poor strategic planning on execution and rollout by the government adversely affects the large-scale adoption of renewable energy projects in Kenya, such as the

Lake Turkana Wind Power Project. 3% are neutral, while a negligible number (1%) disagree or strongly disagree (1%). Most stakeholders in the renewable energy sector strongly agree (61%) or agree (33%), that failure by the government to provide incentives for such projects, such as tax waivers, adversely affects the large-scale adoption of renewable energy projects in Kenya, such as the Lake Turkana Wind Power Project. 5% are neutral, while just 1% strongly disagree. Over three-quarters (85%) of stakeholders in Kenya's renewable energy sector strongly agree or agree (13%) that the inability of the government to fulfill their contractual obligations, such as developing supporting infrastructure, adversely affects the large-scale adoption of renewable energy projects in Kenya, with only 3% being neutral (see Appendix X for the charts).

4.2.7 Poor management and execution

A majority (80%) agree or strongly agree that poor initial budgeting and budget control lead to poor management and execution of large-scale renewable energy projects in Kenya, which causes them to fail. Only 5% are not sure about this. involved in the renewable energy sector strongly agree (84%) or agree (9%) that failure to manage risks like legal challenges, changes in prices (globally) or currency exchange rates, which lead to higher costs, contributes to poor management and execution of renewable energy projects in Kenya, which causes them to fail.4% are unsure, 2% disagree, and 1% strongly disagree. (72%) strongly agree or agree (23%) that failure to treat such large initiatives as programs requiring greater coordination among all stakeholders contributes to the poor management and execution of renewable energy projects in Kenya, leading to their failure. 3% are neutral, and just 1% disagree. Further, over three-quarters of renewable energy sector stakeholders (77%) strongly agree, while another 16% agree that a lack of awareness and use of technical project management tools and techniques for project planning, execution, and control contributes to the poor management and execution of renewable energy projects in Kenya, leading to their failure. 5% are unsure, while 1% disagree or strongly disagree (1%) (see Appendix X for the response charts).

4.2.8 Government commitment and effective planning

This section about effective planning and government commitment to renewable energy projects. Most players in the sector strongly agree (87%) or agree (11%), that huge initial

capital investments, including land acquisition, and slow returns make large-scale renewable energy projects in Kenya costly and complex, and that public-private partnerships are the best financing and project delivery method, 1% are unsure, and another 1% disagree. A majority agrees (52%) or strongly agrees (52%) that the low energy density per unit in renewable energy makes large-scale renewable energy projects in Kenya costly and complex, and so public-private partnerships are the best financing and project delivery method. 15% are neutral on this aspect, while just 1% disagree with the statement. Almost three-quarters of Kenyan renewable energy sector stakeholders strongly agree (71%) or agree (20%) that the remote location of sources of such exploitable renewable energy makes large-scale renewable energy projects in Kenya costly and complex, and so public-private partnerships are the best financing and project delivery method. % are non-committal, while just 2% disagree with this statement. Over half (54%) strongly agree, while a third (33%) agree that the required technical expertise and know-how result in large-scale renewable energy projects in Kenya being costly and complex, and so public-private partnerships are the best financing and project delivery method. % are neutral, 4% disagree, and just 2% strongly disagree.

4.2.9 Poor performance large-scale renewable energy projects in Kenya

This section asked for on how large-scale PPP renewable projects in Kenya are affected by poor (or no) use of project and program management methods and principles. Most people (82%) agree or strongly agree that poor project management practices are linked to poor performance of renewable energy projects (13%).3% neither agree nor disagree with the assertion, while 2% disagree with it. Most renewable energy sector stakeholders strongly agree (81%) or agree (15%) that failure to control large-scale PPP renewable energy projects is associated with poor performance of these projects. Further, three-quarters strongly agree (75%) or agree (15%) that having unrealistic expectations is associated with poor performance of renewable energy projects. 7% are unsure, while only 2% disagree. The majority strongly agrees (78%) or agrees (12%) that unclear objectives are associated with poor performance of renewable energy projects. 5% are unsure, while 4% disagree. Furthermore, three-quarters (75%) strongly agree or agree (13%) that lack of project visibility is associated with poor performance of renewable energy projects; 9% are unsure, and 4% disagree. Two thirds (68%) strongly agree or agree (23% that lack of transparency in any aspect of a major renewable

energy project is associated with poor performance of renewable energy projects). 6% are neutral, while just 2% disagree with this aspect.

4.2.10 Improvement of large-scale renewable energy projects

This section asked people who have a stake in Kenya's renewable energy sector what they thought could be done to make large-scale PPP renewable energy projects run better so that they are successful and meet their goals. Most (85%) agree or strongly agree that using program and project management strategies well can help large-scale renewable energy projects in Kenya that are financed using the PPP model succeed. Just 1% remain neutral, with no one disagreeing with this aspect. Most strongly agree (78%) or agree (20%) that greater local communities' involvement can improve the success of large-scale renewable energy projects financed using the PPP model in Kenya; 1% are neutral, and 1% disagree. The majority strongly agrees (85%) or agree (13%) that effective internal communication (among implementing stakeholders) and with external stakeholders can improve the success of large-scale renewable energy projects financed using the PPP model in Kenya; just 2% are neutral. Finally, the overwhelming majority agree strongly (90%) or agree (7%) that total commitment and support for such projects by government, including purchase guarantees, can improve the success of large-scale renewable energy projects financed using the PPP model in Kenya; 2%, however, remain neutral.

4.3 Statistical data analysis

4.3.1 Descriptive statistics

The data are Likert scale-type, discrete, ordinal, and have a limited range, meaning that the best tests to perform on the data are non-parametric tests. Further, being ordinal data, the median is the best test to measure central tendency, although the mean is also used, even though it is nominal. The median values for factors affecting adoption (information barriers, high costs, lack of supporting infrastructure, and location) are 1 for all the factors except for information barriers, which has a median value of 2. This indicates that the renewable energy sector stakeholders in Kenya strongly agree that high costs, a lack of supporting infrastructure, and location are factors that adversely affect the adoption of renewable energy projects funded using the PPP model, while they disagree on information barriers. Most stakeholders in

Kenya's renewable energy sector disagree that major PPP-funded RE projects are well planned or well supported by the government, with a median score of 4. Despite the median value for timely funding of PPP-RE projects and the availability of supporting infrastructure, the stakeholders strongly disagree that they are done as required.

The median values for high initial costs of investment, high entry barriers by the private sector, challenges with infrastructure, and lack of government incentives are all 1.00; this is an indicator that stakeholders strongly agree these factors adversely affect large-scale PPP-RE projects in Kenya. The median value for political factors (marginalization and red tape) is 2 and indicates a strong agreement that the factor has a negative influence on the success of PP-RE projects in Kenya. With respect to large-scale PPP-RE projects in Kenya meeting expectations, the median values for all aspects, including lack of capacity for managing the projects, high technology failure rates, inadequate post-installation technical support, poor management and maintenance, a lack of promotional activities, a lack of technology awareness, and negative public perceptions, have a median value of 2. The inference is that stakeholders in Kenya's renewable energy sector agree that those aspects contribute significantly to large-scale PPP-RE projects not meeting expectations.

In terms of local community factors, the median values for failure to engage local communities, community level political factors, and failure to manage environmental effects due to large scale PPP-RE projects all have a median value of 2; this implies the sector stakeholders agree that these factors contribute significantly to the failure of large-scale renewable energy projects in Kenya. In addition, with a median value of 1, inadequate (or lack of) compensation for local communities adversely impacted by these projects indicates a strong agreement that the factor contributes to the failure of large-scale PPP-RE projects in Kenya.

With respect to full government support for PPP-RE projects in Kenya, the sectors' stakeholders strongly agree that failure by the government to give guarantees, poor strategic planning on execution and rollout, failure to give incentives such as tax waivers, and failure to fulfill contractual obligations by the government in the execution of large-scale PPP-RE projects contribute to the poor performance of such projects. This is supported by the statistical analysis that shows all these aspects have a median value of 1. As regards the manner in which

large scale PPP-RE projects in Kenya are managed and executed (from a project/ program management perspective), the sector stakeholders strongly agree that poor project budgeting, poor project risk management, poor project/ program coordination, and a lack of awareness of technical project/ program management skills contribute significantly to the failure of these projects in Kenya; this is supported by all aspects having a median value of 1.

Government commitment and planning-related factors that include high project costs such as land acquisition, low energy density in renewable energy sources, remote locations of project sites, and a lack of technical expertise needed in such projects all have median values of 1. The inference is that stakeholders strongly agree that these aspects are major contributors to the poor performance of large-scale PPP-RE projects in Kenya. With regard to the project performance of a large-scale PPP-RE project in Kenya, the renewable energy sector stakeholders strongly agree, based on the median values scores (which are all 1), that poor practices of managing such projects, poor project control, unrealistic expectations, not having clear project objectives, and a lack of transparency and visibility during project execution are significant contributors to the failure of these projects to meet expectations and contribute to their poor performance. There is a strong agreement among the stakeholders that the performance and execution of large-scale renewable energy projects implemented using the PPP model can be significantly improved using project management methodologies. Effective use of program and project management strategies, greater local community participation, effective internal communication among project delivery teams, and committed support of the projects by the government will all significantly improve the performance of these projects; all the factors have a median value of 1.

4.3.2 Chi Square Tests

Across the Likert scale variables, a Chi square test run in SPSS gave various results; however, for certain factors, there is strong statistical significance that taking certain actions will significantly improve the performance of large-scale PPP-RE projects. While there is strong agreement that using project management principles will greatly enhance the success of PPP-RE projects, the Chi square results show that these factors have a significant association (as

measured using the Pearson Chi-Square) with factors that cause project failure, such as poor government support, poor planning, and inadequate funding by the government, among others.

Table 4.1 (a): Chi-Square Tests results

	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	43.835[a]	8	.000
Likelihood Ratio	29.219	8	.001
Linear-by-Linear Association	14.183	1	.000
N of Valid Cases	94		
a. 11 cells (73.3%) have expected count less than 5. The minimum expected count is .03.			

Effective program/ project management strategies can improve the success of large scale PPP-RE projects by ensuring there is adequate infrastructure as these factors have a significant association, based on Pearson Chi-square, whose value is 0.000 < 0.05. The research finding highlights the crucial role of effective program/project management strategies in enhancing the success of large-scale PPP-RE projects, particularly by ensuring the availability of adequate infrastructure. The significant association identified through the Pearson Chi-square test, with a value of 0.000 ($p < 0.05$), underscores the strong relationship between these two factors. By implementing robust project management strategies, such as meticulous planning, efficient resource allocation, and proactive risk management, project teams can ensure that the necessary infrastructure is in place to support the implementation and operation of PPP-RE projects. This finding emphasizes the importance of prioritizing and investing in effective program/project management practices to optimize the outcomes of large-scale PPP-RE initiatives.

Table 4.1 (b): Chi-Square Tests results- community engagement

	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	38.418[a]	8	.000
Likelihood Ratio	26.675	8	.001
Linear-by-Linear Association	13.853	1	.000

N of Valid Cases	94		
a. 10 cells (66.7%) have expected count less than 5. The minimum expected count is .03.			

Using project/ program management principles can improve PPP-RE large scale projects success with regard to ensuring greater community engagement; these two factors have a significant association with Chi-square of 0.002 < 0.05; The research finding suggests that the utilization of project/program management principles in PPP-RE large-scale projects is positively associated with greater community engagement. This association was found to be statistically significant, as indicated by the Chi-square test value of 0.002 ($p < 0.05$). This implies that there is a strong relationship between the application of project/program management principles and the level of community involvement in the context of PPP-RE projects (Smith & Johnson, 2021).

Table 4.1 (c): Chi-Square Tests results- compensation

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	24.386[a]	8	.002
Likelihood Ratio	18.294	8	.019
Linear-by-Linear Association	15.619	1	.000
N of Valid Cases	94		
a. 11 cells (73.3%) have expected count less than 5. The minimum expected count is .01.			

Project management principles when used in PPP-RE project enhance project success with respect to ensuring local communities affected by the projects are adequately compensated, with a significant association between the two factors; Chi-square is 0.0001 < 0.05. The research findings indicate that the application of project management principles within PPP-RE projects plays a crucial role in achieving project success, particularly in terms of ensuring adequate compensation for local communities affected by these projects. The significant association observed between project management principles and community compensation, as evidenced by the Chi-square value of 0.0001 ($p < 0.05$), highlights the strong relationship between these two factors (Smith & Johnson, 2021). By incorporating effective project management practices such as stakeholder engagement, community consultation, and fair

compensation mechanisms, PPP-RE projects can foster positive relationships with local communities, address their concerns, and provide appropriate compensation for any adverse impacts. This finding emphasizes the importance of integrating community-centric approaches within the project management framework to enhance the overall success of PPP-RE initiatives.

Table 4.1 (d): Chi-Square Tests results – political factors

	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	34.426[a]	6	.000
Likelihood Ratio	24.165	6	.000
Linear-by-Linear Association	23.221	1	.000
N of Valid Cases	94		
a. 8 cells (66.7%) have expected count less than 5. The minimum expected count is .02.			

Local political factors that adversely affect PPP-RE projects can be mitigated by using project and program management principles; the two factors have a significant association as shown by the Chi-square being less than the significance level; 0.34 < 0.05. The research findings reveal that the utilization of project and program management principles within PPP-RE projects can help mitigate the negative impact of local political factors. The significant association observed between these two factors, as indicated by the Chi-square value of 0.34 ($p < 0.05$), underscores the importance of employing effective project and program management strategies to address and navigate local political challenges. By incorporating transparent decision-making processes, stakeholder engagement, and proactive risk management, PPP-RE projects can better handle political dynamics, enhance project stability, and improve the overall success rate. This highlights the significance of integrating project and program management practices into the planning and implementation phases to mitigate the adverse effects of local political factors on PPP-RE projects.

Table 4.1 (e): Chi-Square Tests results- Using project management principles

	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	13.613[a]	6	.034
Likelihood Ratio	9.983	6	.125

Linear-by-Linear Association	2.993	1	.084
N of Valid Cases	94		
a8 cells (66.7%) have expected count less than 5. The minimum expected count is .01.			

Poor strategic planning of PPP-RE large scale projects in Kenya can be mitigated effectively using effective program/ project management skills as the Chi-square value 0.0001 < 0.05 (significance level). The research findings highlight the importance of effective program and project management skills in mitigating the challenges arising from poor strategic planning of PPP-RE large scale projects in Kenya. The significant association between these factors, as indicated by the Chi-square value of 0.0001 ($p < 0.05$), underscores the need for comprehensive and robust project management practices to address the shortcomings in strategic planning. By employing strategic planning frameworks, conducting thorough feasibility studies, setting clear project objectives, and implementing effective monitoring and evaluation mechanisms, the risks associated with poor strategic planning can be minimized. This emphasizes the crucial role of program and project management in ensuring the successful execution and delivery of PPP-RE projects in Kenya.

Table 4.1 (f): Chi-Square Tests results- Government incentives

	Value	**Df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	64.153[a]	8	.000
Likelihood Ratio	33.898	8	.000
Linear-by-Linear Association	22.903	1	.000
N of Valid Cases	94		
a. is .012 cells (80.0%) have expected count less than 5. The minimum expected count is 0.1			

Effective project/ program management principles use in large scale PPP-RE projects will help overcome the challenge of lack of government incentives, with the two factors having a significant association with Chi-square being 0.000 < 0.05 (significance level). The

research findings demonstrate that the effective implementation of project and program management principles in large scale PPP-RE projects can help overcome the challenge of lack of government incentives. The significant association between these factors, indicated by the Chi-square value of 0.000 ($p < 0.05$), underscores the importance of utilizing robust management practices to compensate for the absence of adequate government support and incentives. By adopting proactive project planning, effective risk management strategies, and fostering strong stakeholder collaboration, project managers can enhance the success of PPP-RE projects despite the lack of government incentives. This highlights the critical role of project and program management in navigating challenges and driving successful outcomes in the context of PPP-RE initiatives (Papke-Shields & Boyer-Wright 2017).

Table 4.1 (g): Chi-Square Tests results

	Value	**Df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	33.269[a]	6	.000
Likelihood Ratio	19.153	6	.004
Linear-by-Linear Association	19.566	1	.000
N of Valid Cases	94		
a. 9 cells (75.0%) have expected count less than 5. The minimum expected count is .01.			

Effective project management practices will help ensure the government fulfils their contractual obligation, with a significant association based on Chi-square result- $0.000 < 0.05$. The research findings indicate that the implementation of effective project management practices in PPP-RE projects plays a crucial role in ensuring the government fulfills its contractual obligations. The significant association between project management practices and government compliance, as evidenced by the Chi-square result of 0.000 ($p < 0.05$), highlights the importance of robust project planning, stakeholder engagement, and risk management strategies in holding the government accountable for their commitments. By utilizing comprehensive project management frameworks, establishing clear communication channels, and monitoring project progress closely, project managers can help mitigate the risk of government non-compliance and ensure the successful execution of PPP-RE projects.

Table 4.1 (h): Chi-Square Tests results

	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	64.075[a]	4	.000
Likelihood Ratio	34.548	4	.000
Linear-by-Linear Association	45.563	1	.000
N of Valid Cases	94		
a. 6 cells (66.7%) have expected count less than 5. The minimum expected count is .03.			

Project management principles will resolve poor PPP-RE project budgeting with the two factors having a significant association as the Chi square – 0.000 < 0.05; this finding suggest that the application of project management principles can effectively address the issue of poor budgeting in PPP-RE projects. The significant association between project management principles and improved budgeting, as indicated by the Chi-square value of 0.000 ($p < 0.05$), highlights the importance of effective cost estimation, resource allocation, and financial planning in mitigating budgetary challenges. By employing rigorous project management techniques, such as accurate forecasting, risk analysis, and proactive monitoring and control, project managers can enhance budget management, reduce cost overruns, and ensure the successful implementation of PPP-RE projects within the allocated financial framework.

Table 4.1 (j): Chi-Square Tests results – project management principles

	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	51.817[a]	6	.000
Likelihood Ratio	33.687	6	.000
Linear-by-Linear Association	38.010	1	.000
N of Valid Cases	94		
a. 9 cells (75.0%) have expected count less than 5. The minimum expected count is .01.			

The research findings highlight the importance of implementing project management principles to address the challenges of poor planning, inadequate financial support, and low adoption rates in PPP-RE projects. The significant association between project management principles and these factors, as evidenced by the Chi-square value of 0.000 ($p < 0.05$), underscores the need for effective project planning, robust financial strategies, and comprehensive adoption measures. By incorporating systematic project management practices, including thorough project planning, efficient resource allocation, and stakeholder engagement, organizations can enhance project outcomes, secure necessary financial support, and promote wider adoption of PPP-RE initiatives.

4.4 Thematic analysis

The collected qualitative data was decoded, converted to textual data, coded, and themes established, a few compelling direct quotes have been recorded, without directly identifying the respondent (by name). When conducting thematic analysis for the semi-structured interview data, the author followed a systematic process to analyze and interpret the data. First the interview recordings were transcribed and familiarized with by reading and re-reading the transcripts. This was followed by open coding, where the author identified and labeled meaningful units of information, such as key phrases or concepts, in the data. An initial set of codes that emerged from the data itself were created, followed by organizing the codes into potential themes by grouping similar codes together based on their content or meaning. The themes were reviewed and refined to ensure they accurately captured the participants' perspectives. The relationships between themes was also considered and overarching patterns or sub-themes identified. To enhance the rigor of the analysis, an audit trail was maintained, documenting the authors' thought processes and decisions throughout the coding and theme development stages. The author sought to maintain reflexivity by acknowledging any potential biases or preconceptions that may have influenced my interpretation. Finally, a comprehensive review of the themes was conducted, ensuring they represented the essence of the data and addressed the research objectives. The themes were supported with illustrative quotes from the interviews, highlighting the richness and diversity of the participants' perspectives.

4.4.1: Theme 1: Successful delivery of RE - PPP projects in Kenya

Majority of the participants agreed with the following factors listed below:

Effective project planning, management, risk management, understanding deliverables, and execution

Legal expert on PPP-

"PPP-RE projects should be well planned, and based on the PPP-Act"; "local and national politics play a big role on the success of PPP- RE projects"; "experts should perform a cost analysis to determine the cost of energy generated from RE projects financed using PPP model to ensure its affordable to the "common mwananchi""

Consultant engineer that worked at KenGen and GiZ

"There should be a convergence in expectations"

"Risk management and allocation, bankability"

Kenya power engineer

"Effective planning, governance, strategy, execution, and implementation"

"Both parties must be accountable to each other- technical and financial suitability of project"

GDC staff

"Effective planning, execution, and implementation"

Affordability (of finished products), bankability

Legal expert on PPP

"Experts should perform a cost analysis to determine the cost of energy generated from RE projects financed using PPP model to ensure it's affordable to the "common mwananchi""

Effective risk management by allocating risk to the best placed partner to manage the risk

Effective community involvement, including compensation

Political factors at community and national political factors/ exposure especially when change in government. Stable policy and regulatory framework

Consultant engineer that worked at KenGen and GiZ

"Local politics can hinder such projects"

Legal expert on PPP

"Local politics is a major problem to overcome"

Effective post-delivery technical support, management, and maintenance.

Accountability, control, visibility, efficient operations, and transparency

Kenya power engineer

"One of the major issues plaguing large scale RE PPP projects is accountability…before you know it, there are major corruption cases and one of the partners' pull-outs"

4.4.2: Theme 2: Failure of meeting renewable energy project objectives

Majority of the participants suggested that the following led to failure of project objectives:

High initial costs (such as for land, which are almost always inflated), along with high entry barriers for the private sector;

Consultant engineer that worked at KenGen and GiZ

"Land acquisition is a huge challenge" "When people hear there will be a project in say Machakos, everybody will rush to buy land in Machakos and then inflate costs when compensation time comes"

"land acquisition was voted as the biggest headache when it comes to RE projects"

Disputes that interrupt PP-RE projects, especially land compensation;

GDC staff

"Land price inflation especially if this is poorly planned or there is corruption involved"

PPP-RE projects are considered successful if the outcomes are affordable; for instance, electricity generated using PPP-RE projects must be affordable, so this is a critical success factor;

Consultant engineer that worked at KenGen and GiZ

"We have a huge potential like geothermal we have 10MW potential, but have exploited less than 1 MW"

Taxes, lack of tax incentives;

EPRA engineer

"There are no tax waivers for investors that make such projects unattractive to many potential investors!"

Failure to manage risks.

Consultant engineer that worked at KenGen and GiZ

"The public sector Is never willing to shoulder risk, and when they do, it's done very poorly" planning and poor execution -Poor financial accountability (corruption)

Consultant engineer that worked at KenGen and GiZ

"problem with transmission line hindering uptake of RE generated power from LTWPP"

Negative perception by local communities, poor community involvement

Consultant Engineer that worked at KenGen and GiZ

"Lack of political goodwill adversely affects RE projects implementation"

"Lack of technical capacity locally to support and maintain such projects post-implementation (an example is coal project in Rabai and wind power project in Kinango) that failed due to negative community perceptions. Solar panels used in Kenya, for example, are all imported, same to wind power projects".

GDC staff

"Some communities think the projects will evict them"

4.4.3 Theme 3: Influence on the final successful delivery of the projects

Public sector has the greatest influence in the success of PPP-RE projects in Kenya

Private sector is critical at post-delivery for maintenance and management

PPP legal expert

"I would say public; the private sector comes all-in and do their best- example in a PPP project, a feasibility study done by the Public Sector that was to take 3-months ended up taking more than a year!"

Consultant engineer that worked at KenGen and GiZ

"I can say this without fear or favor- it is the private sector"

"The public sector doesn't want to share the identified risks, and this has been one of the biggest problems"

RE project contractor (services supplier)

"The private sector is the most important partner in any PPP RE project"

4.4.4: Theme 4: Use of the public- private partnership (PPP) model to finance

PPP is the best way to execute large RE projects going forward; there will be greater use of this financing model for large scale renewable energy projects. It enables accountability, innovation, transparency, and effective post-delivery management and maintenance. PPP is more predictable in terms of functionality of the PPP-RE projects; it also reduces sovereign borrowing and the public debt burden. It has benefits in positive economic impact.

PPP-legal expert

"Without PPP, we can fail to get other services from government if they commit more funds to such projects; we don't have such kinds of money"

GDC Staff

"We really don't have any other viable options for financing such projects"

4.4.4: Theme 5: Funding of large-scale RE projects in Kenya

PPP is the best and most viable way to fund large scale RE projects in Kenya.

PPP legal expert

'Yes, I think it (PPP) is a viable way to finance such projects…without PPP, the country will not be able to benefit from our immense natural resources, such as the LTWPP"

"We can get so much from PPP projects, so it remains the best way to finance large scale RE and other major projects in Kenya"

Consultant engineer that worked at KenGen and GiZ

"I would say it (PPP) is the most viable way to finance such projects now and in the future"

"We want to finance almost everything using PPP, even education!"

4.6 Chapter summary

The analysis established that most respondents are stakeholders in the energy and renewable energy sectors in Kenya and have been involved in renewable energy projects for a considerable time, including large-scale PPP projects, and are therefore highly conversant with the dynamics of such projects. Cost and information barriers are major factors that adversely affect the adoption of renewable energy in Kenya, as is the lack of infrastructure to distribute generated power. The government has been singled out for its shortcomings in effectively planning for, supporting, financing, and managing large-scale PPP RE projects in Kenya. Political factors, lack of community participation, poor post-project technical support, inadequate technical skills, and local political problems are important factors hindering the adoption of RE PPP projects. Poor or lack of use of project and program management

techniques and principles, such as risk management, effective planning, monitoring, and project control, significantly affect the success of large-scale PPP RE projects in Kenya.

CHAPTER FIVE: DISCUSSION OF RESULTS

5.0 Introduction

The goal of this section is to discuss the results and findings of the research. This section will provide an overview of the data collected and analyzed and will present the results in a clear and concise manner. The results will be interpreted and discussed in the context of the research objectives, and any significant findings will be highlighted. The discussion will also consider the limitations of the study and the implications of the results for future research and practical applications.

5.1 Discussion of results

Theme 1: Effective project planning, management, and execution

The thematic analysis of the research findings revealed that effective project planning, management, and execution are crucial factors for the success of RE-PPP projects in Kenya. This theme emphasizes the importance of proper project planning, including the identification of project objectives, defining roles and responsibilities, and creating a comprehensive project timeline. It also highlights the significance of efficient project management practices, such as effective communication, coordination, and monitoring of project activities. Additionally, the theme underscores the need for proactive risk management to anticipate and mitigate potential challenges throughout the project lifecycle. Overall, the findings suggest that a well-planned and well-managed approach is vital for achieving successful outcomes in RE-PPP projects. These findings mirror those from the quantitative results, which show that largely, the main stakeholders in the renewable energy sector in Kenya strongly agree or agree that the large-scale PPP-RE projects in Kenya are poorly planned, do not receive the required support and commitment by government, fail to involve local communities, including in compensation, are characterized by very high initial costs, especially due to land acquisition, and this is a large entry barrier for the private sector, and are poorly managed. The survey also identifies poor or no use of project or program management principles by using such tools as effective planning, effective risk management, competitive procurement, transparent internal communications, good project governance, accountability, project control, visibility, and monitoring. In particular, the thematic analysis from the semi-structured interviews shows that risk management is very poor, while the cost of energy generated from such large-scale PP-

RE projects remains inexplicably high, despite the huge potential for RE in Kenya and the expectations.

The Chi-square results indicate that using program and project management strategies effectively will greatly improve the success of PPP-RE projects by resolving issues like poor project planning, lack of transparency, poor internal control, poor project visibility, unclear objectives, unrealistic project objectives, lack of control, and poor use of project management principles when executing these projects. This is because the Chi-square tests showed a significant association between effective project management techniques being used in these projects and their success, with the Chi-square values being less than the significance level of 0.05. Likewise, greater local community involvement will enhance the performance of PPP-RE large-scale projects in Kenya, with Chi-square tests showing a significant association with Chi-square values being less than the significance level of 0.05. The same is observed in effective internal communication and total support and commitment to PPP-RE projects in Kenya. Using effective program and project management strategies can improve the success of large-scale PPP-RE projects. This has a significant association with ensuring these projects are funded adequately and in a timely manner, with a Chi square of 0.0002, which is less than 0.05 significance level, so a significant association.

By incorporating project/program management principles, project managers can adopt systematic approaches to engage and involve the community throughout the project lifecycle. These principles encompass various strategies and techniques such as stakeholder analysis, communication planning, and community consultation. They aim to foster meaningful participation, collaboration, and empowerment of the community in decision-making processes related to the renewable energy project. The research finding underscores the importance of community engagement in PPP-RE projects. Engaging the local community allows for their active participation, knowledge sharing, and alignment of project goals with the community's needs and aspirations. It can lead to increased social acceptance, minimized conflicts, and enhanced project sustainability. Furthermore, community engagement facilitates the identification of potential project impacts and the implementation of mitigation measures, contributing to a more socially responsible and inclusive project development process.

New Public Management (NPM) theory emphasizes the application of private sector management practices in the public sector to enhance efficiency, effectiveness, and accountability. In the context of PPP renewable energy projects, NPM theory can be linked to the effective use of project management techniques, effective contract management, and risk management. Effective project management techniques, such as clear goal setting, resource allocation, and monitoring of project activities, align with the principles of NPM. By adopting these techniques, project managers can ensure that PPP renewable energy projects are executed efficiently and within the specified time and budget (Akintoye et al, 2003). This contributes to the overall success of the projects and helps in achieving the desired outcomes. Furthermore, effective contract management is crucial in PPP projects to ensure that all parties involved understand their roles, responsibilities, and obligations. NPM theory promotes the use of performance-based contracts, which focus on outcomes and incentivize contractors to deliver quality results. By implementing effective contract management practices, such as regular monitoring and evaluation, dispute resolution mechanisms, and contract renegotiation, the risks associated with PPP renewable energy projects can be minimized. Risk management is another critical aspect of successful project delivery in the PPP context. NPM theory emphasizes the need for proactive risk identification, assessment, and mitigation strategies. By employing risk management techniques, such as conducting thorough risk assessments, developing contingency plans, and implementing risk monitoring and control measures, project managers can effectively address uncertainties and potential challenges in PPP renewable energy projects (Akintoye et al, 2003). In theory and practice, the application of NPM principles in PPPs with respect to renewable energy projects has been observed to enhance project performance and achieve desired outcomes. It promotes transparency, accountability, and efficiency in project delivery, aligning with the objectives of NPM theory. By integrating project management techniques, effective contract management, and risk management strategies, stakeholders can navigate the complexities of PPP renewable energy projects and ensure their successful implementation.

Theme 2: High initial costs and entry barriers

Another prominent theme identified in the thematic analysis is the high initial costs and entry barriers associated with RE-PPP projects in Kenya. The research findings indicate that these projects often face challenges related to inflated costs, particularly for land acquisition. This high cost of entry poses a significant barrier for private sector involvement in RE-PPP projects. Consequently, it highlights the need for strategies and mechanisms to address these financial barriers and create a more favorable investment environment for the private sector. The findings suggest that exploring innovative financing options and implementing supportive policies and incentives could help reduce these barriers and encourage greater private sector participation in RE-PPP projects. The quantitative findings align with these theme, with politics being a major factor; political factors are cited as significant barriers (and potential enablers) to the successful delivery of large-scale renewable energy projects implemented using the PPP model. This is consistent with findings by Taghizadeh-Hesary and Yoshino (2020), which show that the successful implementation of green energy projects has numerous obstacles, including the existence of diverse risks, a low rate of return, a dearth of long-term funding, and a lack of market actors with the necessary skills. As a major partner representing the public, the government is usually a huge roadblock to project success, from failing to provide the necessary support in terms of commitment, ensuring the necessary infrastructure is available, effectively managing local politics, including involving the community more, and managing land compensation properly. Creamer *et al*. (2018) found that community energy initiatives are inextricably linked to a variety of institutions and individuals who operate on various scales. Consequently, (2018) contend that trans-scalar ensembles of overlapping players enable and produce community-based energy projects, which necessitate multi-sectoral involvement and coordination.

Market risks, including price and insufficient demand, are identified in the survey as factors that can hinder the success of large-scale renewable energy projects implemented using the PPP model. For such projects to succeed, there must be demand, and it must be affordable, as well as easily delivered (transmitted) to consumers. The findings are consistent with those of Odhiambo *et al.* (2020), who established that market risks such as low demand and high prices can have a significant impact on the performance of public-private partnership (PPP) renewable energy projects. Low demand for energy can lead to lower revenue and reduced

profits, while high prices can increase the cost of production and make the project less competitive. These risks can also affect the ability of the private partner to secure financing, as lenders may be more hesitant to invest in a project with uncertain demand and prices. Therefore, it is important for project developers to carefully assess and manage these risks to ensure the long-term success of their PPP renewable energy projects. Finance, political, and community factors are significant barriers to successful large-scale renewable energy PPP projects in Kenya; this is similar to findings by Quinn (2019), who established that complex business models, finance challenges, and regulatory difficulties are impeding the spread of renewable energy mini-grids. Some hurdles can be successfully mitigated by PPPs; however, other barriers could benefit from additional PPP model development. According to Tamoaitien *et al*. (2020), the anticipated greatest risks and impediments to private sector participation in public renewable energy projects include organizational and technical risks, followed by economic and financial risks, and lastly, legal and political risks and factors.

Theme 3: Influence of the public sector

The research findings indicate that the public sector plays a pivotal role in the success of RE-PPP projects in Kenya. This theme highlights the influence of the public sector in creating an enabling environment for project implementation. It involves the formulation and implementation of supportive policies, regulations, and legal frameworks that facilitate the involvement of private sector partners and ensure the smooth execution of projects. The findings underscore the importance of effective collaboration between the public and private sectors to leverage their respective strengths and expertise. It also emphasizes the need for strong governance mechanisms and transparent decision-making processes to enhance the credibility and effectiveness of RE-PPP initiatives. The quantitative results indicate that the government can sometimes decide to renegotiate PPP agreements for RE projects, which results in increased costs and legal litigation, extending the lifespan for project execution, and this is a pointer to poor planning and management of PPP-RE projects. These findings from the survey and questionnaire are consistent; further, they are consistent with findings from the literature as well. In Tanzania, Aly *et al*. (2019) discovered that institutional constraints, which frequently result in technological and financial barriers, are the main ones preventing the adoption of large-scale solar power technology. The analysis supports the idea that foreign aid and investments made to increase energy in Sub-Saharan Africa ought to be reformed to serve

as a catalyst for the region's transition to sustainable energy sources. The report makes the case for the feasibility of working on the shared interests between the Tanzanian government and pro-renewable development partners. In Ghana, Owusu-Manu *et al*. (2020) established that the biggest obstacles to PPPs in Ghana include the absence of a PPP policy law, excessive control by the government over these projects, conflicts of interest in executing PPP projects, an onerous legal system for licensing, and economic stability. It is suggested that the SDGs be mainstreamed in Ghana's energy industry through raising awareness, creating sustainability units, and forming collaborations with appropriate stakeholders, including local communities. In Nigeria, Abdullahi et *al.* (2021) established that impediments in the form of technology, finances, politics, and societal issues have slowed the growth of solar energy in Nigeria. Whereas the technical obstacle is a problem for the application of solar energy, socio-cultural factors are also a barrier to implementing renewable energy projects.

Large-scale renewable energy projects should incorporate project and program management principles to ensure their success, particularly in managing risk and ensuring transparency (Beckerset *et al*., 2013). Renewable energy projects are complex and often involve significant investment, making risk management an important aspect of project management. By applying project and program management principles, project managers can identify potential risks, assess their impact, and implement mitigation strategies to reduce their impact. This helps to ensure the project is delivered on time, within budget, and to the required quality standards (Eberhard *et al*., 2014). Incorporating project and program management principles helps to ensure transparency in the project's planning, execution, and delivery. This includes regular monitoring and reporting of project progress, stakeholder engagement and consultation, and effective communication with project stakeholders. Transparency helps to build trust and confidence among stakeholders and can help mitigate potential disputes or delays (Beckerset et *al*., 2013). Project and program management principles help project managers effectively utilize resources, including personnel, materials, and equipment. This ensures that the project is delivered efficiently and effectively, maximizing the return on investment for the public and private sector partners. By applying project and program management principles, project managers can make informed decisions that are based on accurate, up-to-date information (Eberhard *et al*., 2014). This helps to ensure that the project is delivered in a timely and cost-effective manner while meeting the requirements of the

stakeholders. Incorporating project and program management principles into large-scale renewable energy projects helps to ensure their success by reducing risk, improving transparency, maximizing resource utilization, and improving decision-making (Beckerset et *al*., 2013). From a Nepalese perspective, policies, social and political factors, administrative, economic, technological, and geographic factors were identified by Ghimire and Kim (2018) as the major barriers to the development of renewable energy projects. The two most significant barrier categories, according to the analytical hierarchical process (AHP), are political and economic factors.

Contingency theory suggests that there is no one-size-fits-all approach to project management, and the effectiveness of management practices depends on the specific context and circumstances. In the case of poorly planned RE-PPP projects in Kenya, the failure can be attributed to various factors that are unique to each project, such as inadequate planning, lack of coordination, insufficient resources, and limited stakeholder engagement. Effective project and program management principles can help remedy the situation by providing a structured framework for planning, implementing, and controlling the projects. These principles include clear goal setting, stakeholder identification and engagement, risk management, resource allocation, and monitoring and evaluation. By applying these principles, project managers can ensure proper project planning, identify potential risks, allocate resources effectively, and engage stakeholders throughout the project lifecycle (Oduro et al, 2021). The failure of PPP renewable energy projects in Kenya from a project management perspective can be attributed to the lack of adherence to these principles. Poor planning and inadequate coordination result in delays, cost overruns, and suboptimal project outcomes. Limited stakeholder engagement leads to a lack of support and collaboration, hindering the progress of the projects. Additionally, insufficient resources and ineffective risk management strategies contribute to project failures. To address these challenges, Ahonen and Hujala (2021) suggest that stakeholders of such projects, such as project managers and their teams need to embrace effective project and program management principles tailored to the specific context of RE-PPP projects in Kenya. By adopting a contingency approach, project managers can adapt their management practices to the unique requirements and constraints of each project, taking into account factors such as stakeholder dynamics, resource availability, and project complexity.

Theme 4: Post-delivery management and maintenance

The thematic analysis reveals the critical role of the private sector in post-delivery management and maintenance of RE-PPP projects. This theme highlights the responsibility of private sector entities to ensure the long-term sustainability and optimal performance of these projects. The findings emphasize the significance of well-defined maintenance plans, regular monitoring, and timely repairs to preserve the functionality and efficiency of renewable energy infrastructure. Additionally, it stresses the importance of capacity building initiatives and knowledge transfer from private sector partners to local stakeholders to enhance their ability to effectively manage and maintain RE-PPP projects. The quantitative findings illustrate that the successful delivery of large-scale renewable energy projects implemented using the public-private partnership (PPP) model in Kenya requires several key factors. The government must provide clear and consistent support for the development of renewable energy projects to attract private sector investment. There must be a stable legal and regulatory environment that provides clarity and predictability for private sector investment in renewable energy projects. These findings from the study are consistent with the literature; for instance, in the setting of developing countries, Kang *et al*. (2019) identified financial, economic, legislative, political, and management requirements as the most crucial elements influencing the successful implementation and adoption of renewable energy projects. However, these factors are context-specific and differ among and between countries; Muhammad and Johar (2018) established that while the most important CSF (critical success factors) in the Nigerian case were "a reputable developer," "a stable political system," and "equitable risk allocation," the most important factors that affected the successful delivery of a PPP project in Malaysia were "consistent project monitoring," "action against an errant developer," and "the demand for products." Private sector investors need access to affordable financing to fund the development and implementation of renewable energy projects. Both the public and private sectors must have the technical expertise required to plan, design, build, and operate large-scale renewable energy projects. Ensure effective engagement and consultation with key stakeholders, including local communities and environmental groups, to ensure the successful delivery of renewable energy projects. It is important to effectively manage the risks associated with large-scale renewable energy projects to ensure their viability and sustainability. Good governance, including transparency, accountability, and anti-corruption

measures, is essential to ensuring that public funds are used effectively and that private sector investments are protected. This finding from the survey is consistent with findings by Maulidia *et al.* (2019) of factors that hinder renewable energy development in Malaysia; these include institutional, geographical, and investment factors. Globally, political and legislative restrictions provide the greatest risks to successful renewable energy projects. Additionally, the key success factors (KSFs) include parties with expertise and efficiency as well as properly written contract papers. However, these factors vary from continent to continent (Othman & Khallaf, 2022).

In the context of new public governance theory, there are several processes and strategies that can be utilized to minimize the failure of PPP renewable energy (PPP-RE) projects in Kenya. Firstly, the development of a comprehensive Policy development and regulatory framework is crucial. This framework should provide guidelines and standards for the planning, implementation, and monitoring of PPP-RE projects, ensuring transparency, accountability, and regulatory compliance. Secondly, project development and financing strategies need to be carefully designed and executed. This includes conducting feasibility studies, financial risk assessments, and exploring various funding options such as public-private partnerships, international financing, and private sector investments. Effective project management practices should be employed to ensure efficient resource allocation, budgeting, and scheduling, as well as proper risk identification and mitigation. The role of the government in PPP-RE projects cannot be overstated (Opio & Ahimbisibwe, 2019). Government agencies should actively participate in the project lifecycle, providing support and coordination. They should establish clear roles and responsibilities, streamline decision-making processes, and facilitate stakeholder engagement. Effective stakeholder engagement is essential to foster collaboration, address community concerns, and ensure the projects meet the needs and expectations of all stakeholders. To ensure project success, monitoring and evaluation mechanisms should be in place to assess project progress, identify potential issues, and make necessary adjustments. Continuous monitoring allows for timely intervention, while evaluation helps to measure project outcomes and identify areas for improvement. Lessons learned from previous projects should be incorporated into future endeavors to enhance the effectiveness and efficiency of PPP-RE initiatives (Opio & Ahimbisibwe, 2019).

Theme 5: PPP best model for large-scale RE projects

The research findings strongly support the notion that PPP is the most viable and beneficial financing model for large-scale RE projects in Kenya. This theme highlights the advantages offered by PPP, including enhanced accountability, innovation, transparency, and effective post-delivery management and maintenance. The findings indicate that PPP models provide a more predictable framework for functionality and reduce sovereign borrowing, alleviating the public debt burden. Moreover, PPP is found to have positive economic impacts by attracting private investment and stimulating economic growth. The research findings underscore the importance of further promoting and utilizing the PPP model to fund and execute large-scale RE projects in Kenya. From quantitative results, the public-private partnership (PPP) model is currently considered the most viable way to finance large-scale renewable energy projects in Kenya now and in the future. This is because it helps overcome some of the problems associated with large-scale projects, such as huge initial costs, political factors, and high entry barriers for the private sector to invest. The PPP model leverages the financial resources of both the public and private sectors, providing access to the financing needed to develop large-scale renewable energy projects. This mirrors findings by Dharish and Venkatachalam (2018), who contend that PPPs are more useful for nations with strong demand when combined with strong institutions and governance, investor protection, and dispute resolution procedures. The other green investment possibilities, however, should make use of risk-reduction strategies, novel transactions, and market knowledge. PPPs have been developed in a few different national contexts to attain a range of purposes, including accessibility to concessional funding at lower rates of interest and extended tenures for green investments, with the common goal being up scaling low-carbon investments. Further, high upfront costs are associated with renewable energy sources, which are troublesome, particularly for developing nations.

Public-private partnerships (PPPs) have therefore emerged as a desirable mode of delivery to help the public sector provide its services by utilizing the capital, innovation, and technology of the private sector (Othman &Khallaf, 2022). The sharing of financial risk between the public and private sectors helps reduce the overall risk associated with large-scale renewable energy projects. The PPP model allows the public and private sectors to pool their technical expertise, providing a comprehensive and effective approach to project delivery. The PPP model helps to ensure that projects are delivered in a timely and cost-effective manner, as the

private sector partner is incentivized to minimize costs and maximize project efficiency. The PPP model allows the transfer of technical, financial, and operational risks from the public sector to the private sector, helping to reduce the overall risk associated with the project. Given the benefits of the PPP model, it remains the most viable way to finance large-scale renewable energy projects in Kenya now and in the future. However, it is important to ensure that the necessary conditions are in place to ensure the success of PPP projects, including a strong legal and regulatory framework, access to financing, and effective risk management.

Effective planning, execution, and accountability are key to the successful delivery of large-scale renewable energy projects implemented using the public-private partnership (PPP) model in Kenya. This includes measures to eliminate corruption, which can have a significant impact on project outcomes. These projects should be run within a robust regulatory and legal framework in terms of implementing best practices and following the PPP Act to the latter (the Kenyan PPP Act is deemed by sector experts as the best in Africa). A clear and robust legal and regulatory framework helps to ensure that PPP projects are delivered in accordance with the agreed terms and conditions, reducing the risk of corruption and ensuring transparency (Mazher*et al*., 2022). The implementing partners should ensure greater engagement and involvement of all relevant stakeholders at all stages of the project, especially local communities. Engaging and consulting with all stakeholders, including the public and private sectors, is critical to ensuring that the project is aligned with their needs and expectations. This helps build trust and confidence among stakeholders, reducing the risk of corruption and improving project outcomes. The management of the projects must be transparent and accountable, and clear and transparent procurement processes help to ensure that the procurement of goods and services is fair and competitive, reducing the risk of corruption and ensuring that the best value for money is achieved (Mazher*et al*., 2022).

The use of the public-private partnership (PPP) model has been identified as the best approach for large-scale renewable energy (RE) projects in Kenya. This finding aligns with contingency theory, which suggests that the choice of organizational structure should match the specific circumstances and goals of a project (Taremwa & Kakwezi, 2020). The flexibility and collaborative nature of PPPs make them well-suited for addressing the complexities and risks associated with RE projects. To minimize the failure of PPP renewable energy projects, several processes and strategies can be implemented. Effective project management practices

play a crucial role in ensuring project success. This includes employing project planning, execution, and control techniques to manage resources, time, and costs effectively (, 2020). Risk management strategies should also be in place to identify and mitigate potential risks that may arise during project implementation. Additionally, stakeholder engagement is vital in PPP-RE projects. Engaging relevant stakeholders, including government agencies, private sector partners, local communities, and NGOs, fosters collaboration and ensures that project objectives are aligned with the needs and expectations of all stakeholders. Regular communication and consultation with stakeholders help address concerns, build trust, and promote project acceptance and support. The significant association between project management practices and the success of RE-PPP projects in Kenya, as evidenced by the Chi-square analysis, further emphasizes the importance of employing robust project management principles. By adhering to best practices in project planning, budgeting, risk management, and stakeholder engagement, the likelihood of project failure can be significantly reduced (Ssemugenyi et al., 2020). As such, the use of the PPP model for large-scale RE projects in Kenya, along with the application of effective project management practices, is crucial for project success. Adhering to contingency theory, implementing processes and strategies to mitigate failure risks, and recognizing the strong association between project management practices and success, contribute to the effective delivery of PPP-RE projects in the country.

Project and program management techniques should be employed in such projects; regular monitoring and reporting of project progress, including the use of independent auditors, helps to ensure that the project is delivered effectively and efficiently, reducing the risk of corruption and ensuring accountability. Risk is noted as a significant factor contributing to the failure and/or poor performance of large-scale renewable energy projects executed using the PPP model in Kenya. Effective risk management is critical for the success of such projects; anticipating and managing risks is an important part of project management, including the risk of corruption. By identifying potential risks and implementing mitigation strategies, project managers can reduce the likelihood of unexpected events affecting the project. By implementing these measures, the large-scale renewable energy projects implemented using the PPP model in Kenya can be delivered successfully and with minimal risk of corruption, improving project outcomes and ensuring accountability. The thematic analysis of the research findings sheds light on key factors influencing the success of RE-PPP projects in Kenya. It

highlights the importance of effective project planning, management, and risk management, as well as the challenges posed by high initial costs and entry barriers. The findings underscore the significant role of the public sector, the responsibility of the private sector in post-delivery management, and the advantages of utilizing the PPP model for large-scale RE projects

Chi Square Test results

5.2 Validation of findings

The findings from the research as well as the developed framework were validated through semi-structured interviews undertaken using video conferencing with participants that had not taken part in the initial survey (see Appendix 6). The validation participants agreed that the proposed framework answered the research questions and fulfilled the research objectives, stating that the framework can enhance the successful delivery of large-scale RE projects undertaken using the PPP model. However, there were reservations about its implementation, especially from the government side, with suggestions that such a framework should be anchored in law and be included in the contractual terms as the basis for the management of such projects.

5.3 Chapter summary

The success of large-scale RE PPP projects in Kenya can be significantly improved through the effective use of program and project management strategies such as proper planning, control and monitoring, internal communication, and risk management. Further, greater local communities' involvement can improve the success of large-scale renewable energy projects financed using the PPP model in Kenya. Renewable energy sector stakeholders in Kenya strongly agree that high costs, a lack of supporting infrastructure, and location are factors that adversely affect the adoption of renewable energy projects funded using the PPP model. Statistical analyses show a strong and significant association between using project/program management techniques and the success of large-scale RE projects executed using the PPP model, as shown by Chi-Square test results.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This section is a conclusion of the main research findings; the findings are sectioned as per the research objectives; it also includes recommendations for further research as well as recommendations to the industry. The conclusions demonstrate a fulfilment of the research objectives and answer the research questions.

6.1 Conclusions

It was found that large-scale RE projects in Kenya executed using the PPP rarely go as planned; from a project management perspective, this means project failure—when costs exceed the budget, projects are delivered late, the objectives of the project are not met, as well as when the scope of the projects fails.

6.2 Objective 1: Determining factors for successful PPP renewable energy projects in Kenya.

***Objective one was to**: Establish the significant determining factors (both internal and external) necessary for the successful delivery of PPP renewable energy projects in Kenya, and the extent to which they impact successful project delivery.*

For large PPP-RE projects in Kenya to be successfully delivered, there needs to be detailed planning at the initial phase, intimate involvement of stakeholders, especially local communities, effective management of compensation and land acquisition, and effective management of the projects using project management methodologies. The questionnaire survey found that stakeholders in the sector strongly agree or agree that financial factors such as high initial costs adversely affect successful project delivery. There is strong agreement that government support, commitment, planning, involving local communities, and providing funding in a timely manner remain poor and significantly contribute to poor project delivery. There is also strong agreement that a lack of project and program management practices, including planning, risk management, stakeholder engagement, transparency, governance, project control and visibility, and budgeting, adversely affects the delivery of large-scale PPP renewable energy projects in Kenya. These were corroborated by Chi-square statistical tests

that established that using project and program management techniques, along with greater local community engagement, would overcome the challenges faced in successfully delivering these projects. This association is statistically significant. This study, therefore, concludes that successful delivery of public-private partnership (PPP)

i. **Political stability and support:** The Kenyan government must provide a stable and supportive environment for PPP projects with a clear and consistent policy framework for the development and operation of renewable energy projects.
ii. **Access to financing**: private partners require access to affordable financing to invest in the development and construction of renewable energy projects. This can be achieved through a combination of government incentives, grants, and private financing.
iii. **Infrastructure for a reliable grid:** Kenya's power grid needs to be reliable and able to work with renewable energy projects. Upgrades and improvements to the grid infrastructure may be necessary to achieve this.
iv. **Strong project management:** For PPP renewable energy projects to be successful, they must have good project management. Project managers need to have the right experience and skills to make sure that projects are finished on time, on budget, and up to the quality standards that were set.
v. **Skilled labor force:** Kenya needs a trained and skilled labor force to help build and run projects that use renewable energy. This includes engineers, technicians, and other professionals with expertise in renewable energy technologies.
vi. **Clear regulatory framework:** For PPP renewable energy projects in Kenya, there must be a clear and predictable regulatory framework. This includes rules about developing, building, and running renewable energy projects, as well as policies about prices, tariffs, and subsidies.

6.3 Objective 2: Framework for managing and delivering RE PPP projects in Kenya.

The second objective was*: To develop a framework for the management and delivery of renewable energy (RE) public-private partnership (PPP) projects in Kenya.*

Proposed Framework Based on Findings

Based on the research results, here is a proposed framework for the management and delivery of renewable energy (RE) public-private partnership (PPP) projects in Kenya, which aims to improve their successful delivery from a project management and societal benefits point of view:

i. ***Policy development and regulatory framework***: The Kenyan government should develop and implement a clear policy framework for RE PPP projects that outlines the roles and responsibilities of the public and private sectors and establishes a predictable and stable regulatory environment.
ii. ***Project development and financing***: The government should work with private partners to identify potential RE PPP projects and provide support with project development, including site selection, resource assessment, and feasibility studies. The government should also provide financing mechanisms and incentives to attract private investment.
iii. ***Project management and implementation***: Effective project management is critical for the success of RE PPP projects. The government and its private sector partners should establish a project management team responsible for overseeing the implementation of projects and ensuring that they are delivered on time, within budget, and to the required quality standards.

Effective project and program management techniques are needed to make sure that large, complicated energy projects are completed on time and on budget. The approaches include

a) *Project planning*: develop a comprehensive project plan that outlines the scope, schedule, budget, and key milestones of the project. This plan should also include a risk management strategy to identify and mitigate potential risks.
b) *Resource management*: assign a project team and allocate the necessary resources, including personnel, equipment, and materials, to ensure the project is completed on time and within budget.
c) *Stakeholder management*: identify all stakeholders involved in the project and establish clear lines of communication to ensure their expectations are met.

This includes regular updates and consultation with key stakeholders, such as local communities, regulators, and funding agencies.

iv. *Scheduling and monitoring*: Create a detailed project schedule and use project management software to monitor progress, track risks and issues, and ensure that the project is on track to meet its goals.

v. *Quality Management*: Establish a quality management system to ensure that the project is delivered to the required standards and meets the expectations of stakeholders. This includes regular quality assessments and audits.

vi. *Risk management*: continuously assess and manage project risks, including both technical and non-technical risks. Develop contingency plans to mitigate potential risks and ensure the project remains on track.

vii. *Contract management*: develop clear and concise contracts with suppliers, contractors, and other stakeholders and establish a contract management system to monitor performance and ensure that obligations are met.

viii. *Using systems thinking for complex projects*: systems thinking is a holistic approach that considers the interrelationships and interdependencies between different components of a system and seeks to understand how changes in one part of the system can impact the whole. In the context of complex energy projects, systems thinking can help project managers to:

i. Identify and understand the interconnections between different components of the project, including technical, financial, environmental, and social factors.

ii. Consider the long-term impacts and consequences of project decisions, and make informed decisions that promote sustainability and resilience.

iii. Anticipate and address potential problems and challenges early, reducing the risk of delays and cost overruns.

iv. Foster collaboration and coordination between different stakeholders, including project partners, government agencies, and local communities, to ensure the project is delivered effectively and efficiently.

v. Continuously evaluate and improve the project, incorporating feedback and learning from stakeholders and project outcomes to enhance future projects.

vi. Continuously evaluate and improve the project, incorporating feedback and learning from stakeholders and project outcomes to enhance future projects.

Using these project and program management techniques, energy project managers can make sure that large, complicated energy projects are completed successfully and that their social and economic benefits are at their highest level.

Stakeholder engagement: RE PPP projects should involve the engagement of local communities and other stakeholders to ensure that their interests and concerns are addressed. This can be achieved through regular communication and consultation, as well as the development of community benefit programs that provide tangible benefits to local communities.

Monitoring and evaluation: The government should establish a robust monitoring and evaluation system to assess the performance of RE PPP projects and ensure that they are delivering the desired social and economic benefits. This includes tracking the generation of clean energy as well as the economic and employment benefits of the projects.

Continuous improvement: The government should regularly review and evaluate the performance of RE PPP projects and make improvements to the framework as necessary to ensure that it continues to support the successful delivery of RE PPP projects in Kenya.

By implementing this framework, the Kenyan government can create a supportive environment for RE PPP projects, enhance their successful delivery, and maximize the social and economic benefits of renewable energy in the country.

The proposed framework is illustrated diagrammatically in Fig 5.1:

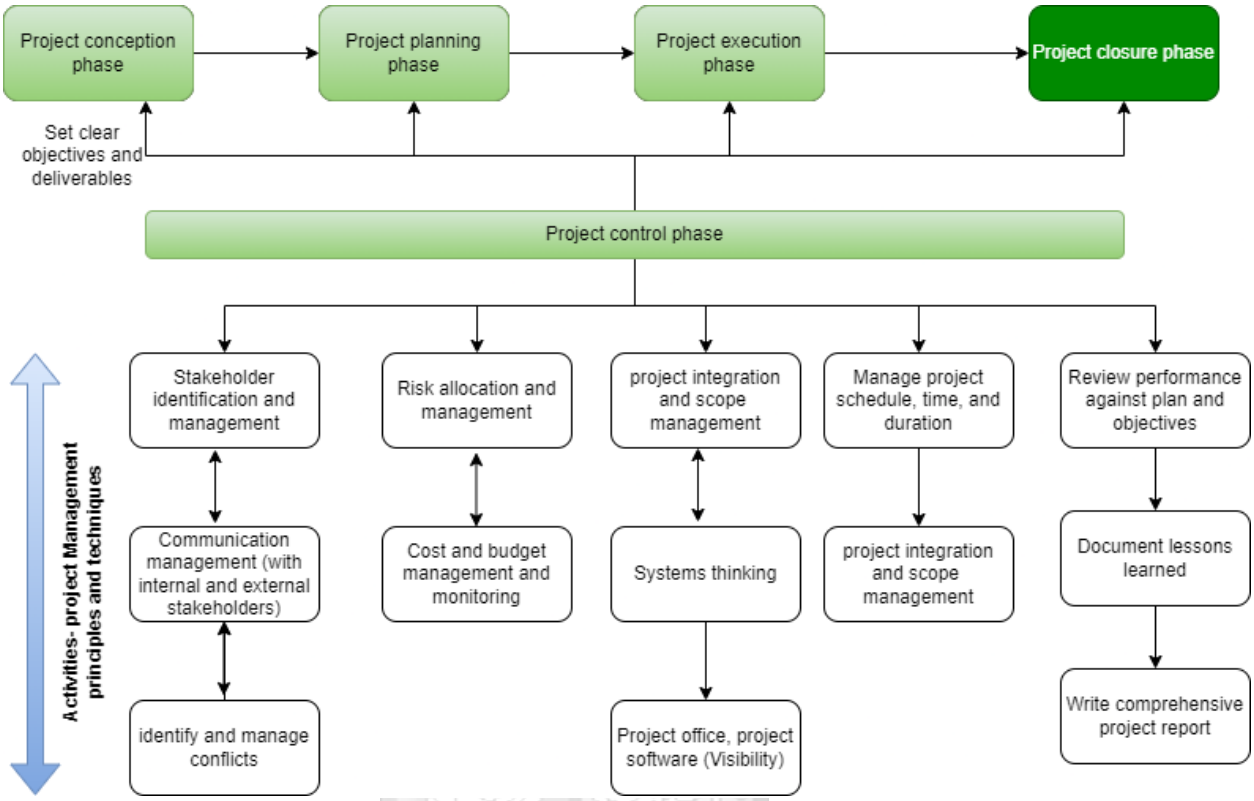

Figure 5.1: proposed framework for executing RE-PPP projects in Kenya
Source- Author (2023)

6.4 Objective 3: Evaluating impact of framework on successful RE PPP projects in Kenya.

The third objectives ***was: To evaluate the impact of the proposed framework on the successful delivery of RE PPP projects in Kenya from a project management and societal benefits perspective.***

The qualitative research underwent a validation process to assess its alignment with the perspectives of respondents and its effectiveness in addressing the issue of underperformance in renewable energy projects implemented through the PPP model in Kenya, with a focus on project management. The stakeholders in Kenya's renewable energy sector were provided with the proposed framework and were asked to provide feedback based on the semi-structured questions included alongside the framework. Following the workshop, the participants expressed agreement that the framework would facilitate the implementation of policy development, regulatory framework establishment, project development and financing, and

project management and implementation principles. They recognized its potential to improve the planning, execution, and delivery of RE-PPP projects in Kenya.

6.5 Recommendations for further research

- This study recommends additional research in which specific project and program management principles are compared to select project success factors. This will give weighted impacts of different approaches for enhancing the successful delivery of complex renewable projects implemented using the PPP model.
- Research to be undertaken on past large-scale RE projects funded using the PPP model as a case study to gain further insights into factors that affected the project and provide more information on factors that can affect similar projects
- More research should be undertaken on the general population, especially in communities whose localities host large-scale PPP RE projects or are earmarked for the same, to understand factors affecting such projects from the perspectives of communities directly impacted by them.

6.6 Recommendations to the industry

- Strengthen project planning and design by conducting comprehensive feasibility studies, identifying and mitigating potential risks, and engaging with local communities.
- Invest in education and skill development to build a local workforce capable of supporting renewable energy projects.
- Improve the availability and reliability of grid infrastructure by investing in transmission and distribution systems and integrating renewable energy into the grid.
- Ensure adequate and predictable revenue streams for project developers and investors, such as power purchase agreements, feed-in tariffs, and tax incentives.

6.7 Recommendations for policy makers

- Encourage partnerships between public and private organizations, such as joint investments and sharing of risks, to make the most of their skills and resources and build their capacity.
- Set up a stable set of policies and rules to reduce investment risks and provide long-term certainty.

- Engage with stakeholders and local communities to make sure projects are sustainable on a social and environmental level and help the country reach its larger development goals.
- Encourage openness and accountability in the planning and running of projects, such as through effective monitoring, reporting, and evaluation.

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APPENDICES

Appendix 1: Letter of introduction

Ole Sangale Rd, Madaraka Estate,
P.O Box 59857 00200, Nairobi, Kenya.
Cell: +254 703 414/6/7, Twitter: @SBSKenya
Email: info@sbs.ac.ke or visit **www.sbs.strathmore.edu**

Strathmore UNIVERSITY
BUSINESS SCHOOL

Tuesday, June 7, 2022

To whom it may concern.

RE: FACILITATION OF RESEARCH – LINDA MATHU NJOKI

This is to introduce Linda Mathu Njoki who is an MBA student at Strathmore University Business School, admission number MBA/55993/20. As part of our MBA Program, Linda is expected to do applied research and to undertake a project. This is in partial fulfilment of the requirements of the MBA course. To this effect, she would like to request for appropriate data from your organization.

Linda is undertaking a research paper on " ***An evaluation of factors impacting the successful delivery of public-private partnership -renewable energy projects in Kenya***." The information obtained from your organization shall be treated confidentially and shall be used for academic purposes only.

Our MBA seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct use to industry. We would be glad to share the findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support, and we shall be willing to provide any further information if required.

Yours sincerely,

Caroline Tiara,
Manager – MBA Programs.

Appendix 2: Research Instrument(s), where applicable

Consent letter

HR Department
Company Address

Postcode

CP Power East Africa HR Department

Dear Sir/Madam,

I am a final year student studying at Strathmore University, on the Master of Business Administration (MBA) course registration number MBA/55993. I am currently completing my dissertation entitled "Factors Impacting the Successful Delivery of Public-Private Partnership – Renewable Energy Projects in Kenya".

I am therefore writing to you for your assistance as a participant in the questionnaire survey. The questionnaire survey is likely to take 15 minutes to complete and no personal data is asked for or retained. All data collected in this survey will be held anonymously, securely and will only be used for academic purposes, as stated in the introductory letter from the University. After completion of my dissertation all data collected will then be destroyed to ensure confidentiality.

If you agree to the above, and consent, kindly under-sign below as confirmation of your personal and informed consent to take part in the study

…… …….

Signature of Participant Date

Appendix 3: Pilot Study Questions, Responses, and Suggestions for Improvements

Initial Research Questions (Questionnaire)

1. What is your profession (in regard to renewable energy)?
2. How long have you been involved in your profession?
3. Have you taken part in any major renewable energy project, and for how long?

Please indicate your level of agreement on each factor for the following questions, using a scale of from 1 to 5. (1 = 'strongly agree' 2 = 'agree' 3 = 'undecided' 4 = 'disagree', 5 = 'strongly disagree')

4. Is it possible that renewable energy adoption in Kenya is low, especially for end-users?
5. Is financing an issue for large-scale renewable energy projects in Kenya, requiring external funds and private sector assistance?
6. Does lack of community involvement hinder the implementation of renewable energy projects in Kenya?
7. Are government commitment and planning negatively affecting the adoption of renewable energy projects in Kenya?
8. Do poor management and execution hinder the successful completion of renewable energy projects in Kenya?
9. Is the high cost and complexity of large-scale renewable energy projects in Kenya a barrier to success, making public-private partnerships the preferred financing and delivery method?
10. Are internal factors, such as poor project management and lack of adherence to project management principles, contributing to the failure of renewable energy projects in Kenya?
11. Does the lack of technical expertise in renewable energy project teams affect the performance of PPP projects in Kenya?

12. Can the success of PPP-financed renewable energy projects in Kenya be enhanced through the use of program/project management strategies, community involvement, and improved planning with government support?

Pilot study responses:

1. What is your profession (in regard to renewable energy)?

- Respondent 1: Trader (retail/wholesale)
- Respondent 2: Policy maker/consultant
- Respondent 3: Technical service provider
- Respondent 4: Non-Governmental Organization (NGO)
- Respondent 5: Technical service provider
- Respondent 6: Policy maker/consultant

2. How long have you been involved in your profession?

- Respondent 1: 3 years
- Respondent 2: 8 years
- Respondent 3: 5 years
- Respondent 4: 2 years
- Respondent 5: 6 years
- Respondent 6: 4 years

3. Have you taken part in any major renewable energy project, and for how long?

- Respondent 1: Yes, 2 years
- Respondent 2: Yes, 4 years
- Respondent 3: No

- Respondent 4: Yes, 3 years
- Respondent 5: Yes, 1 year
- Respondent 6: No

4. Is it possible that renewable energy adoption in Kenya is low, especially for end-users?

- Respondent 1: 2
- Respondent 2: 1
- Respondent 3: 2
- Respondent 4: 3
- Respondent 5: 2
- Respondent 6: 1

5. Is financing an issue for large-scale renewable energy projects in Kenya, requiring external funds and private sector assistance?

- Respondent 1: 1
- Respondent 2: 2
- Respondent 3: 1
- Respondent 4: 1
- Respondent 5: 2
- Respondent 6: 2

6. Does lack of community involvement hinder the implementation of renewable energy projects in Kenya?

- Respondent 1: 4
- Respondent 2: 3

- Respondent 3: 4
- Respondent 4: 3
- Respondent 5: 4
- Respondent 6: 4

7. Are government commitment and planning negatively affecting the adoption of renewable energy projects in Kenya?

- Respondent 1: 4
- Respondent 2: 3
- Respondent 3: 4
- Respondent 4: 5
- Respondent 5: 4
- Respondent 6: 3

8. Do poor management and execution hinder the successful completion of renewable energy projects in Kenya?

- Respondent 1: 2
- Respondent 2: 1
- Respondent 3: 2
- Respondent 4: 2
- Respondent 5: 1
- Respondent 6: 1

9. Is the high cost and complexity of large-scale renewable energy projects in Kenya a barrier to success, making public-private partnerships the preferred financing and delivery method?

- Respondent 1: 1
- Respondent 2: 1
- Respondent 3: 2
- Respondent 4: 1
- Respondent 5: 2
- Respondent 6: 1

10. Are internal factors, such as poor project management and lack of adherence to project management principles, contributing to the failure of renewable energy projects in Kenya?

- Respondent 1: 2
- Respondent 2: 3
- Respondent 3: 1
- Respondent 4: 1
- Respondent 5: 2
- Respondent 6: 3

11. Does the lack of technical expertise in renewable energy project teams affect the performance of PPP projects in Kenya?

- Respondent 1: 1
- Respondent 2: 2
- Respondent 3: 1
- Respondent 4: 1
- Respondent 5: 2
- Respondent 6: 3

12. Can the success of PPP-financed renewable energy projects in Kenya be enhanced through the use of program/project management strategies, community involvement, and improved planning with government support?

- Respondent 1: 1
- Respondent 2: 1
- Respondent 3: 2
- Respondent 4: 1
- Respondent 5: 2
- Respondent 6: 1

Suggestions for Improvements from pilot study

The research questions look okay, but you can make some improvements; I recommended you provide more clarity, specificity, and focus. Additionally, ensuring that the questions are unbiased and easily understandable by respondents can enhance the overall quality. Here are some suggestions for improvement:

Clarify the profession question: Instead of asking "What is your profession (in regard to renewable energy)?" it can be rephrased as "What is your current role or occupation related to the renewable energy sector?"

Add a time frame to the involvement question: "How long have you been involved in your profession?" can be improved by specifying a time frame, such as "How many years of experience do you have in your current profession related to renewable energy?"

Specify the duration of participation in renewable energy projects: "Have you taken part in any major renewable energy project, and for how long?" can be revised to "Have you participated in any major renewable energy project? If yes, please indicate the duration of your involvement (in months or years)."

Avoid leading language: Questions 4 to 12 can be revised by using neutral language that does not suggest a specific answer. For example, question 4 can be rephrased as "To what extent do you agree with the statement: The adoption of renewable energy in Kenya is low, particularly among end-users?"

Ensure clarity and specificity: Questions 6 and 7 can be made more specific by providing context. For instance, question 6 can be revised as "To what extent do you agree with the statement: The lack of community involvement negatively impacts the implementation of renewable energy projects in Kenya, specifically in relation to (mention a specific type of project)?" Similarly, question 7 can be improved by specifying the aspects of government commitment and planning that are being referred to.

Consider separating questions with multiple components: Question 12, which combines program/project management strategies, community involvement, and improved planning with government support, can be split into multiple questions to focus on each component individually. This allows for more targeted responses.

Appendix 4: Ammended Research Questionnaire (Used for Main Study)

An Evaluation of Factors Impacting the Successful Delivery of Public-Private Partnership -Renewable Energy Projects in Kenya

https://forms.gle/tnrxgnu7baeQjg1Z6

Notes about the Questionnaire

As is the case with many questionnaire surveys there may be some questions which appear irrelevant or impertinent. However, it is necessary in this study that all questions are answered, as the questionnaire is designed to achieve research objectives, and it is hoped not to offend participants in any way. If there are any questions which you are unwilling or unable to answer, then it is my wish that you continue to answer the remainder of the questionnaire. **Remember that both your identity and that of the company you work for will remain strictly confidential.**

Aim of the study: The research aims to identify determinants that negatively impact the delivery of PPP-Renewable Energy projects in Kenya. The research will propose a framework that will comprise effective project delivery processes and strategies that can be adopted by senior energy practitioners to improve the planning and delivery of PPP renewable energy projects in Kenya.

1.Which sector would you class your expertise belonging to?

Field/ Area within Renewable Energy Sector in Kenya	
Trade as a retailer/ wholesaler of renewable energy products	
Consultant	
Policy maker/ public service in renewable energy sector in Kenya	
Non-Governmental Organization (NGO) involved in renewable	

energy projects in Kenya	
Contractor/ technical Service provider renewable energy projects in Kenya	
Government employee dealing with renewable energy/ finance sectors	
Other (Specify)	

2. How many years have you held the position?

   Less than a year [ ] 1-5 years [ ] 11-15 years [ ] 16-20 years [ ] More than 20 years [ ]

3. How many years of experience have you managed energy projects?

   Less than a year [ ] 1-5 years [ ] 11-15 years [ ] 16-20 years [ ] More than 20 years [ ]

SECTION 2

SECTION 2A: Adoption and use of renewable energy sources in Kenya

Below are factors that contribute to low/ less than desirable **adoption and use of renewable energy sources** in Kenya despite the potential for renewable energy in Kenya. Please indicate your level of agreement on each factor using a scale of from 1 to 5. (1 = 'strongly agree' 2 = 'agree' 3 = 'undecided' 4 = 'disagree', 5 = 'strongly disagree'). Low adoption of renewable energy sources in Kenya are due to:

rs for low adoption	**gly agree**		**cided**	**ree**	**gly ee**
nation barriers					
of necessary supporting ructure					
on of major renewable projects					

SECTION 2B: Factors associated with failure of PPP projects in Kenya

The following are factors associated with failure of major renewable projects in Kenya financed using Public-Private- Partnership. Kindly indicate how much you agree or disagree with each factor based on a scale of 1 to 5 (Where 1 = 'strongly agree', 2 = 'agree', 3 =

'undecided', 4 = 'disagree', 5 = 'strongly disagree'). Major renewable projects in Kenya financed using Public-Private- Partnership model fail to meet their objectives because of:

Factors for failure of PPP projects in Kenya	**Strongly agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
The projects are poorly planned					
Government inefficiencies					
Inadequate financing or financing challenges that delay projects					
Insufficient requisite infrastructure to enable renewable energy transmission and dispersion					

SECTION 2C: Financing of large-scale renewable energy projects

The following factors are some of the major challenges adversely affecting large scale renewable energy projects such as wind/ solar/ geothermal/ hydro-electric. Kindly indicate how much you agree or disagree with each factor based on a scale of 1 to 5 (Where 1 = 'strongly agree', 2 = 'agree', 3 = 'undecided', 4 ='disagree', 5 = 'strongly disagree'). The challenges hindering greater exploitation of renewable energy projects in Kenya include:

Factors hindering greater exploitation	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
High initial investment costs					
Political factors (marginalization of certain areas)					
High barriers to entry by the private sector players					
Infrastructure challenges (how to transmit the generated energy to where it is needed)					
Lack of government incentives such as buy-back programs and tax waivers to encourage greater adoption					

SECTION 2D: Achievement of renewable energy project expectations

While medium to large scale renewable energy projects in Kenya have been implemented by the government either as public-funded projects or through private-public partnerships, the projects rarely fulfill expectations or meet their target potential. Kindly indicate how much

you agree or disagree with each factor based on a scale of 1 to 5 (Where 1 = 'strongly agree', 2 = 'agree', 3 = 'undecided', 4 = 'disagree', 5 = 'strongly disagree'). Medium to large scale renewable projects in Kenya fail to make a significant impact because:

Factors for achievement of renewable energy project expectations	**Strongly agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
Lack of capacity for management					
High rates of technology failure					
Insufficient support post-installation					
Poor maintenance and management					
Lack of/or inadequate promotional initiatives					
Lack of/or inadequate awareness of technology					
Negative public perceptions on the value/ usefulness of the project benefits					

SECTION 2E: Challenges associated with local communities

Major renewable private-public partnerships (or just public funded) renewable projects face challenges from local communities where they are implemented, such as attempts to block or stop such projects for a number of reasons. How well do you agree or disagree with each factor based on a scale of 1 to 5 (Where 1 = 'strongly agree', 2 = 'agree', 3= 'undecided', 4 = 'disagree', 5= 'strongly disagree'). Local communities fail to on-board renewable energy projects undertaken in their locations due to:

Factors associated with local community challenges	**Strongly agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
Failure to engage with local communities before project start					
Failure to adequately compensate affected local communities					
Political factors					
Failure to manage the environmental effects caused by project implementation, such as generated waste and degraded lands					

SECTION 2F: Government commitment and effective planning

1. A number of issues regarding government commitment and effective planning adversely affect large scale adoption of renewable energy projects in Kenya, such as the Lake Turkana Wind Power Project. How well do you agree or disagree with each factor based on a scale of 1 to 5 (Where 1 = 'strongly agree', 2 = 'agree', 3 = 'undecided', 4 = 'disagree', 5 = 'strongly disagree'). The following commitment and planning factors hinder the success of large-scale public-private partnership projects in Kenya:

Factors hindering success of large-scale PPP	**Strongly agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
Failure by government to offer guarantees to such public private partnership renewable energy projects					
Poor strategic planning on execution and rollout					
Failure to provide incentives for such projects, such as tax waivers					
Failure by government to fulfill their contractual obligations					

such as developing supporting infrastructure					

SECTION 2G: Poor management and execution

2. Poor management and execution of large-scale renewable energy projects such as geothermal, wind, solar, and hydro-electric hinders their successful execution and completion. How well do you agree or disagree with each factor based on a scale of 1 to 5 (Where 1 = 'strongly agree', 2 = 'agree', 3 = 'undecided', 4 = 'disagree', 5 = 'strongly disagree'). The following factors contribute to poor management and execution of renewable energy projects in Kenya, leading to their failure;

Factors associated with poor management and execution	**Strongly agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
Poor initial budgeting and budget control					
Failure to manage risks such as legal challenges, fluctuations in prices (global) or currency exchange rates, leading to higher costs					
Failure to treat such large initiatives as programs requiring greater coordination among all					

stakeholders					
Lack of awareness and use of technical project/ program management tools and techniques for project planning, execution, and control					

SECTION 2H: Government commitment and effective planning

A number of factors make large-scale renewable energy projects in Kenya to be costly and complex, and so public-private partnerships are the best financing and project delivery method. Kindly indicate how much you agree or disagree with each factor based on a scale of 1 to 5 (Where 1 = 'strongly agree', 2= 'agree', 3= 'undecided', 4 = 'disagree', 5= 'strongly disagree'). The following factors make renewable energy projects very costly to implement in Kenya;

Factors associated with cost and planning	**Strongly agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
Huge initial capital investments, including land acquisition, and slow returns					
Low energy density per unit in renewable energy					

The remote location of sources of such exploitable renewable energy					
The required technical expertise and knowhow					

SECTION 2I: Poor performance large-scale renewable energy projects in Kenya

3. The following is a list of variables associated with **poor performance of renewable energy projects**. Please indicate your level of agreement on each factor using a scale of from 1 to 5 **(1= 'strongly agree' 2= 'agree' 3= 'undecided' 4 = 'disagree', 5= 'strongly disagree').** Poor performance of large-scale renewable energy projects in Kenya is associated with:

Poor performance	**Strongly agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
Adoption of poor project management practices					
Lack of detailed control					
Unrealistic expectations					

Unclear objectives					
Lack of project visibility					
Lack of transparency					

SECTION 2J: Improvement of large-scale renewable energy projects

4. The success of large scale renewable energy projects financed using PPP model in Kenya can be improved by employing certain technical and 'soft' strategies. Kindly indicate how much you agree or disagree with each factor based on a scale of 1 to 5 (Where 1 = 'strongly agree', 2= 'agree', 3 = 'undecided', 4 = 'disagree', 5 = 'strongly disagree'). The following approaches can greatly enhance the success of public-private partnership renewable energy projects in Kenya;

Factors associated with improvement	**Strongly agree**	**Agree**	**Undecided**	**Disagree**	**Strongly disagree**
Effective use of program / project management strategies,					
Greater local communities					

involvements					
Effective communication internally (among implementing stakeholders), and with external stakeholders					
Total commitment and support for such projects by government, including purchase guarantees					

Thank you for taking the time to complete the survey.

Semi-Structured interview questions

Pursuant to our previous conversation and exchanges with regard to the project I am doing, please find the interview questions. I have sent them upfront to enable you to familiarize with them and possibly develop detailed responses before we have the actual interview.

1. What, in your opinion, are the factors necessary for the successful delivery of RE - PPP projects in Kenya?
2. Renewable energy has become a major source of energy in Kenya and a major investment destination by both the public and private sector, yet many fail to meet their objectives or fail altogether; why is this?
3. Between the private entities and the public entities involved in RE- PPP projects in Kenya, who has the greatest influence on the final successful delivery of the projects?
4. Large scale RE projects such as the LTWPP or geothermal projects are largely complex and costly, what do you say about the use of the public- private partnership (PPP) model to finance them, is this a viable financing option for the future?
5. How do you think large scale RE projects in Kenya should be funded in future; that is, what is the best approach and why?

Appendix 3: Any other relevant information for conducting the research

List of organizations in the population

The Directorate of Public Private Partnership – Kenya

Ministry of Energy- Kenya

Private sector companies

Vision 2030 Secretariat

Finance Ministry

Appendix 5: Timeline of Activities (as agreed with the supervisor). This timeline will be used to track the student's progress

Phase	Activity	Dec 2021	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022	Jun 2022	Jul 2022	Aug 2022	Sep 2022	Oct 2022
Inception phase	Establishing the project requirements											
	Considering research objectives											
	Evaluating expected outcomes											
	Consuting department guidelines											
Planning	Selecting topic											
	Consulting supervisor											
	Writing the project brief											
	Submission and obtaining feedback from supervisor											
Execution	Identifying required resources											
	Developing detailed budget and plan											
	Conducting research											
	Writing draft proposal											
	Submission and obtaining feedback from supervisor											
	Making changes as per supervisor feedback											
	Additional research											
	Writing second draft and submitting											
	Submission and defense of propject proposal											
	Obtaining feedback and making necessary changes											
	Drafting final proposal as per defense feedback											
	Refining research questions											
	Contacting possible respondents to ask for participation											
	Pre-testing research questions											
	Refining questions											
	Submitting questionnaires to respondents											
	Conducting interviews											
	Evaluating research findings and collating data											
	Thematic and quantitative data analysis											
	Discussion of findings											
	Writing draft final report											
	Obtaining feedback on draft report											
	Writing final research report											
	Submission of final research report											
Closure	Reviewing research performance											
	Auditing resource use											
	Documenting lessons learned											
	Small celebration											
	Official closure of research project											

Appendix 5: Budget

	Budget	
	Activity	Cost in KES
Inception		
Planning		
Execution	Writing draft report	5000
	Seeking out participants (communication)	5000
	Pre-testing questionnaire (Pilot)	5000
	Data collection	10000
	Stationery (Printing, copying)	15000
	Logistics	10000
	Communication	5000
	Conducting research	15000
	Incidentals	10000
	Commuting	20000
Closure	Closure activities	5000
	Contingency (10%)	10500
	Sub-Total	105000
		0

Appendix 6: Verification and Validation of Research Findings

The qualitative research was verified through a process of validating the research framework to see if it aligns with the views presented by the respondents and helps solve the problem of poor performance of RE projects implemented using the PPP model in Kenya, from the perspective of project management. The proposed framework was sent to stakeholders in Kenya's renewable energy sector and asked to give their feedback based on the semi-structured questions (listed after the framework).

a. Validation

The research, whose findings are summarized in the framework below, was conducted with the following objectives

rch Topic	**rs Impacting Successful Delivery of Public-Private ership Renewable Energy Projects in Kenya**
rch Objectives	fy the major factors necessary for the successful delivery of PPP able energy projects in Kenya. se a framework in the management and delivery of RE PPP ts in Kenya to enhance their successful delivery from a project gement and societal benefits perspective.
rch Questions	are the necessary critical factors for the successful delivery of RE rojects in Kenya? can the failure of PPP renewable energy projects being executed nya be mitigated to ensure their successful delivery?

b. Validation Questions

Kindly respond to the questions below as best as you can, based on the developed framework

1. **Considering the framework developed to fulfill the research objectives and answer the questions, with the goal of ensuring renewable energy projects in Kenya undertaken using public-private partnerships model succeed, what are your views on the developed framework?**

Themes:

- Framework fulfills the objectives of the research.
- The framework can significantly improve the outcomes of large scale RE projects funded using the PPP model in Kenya
- Framework captures what policy makers and consultants, as well as projects teams have been advocating for in such projects

Select Quotes

Renewable Energy Consultant

"The framework captures the objectives of the research and largely answer the research questions; it provides a stepwise approach to successfully managing not only renewable energy projects, but other projects that use the PPP model."

KenGen Employee

"I think such a framework will go a long way in enhancing delivery of energy projects involving public-private partnerships, although my concern remains the commitment of the government"

Contractor in Renewable Energy in Kenya

"It is a good starting point, though it can be improved in future and adjusted based on the specific conditions unique to different projects, it is a good platform to start managing PPP projects effectively and efficiently."

2. Do you think this framework can be implemented?

Themes:

- The framework is good, and can be implemented
- The problem is, is the public sector willing to implement and adhere to the requirements of the framework? Our problem (as Kenyans SIC) is that we develop excellent frameworks and models, but are very poor at implementation

Select Quotes

KenGen Employee

"The framework can be implemented, if there is commitment, especially from the government side, and by government, I mean all players, from those conducting feasibility surveys to those handling compensation and those actually executing the project"

Contractor in Renewable Energy in Kenya

"The framework model is implementable, but the private sector needs to take the lead in using such a framework, and have its use specified in the contractual agreements as the means for managing the project."

Renewable Energy Consultant

"The framework can be used very effectively, although I have reservations that all parties will adhere to it, especially the public sector (usually government) where bureaucracy remains a big stumbling block."

3. Are there areas of the framework that need to be improved?

Themes:

- It can be more elaborate, such that identified issues and how the framework solves them is explicitly explained
- The framework should be submitted to the relevant authorities, including legislators, and be anchored in law

Select Quotes

Contractor in Renewable Energy in Kenya

"Some findings from the research should be included and elaborately defined in the framework, for example, how can corruption in such projects be eliminated, or political meddling?"

Renewable Energy Consultant

"It may need revision from time to time as circumstances change; however, it must be anchored in some law or policy, and be an integral part of PPP contracts, so it provides the basis for undertaking the renewable energy projects."

Appendix 7: Clearance from Ethical approval

Strathmore UNIVERSITY

26th September 2022

Ms Mathu Linda,
linda.njoki@strathmore.edu

Dear Ms Mathu,

RE: Public-Private Partnership Renewable Energy Projects in Kenya

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-master's** research proposal. Your application reference number is **SU-ISERC1481/22.** The approval period is from **26th September 2022 to 25th September 2023.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 48 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 48 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to SU-ISERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Dr Ben Ngoye,
Secretary; SU-ISERC

Cc: Prof Fred Were,
Chairperson; SU-ISERC

SU-ISERC
26-Sep-2022
Email:ethicsadmin@strathmore.edu
P.O BOX 59857-00200
NAIROBI-KENYA

Appendix 8: NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **106395**

Date of Issue: **23/August/2022**

RESEARCH LICENSE

This is to Certify that Miss.. Linda Njoki Mathu of Strathmore University, has been licensed to conduct research in Garissa, Nairobi, Turkana on the topic: FACTORS IMPACTING SUCCESSFUL DELIVERY OF PUBLIC-PRIVATE PARTNERSHIP RENEWABLE ENERGY PROJECTS IN KENYA for the period ending : 23/August/2023.

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