FACTORS INFLUENCING PERFORMANCE OF SOLAR ENERGY PROJECT: A CASE OF REMBA-HOMABAY COUNTY, KENYA

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DECLARATION

The work contained in this research project report is my original work and has not been presented in any other university for a degree.

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L50/82382/2015

This research project report is presented for examination with my approval as university supervisor.

Signature: _____Date: _____

DR. ANNE NDIRITU

DEDICATION

I dedicate this research study to my loving parents Mr. and Mrs. Motari, for always supporting me throughout my academic journey. I also dedicate it to my siblings and friends for their constant encouragement and for being patient enough to see me go through my academic struggle thus realizing my long cherished dream.

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I am also greatly indebted to the staffs implementing the solar energy projects who will be my respondents for their support and willingness to provide the required information during the fieldwork phase of this study.

To my classmates and friends without whose interest and co-operation I could not have produced this study. I wish to thank them for supporting this initiative and affording me their time and sharing their experiences.

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ABSTRACT

Project failure in mainstream project management has received a lot more attention than project performance; there are quite some significant studies on factors that impact project performance. The objective of the study was to establish the factors influencing performance of solar energy projects: a case of Remba-Homabay County, Kenya. The specific objectives were be to establish the extent to which economic factors influences performance of solar energy projects in Remba-Homabay County, to determine how government involvement in renewable energy projects influence performance of solar energy projects in Remba-Homabay County, to examine the extent to which stakeholder participation influence performance of solar energy projects in Remba-Homabay County, and to determine how project management influence performance of solar energy projects in Remba-Homabay County. This study utilized descriptive survey research design. The population for this study was 400 respondents who included the three-project manager, community member, and ministry representative who are involved in the implementation and performance of projects in Remba-Homabay County. This study adopted the stratified sampling technique. The sample size will be 120 respondents. A questionnaire was used to collect primary data. The study generated both qualitative and quantitative data. Descriptive statistics data analysis method was applied to analyze both quantitative and qualitative data. Information obtained from the questionnaires was processed through editing and coding and then entered into a computer for analysis using descriptive statistics with the help of Statistical Package for Social Sciences (SPSS) version 20. The study also employed a regression model to study the influence of project maintenance, government involvement, stakeholder participation, and project management on solar energy projects. The regression method was useful for its ability to test the nature of influence of independent variables on a dependent variable. The study found that economic factors influence the performance of solar energy projects. The study further established that there is limited policy support for solar energy projects as shown by minimum budget allotment to renewable which has greatly influenced the success of the projects. The study also established that establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy. The study found that any stakeholder engagement mechanism requires some form of common, transparent way of providing timely information to all sectors before policy decisions are final. On the extent to which economic factors influences performance of solar energy projects in Remba-Homabay County, the study concluded that solar energy projects as shown by minimum budget allotment to renewable which has greatly influenced the success of the projects. On government involvement in renewable energy projects influence performance of solar energy projects in Remba-Homabay County, the study concluded that establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy. The study recommended that The Government should consider zero rating tax on solar equipment so as to influence lower pricing thus making it more affordable for purchase and installation of solar system. This would be of assistance especially for the people living in the rural areas.

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

Renewable energy comes from natural resources such as sunlight, wind, rain, tides and geothermal heat. About 16% of global energy consumption comes from renewables: 10% is from traditional biomass, which is used mainly for heating and 3.4% from hydroelectricity. New renewables such as small hydro, modern biomass, wind, solar, geothermal, and bio-fuels account for about 2.8% (UNEP, 2011). There has been a rapid growth in new renewables because of increased uptake of the relevant technologies. The share of renewables in electricity is about 19%, and it is estimated that about 16% of global electricity comes from hydroelectricity and 3% from new renewable.

Global investments in renewable energy increased by 32% in 2010, to a record US$211 billion. The increase was mainly because of wind-farm development in China and small-scale solar PV installations in Europe (UNEP, 2011). Africa achieved the largest percentage increase in investment in renewable energy among developing regions excluding the three big economies. Total investment on the continent rose from US$750 million to US$3.6 billion, largely, because of strong performance in Egypt and Kenya. In 2008, India accounted for 17.7% of the global population but was the fifth-largest consumer of energy, accounting for 3.8% of global consumption. India's commercial energy supply is dominated by coal and oil (most of it imported), with renewable energy contributing less than 1% overall and accounting for approximately 10% of installed capacity.

In Egypt, which is Kenya's main competitor within the COMESA region, investment in renewable energy rose by US$800 million to just over US$1.3 billion as a result of just two deals, a 100MW solar thermal project in Kom Ombo, and a 220MW onshore wind farm in the Gulf of El Zeit. The country's next move in renewable energy is likely to be a tender for several hundred MW of wind projects in the Gulf of Suez region (UNEP, 2011). Although Kenya has vast renewable energy resources such as solar, wind, biomass, bio-fuel, geothermal and hydropower, their use has been limited. Expansion of the sector is being catalyzed by the growing demand and cost of electricity, increasing global oil and gas prices and environmental pressure.

Currently, the Kenyan energy sector is characterized by the heavy reliance on unsustainable biomass use, frequent power outages, low access to modern energy, over reliance on hydroelectricity and high dependence on oil imports. Renewable energy is, therefore, an important and timely means to meet the challenges of growing demand and addressing the related environmental concerns. Kenya's Least Cost Power Plan (LCPP) aims to identify new generation sources to enable the national electricity supply to respond to demand, taking into account the 15% margin required to ensure its security.

In the light of frequent droughts and the increase in oil prices, there has been emphasis on developing alternative energy resources especially geothermal, solar, wind and coal. Since power projects take time to construct, there will be measures to fast-track implementation of the power projects in the master plan, to ensure adequate energy supply to meet the demand over the MTP period (Ministry of Finance, 2011). As evidenced by good government policy and energy planning that aim to ensure a

sustainable energy mix, Kenya's move towards renewable energy has been broad-based. Investment has grown from virtually zero to more than US$1.3 billion (including funding for wind, geothermal and small hydro).

1.2.Statement of the Problem

The world over, financing and implementation of various project activities has been an integral part of public planning and management. Kenya has not been an exception. Vision 2030 and other sessional papers before it recognized the energy sector as a concrete pillar and whose success can be an enabler of overall economic growth. Given the importance of the energy sector, procedures have evolved to help keep watch so that such projects are well managed to facilitate their performance success. Solar energy projects are among the most deliberated upon energy issues in Kenya. It has been at the centre of national and regional energy policy agenda and different actors both state and non-state have taken steps to resolve the energy deficiency.

Although project failure in mainstream project management has received a lot more attention than project performance, there are quite some significant studies on factors that impact project performance. Many researchers including (Naomi, 2014) have investigated indicators of project success and impact on policy process in Kenya project performance and as a result have provided a number of factors believed to affect project performance. Accordingly, proper project design, realistic budget estimates, realistic time frames, effective communication, secure funding, institutional strengths, prudent risk management among others abound in project management literature as some determinants of how a project performs.

However, literature on how project performance for solar energy projects is impacted by the four variables (economic factors, government involvement, stakeholder participation, and project management) especially in Kenya though available is still not fully developed (Sansom, 2011). An attempt to establish critical success factors that impact performance of energy sector projects specifically solar energy projects based on a project done at Remba - Homabay county leads to the primary purpose of this study. There has been no evident comprehensive research on the factors that influence performance of solar energy projects that can explain the minimal performance of solar energy projects in Kenya. This study therefore sought to fill this gap by investigating out the factors influencing performance of solar energy projects: a case of Remba-Homabay County, Kenya.

1.3. Purpose of the Study

The study sought to establish the factors influencing performance of solar energy projects: a case of Remba-Homabay County, Kenya

1.4. Objectives of the Study

The study was guided by the following objectives:

i. To establish the extent to which economic factors influences performance of solar energy projects in Remba-Homabay County.
ii. To determine how government involvement in renewable energy projects influence performance of solar energy projects in Remba-Homabay County.
iii. To examine the extent to which stakeholder participation influence performance of solar energy projects in Remba-Homabay County.

iv. To determine how project management structures/process influence performance of solar energy projects in Remba-Homabay County.

1.5. Research Questions

The study sought to answer the following research questions:

i. To what extent do economic factors influence performance of solar energy projects in Remba-Homabay County?
ii. How does government involvement influence performance of solar energy projects in Remba-Homabay County?
iii. To what extent does stakeholder participation influence performance of solar energy projects in Remba-Homabay County?
iv. How does project management influence performance of solar energy projects in Remba-Homabay County?

1.6. Significance of the Study

The study was significant to contribute to the existing knowledge in project performance and will contribute to increasing performance standards amongst the project management professionals and the entire industry. The study provided information to the policy makers and planners in both governmental and non-governmental organizations on areas of focus and avoids duplication of interventions of related services. The study on a number of project performance practices provided a platform for more research in order to establish more of them and how they influence the performance of solar energy projects within and/or without the scope of study. This study can be used for the future and references.

1.7. Limitations of the Study

Ignorance by some respondents on the information being studied. The researcher will overcome this by selecting various categories of project participants as respondents who have information concerning the targeted project. Inaccessibility of some areas due to the nature of rural roads also poses a challenge to the researcher. This will be solved in that the researcher will use whatever means of transport that will be available. .

1.8. Delimitations of the Study

The study was limited to factors influencing performance of solar energy projects: a case of Remba-Homabay County, Kenya. Only four variables were focused on which included economic factors, government involvement, stakeholder's participation, and project management. This is because the effect of the four variables was more pronounced as compared to others which might also affect the performance.

1.9. Assumptions of the Study

In undertaking this study the researcher assumed that the respondents would be willing to participate. The response rate was therefore expected to be high. Additionally the researcher took the proposed time to complete the collection of data and that the findings will be accurate so as to help make informed conclusions and recommendations. Another assumption was that the area selected for this study was a case reflecting other areas in Kenya and therefore the findings from this research could objectively be generalized to other areas in Kenya. .

1.10. Definitions of Significant Terms Used in the Study

This section presents the definition of terms that were used in the study. They include:

Government Involvement is the exercise of political authority over the actions, affairs, of a political unit, people, as well as the performance of certain functions for this unit or body; the action of governing; political rule and administration

Solar Technology refers to source of energy from the sun that is converted for lighting, heating, pumping water and also for running other household appliances.

Stakeholder Participation refers to the process by which an organization involves people who may be affected by the decisions it makes or can influence the implementation of its decisions.

Economic factors are financial factors which may include costs such as wages, interest rates, governmental activity, laws, policies, tax rates, and unemployment. All of these factors occur outside of the business or investment itself, but they heavily influence the value of the investment in the future.

Project management refers to initiating, planning, executing, controlling, and closing the work of a team to achieve specific goals and meet specific success criteria at the specified time.

1.11. Organization of the Study

This study was divided into five chapters. Each chapter has sections which provide details as required for a standard academic research. Chapter one gave the background of the study, statement of the problem, purpose of the study, research objectives and research questions and the significance of the study. Additionally, Chapter one explained

the delimitation and limitation of the study and assumptions of the study. Chapter two provided the literature review of the study. It accounted for the previous research and what has been found out in the area of study. This chapter mainly focused on the factors influencing performance of solar energy projects. The other items under this chapter were the theoretical and conceptual frameworks. Chapter three gave details on the research design used; target population; methods of data collection and validity and reliability of data collection instruments. Chapter four provided details of data analysis, presentation and interpretation of the findings. Chapter five listed the summary of findings, discussions, conclusions and recommendations. Further, it provided recommendations for further studies.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

Chapter two provides the literature review of the study. It accounts for the previous research and what has been found out in the area of study. This chapter mainly focuses on the leadership styles and the relationship to the performance of projects. In addition, the chapter presents the theoretical framework, conceptual framework, knowledge gap, and summary of literature.

2.2 Project Performance of Solar Energy Projects

The ultimate importance of project performance is achieved through avoiding the project's failure to keep within cost budget, failure to keep within time stipulated for approvals, design, occupancy and failure to meet the required technical standards for quality, functionality, fitness for purpose, safety and environment protection (Flanagan and Norman 2003). Project performance ensures that enterprises maximize on profitability, minimize the consequences of risky and uncertain events in terms of achieving the project's objectives and seizes the chances of the risky events from arising (Kululanga and Kuotcha, 2010). The benefits of project risk management for small businesses lie at the point of time and budget project advantages. It is understandable why there are as many models of project risk management as general risk management schemes.

The criteria of project performance for the project will be cost, time and quality which are basic elements of project success (Mohammed, 2002). Quality is all about the entirety of features requisite by a product to meet the desired need and fit for purpose. To ensure the effectiveness and conformity of quality performance, the specification of quality requirements should be clearly and explicitly stated in design and contract documents. Project performance measure for this study was defined in terms of cost, time, quality and profitability, as small and medium enterprise focus on earning returns over project investment. In Kenya, project performance has been measured through project cost, quality, customer or stakeholder's satisfaction, timeliness and achieving of project objective is effective indicator to measure of project performance (Nyikal, 2011). Solar energy is not being implemented at the rate that it could or should be in the United States for reasons mainly due to efficiency and cost. United States is dependent on environmentally degrading energy sources owned and operated by corporate conglomerates. Changing the way they use energy would be changing the way multinationals do business, and it may be that their non-renewable resources such as coal and natural gas must be depleted till they look for alternative sources such as solar.

Research has already suggested that to be attractive in simple financial terms, solar technologies would need to cost approximately £1000 at 2003 UK prices (BRECSU 2001). The single largest trend in international solar policy circles over the past decade has been to shift solar dissemination strategies from heavily subsidized donor projects to private market-based approaches that seek to achieve or at least move toward full cost recovery (Martinot et al 2002). Solar photovoltaic technology emerged as an important

tool for rural electrification at a time when neo-liberal policies dominated mainstream development thinking. In the late 1980s and 1990s, a period that some have called the age of market triumphalism (Peet & Watts, 1993), mainstream development policies emphasized economic liberalization, privatization, and market-based approaches to service provision. In the energy sector, donor financing for state-owned electricity infrastructure was reduced, while efforts to support liberalization, reforms, and private sector participation expanded.

2.3. Factors Influencing Performance of Solar Energy

This section presents literature on factors influencing performance of solar energy. The factors are presented in the subsequent sections:

2.3.1. Economic Factors and Performance of Solar Energy Projects

Funding plays a great role in the performance of projects. Researchers have shown that one of the primary obstacles to carrying out energy projects is frequently not the technical feasibility of these projects instead it is the absence of low cost, long term funding. This situation is complicated more by competition for limited financing by the various projects and gets critical if the nation is running under unfavorable macro-economic circumstances (Martinot et al 2002). Therefore, the governments and private firms must find creative means of funding solar energy projects. The main challenge of funding solar energy projects is to come up with models that can give these energy sources to consumers at affordable costs while securing that the industry stays sustainable. There is limited policy support for solar energy projects as shown by minimum budget allotment

to renewable at government level. As a result, the private sector is left to bear the weight of funding solar energy projects (Kapur et al. 2010).

Majority of advanced solar energy projects are not affordable to most of the population in Kenya who are poor, with poverty degrees of between 50 to 70% (World Bank, 1996). This is true particularly for solar energy projects that have huge cost of production. The solar energy projects with huge cost put an extra burden on foreign exchange reserves of Kenya economy, which are frequently little and approaching exhaustion, and needs expensive funding strategies and huge subsidies (Karekezi and Kithyoma, 2002). The subsidies are unsustainable in the long term, except when the technologies given are planned to include income generation.

Banks have unfavorable demands for solar energy projects funding. They usually make strict terms for solar energy projects investors and this discourages potential consumers. The terms needed include a feasibility study carried out at the applicant's costs, because of the limited know how on renewables by banking institutions. Additionally, the banking institutions require title deeds as collateral, portfolios of project sponsors and directors, information on past and current activities, a valuation report, estimate value of existing investment, raw material procurement strategy, and the marketing plans for the final product (Karekezi & Turyareeba, 2015).

2.3.2. Government Involvement and Performance of Solar Energy

Experience in the Kenya, points that the establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy.

These policies are significant factors in conditions of their power to create an enabling environment for solar energy projects public exposure and mobilizing resources, in addition to supporting private sector investment (Sampa, 1994). Early policy initiatives on renewables in the country were as a result by the oil crisis of the 1970s. As a result to the crisis, governments launched either an autonomous Ministry of Energy or a department committed to the advancement of good energy policies, including the development of solar energy projects. For instance, Zambia reacted by drafting policy proposals in its Third National Development Plan (1979-83) to develop alternative kinds of energy as partial substitutes for conventional energy sources. Regrettably, when the energy crisis lessened, government funding for energy development and solar energy projects practices decreased significantly.

Majority of African governments do not have a laid out policy on the development and support of solar energy projects, which proceed to be undertaken without the necessary energy planning and policy. As a consequence, solar energy projects development follows an unplanned route, with no clear association to national power master plans, which are seldom accessible or are outdated (Karekezi & Ranja, 1997). A research done in Botswana showed that about 57% of the respondents did not know their government policies planned to support the use of solar energy projects (Sampa, 1994). In Malawi, lack of policy meant that the majority of Solar energy projects diffusion efforts have not only been unplanned, but have been practiced mostly as informal sector operations beyond the government machinery framework, therefore unable to mobilize the fiscal support of the government and its great donors. A research on wind energy done in

Kenya established that Dutch aid officials would have been interested in funding wind projects if there was an official policy on wind energy powerfully supported by the Kenyan government (IT Power, 1988).

Policy support for renewables is limited as shown by the low budgetary allotment to renewables in most economies. Majority of the countries laid more significance on the petroleum and power sectors, which supply a low percentage share of the population, than on renewables which provide energy or has potential to supply to a large percentage of the population. Very small expenditure is allotted to small and medium scale solar energy projects in comparison to the conventional energy sector. For instance, Ethiopia's investment trends in energy sector show huge investments in the electricity and petroleum sub-sectors. Investments in petroleum quadrupled between 1990 and 2000, whereas investments in electricity nearly tripled in the same period. In direct contrast, expenditure on traditional and alternative energy (which includes solar energy) has steadily reduced from around 1% of entire expenditure in 1990, to about 0.1% of full expenditure in the year 2000 (Teferra, 2000). About 2.9% of entire anticipated expenditure for the energy sector in Kenya was allotted to renewable energy. Additionally, the public investment program shows that only about 1% of the priority project investment for the energy sector was allotted to small and medium Renewable Energy Technologies in 1999/2000 (Kiplagat et al., 2011).

According to AFREPREN (2002) the policy programs should be planned to show the economic and environmental gains of solar energy projects to Africa's poor and suggests short and medium term policy initiatives that would make large-scale diffusion of renewables. Emphasis should be devoted to bringing out the real and tangible economic gains, like job creation and income generation, which renewable energy projects can achieve to the area at both the micro and macro levels. For instance, solar energy projects are usually more labor intensive compared to the conventional and centralized energy projects and therefore can help to deal with troubles of employment of the urban and rural poor. Of interest to sub-Saharan policy-makers in Africa are revenue neutral policy and institutional measures.

For instance, there is potential to make the scenario that the reduced revenue linked with the removal or reduction of duties and taxes on renewable energy technologies such as solar panels can be recovered from the long-time savings in imports of petroleum products that need rare convertible currencies in addition to the income and sales tax remittances from a large and functional solar industry (AFREPREN, 2000). So as to improve access to credit, banking institutions should seek alternatives to strict demands such as the collateral requirements. Since banking policies are not likely to vary in the near future, a possible action is to recommend potential end users to create self-help groups or cooperatives to be able to acquire loans through cooperative banks, majority of which do not have strict collateral demands. Additionally, small credit or micro-finance institutions can provide financing for solar energy projects investors and users at less

costly and accessible terms. These institutions are important in making sure projects continue even when external support stops.

2.3.3. Stakeholder Participation and Performance of Solar Energy

Energy stakeholders must have trustworthy mechanisms to constructively discuss concerns and viewpoints in dealing with the challenges of an increased use of renewable energy resources. For example, a forum to allow groups to reach common ground from which to devise concrete actions for increased use of renewable energy resources. The forum would have to deal with the uncertainty issues and regional variations mentioned earlier. The forum would also have to manage trust problems that might exist among groups that have traditionally had contentious relationships (Mitchel, 1997). Any stakeholder engagement mechanism requires some form of common, transparent way of providing timely information to all sectors before policy decisions are final. This is especially true considering that many energy decisions are usually made based on hierarchal, top-down approaches. The key challenges for project management and stakeholder involvement vary according to technology and geographic context.

However, more generic factors pertaining to the kinds of social networks that builds up around new energy projects and to the negotiation and alignment of expectations. These networks were naturally different for different projects, but could involve experts and technology providers, other businesses (as project partners, suppliers or competitors), authorities and politicians at the national and local level, non-governmental organizations and other interest groups, local residents and users. Moreover, it is important to note that

stakeholders' positions often evolved during the course of the negotiations: stakeholders are thus not monolithic and their positions are not static. Stakeholders' expectations that required negotiation pertained to a range of factors. Some of them can be termed "genuine differences of interest", such as the distribution of costs and benefits (the distribution of economic costs among actors, the balance between local and global environmental benefits).

There were also sometimes fundamental value conflicts, for example about the instrumental versus intrinsic or amenity value of nature, or different views on desirable future economic and social development. Moreover, fundamental limits to knowledge and certainty were also present, such as genuine uncertainties about the performance, impacts and relevance of different new energy technologies. Other kinds of issues can more readily be termed "organizational problems", such as creating trust when there was a lack or precedents or poor earlier experiences, communication problems such as articulating the vision of the project or understanding local concerns, culture and communication patterns, or negotiation problems, such as finding suitable procedures for negotiation and arbitration or defining roles and responsibilities (Mitchel, 1997).

2.3.4. Project Management Structures and Performance of Solar Energy

To introduce unknown technologies like Solar Energy need the development of technical skills for project management. The importance of technical knowledge in the enhanced uptake of Solar Energy has been realized in the region, but despite of attempts by governments, there is a continuing deficit of qualified force (Baguant, 1992). Technical

knowhow is crucial in order to form over the long term, a critical mass of professional African policy analysts, economic leaders and engineers who are capable of managing all facets of the RET development work and to make sure effective use of already trained African analysts and managers (World Bank, 1996). Trained workforce which is able of designing and manufacturing renewable energy technologies is a requirement for their productive diffusion. African Government and ministries experience a shortfall of qualified Solar Energy management personnel.

In Kenya, for instance, there is inadequate general expertise in all facets of solar pumps in the applicable ministries and NGOs (IT Power, 1988). At one time, in Zambia only one engineer was responsible for organizing all renewable energy operations of the government (Sampa, 1994). A project financed by Britain to map out the wind energy in Seychelles was not successful because of lack of trained personnel (Razanajatovo et al., 1994). This lack is to a large extent to blame for the usually under-developed research and technological ability and the inadequate management of renewable energy plans. Provided that there is inadequate technical knowledge in the formal sector, the state of affairs in the informal sector poses a major challenge. In the informal sector, technical skills are mainly mechanical. As a result, electrical technologies are not easy to comprehend for artisans in the informal sector, as well as most consumers, particularly in rural areas. This can be used to explain the low intake of electrical Solar Energy technology such as solar PV.

A good example is a case in Kenya, where an expatriate designed a low-cost, locally built control unit for PV lighting systems; when he left, production halted and has not restarted since (Karekezi & Kimani, 2002). Therefore the level of technical knowledge and expertise currently in existence in African economies is a key requirement for the successful execution of Solar Energy technology. The options of renewable energy technologies for diffusion and development in Kenya should take into consideration the available technical expertise and local industries. Technologies that build on available methods and improve already established manufacturers are likely to be successfully diffused. Additionally, these technologies can in the long-term get self-sustainable. Renewable energy technologies used to produce electricity (such as solar PV) are not likely to be widely diffused in the region, because of the inadequacy of technical knowledge locally on their functioning.

A significant percentage of conventional energy projects have been wasted chiefly because of the big emphasis on electricity and on imported technology. Additionally, a large part of the constituents in electrical technologies are sourced abroad. This results in high costs and minimizes the chances for the local technological growth. When Solar Energy technology builds on local knowledge and skills, there are fewer problems with maintenance, which brings in greater and more sustainable diffusion. Additionally, these technologies are can be increased gradually over time, and can be produced locally. This results in more opportunities for employment and local enterprise creation. Given enhanced funding support at national and international levels for Solar Energy

technology, it would be possible for countries in Africa to be a major participant in the world renewable energy industry (Makadok 2001).

For example, with the exclusion of solar PV technologies, over 60% of the parts needed in most renewable energy technologies can be obtained locally (Karekezi and Kithyoma, 2003). Long-run renewable energy training programs formulated to nurture a critical mass of locally-trained work force with the needed technical, economic and social-cultural skills are desperately required. Most engineering and technical programs offered currently at local universities and colleges in Africa give small exposure to energy technologies. Minor shift in the curricula of existent universities and colleges could to a large extent improve the provision of skilled renewable energy engineers, policy analysts and technicians.

2.4. Theoretical Framework

The study was guided by two theories that relate to performance of solar energy projects. The two theories were Resource Based Theory and the theory of Reasoned Action as discussed in the subsequent sections:

2.4.1. Resource Based Theory

The resource based theory states that the basis for competitive advantage of a firm lies primarily in the application of the bundle of valuable resources at the firms disposal (Wernerfelt, 1984), including technology such as solar technology. According to Manoney and Pandian (1992) firm`s ability to reach competitive advantage when different resources are employed and these resources cannot be imitated by competitors.

This relates to access to solar technology resources, tools and funds. From this theory when households have enough resources of funds and access to solar tools they can easily adopt solar technology in their homes. The resource based view has been a common interest for management researchers and numerous writings could be found for same. A resource-based view of a firm explains its ability to deliver sustainable competitive advantage when resources are managed such that their outcomes cannot be imitated by competitors, which ultimately creates a competitive barrier (Hooley and Greenley 2005).

RBV explains that a firm's sustainable competitive advantage is reached by virtue of unique resources being rare, valuable, inimitable, non-tradable, and non-substitutable, as well as firm-specific (Makadok 2001). These authors write about the fact that a firm may reach a sustainable competitive advantage through unique resources which it holds, and these resources cannot be easily bought, transferred, or copied, and simultaneously, they add value to a firm while being rare. It also highlights the fact that not all resources of a firm may contribute to a firm's sustainable competitive advantage. Varying performance between firms is a result of heterogeneity of assets (Helfat and Peteraf 2003) and RBV is focused on the factors that cause these differences to prevail (Grant 1991).

Fundamental similarity in these writings is that unique value-creating resources will generate a sustainable competitive advantage to the extent that no competitor has the ability to use the same type of resources, either through acquisition or imitation. Major concern in RBV is focused on the ability of the firm to maintain a combination of resources that cannot be possessed or built up in a similar manner by competitors. Further

such writings provide us with the base to understand that the sustainability strength of competitive advantage depends on the ability of competitors to use identical or similar resources that make the same implications on a firm's performance. This ability of a firm to avoid imitation of their resources should be analyzed in depth to understand the sustainability strength of a competitive advantage.

2.4.2. Theory of Reasoned Action

According to Brown, Massey and Burkman, (2002) the theory states that both attitude and subjective norm are important determinants of people's intention to adopt and use technology in enterprises. Further the intention to adopt and to continue using technology in this case solar technology is influenced by ones attitude. The theory states that an individual behavior is influenced by his or her behavior`s intention which is influenced by his or her attitude towards behavior of subjective norm (Venkatesh et al, 2000). Behavioral intention measures a person's relative strength of intention to perform a behavior. Attitude consists of beliefs about the consequences of performing the behavior multiplied by his or her evaluation of these consequences (Fishbein & Ajzen, 1975).

Subjective norm is seen as a combination of perceived expectations from relevant individuals or groups along with intentions to comply with these expectations. In other words, "the person's perception that most people who are important to him or her think he should or should not perform the behavior in question (Fishbein & Ajzen, 1975). To put the definition into simple terms: a person's volitional (voluntary) behavior is predicted by his attitude toward that behavior and how he thinks other people would view them if they

performed the behavior. A person's attitude, combined with subjective norms, forms his behavioral intention. Fishbein and Ajzen suggest, however, that attitudes and norms are not weighted equally in predicting behavior. "Indeed, depending on the individual and the situation, these factors might be very different effects on behavioral intention; thus a weight is associated with each of these factors in the predictive formula of the theory. For example, you might be the kind of person who cares little for what others think. If this is the case, the subjective norms would carry little weight in predicting your behavior (Miller, 2005)

2.5. Conceptual framework

The conceptual framework in Figure 1 demonstrates the relationships that existed between the dependent and independent variables under investigation. The dependent variable is performance of solar energy projects. The independent variables that was investigated to establish their level of influence on the dependent variable were: project maintenance, government involvement, stakeholder participation, and project management and how they influence performance of solar energy project.

Independent Variables

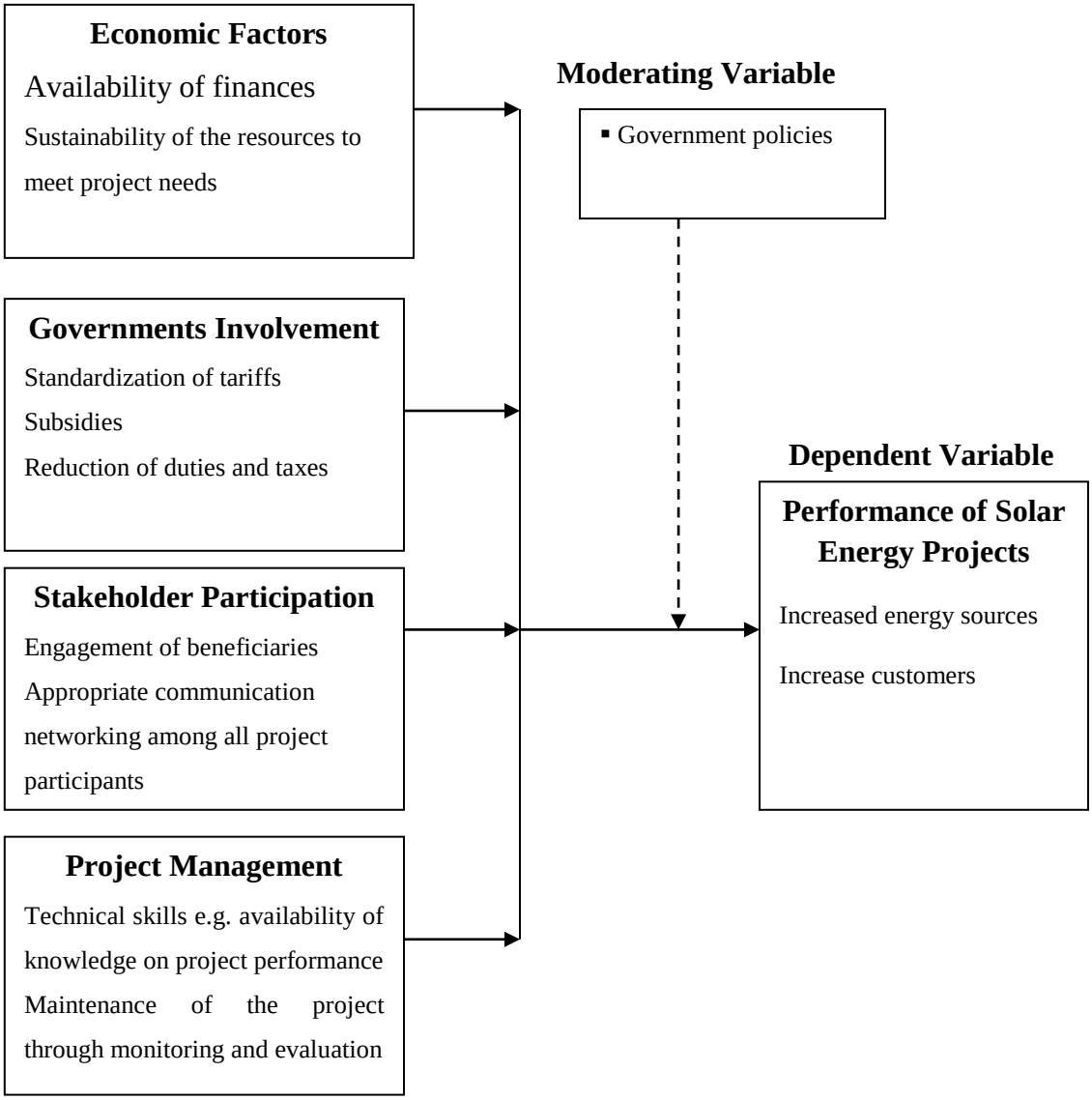

Figure 1: The Conceptual Framework Showing the Relationship among Variables

2.5.1. Economic Factors

The main challenge of funding solar energy projects is to come up with models that can give these energy sources to consumers at affordable costs while securing that the industry stays sustainable (Kapur et al. 2010). There is limited policy support for solar energy projects as shown by minimum budget allotment to renewable at government

level. As a result, the private sector is left to bear the weight of funding solar energy projects.

2.5.2. Government Involvement

Experience in the Kenya, points that the establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy. These policies are significant factors in conditions of their power to create an enabling environment for solar energy projects public exposure and mobilizing resources, in addition to supporting private sector investment (Sampa, 1994). Early policy initiatives on renewables in the country were as a result by the oil crisis of the 1970s. As a result to the crisis, governments launched either an autonomous Ministry of Energy or a department committed to the advancement of good energy policies, including the development of solar energy projects.

2.5.3. Stakeholder Participation

Energy stakeholders must have trustworthy mechanisms to constructively discuss concerns and viewpoints in dealing with the challenges of an increased use of renewable energy resources. For example, a forum to allow groups to reach common ground from which to devise concrete actions for increased use of renewable energy resources. The forum would have to deal with the uncertainty issues and regional variations mentioned earlier. The forum would also have to manage trust problems that might exist among groups that have traditionally had contentious relationships (Mitchel, 1997).

2.5.4. Project Maintenance and Management

To introduce unknown technologies like Solar Energy need the development of technical skills for project maintenance and management. The importance of technical knowledge in the enhanced uptake of Solar Energy has been realized in the region, but despite of attempts by governments, there is a continuing deficit of qualified force (Baguant, 1992). Technical knowhow is crucial in order to form over the long term, a critical mass of professional African policy analysts, economic leaders and engineers who are capable of managing all facets of the RET development work and to make sure effective use of already trained African analysts and managers (World Bank, 1996).

2.6. Knowledge Gaps

Rebane and Barham (2011) analyze the factors that determines the performance of solar energy systems awareness and adoption in Nicaragua. They identify the determinants of four measures of solar energy systems knowledge. Knowledge is predicted most strongly by the presence of other installed solar energy systems, being male, being young and having a high-quality residence, Income, having learned about solar energy systems from a business or NGO and not living in the Caribbean lowlands are all positive determinants of solar energy systems adoption, while living near a dealer reduces the likelihood of adoption. The study was limited to how various factors of perception influences adoption of solar energy projects and thus does not explain how it influences performance and as such performance is more critical than adoption from the researcher's point of view. This study will address how community perception influences the performance of solar energy projects.

Caird et al (2008) in his study on solar energy project performance concluded that the performance is influenced by various factors such as the socio-economic context, consumer variables, communication sources, and product and system properties to determine whether to adapt to solar energy. The research was found not to substantially single out and exhaust on the various factors that influence performance of solar energy projects. This research will particularly focus on projects in Remba-Homabay County, Kenya and provide a deep insight of how the various factors will influence performance of solar energy projects. From the reviewed literature, it is evident that much research has not been carried on the study topic. Also, the studies in the literature review have limited information on the extent to which various factors influence performance of solar energy projects. Lastly, it is evident that few organizations fully understand the use of technology in management of the projects.

Nguyen et al (2007), while undertaking a study of large scale construction contracts in Vietnam identified from among 20 factors of project performance, five (5) CSFs. These are competent project manager, provision of sufficient financial and non-financial resources to see the project to completion, dedicated and technically knowledgeable project team that has access to needed resources. In Kenya, little research has been done on project performance in energy sector in Africa and the enabling factors, there is little to indicate that factual contribution of other scholars and / or researchers has been made in the target area. This will research will tend to elaborate more on factors that affect project performance.

Mohammed, (2008) addressed the various factors influencing performance of mega energy projects, namely physical infrastructure, technology, procurement policy and personnel training all in relation to project performance. The project has shown that each component is important to the performance of mega projects. The literature however lacks in-depth linkage between these elements and mega project performance within the energy context. The literature is also largely international with local studies remaining scanty. Against this backdrop, the present study sets out to address these gaps by exploring the factors influencing performance of energy projects.

A study by Nyikal, (2011), established that in Kenya, project performance has been affected by factors such as project cost, quality, customer or stakeholder's satisfaction, timeliness and achieving of project objective is effective indicator to measure of project performance. Solar energy is not being implemented at the rate that it could or should be in the United States for reasons mainly due to efficiency and cost. However the study failed to address the factors that influence performance of the solar energy projects creating a gap that needs to be filled. This will research will address the issue by elaborating more on factors that affect project performance.

2.7. Summary of the reviewed literature

The literature has been reviewed under the four themes which basically forms the basis of the study. On the economic factors, the studies available do not clearly indicate how it impacts on project performance. There is limited information on the extent to which Government Involvement impacts effective implementation and performance of projects.

Generally, the studies available shows that much research has not been carried on the study topic and specifically not much attention to solar energy projects, for which this study will help provide more information about.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

This chapter presents the research design, the target population, the sample size and sampling procedure, data collection instruments, techniques of data analysis, ethical considerations and operational definition of variables.

3.2. Research Design

This study utilized descriptive survey research design. The survey design enabled the researcher to explore a wide range of factors affecting community solar energy projects. The reason for this choice was based on the knowledge that descriptive design are the most appropriate for examining the effects of an independent variable on a dependent variable without any manipulation. This method was appropriate for the study in that it helped in portraying the accuracy of peoples profile events and situations. According to Orodho (2003), descriptive survey is a method of collecting information by interviewing or administering a questionnaire to a sample of individuals. This method was appropriate for the study in that it helped in portraying the accuracy of peoples profile events and situations. A descriptive research design also allowed for in-depth analysis of variables and elements of the population to be studied and as well as collection of large amounts of data in a highly economical way. It enabled generation of factual information about the study. This is so because the descriptive design relied much on secondary data which helps in developing the case basing on facts, sustained by statistics and descriptive interpretations from archival materials and data.

3.3 The Target Population

The population for this study was 400 respondents who included the three-project managers, community members, and ministry representatives who are involved in the implementation and performance of projects in Remba-Homabay County, Kenya (Homabay County, 2017).

Table 3.1. Target Population

Population	Frequency
Project managers	34
Community members	356
Ministry representative	10
Total	**400**

3.4 Sample Size and sampling Procedure

This section describes the sample size, sampling technique and selection that were employed in the study.

3.4.1. Sample Size

From the possible 400-target population, stratified random sampling was employed to select a total of 120-sample population. This was 30% of the total population. Mugenda and Mugenda (2003) states that in stratified sampling where population within each strata is known, a sample of 10-30% is adequate representation for data collection. The reason for using 10-30% population is that it is easier to obtain data for all the respondents as the population is manageable under normal circumstances.

Table 3.2. Sample Size

Population	Frequency	Sample Ratio	Sample size
Project managers	34	0.3	10
Community members	356	0.3	107
Ministry representative	10	0.3	3
Total	**400**	**0.3**	**120**

3.4.2 Sampling procedure

This study adopted the stratified sampling technique. This was important as it enabled the researcher to obtain a sample population that best represents the entire population being studied. It also minimized sample selection bias and ensures certain segments of the population were not overrepresented or underrepresented. From the possible 400-target population, stratified random sampling was employed to select a total of 120-sample population. The strata comprised of the project manager strata, community member strata, and the ministry strata. From the project managers strata the researcher picked 10 respondents randomly, from the community member's strata the researcher picked 107 respondents, while from the ministry strata the researcher picked 3 respondents which contributed to a sample of 120 respondents.

3.5 Research instruments

A questionnaire and an interview guide were used to collect primary data. The questionnaire comprised of questions, which sought to answer questions related to the objectives of this study. The questions entailed both closed-ended to enhance uniformity and open ended to ensure maximum data collection and generation of qualitative and

quantitative data. The questionnaire was divided into two sections, the background information section and the research questions section. Furthermore, the research questions section was divided to sections according to the research objectives. An interview schedule was prepared with pre-coded questions to produce quick, cheap and easy qualitative data. It had two components: a set of questions designed to be asked exactly as worded, and instructions to the interviewer about how to proceed through the questions (Rowley, 2012).

The questions appeared in the order in which they are to be asked. The questions were designed so they can be administered verbatim, exactly as they are written. The researcher adopted the use of exploratory interview as a type of interview schedule. In the exploratory interview, the question areas were pre-determined but the respondents were allowed some latitude to answer in their own way and the interviewer probed for more information in promising areas. The study adopted the use of interviews for information gathering as they assisted in making clarification where it's not possible through a questionnaire besides obtaining accurate and detailed information. Interviews provided an opportunity for a personal contact between the investigator and the respondent and it was also used for both the educated and uneducated respondents.

3.5.1 Pilot Testing of Instruments

Pilot testing of the tools was done immediately after training research assistants in order to make the instrument reliable. Moreover, a pilot study was done to assess the capability of the research instruments to collect required data for the research. Besides, it was essential to establish whether all the questions from the questionnaire were fully

understood by the targeted respondents and hence rectifications done. Piloting was important as it helped in determining the reliability of the instrument. In this research, 12 (this is 10% of the sample population which is recommended for a pilot of the instruments) respondents were chosen to contribute and were not included in the sample chosen for the study. During piloting, the researcher administered the questionnaire to a different set of respondents who were not part of the groups of sampled respondents, but similar in characteristics to those sampled for the study. The piloting process also played the important role of checking the respondents for their suitability, clarity, relevance of information and appropriateness of the language used.

3.5.2 Validity of the instruments

The researcher checked the instruments for content validity. This refers to the extent to which the research instrument measures what it purports to measure (Kothari, 2004). The validity of the research questions was ascertained by consultations with the university supervisors who guided the researcher on items to be corrected. The corrections on the identified questions were incorporated in the instrument to increase validity.

3.5.3 Reliability of the instruments

Test-retest was employed to check on reliability. In this regard, test-retest was employed to check on reliability. This involved administering the same instruments twice to the same group of subjects, but after some time. Hence, to determine stability, a measure or test was repeated on the subject at a future date. Results were compared and correlated with the initial test to give a measure of stability. Responses obtained during the piloting were used to calculate the reliability coefficient from a correlation matrix. A reliability of

at least 0.70 at a=0.05 significance level of confidence was acceptable (Gable & Wolf, 2003).

Table 3.3. Reliability Values

VARIABLE	CRONBACH'S ALPHA
Economic factors	0.769
Government involvement	0.848
Stakeholder participation	0.797
Project management	0.824

From the table above it was found that the entire variables had a reliability level of above 0.7 and thus they were deemed appropriate in determining their influence on the dependent variable.

3.6 Data Collection Procedure

The procedure for data collection started when the researcher was given a letter of approval by the university to go to the field. In addition the researcher applied for permit from NACOSTI. Using the letter of approval, a permit to conduct the study was acquired. Afterwards, the District Commissioner was informed of the study and hence all the relevant stakeholders were informed as well. In addition the researcher trained the research assistants on how the study was to be done. This was through provision of guidelines that elaborated more on how data collection was done. The research assistants were also trained on the criteria of collecting data from the respondents. The training was conducted before the actual data collection and after data collection which aimed at guiding them on how to sort out data ready for analysis. The drop and pick method was

used where the research assistants delivered the questionnaire and interviews to the respondents and picked them when completed. The data collection took two weeks.

3.7 Data Analysis Technique

The study generated both qualitative and quantitative data. Descriptive statistics data analysis method was applied to analyze both quantitative and qualitative data. Information obtained from the questionnaires was processed through editing and coding and then entered into a computer for analysis using descriptive statistics with the help of Statistical Package for Social Sciences (SPSS) version 20. The software offered extensive data handling capabilities and numerous statistical analysis procedures that analyses small to very large data statistics (Bell, 2007). Descriptive statistics helped to compute measures of central tendencies and measures of variability (Bell, 2007).

Descriptive analyses were important since they provide the foundation upon which correlational and experimental studies emerge; they also provide clues regarding the issues that should be focused on leading to further studies (Mugenda & Mugenda, 2009).

The study also employed a multivariate regression model to study the influence of economic factors, government involvement, stakeholder participation, and project management on solar energy projects. The regression method was useful for its ability to test the nature of influence of independent variables on a dependent variable. Regression was able to estimate the coefficients of the linear equation, involving one or more independent variables, which best predicted the value of the dependent variable. The regression model was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where: Y = performance of solar energy projects; β_0 = Constant Term; β_1, β_2, and β_3 = Beta coefficients; X_1= project maintenance; X_2= government involvement; X_3= stakeholder participation; X_4 = project management and ε = Error term

The analyzed findings were presented inform of frequency tables, pie charts and bar charts since they were user friendly and gave a graphical representation of the different responses given by the respondents.

3.8 Ethical considerations

To guarantee that the study met ethical standards, the researcher obtained informed consent from participants and ensured that all participated voluntarily. The participants were allowed to pull out of the study at any time without prior notice to the researcher. In addition the researcher ensured that the information collected remained confidential, and that the respondents were not required to indicate their names on the questionnaire to ensure anonymity.

3.9 Operational definition of variables

Table 3.3 lists the definition of variables as they were used in the research.

Table 3.3: Operational definition of variables

Objective	Variable (IV)	Indicator(s)	Measurement scale	Method of Data Collection	Data Analysis
To establish the extent to which economic factors influences performance of solar energy projects in Remba-Homabay County	Economic factors	▪ Availability of finances ▪ Sustainability of the resources to meet project needs	Ordinal	Questionnaire	Descriptive statistics.
To determine how government involvement in renewable energy projects influence performance of solar energy projects in Remba-Homabay County	Government involvement	▪ Laws governing the project ▪ Amount of money engineered to facilitate project operation	Ordinal	Questionnaire	Descriptive statistics.
To examine the extent to which stakeholder participation influence performance of solar energy	Stakeholder participation	▪ Level of stakeholder participation ▪ Number of workshops on project implementation	Ordinal	Questionnaire	Correlation and descriptive

projects in Remba-Homabay County		▪			
To determine how project management influence performance of solar energy projects in Remba-Homabay County	Project maintenance and management	▪ Frequency of project management techniques ▪ Nature of the feedback on project management	Ordinal	Questionnaire	Descriptive statistics

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents data analysis and discussions. The study sought to establish the factors influencing performance of solar energy projects: a case of Remba-Homabay County, Kenya. Primary data was collected through administration of questionnaires and interview guide to the targeted respondents. The chapter introduces with analysis of residents' personal information, and then looks into the analysis of themes: economic factors, government involvement, stakeholder's participation, and project management. Findings from open-ended questions were presented in prose.

4.2. Questionnaire Return Rate

A total of one hundred and twenty (120) questionnaires had been distributed to the respondents, out of which 111 were completed and returned. This gave a response rate of 83.3%. According to Mugenda and Mugenda (2003) a response rate of 50% is adequate for a study, 60% is good and 70% and above is excellent. Thus, a response rate of 92.5% was fit and reliable for the study as shown in Table 4.4.

Table 4.4. Questionnaire Return Rate

	Frequency	Percent (%)
Responded	111	92.5
Non-respondents	9	7.5
Total	**120**	**100**

4.3. General information

As part of the general information, the research requested the respondents to indicate the general information concerning the organization. This was important since it forms foundation under which the study would fairly adopt in coming up with conclusions.

4.3.1. Distribution of Respondents by Gender

The respondents were requested to indicate their gender. Accordingly, the findings are as presented in the Table 4.5.

Table 4.5. Distribution of Respondents by Gender

	Frequency	Percentage (%)
Male	63	56.8
Female	48	43.2
Total	**111**	**100.0**

From the findings, majority (63) of the respondents were males and 48 of the respondents were female. This implies that there was gender disparity with regard to female respondents. This further depicts that there was less involvement of the female gender in the project management and performance in Homabay County.

4.3.2. Distribution of participants by Level of Education

The respondents were requested to indicate their level of education. The findings on analysis of respondents level of education has been presented on Table 4.6

Table 4.6: Distribution of participants by Level of Education

	Frequency	**Percentage (%)**
Primary school	0	0
Secondary school	27	24.3
Diploma	54	48.6
University degree	20	18
Post graduate	10	9.1
Total	**111**	**100**

From the findings, majority (54) of the respondents had diploma level of education, 27 had secondary level of education, 27 had university degree, while 10 were postgraduate. This implies that respondents had adequate education with regard to involvement in project management and performance.

4.3.3. Distribution of Respondents by Age

The study sought to establish the age of the respondents and the findings are as shown in Table 4.7

Table 4.7: Distribution of Respondents by Age

	Frequency	**Percentage (%)**
20-30 years	11	10
31-40 years	51	45.9
41-50 years	26	23.4
Over 50 years	23	20.7
Total	**111**	100

According to the findings, 51 of the respondents were aged between 31-40 years, 26 were 41-50 years, 23 were over 50 years, and 11 respondents were between 20-30 years. This depicts that most of the respondents were aged enough and thus could offer high quality information in project performance.

4.3.4 Duration of working in Projects

The study also sought to establish how long respondents had worked in projects. The findings are as shown in Table 4.8.

Table 4.8. Duration of working in project work

	Frequency	Percentage (%)
Less than a year	3	2.7
between 1-2 years	39	35.1
between 2-4 years	66	59.5
over 4 years	3	2.7
Total	**111**	**100**

Based on the findings, 66 of the respondents had worked in project work for 2-4 years, 39 of the respondents had worked for in project work for 1-2 years, while 3 of the respondents had worked in project work for over four years and less than one year respectively. This illustrates that the most of the respondents had worked in the projects for duration of between 2-4 years which had made them gain experience with the inception of projects and the county governments.

4.4. Economic Factors

This section presents findings on economic factors and performance of solar energy projects. The findings are as shown in the subsequent headings.

4.4.1. Influence of Economic Factors on Performance of Solar Energy Projects

The respondents were asked to indicate whether economic factors influence the performance of solar energy projects. The findings are as tabulated in table 4.9

Table 4.9. Influence of Economic Factors on Performance of Solar Energy Projects

	Frequency	**Percent(%)**
Yes	81	73
No	30	30
Total	**111**	**100**

From the findings, 81 of the respondents agreed that economic factors influence the performance of solar energy projects while 30 of them were of the contrary opinion. This implies that the economic factors influence the performance of solar energy projects. The KIIs indicated that economic factors affect the performance of the solar projects in that inadequate finance affect the project financing which may ultimately lead to failure in accomplishment of its mission. In the case where the finances are not available the project may fail to take off since no resources to propel it.

4.4.2. Extent to which aspects of Economic Factors affect Project Performance

The respondents were requested to indicate the extent to which aspects of economic factors affect project performance. The findings are as shown in table 4.10

Table 4.10. Extent to which aspects Economic Factors affect Project Performance

Statements	Mean	Std Dev.
Availability of the finances determines the performance and success of the projects	3.92	0.2569
Availability of funds facilitates the sustainability of the projects which aids in the project success	3.71	0.2678
There is limited policy support for solar energy projects as shown by minimum budget allotment to renewable which has greatly influenced the success of the projects	4.12	0.2872
Majority of advanced solar energy projects are not affordable to most of the population in Kenya who are poor thus affecting their performance	4.09	0.2920

From the findings the respondents indicated to a great extent that there is limited policy support for solar energy projects as shown by minimum budget allotment to renewable which has greatly influenced the success of the projects (mean=4.12), followed by majority of advanced solar energy projects are not affordable to most of the population in Kenya who are poor thus affecting their performance (mean=4.09), availability of the finances determines the performance and success of the projects (mean=3.92), and that availability of funds facilitates the sustainability of the projects which aids in the project

success (mean=3.71). This depicts that there is limited policy support for solar energy projects as shown by minimum budget allotment to renewable which has greatly influenced the success of the projects.

4.5. Government Involvement

This section presents findings on government involvement and performance of solar energy projects. The findings are as shown in the subsequent headings.

4.5.1. Influence of Government Involvement in Solar Energy Projects in Remba-Homabay County

The respondents were asked to indicate whether the government is involved in solar energy projects in Remba-Homabay County. The findings are as tabulated in table 4.11

Table 4.11. Influence of Government Involvement in Solar Energy Projects in Remba-Homabay County

	Frequency	**Percent(%)**
Yes	69	62.2
No	42	37.8
Total	**111**	**100**

From the findings, 69 of the respondents indicated that the government is involved in solar energy projects in Remba-Homabay County while 42 of them were of the contrary opinion. This implies that the government is involved in solar energy projects in Remba-

Homabay County. According to the KIIs government policies determine the performance and success of solar energy projects. For instance, government policy where there is potential to make the scenario that the reduced revenue linked with the removal or reduction of duties and taxes on renewable energy technologies such as solar panels can be recovered from the long-time savings in imports of petroleum products that need rare convertible currencies in addition to the income and sales tax remittances from a large and functional solar industry.

4.5.2. Influence of Various Government Policies on Performance of Projects

The respondents were requested to indicate how the various government policies determine the performance and success of solar energy projects. The respondents indicated that establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy. These policies are significant factors in conditions of their power to create an enabling environment for solar energy projects public exposure and mobilizing resources, in addition to supporting private sector investment.

4.5.3. Extent to which aspects of Government Involvement affect Project Performance

The respondents were requested to indicate the extent to which aspects of government involvement affect project performance. The findings are as shown in table 4.12

Table 4.12. Extent to which aspects government involvement affect Project Performance

Statements	Mean	Std Dev.
Establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy	3.87	0.2901
Very small expenditure is allotted to small and medium scale solar energy projects in comparison to the conventional energy sector	3.98	0.2723
Policy programs should be planned to show the economic and environmental gains of solar energy projects	3.81	0.2240
Government policies determines how solar energy projects are carried out	3.67	0.1945

From the findings the respondents indicated to a great extent that very small expenditure is allotted to small and medium scale solar energy projects in comparison to the conventional energy sector (mean=3.98), followed by establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy (mean=3.87), policy programs should be planned to show the economic and environmental gains of solar energy projects (mean=3.81), and that Government policies

determines how solar energy projects are carried out (mean=3.67). This depicts that very small expenditure is allotted to small and medium scale solar energy projects in comparison to the conventional energy sector.

4.6. Stakeholder Participation

This section presents findings on stakeholder participation and performance of solar energy projects. The findings are as shown in the subsequent headings.

4.6.1. Involvement of the stakeholders

The respondents were requested to indicate how stakeholders get involved in the solar energy projects in Remba-Homabay County. A summary of the findings is as tabulated in table 4.13

Table 4.13. Involvement of the stakeholders

	Frequency	**Percent(%)**
Brainstorming on project ideas	57	51.4
Sharing of information	31	27.9
Cost sharing	23	20.7
Total	**111**	100

The findings in table 4.13 indicate that (majority) 57 of the respondents stated that they were involved through brainstorming on project ideas, 31 indicated sharing of information, while 23 indicated cost sharing. This implies that stakeholders were involved in the solar energy projects in Remba-Homabay County through brainstorming on project ideas. The KIIs indicated that various stakeholders get involved through financing of the project activities, others are involved as contractors, while other are involved in decision making.

4.6.2. Extent to which aspects of Stakeholder Participation affect Project Performance

The respondents were requested to indicate the extent to which aspects of stakeholder participation affect project performance. The findings are as shown in table 4.14

Table 4.14. Extent to which aspects of Stakeholder Participation affect Project Performance

Statements	Mean	Std Dev.
Energy stakeholders must have trustworthy mechanisms to constructively discuss concerns and viewpoints in dealing with the challenges of an increased use of renewable energy resources	3.99	0.2901
Any stakeholder engagement mechanism requires some form of common, transparent way of providing timely information to all sectors before policy decisions are final	4.20	0.2723
The key challenges for project management and stakeholder involvement vary according to technology and geographic context	3.81	0.2240

From the findings the respondents indicated to a great extent that any stakeholder engagement mechanism requires some form of common, transparent way of providing timely information to all sectors before policy decisions are final (mean=4.20), followed by energy stakeholders must have trustworthy mechanisms to constructively discuss concerns and viewpoints in dealing with the challenges of an increased use of renewable energy resources (mean=3.99), and that the key challenges for project management and stakeholder involvement vary according to technology and geographic context (mean=3.81). This depicts that any stakeholder engagement mechanism requires some form of common, transparent way of providing timely information to all sectors before policy decisions are final.

4.7. Project Management

This section presents findings on project management and performance of solar energy projects. The findings are as shown in the subsequent headings.

4.7.1. Number of Respondents Conversant with Project Management

The respondents were requested to indicate the number of project team members that are conversant with project maintenance and management of solar energy project. The findings are tabulated in table 4.15

Table 4.15. Number of Respondents Conversant with Project Management

	Frequency	**Percent(%)**
All of them	29	26.1
Most of them	71	64
Some of them	8	7.2
Non of them	3	2.7
Total	**111**	100%

From the findings in the table above the majority (71) of the respondents indicated that most of the project team members were conversant with project maintenance and management of solar energy project, 29 indicated all of them, 8 indicated some of them, while 3 indicated none of the project team members were conversant with project maintenance and management. This depicts that most of the project team members were conversant with project maintenance and management of solar energy project.

4.7.2. Extent to which aspects of Project Management affect Project Performance

The respondents were requested to indicate the extent to which aspects of project management affect project performance. The findings are as shown in table 4.16

Table 4.16. Extent to which aspects of Project Management affect Project Performance

Statements	Mean	Std Dev.
Project management requires technical skills that aid in project success	3.88	0.3846
Poor project management leads to project failure	3.79	0.3367
Project management ensures that the project is sustainable and beneficial to the society	4.14	0.3215
Trained workforce which is able of designing and manufacturing renewable energy technologies is a requirement for their productive diffusion of a project	3.95	0.3761
Inadequate general expertise in all facets of solar pumps in the applicable ministries has led to slow project implementation and success	4.04	0.2178

From the findings the respondents indicated to a great extent that project management ensures that the project is sustainable and beneficial to the society (mean=4.14), followed by inadequate general expertise in all facets of solar pumps in the applicable ministries has led to slow project implementation and success (mean=4.04), trained workforce which is able of designing and manufacturing renewable energy technologies is a

requirement for their productive diffusion of a project (mean=3.95), project management requires technical skills that aid in project success (mean=3.88) and that poor project management leads to project failure (mean=3.79). This depicts that project management ensures that the project is sustainable and beneficial to the society. According to the KIIs indicated that the aspects aim to minimize the gap between project planning and project execution in order to achieve project aims, that with the set cost, and time frame.

4.8. Inferential Statistics

The study further applied general linear model to determine the predictive power on the factors influencing performance of solar energy projects: a case of Remba-Homabay County, Kenya. This included regression analysis, the model, and coefficient of determination.

4.8.1 Regression Analysis

The researcher conducted a multiple regression analysis so as to test relationship among variables (independent) on the performance of solar energy projects. The researcher applied the statistical package for social sciences (SPSS) to code, enter and compute the measurements of the multiple regressions for the study. Coefficient of determination explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (performance of solar energy projects) that is explained by all the four independent variables (economic factors, government involvement, stakeholder participation, and project management).

4.8.2. Model Summary

The table below shows the model summary of the effect of the independent variables on performance of solar energy projects: a case of Remba-Homabay County, Kenya as shown in table 4.17

Table 4.17. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.797	0.645	0.592	0.043

The four independent variables that were studied, explain only 64.5% of the performance of solar energy projects as represented by the R2. This therefore means that other factors not studied in this research contribute 35.5% of the performance of solar energy projects. Therefore, further research should be conducted to investigate the factors influencing performance of solar energy projects: a case of Remba-Homabay County, Kenya.

4.8.3. ANOVA Results

The table below shows the ANOVA results of the effect of the independent variables on performance of solar energy projects: a case of Remba-Homabay County, Kenya as shown in table 4.18

Table 4.18. ANOVA of the Regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	88.192	4	22.048	9.475	.0031
	Residual	235.027	107	2.327		
	Total	**323.219**	**111**			

The significance value is 0.031 which is less than 0.05 thus the model is statistically significance in predicting how project performance factors (economic factors, government involvement, stakeholder participation, and project management) affect performance of solar energy projects. The F critical at 5% level of significance was 2.327. Since F calculated is greater than the F critical (value = 9.475), this shows that the overall model was significant.

4.8.4. Coefficient of Determination

The table below shows the coefficient of determination of the effect of the independent variables on performance of solar energy projects: a case of Remba-Homabay County, Kenya. It explains how the four variables influence the degree of performance of solar energy projects as shown in table 4.19

Table 4.19. Coefficient of Determination

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.127	0.2235		5.132	0.000
	Economic factors	0.552	0.1032	0.1032	7.287	.000
	Government involvement	0.487	0.3425	0.1425	3.418	.000
	Stakeholder participation	0.345	0.2178	0.1178	4.626	.000
	Project management	0.339	0.1937	0.0937	4.685	.000

Multiple regression analysis was conducted to determine the factors influencing performance of solar energy projects: a case of Remba-Homabay County, Kenya and the four variables. As per the SPSS generated table below, regression equation

(**Y** = $\alpha + \beta_1 X_1 + \beta_2 X_2 + + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$) becomes:

($Y = 1.127 + 0.552X_1 + 0.487X_2 + 0.345X_3 + 0.339X_4 + \varepsilon$)

According to the regression equation established, taking all factors into account (economic factors, government involvement, stakeholder participation, and project management) constant at zero, the performance of solar energy projects was 1.127. The data findings analyzed also showed that taking all other independent variables at zero, a unit increase in economic factors led to a 0.552 increase in the performance of solar

energy projects; a unit increase in government involvement led to a 0.487 increase in performance of solar energy projects, a unit increase in stakeholders participation led to a 0.345 increase in performance of solar energy projects, and a unit increase in project management led to a 0.339 increase in performance of solar energy projects. This infers that economic factors contributed the most to the performance of solar energy projects. At 5% level of significance and 95% level of confidence, economic factors, government involvement, stakeholder participation, and project management were all significant practices to increased performance of solar energy projects.

CHAPTER FIVE: SUMMARY OF THE FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1.Introduction

This chapter presents summary, discussions, conclusions and recommendations on the factors influencing performance of solar energy projects: a case of Remba-Homabay County, Kenya.

5.2.Summary of findings

This section presents the summary of the findings and they are discussed in subsequent headings:

5.2.1. Economic Factors and Performance of Solar Energy Projects

From the findings, 81 of the respondents agreed that economic factors influence the performance of solar energy projects while 30 of them were of the contrary opinion. This implies that the economic factors influence the performance of solar energy projects. The study found that economic factors influence the performance of solar energy projects. From the findings the respondents indicated to a great extent that there is limited policy support for solar energy projects as shown by minimum budget allotment to renewable which has greatly influenced the success of the projects (mean=4.12), followed by majority of advanced solar energy projects are not affordable to most of the population in Kenya who are poor thus affecting their performance (mean=4.09), availability of the finances determines the performance and success of the projects (mean=3.92), and that

availability of funds facilitates the sustainability of the projects which aids in the project success (mean=3.71).

5.2.2 Government Involvement and Performance of Solar Energy Projects

The study established that the government is involved in solar energy projects in Remba-Homabay County. The study also established that establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy. These policies are significant factors in conditions of their power to create an enabling environment for solar energy projects public exposure and mobilizing resources, in addition to supporting private sector investment. From the findings the respondents indicated to a great extent that very small expenditure is allotted to small and medium scale solar energy projects in comparison to the conventional energy sector (mean=3.98), followed by establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy (mean=3.87), policy programs should be planned to show the economic and environmental gains of solar energy projects (mean=3.81), and that Government policies determines how solar energy projects are carried out (mean=3.67).The study also found that very small expenditure is allotted to small and medium scale solar energy projects in comparison to the conventional energy sector.

5.2.3 Stakeholder Participation and Performance of Solar Energy Projects

From the findings the respondents indicated to a great extent that any stakeholder engagement mechanism requires some form of common, transparent way of providing timely information to all sectors before policy decisions are final (mean=4.20), followed

by energy stakeholders must have trustworthy mechanisms to constructively discuss concerns and viewpoints in dealing with the challenges of an increased use of renewable energy resources (mean=3.99), and that the key challenges for project management and stakeholder involvement vary according to technology and geographic context (mean=3.81). The study stakeholders were involved in the solar energy projects in Remba-Homabay County through brainstorming on project ideas. The study found that any stakeholder engagement mechanism requires some form of common, transparent way of providing timely information to all sectors before policy decisions are final.

5.2.4 Project Management and Performance of Solar Energy Projects

The study found that most of the project team members were conversant with project maintenance and management of solar energy project. From the findings the respondents indicated to a great extent that project management ensures that the project is sustainable and beneficial to the society (mean=4.14), followed by inadequate general expertise in all facets of solar pumps in the applicable ministries has led to slow project implementation and success (mean=4.04), trained workforce which is able of designing and manufacturing renewable energy technologies is a requirement for their productive diffusion of a project (mean=3.95), project management requires technical skills that aid in project success (mean=3.88) and that poor project management leads to project failure (mean=3.79).The study also established that project maintenance and management ensures that the project is sustainable and beneficial to the society.

5.3. Discussion of Findings

This section presents the discussion of the findings and they are discussed in subsequent headings:

5.3.1. Economic Factors and Performance of Solar Energy Projects

The study found that economic factors influence the performance of solar energy projects. The study further established that there is limited policy support for solar energy projects as shown by minimum budget allotment to renewable which has greatly influenced the success of the projects. This agrees with a study by Martinot et al (2002) who that one of the primary obstacles to carrying out energy projects is frequently not the technical feasibility of these projects instead it is the absence of low cost, long term funding. This situation is complicated more by competition for limited financing by the various projects and gets critical if the nation is running under unfavorable macro-economic circumstances. The solar energy projects with huge cost put an extra burden on foreign exchange reserves of Kenya economy, which are frequently little and approaching exhaustion, and needs expensive funding strategies and huge subsidies (Karekezi and Kithyoma, 2002). The subsidies are unsustainable in the long term, except when the technologies given are planned to include income generation.

5.3.2 Government Involvement and Performance of Solar Energy Projects

The study established that the government is involved in solar energy projects in Remba-Homabay County. The study also established that establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy. These policies are significant factors in conditions of their power to create an

enabling environment for solar energy projects public exposure and mobilizing resources, in addition to supporting private sector investment. This agrees with a study by Sampa, (1994) who stated that Experience in the Kenya, points that the establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy. These policies are significant factors in conditions of their power to create an enabling environment for solar energy projects public exposure and mobilizing resources, in addition to supporting private sector investment. The study also found that very small expenditure is allotted to small and medium scale solar energy projects in comparison to the conventional energy sector.

5.3.3 Stakeholder Participation and Performance of Solar Energy Projects

The study stakeholders were involved in the solar energy projects in Remba-Homabay County through brainstorming on project ideas. The study found that any stakeholder engagement mechanism requires some form of common, transparent way of providing timely information to all sectors before policy decisions are final. The study concurs with a study by Mitchel, (1997) who stated that energy stakeholders must have trustworthy mechanisms to constructively discuss concerns and viewpoints in dealing with the challenges of an increased use of renewable energy resources. Any stakeholder engagement mechanism requires some form of common, transparent way of providing timely information to all sectors before policy decisions are final. This is especially true considering that many energy decisions are usually made based on hierarchal, top-down approaches. The key challenges for project management and stakeholder involvement vary according to technology and geographic context.

5.3.4 Project Management and Performance of Solar Energy Projects

The study found that most of the project team members were conversant with project maintenance and management of solar energy project. The study also established that project maintenance and management ensures that the project is sustainable and beneficial to the society. This agrees with a study by Baguant, (1992) who argued that Solar Energy needs the development of technical skills for project management. The importance of technical knowledge in the enhanced uptake of Solar Energy has been realized in the region, but despite of attempts by governments, there is a continuing deficit of qualified force. Technical knowhow is crucial in order to form over the long term, a critical mass of professional African policy analysts, economic leaders and engineers who are capable of managing all facets of the RET development work and to make sure effective use of already trained African analysts and managers (World Bank, 1996). Trained workforce which is able of designing and manufacturing renewable energy technologies is a requirement for their productive diffusion. African Government and ministries experience a shortfall of qualified Solar Energy management personnel.

5.4. Conclusions

On the extent to which economic factors influences performance of solar energy projects in Remba-Homabay County, the study concluded that solar energy projects as shown by minimum budget allotment to renewable which has greatly influenced the success of the projects. On government involvement in renewable energy projects influence performance of solar energy projects in Remba-Homabay County, the study concluded that establishment and success of any renewable energy technology is dependent to a

great extent, on the government existing policy. On the extent to which stakeholder participation influence performance of solar energy projects in Remba-Homabay County, the study concluded that stakeholder engagement mechanism requires some form of common, transparent way of providing timely information to all sectors before policy decisions are final. On project management influence performance of solar energy projects in Remba-Homabay County, the study concluded that most of the project team members were conversant with project maintenance and management of solar energy project. The study also concluded that project maintenance and management ensures that the project is sustainable and beneficial to the society.

5.5. Recommendations

From the findings the study makes the following recommendations:

1. The ministry of energy should consider zero rating tax on solar equipment so as to influence lower pricing thus making it more affordable for purchase and installation of solar system. This would be of assistance especially for the people living in the rural areas. Alternatively, the government could arrange for a plan that allows households to pay an agreeable small amount of money per month in a bid to increase the use of solar energy.

2. With regard to the stakeholders the Ministry of Energy need to provide training and education to increase the level of knowledge and awareness on the use of solar energy among the project managers and the beneficiaries of the project. This can be done through seminars, workshops and public barazas where members are invited for training and demonstration on the use and benefits of solar energy.

3. With regard to economic issues the project stakeholders need to offer subsidies which will lower the cost of producing solar energy which will make it easier for the beneficiaries to have access to it

4. Project management more skills and techniques need to be applied in the solar energy projects to ensure all the project phases are carried out in the right manner.

5.6 Suggestions for Further Studies

Given the findings and conclusions drawn from the undertaken research project, it is apparent that there is a changing landscape as far as project performance in general is concerned. What was considered critical in yester years may not necessarily be the same today and in future. Technology is among the factors that are significantly changing the landscape of project implementation. It is therefore importance for a study to be undertaken on the emerging trends in factors affecting project performance as well as effects of globalization on project performance.

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APPENDICES

APPENDIX 1: INTRODUCTORY LETTER

MOTARI DIANA KWAMBOKA
P.O BOX 611-00606
NAIROBI, KENYA.

THE GOVERNOR
HOMABAY COUNTY
KENYA.

Dear Sir,

REF: REQUEST FOR USE OF INFROMATION

I am a master of arts in project planning and management student at the University of Nairobi and in the partial fulfillment of the requirements of the degree; I wish to undertake a research study on the **factors influencing performance of solar energy projects: a case of Remba-Homabay County, Kenya.**

The purpose of this letter is to request your permission to collect data through interviewing the respondents dealing with performance of solar energy projects in the county. Your support and responses will be helpful in the study as I will be able to summarize, conclude the findings and help me come up with the right recommendations.

I take this opportunity to ensure that the data obtained will be used for academic purposes only and your identity will be held confidential.

Your cooperation will be highly appreciated.

Yours Faithfully,

MOTARI DIANA KWAMBOKA
L5/82382/2015

APPENDIX II: QUESTIONNAIRE

This questionnaire aims at collecting information and data for academic use by the researcher. Your kind participation will go a long way in providing useful information required to complete this research. The information provided will be treated in confidence. You need not indicate your name. Please answer the questions precisely and objectively; the information will be treated confidentially. Kindly provide correct and useful data and fill appropriately as logically guided. *(This questionnaire has been provided as a word document that can be filled out in soft copy and returned via e-mail; or printed, filled out and mailed).*

SECTION A: BACKGROUND INFORMATION

1. Indicate your Gender

   [ ] Male [ ] Female

2. What is the highest level of education you have attained? (specify)

   [ ] Primary [ ] Secondary [ ] Diploma [ ] University Degree [ ] Post Graduate

3. Please indicate your age bracket

   [ ] 20-30 years [ ] 31-40 years [ ] 41-50 years [ ] over 50 years

4. How long have you been working in project work?

   [ ] Less than a year [ ] between 1-2 years [ ] between 2-4 years [ ] over 4 years

SECTION B: Economic Factors

5. Do the economic factors influence the performance of solar energy projects?

Yes [ ] No [ ]

6. State the extent to which the following aspects of economic factors affect project performance. Use a scale where 1- To a very low extent, 2- To a low extent, 3- To a moderate extent, 4- To a great and 5-To a very great extent

Statements	**1**	**2**	**3**	**4**	**5**
Availability of the finances determines the performance and success of the projects					
Availability of funds facilitates the sustainability of the projects which aids in the project success					
There is limited policy support for solar energy projects as shown by minimum budget allotment to renewable which has greatly influenced the success of the projects					
Majority of advanced solar energy projects are not affordable to most of the population in Kenya who are poor thus affecting their performance					

SECTION C: Government Involvement

7. Is the government involved in solar energy projects in Remba-Homabay County?

   Yes [ ] No [ ]

8. Explain how the various government policies determine the performance and success of solar energy projects

……

……

……

9. State the extent to which the following aspects of government involvement affect project performance. Use a scale where 1- To a very low extent, 2- To a low extent, 3- To a moderate extent, 4- To a great and 5-To a very great extent

Statements	**1**	**2**	**3**	**4**	**5**
Establishment and success of any renewable energy technology is dependent to a great extent, on the government existing policy					
Very small expenditure is allotted to small and medium scale solar energy projects in comparison to the conventional energy sector					
Policy programs should be planned to show the economic and environmental gains of solar energy projects					
Government policies determines how solar energy projects are carried out					

SECTION D: stakeholder participation

10. How do the stakeholders get involved in the solar energy projects in Remba-Homabay County?

[ ] Brainstorming on project ideas

[ ] Sharing of information

[ ] Cost sharing

11. State the extent to which the following aspects of stakeholder participation affect project performance. Use a scale where 1- To a very low extent, 2- To a low extent, 3- To a moderate extent, 4- To a great and 5-To a very great extent

Statements	**1**	**2**	**3**	**4**	**5**
Energy stakeholders must have trustworthy mechanisms to constructively discuss concerns and viewpoints in dealing with the challenges of an increased use of renewable energy resources					
Any stakeholder engagement mechanism requires some form of common, transparent way of providing timely information to all sectors before policy decisions are final					
The key challenges for project management and stakeholder involvement vary according to technology and geographic context					

SECTION E: Project Management

12. How many project team members are conversant with project management of solar energy project?

[ ] All of them [ ] Most of them [ ] Some of them [ ] None of them

13. State the extent to which the following aspects of project management affect project performance. Use a scale where 1- To a very low extent, 2- To a low extent, 3- To a moderate extent, 4- To a great and 5-To a very great extent

Statements	**1**	**2**	**3**	**4**	**5**
project management requires technical skills that aid in project success					
Poor project management leads to project failure					
Project management ensures that the project is sustainable and beneficial to the society					
Trained workforce which is able of designing and manufacturing renewable energy technologies is a requirement for their productive diffusion of a project					
Inadequate general expertise in all facets of solar pumps in the applicable ministries has led to slow project implementation and success					

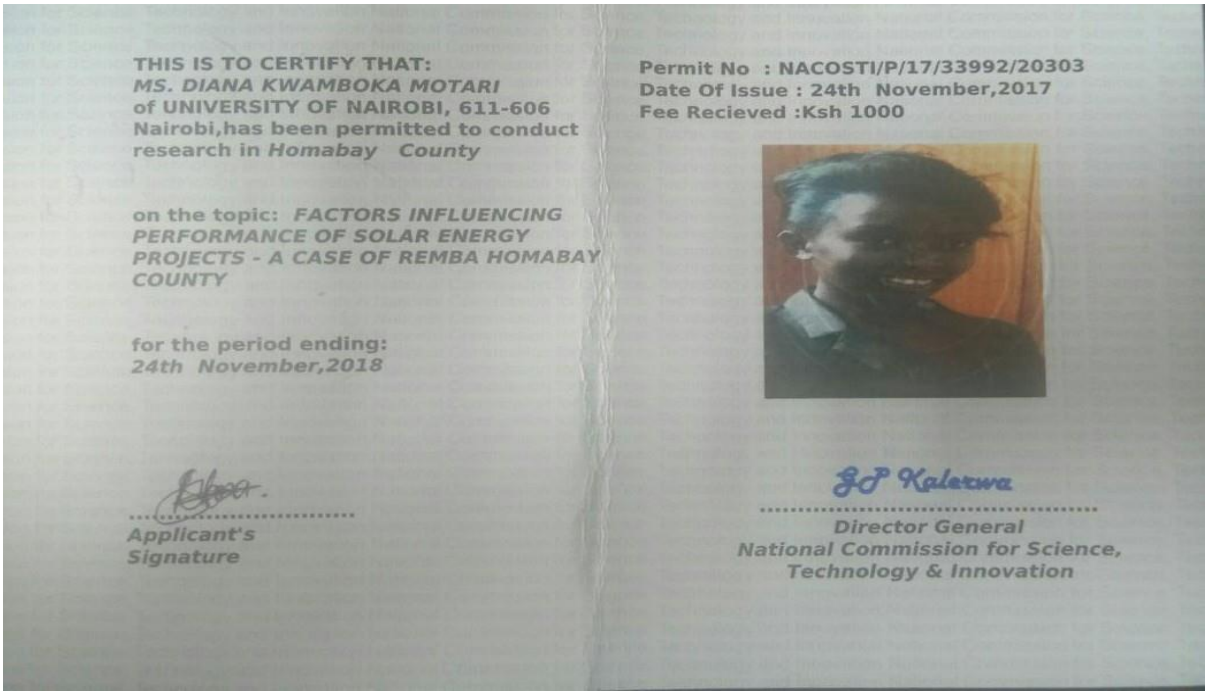
THANK YOU AND GOD BLESS YOU

APPENDIX III: INTERVIEW GUIDE

This interview guide aims at collecting information and data for academic use by the researcher. Your kind participation will go a long way in providing useful information required to complete this research. The information provided will be treated in confidence. You need not indicate your name.

1. To what extent do the economic factors affect the performance of the solar projects?
2. The success of solar energy projects in the community goes hand in hand with an availability of finances. Explain
3. Explain how the various government policies determine the performance and success of solar energy projects.
4. Describe how the stakeholders get involved in the solar energy projects in Remba-Homabay County?
5. The key challenges for project management and stakeholder involvement vary according to technology and geographic context. Explain
6. Describe the extent to which various aspects of project management affect project performance?

APPENDIX IV: NACOSTI RESEARCH AUTHORIZATION



THIS IS TO CERTIFY THAT:
MS. DIANA KWAMBOKA MOTARI
of UNIVERSITY OF NAIROBI, 611-606
Nairobi,has been permitted to conduct
research in *Homabay County*

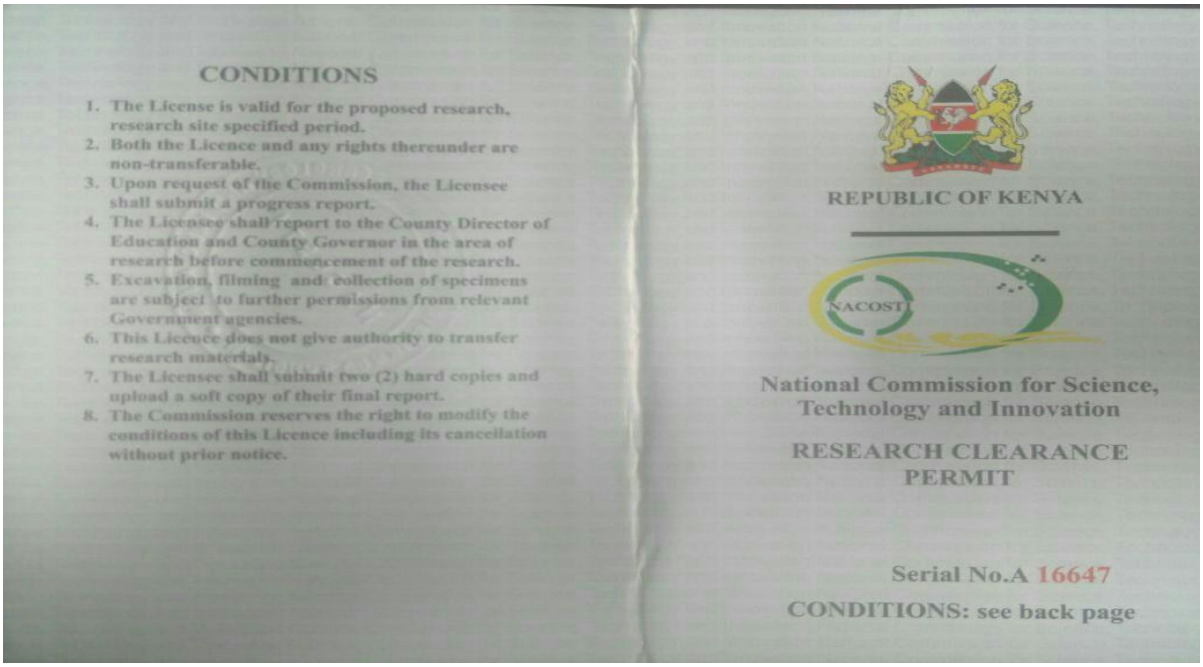
on the topic: *FACTORS INFLUENCING PERFORMANCE OF SOLAR ENERGY PROJECTS - A CASE OF REMBA HOMABAY COUNTY*

for the period ending:
24th November,2018

.....
Applicant's Signature

Permit No : NACOSTI/P/17/33992/20303
Date Of Issue : 24th November,2017
Fee Recieved :Ksh 1000

BP Kalerwa
.....
Director General
National Commission for Science, Technology & Innovation



CONDITIONS

1. The License is valid for the proposed research, research site specified period.
2. Both the Licence and any rights thereunder are non-transferable.
3. Upon request of the Commission, the Licensee shall submit a progress report.
4. The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
5. Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.
6. This Licence does not give authority to transfer research materials.
7. The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.
8. The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No.A 16647

CONDITIONS: see back page

APPENDIX V: RESEARCH AUTHORIZATION

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: 020 400 7000,
0713 788787,0735404245
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref. No. **NACOSTI/P/17/33992/20303**

Date: **24th November, 2017**

Diana Kwamboka Motari
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Factors influencing performance of solar energy projects - A case of Remba Homabay County"*** I am pleased to inform you that you have been authorized to undertake research in **Homabay County** for the period ending **24th November, 2018.**

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

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

GP Kalerwa

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

Copy to:

The County Commissioner
Homabay County.

The County Director of Education
Homabay County.