INFLUENCE OF RISK FACTORS ON PERFORMANCE OF SOLAR DISTRIBUTION PROJECTS IN KENYA: A CASE OF MKOPA SOLAR COMPANY LTD IN NAIROBI COUNTY

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A Research Project Report Submitted in Partial Fulfillment of the Requirements for the Award of the Degree of Masters of Arts in Project Planning and Management of the University of Nairobi

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DECLARATION

The research report is my original work and has not been submitted for a degree or any other award in any other institution.

Sign:..... Date: .....

PHILIP NDUNGUMWAURA

L50/82179/2015

The research report has been submitted for examination with my approval as the University Supervisor.

Sign:……. Date:…….

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DEDICATION

I dedicate this research work to my wife Esther and Daughter Joy who have had to bear with my prolonged absence from home.

ACKNOWLEDGEMENT

I wish to acknowledge with gratitude the help I received from all those who in diverse ways made it possible for me to undertake this research and project to its successful conclusion. I wish to acknowledge my supervisor, Dr. Dorothy Kyalo, for her patience and perseverance in guiding me through this research project. I am grateful to the University of Nairobi lecturers: Prof. Harriet Kidombo, Professor Christopher MwangiGakuu, Dr. BwiboAdieri to mention but a few, who taught me the various courses in this Master's degree program. I wish to express my gratitude to the University of Nairobi for the providing me with the opportunity to undertake this post graduate degree course. I salute the senior management of Mkopa Solar Ltd for granting me the permission to carry out my study in the organization and the staff who agreed to participate in the research project. The knowledge I have gained has made me a better manager and leader in my occupational life. I am grateful to my classmates whose constant interaction, discussions, ideas and encouragement assisted me in completing the course work and researchproject.

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ABBREVIATIONS AND ACRONYMS

M-KOPA	Mobile (Kopa-Swahili word for borrowed)
ERC	Energy Regulatory Commission
KPLC	Kenya Power and Lighting Company Limited
NACOSTI	National Commission for Science, Technology and Innovation
PDU	Presidential Delivery Unit
PMBOK	Project Management Body of Knowledge Guide
PM	Project Manager
PMI	Project Management Institute
PRINCE2	Projects IN Controlled Environments
SGR	Standard Gauge Rail
SPSS	Statistical Package for Social Sciences
TC	Triple Constraints

ABSTRACT

Despite the existence of project management in the past decades, researchers have explored this principle only a few years ago. There are many scenarios under which project management is applied. It refers to the main criteria through which the operational and strategic changes are managed in contemporary organizations. Project risks management is considered as a vital tool in project in an organization's project management. In Kenya, little research exists on the impact of risk factors on project performance in organizations within the off-grid power sector. This study's general objective was to evaluate the impact of various types of risks on the performance of distribution projects in Nairobi County by Mkopa Solar Ltd. The main research objectives were: To determine how economic risk factors influence performance of distribution projects; to ascertain how regulatory risk factors influence performance of distribution projects; to determine the influence of completion risk factors on performance of distribution projects and to determine the influence of technological risk factors on performance of distribution projects . In order to answer these research questions, the study adopted a descriptive survey design. This study's target population included Mkopa Solar employees associated the planning, designing, arranging for finance and executing distribution projects in Kenya. A sample size of 108 respondents was selected using stratified random sampling technique to group respondents into eight strata. Structured questionnaires were employed for data collection and data analyzed qualitatively and quantitatively and findings analyzed using descriptive statistics and presented using tables. The response rate obtained from the study was 82 (75.93%) responses were received which was considered sufficient to draw conclusions. The study findings indicated that Mkopa Solarstaff involved in distribution project activities, within Nairobi County, were keenly aware about how project performance was influenced by management of economic, completion, regulatory and technological risks.54 (63.41%) respondents agreed that the organization total revenue after considering project risk factors had improved.52 (63.41%) respondents agreed that there was an increase in the number of subscribers after considering project risk factors. The Likert aggregate mean was 3.62. The study further confirmed that there was a positive correlation between performance of distribution projects and management of economic(beta=0.019,p=0.760), completion(beta=0.313,p=0.000), regulatory(beta=0.253,p=0.131)and technological(beta= 0.253, p=0.038) risks. The study further found that 31 (37.8%) respondents agreed that the organization had instituted systems for effective management of the resources.38 (46.34%) agreed that the organization had quality control systems that ensure the attainment of customer satisfaction. The study further found that an average of 42 (51.22%) and 44 (53.66%) respondents agreed with management of completion risk and technological risk respectively by the existing organizational systems. These findings led to the conclusion that quality control, monitoring and control of distribution projects within Nairobi County needed to be improved from current levels. Furthermore, the management of completion and technological risks needed to improve if performance of distribution projects within Nairobi County is to improve. The study recommends that Mkopa solar improves these risks'management through training of Mkopa solar supervisors, improving procurement systems and enhancing innovative skills through training from within and without. This will ultimately improve performance of distribution projects in Nairobi County.

CHAPTER ONE
INTRODUCTION

1.1 Background to theStudy

Due to the dynamic nature under which organizations operate, firms have to constantly foresee on how to cope with changing customer requirements and increasing customer pressures. Often, they are forced to formulate risk management practices so as to solve challenges that accrue due to the dynamic environment(Teller, 2013).Growth in the projects' monetary value across the board in the industry setup means that the concept of project management has tremendously advance and is considered of great value in the modern society. Project implementation is greatly influenced by risks and uncertainties management. Its main pillar is the (TC-paradigm) namely referred to as: scope, cost and schedule (Lechler et al., 2013). According to (PMI, 2013), project risk management is the process of undertaking risk management identification, planning and analysis. Project risk management seeks to increase the impact and likelihood of positive occurrences and reduce the probability and impact of negative consequences that might affect the project.

Worldwide, risk management differs across from project management in accordance with the level project management maturity in a specified country. The PMI Network magazine in its November 2010 edition, quoted Shelley Hurley, the head of the risk-management practice for the resource operating department of global consulting giant Accenture, USA, saying "Companies that are able to proactively assess, analyze and manage risks are better equipped toeffectively manage uncertainties,", She asserted that identification of project risks on time , enabled teams to understand their interests for in potential problems—and opportunities—early enough. Accenture argues that a wide scope of organizational framework is vital for complete understanding of the risk profile of the organization and to position itself to attain the objectives of the business. The model includes a proactive and robust assessment of risk, analysis, reporting, feedback and monitoring technique. A well coordinated project management process and risk management makes the risk management process less cumbersome and easier. Ms Cindy Qin, an expert of project management in China at the time of the 2005 PMI Global

Conference proceedings, observed that regardless of more than twenty years of practicing, learning, and being awarded with acknowledgment in China, a great gap still existed between its experience in China and its worldwide application. For example, she stated there was absence of project management methods and techniques in undertaking of major projects prejudice against utilization of project management skills, lack of institutional platform which did not consider early planning necessary, low level of professionalism, insufficient laws and regulation, poor practice or malpractice of project management and lack of disciplined research in project management. The consequence for lack of project management, including risk management, predisposes projects to failure in achieving project objectives and goals. She stated that design and cost overruns, wastage and theft of resources allocated to a project were common results of the failure by Chinese organizations to adopt modern project management. A possible explanation, for the apparent disconnect between modern project management and application in China, is the conflict between local cultural issues and elements of project management from theWest.

MsSerafin, in the PMI Network magazine, June 2010 edition, stated that in Nigeria, risk management was taking centre stage given the political instability in various parts of Nigeria such as Boko Haram, security and regulatory concerns, corruption, poor infrastructure and lack of professionally trained project managers in the West African country. However, lack of project management skills and management buy-in in use of modern project management means level of management of project risks was low and importation of expatriate labour proficient in project management is deemed necessary. In South Africa, project management and by extension project risk management has a greater footprint than in Nigeria. South Africa is a country classed as an emerging economy, with one foot in the first world and the other foot in the third world. The political changes begun in the early 1990s have led to enormous change including new government legislation and structures, social change and infrastructure improvements such as health clinics, low cost housing, water delivery and increased telecommunication facilities. The South African government spent Kshs840 billion on infrastructure projects, including transport, energy and communications, in 2013-2014. By 2017, it will increase

that investment by7.9percentayeartoKshs1050billion.Tomanagethislargeinvestmentininfrastructureincluding social and health there is need to engage stakeholders and manage their expectations, improved quality and quantity of project managers to manage programs and projects and the attendant risks, (Guarino and Dirie, 2014).

Kenya, is currently undertaking major investments in public and private sector under the Vision 2030 (NECK, 2007). It is underpinned on the social, economic and political pillars. This is equivalent to infrastructure-roads, airports and rail among others and social infrastructure-political dispensation and public governance structures of the nation. The goals of the pillars are Economic-adding value to the nation's product and services, Social-investing in the people of Kenya and Political-moving to the future as a nation. The government in its development of the Vision 2030 development plan identified and acknowledged the possible risks that could hinder the successful implementation of the program. The possible project risks include macroeconomic instability, instability in governance structures, increased economic and wealth disparities, poor infrastructure by way of transportation systems, energy supplies and lack of human resource development, lack of land reforms, insecurity and lack of public sector reforms, insufficient public funding and thus need to raise funds using Public-Private partnerships (PPP).The level of project management maturity is still low with similar constraints of qualified project managers ,witnessed in Nigeria, been experienced in Kenya. President Uhuru Kenyatta created the Presidential Delivery Unit (PDU) in April 2015 to oversee the delivery of the big ticket projects. This was a clear effort by the President to stamp his imprint on the government and ensure major public and private projectsespoused in the Vision 2030 are implemented. The unit would have the mandate of tracking and reporting on the progress of the implementation of key governmentprojects.

In order to improve project and program performance in African countries it has been argued that six key themes are essential in order to see improved performance of program management. These themes are governance, policy, definition, stakeholders, process and capacity (Eggington and Fitz- Gerald, 2012).Policy refers to government policy affecting project planning and management; governance refers to structures boundaries, roles and

responsibilities and key forum and decisionmakers; stakeholders refers to stakeholder engagement ,management and communication; definition refers to scope definition and related changes and alignment to strategy; capacity refers to human resource availability ,training needs, people development and use of external consultants; process refers to elements related to specific processes such as life cycle, scheduling, risk management, benefits management. As shall be seen later, in Chapter two, these themes have a strong resonance with the theoretical and conceptual frameworks that will be developed. Furthermore, the themes have a strong interdependency throughout the program and project life cycle. Under the process theme, although risk management is sometimes carried out in the preparatory stages of a project, the analysis often does not encompass the interests of all groups. For example, one project has to be scaled down because the received bids exceeded initial estimates due to the rising political tensions and the impact was not factored in the project risk managementplan.

In Kenya, an estimated 6 million households are outside the power grid. These households spend a significant percentage of their disposable incomes on poor quality energy sources for lighting and heating, especially kerosene. According to the Energy Regulatory Commission (2015), Kenya has high isolation rates with an average of 5-7 peak sunshine hours translating to a potential of generating 430Mw.Established in 2011, Mkopa set out to tap and solve the increased demand for affordable off grid energy through offering a pay-as-you-go energy service. To date, more than 500,000 customers have used this service. This growth has been achieved using home energy systems that are connected using cellular communication (GSM) technology, which allows remote monitoring and real time control of each unit. Mkopa solar has a major role in development of the energy sector infrastructure in the Vision 2030 plan. The key mandate of Mkopa solar is to plan for clean and reliable source of energy to its customers and ultimately environment protection. In performing its role of transmitting, distributing and retailing solar energy throughout Kenya, Mkopa solar is guided by its strategic and business plans which are closely aligned with the Government's 5,000+MW plan, under Vision 2030, as well as its other target of making off grid energy accessible and affordable to more than 70% of the population by 2020, compared to 35 per cent

currently. Mkopaplans to invest US$ 80 million by 2017, particularly to support the distribution of the additional solar energy that will be generated under the 5000+MWprogram.

According to the financial report for the year ended 2014-15, Mkopa solar spent Kshs.2bn to refurbish the distribution network and expand it. Funding for the projects is sourced from internally generated funds and aid flows from multilateral financing institutions such as Richard Branson, Generation Investment, Blue Haven Initiative and LGT Venture Philanthropy. In order to achieve its strategic goals and attain the infrastructure investment laid out in the Vision 2030 national plan, Mkopaneedstoexpandonitsportfolioofdistributionprojectscountrywideandmore specifically regionally in East Africa to meet the growing off-grid energy demand.

Mkopa solar organizational structure could be defined as a matrix which represents a combination of a blend of functional and projectized attributes. A functional structure, or all rounded- organization, is ideal for the management of specific projects within the required schedule, performance standards and costs (Ireland and cleland, 2007). Many attributes are associated with strong matrix organization structures and exhibit full-time project managers who are endorsed with all the mandate and complete project personnel (PMI, 2013). Project-based organizations for instance Mkopa solar should thus implement a well coordinated project risk management plan that has team members who can reason together, good proper project risk management culture and knowledge, and a team will agree on common analytical abilities that can foresee and prevent the occurrence of potential risks and also exploit opportunities the available opportunities(Boukhari,2013).

1.2 Statement of theProblem

Project management can be described as the art and science of human interactions undertaken by a specific group of individuals to meet to meet the needs of others. Most challenges in projects are brought about by un anticipated consequences of unintentional or intentional human actions. People forget, make poor estimates, make mistakes,

communicate poorly will in totality contribute to bigger issues (Virine, 2013). Projects in power utilities such as Mkopa solar suffer from failure to achieve optimum performance due to decisions made by its personnel while undertaking projects. Virine attributes the source of the problems to the following- overconfidence, faulty analysis and processes, biases and assumptions. A project manager who follows important guidelines for time, scope, risk management, cost and other knowledge areas, should expect an improvement in the quality of the decisions made during the execution of the project and reduce chance of failure Odeh and Battaineh (2002) in their study identified major causes of project delay in the civil construction industry to several factors. The factors were relatedtomatterssuchaspaymentsforworkdoneorlackthereof,financeavailability,sitemanagement, inadequate contractor experience, delays by the contractor, shortage of materials and labour and contract disputes.

The factors were categorized into eight categories namely –contractor related, client related, consultant related, material factors, labour and equipment related, contract related, contractual relationship issues and external factors. Organization and project leaders and their team members not only need to understand the importance of types of risks and opportunities that may arise in the project but they need to appreciate the causes and impacts the risks or opportunities may have on the project outcomes. Ashrafi and Hartman (1997) observed that in power utilities, although some project success measurements i.e. scope, finance, duration, risk, quality, customer satisfaction were well defined, others such as poor project selection, poor scope management, poor contingency planning and poor communication led to project success failure. Recent occurrences in the planning and implementation of different distribution projects in Kenya, has led to challenges faced by Mkopa solar in its project distribution and implementation within East Africa, including challenge in completion of projects on time, quality control, new entrants to the market, duplication of products and finally failure of compliance to policies and regulations. These incidents have initiated the undertaking of the study on the influence of various types of risk on performance of distribution projects in NairobiCounty.

1.3 Purpose of theStudy

The overall purpose of the study was to investigate the influence of risk factors on the performance of distribution projects, by Mkopa solar, within Nairobi County.

1.4 Objectives of theStudy

This study was guided by the following specific objectives: -

1. To determine how economicrisk factorsinfluences performance of distribution projects in Mkopa solar, NairobiCounty.
2. To determine the influence of completion risk factorson performance of distribution projects in Mkopa solar, NairobiCounty.
3. To establish how regulatoryrisk factorsinfluences performance of distribution projects in Mkopa, NairobiCounty.
4. To determine the influence of technological risk factorson performance of distribution projects in Mkopa solar, NairobiCounty.

1.5 ResearchQuestions

The study sought to answer the following questions: -

1. To what extent does economic riskfactors influence performance of distribution projects in Mkopa solar, Nairobi County?
2. How does completion risk factors influence performance of distribution projects inMkopa solar, NairobiCounty?
3. How does regulatory risk factors affect performance of distribution projects in Mkopasolar, NairobiCounty?
4. How does technological risk factors influence performance of distribution projects in Mkopasolar, NairobiCounty?

1.6 Significance of theStudy

The study, it is hoped, would provide an understanding of the influence of riskfactors on performance of distribution projects in Nairobi County.

The findings of the study are aimed at assisting management of Mkopa solar in

improving delivery of the objectives of distribution projects, in Nairobi County and even countrywide, by minimizing on project risk and maximizing opportunities. In addition, it is hoped, it will assist current and future researchers understand better how the various risk types affect development and implementation of distribution projects within off-grid power utilities and what risk mitigation measures or opportunity enhancers can be pursued.

1.7 Limitations of theStudy

There were a number of limitations in this study that included deliberate refusal by some of the identified respondents to respond adequately to the survey questionnaire despite written and oral assurances by the researcher and even approval of the respondent's employer. A second limitation was that the research was conducted during the electioneering period that witnessed instances of insecurity thereby limiting and at times hindering the movement of the researcher. The limitation of timewas mitigated through adoption of a descriptive survey design and using a data collection tool that would enable collection of sufficient quantifiable data at minimum cost and shortest time possible.

1.8 Delimitation of theStudy

The study targeted an organization within the off-grid power sector, specifically Mkopa solar, and how various specific risks, namely, economic, completion, regulatory and technological risks influences performance of distribution projects in Mkopa solar within the geographical area of Nairobi County. The study did not explicitly cover other categories of risk types, such as force majeure or operational risks, however the interdependent nature of risks permits a limited inference of this study results to other risks types not considered. The chosen design methodology for the study is descriptive survey design as it was considered most amenable to the data that would be generated by thesurvey.

1.9 Basic Assumptions of theStudy

The following assumption were made while preparing and conducting the research: the respondents had a basic awareness of the various types of risks that affect the distribution

projects they handle in their daily work activities and they have a desire to achieve improved project outcomes by managing these risks and opportunitiesproactively.

1.10Definition of SignificantTerms

Completion Risk: Risk that a project being undertaken by Mkopa solar fails to achieve completion due to financial or technical difficulties.

Economic Risk: Risk that a project being executed by Mkopa solar fails to achieve financial viability during design, completion or operation stage.

Project Management: Is a series of activities which Mkopa solar is dedicated to, which involve application of management principles and existing capabilities to deliver a predefined scope of work within agreed timescales and costs to achieve desired benefits, goals andobjectives.

Project Performance: Defined as the degree to which a project by Mkopa solar achieves the desired goals and objectives within the planned scope, duration, quality and cost.

Project Risk Management: involves the process by which Mkopa solar conducts risk management planning, identification, analysis, response planning, and controlling and mitigating risk on a project.

Regulatory Risk:A Risk that Mkopa solar may not achieve completion, desired outcomes or goals due to failure to observe established legal statutes or compliancerequirements.

Technological Risk: Risk that can occur in Mkopa solar due to failure to perform according to set specifications or become prematurely obsolete on account of the technology used in operation.

Triple Constraint Paradigm: The three constraints in a project: scope, schedule and cost that may restrain the successful implementation of projects in Mkopa solar.

1.11 Organization of theStudy

The report contains five chapters and an appendices section. The first chapter provides the study's background, statement of the problem, aim of the study, the study's objectives, research questions, the importance study, the challenges experienced in the study, basic assumptions and the definitions of common terms.

Chapter Two discusses the literature on concepts of risk and uncertainty in project management, responses to risks and opportunities by organizations, benefits in applying risk management techniques and tools, types of risks and mitigation measures and the theoretical and conceptual framework for the study is examined

Chapter Three provides a description of the methodology used for the study. The research design together with the sampling techniques used in the study are explained. The sample selection and determination criteria is also outlined. The other components discussed here are the data collection, data analysis and data presentation methods. The chapter is summarized with the operational definition of variables, which seek to link the objectives with the methodology to be adopted.

Chapter Four contains the presentation to the findings, derived from data analysis using the techniques discussed in Chapter Three and concludes with a detailed interpretation of the findings.

Chapter Five presents the summary of the study findings, discussions, conclusion and the recommendations of the study. The chapter contains a section on suggestions for further studies that accrue from the findings of the study. The appendices section contains the introductory letter to respondents and research questionnaire

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter examines both empirical and the theoretical literature associated with the study. The chapter cites existing literature on concepts of risk and uncertainty in project management, responses to types of risks and opportunities by organizations and benefits in applying risk management techniques and tools. The theoretical and conceptual frameworks are reviewed. The chapter concludes by highlighting the knowledge gaps of the study.

2.2 Concept of Risk and Project Performance

Projects are mainly initiated to provide solutions to particular crisis. At the initial stages of a projects, the biggest challenge experienced is risk and uncertainty which gradually decrease as the project continues since the deliverables are accepted by the owner of the projects and little decision making is involved (PMI, 2013). Within the project lifespan, numerous activities are undertaken in a bid to attain the project objective. A lot of uncertainty surrounds project activities environment due to operational or technical issues, financial or commercial constraints, external dependencies and management issues (Hillson, 2006). The success of a project is however greatly influenced by uncertainties as it is perceived as the main cause of risk. The firm must anticipate for uncertainties so as to become successful as it operates in a dynamic environment. However, surprises can be beneficent and opportunities can be propitious.

The notion of opportunity is not directly addressed by the TC-paradigm since uncertainty and risk are not differentiated.TC-paradigm is based on the notion of optimization rather than maximization (Lechler et al, 2013).Other project management practitioners and academics view uncertainty to entail both unforeseeable and foreseeable circumstances and focus on the foreseeable aspect of uncertainty —namely, risks (Teller, 2013).A good project manager will maximize opportunities which arise during project planning and execution. Practitioners of project management have realized the connection between risks, risk management and achievement of project objectives (Hillson, 2006). Since

projects are a tactical means for organizations to achieve their strategic mission and vision, it then follows that project risk management is a process by which project managers are able to increase likelihood of achievement of business success throughprojects.

The two most popular models for project management approaches in identifying and managing project risks are the Project management body of knowledge (PMBOK) guide and Projects in controlled environments (PRINCE2). These methods outline a project-manager driven process for risk identification and management. The processes are, first, define and identify the risks, second assess and analyze the identified risks using qualitative and quantitative methods, third, plan appropriate risk responses and implement the responses, fourth, manage and control the risks and fifth, review the risks by updating the risks register and communicating with stakeholders, determine effectiveness of the agreed responses and review the entire risk process (Griffiths and Stevens, 2013).Excellent project risk management enables a project better probability of staying on track, project team members to be empowered in their decision making ability and eventually been successful (Margules, 2013).Project risk management seeks to address risk exposure and result in an manageable and acceptable risk level (Hillson, 2006). Risk exists when a threat and vulnerability overlap. A risk process is usually considered to begin with a risk event and end in a risk consequence, (Deng, 2014). Risk is not the same as uncertainty. Lechler et al (2013) states that classical project management has not clearly defined the concept of uncertainty or distinguished the difference between risk and uncertainty. Lechler supports the non-ergodic theory, which recognizes that some form of uncertainty cannot be reducible to measurable or estimated risk. This means practically that there is no information available today about every single event and therefore the future is not fully calculable.

Uncertainty can be described as the unknown-unknown. Risk arises when uncertainty has the potential to affect project objectives. Objectives can be used as a measure of project deliverables or success. Project success is measured as adherence to the triple constraints objectives of scope, duration and cost with addition of other constraints such as quality,

risk and resources and utility value to the expected beneficiaries. Measurement involves using a predetermined and defined baseline before the project is started or modified. The project manager's perspective is to make sure that the projects sticks to its predetermined success criteria, (Lechler et al, 2013). Project objectives are often represented by a project's baseline and therefore only possible to identify and evaluate risks if the project objectives are defined. Consequently, it follows that project risk management is a tool for ensuring the project fulfills the set success criteria. Some uncertainties do not affect objectives and therefore not termed as risks (Hillson, 2006). Risks are described as known once they have been identified and analyzed which makes it ieasir to respond to them . Known risks that can't be managed proactively are transferred to a third party together with ownership of the response or alternatively avoided completely by the project team. Mitigation of risk involves the project team taking measures towards reducing the probability of occurrence or the impact of a risk (PMI, 2013). Risk threshold can be defined as the measures along the level of impact or uncertainty at which an entity may have certain interests below which the entity will experience risk; above that level, the entity will not condone the risk. A project is acceptable to stakeholders if the level of risks is within tolerances and can be balanced out with possible rewards from undertaking the project.

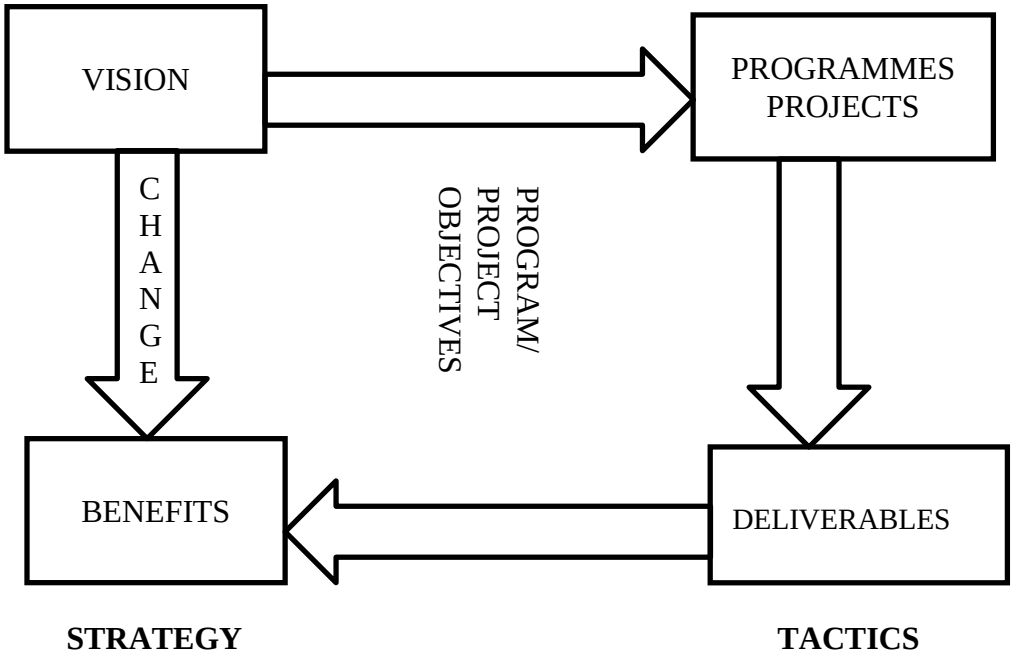
Indeed, forward thinking organizations are not risk averse since they recognize the association between risks and rewards. A "zero risk" project is non-existent and undesirable since the available alternatives are greatly determined by the level of risk (Hillson, 2013). The criteria used by the project team to prevent risks is referred to as risk avoidance strategies, this include measures of avoiding the risk including changing the project implementation plan. Risk acceptance is where the project team acknowledges the risk and does not take any action when the risk occurs. The process where the project team acknowledges the existence of a risk is referred to as project acceptance . Risk transfers is a response strategy where the project team shifts the threats impacts to a third party together with ownership of response. The development of ideal measures for solving risks is fundamental to enhancing the capacity of the organization in handling risks. Salomo et al (Teller, 2013) stated that identification of risks aids in estimation of a

precise and reliable risk level being prepared for materializing risks and therefore decrease the negative effects of risk. The relationship between project objectives, risk and uncertainty ensures that risk management is an important contributor to project success and achievement of organization strategy (Hillson, 2003). It is the responsibility of a project manager to identify risks that influence the continuity of the project and develop risk control strategies. The project manger is also required to communicate to on time with the stakeholders on the potential risks in the environment (Alderton, 2014). The interested parties in the execution of a project include the financiers, beneficiaries and project sponsors. Project stakeholders and managers who do not understand the potential project risks are helpless. Over time, risk management has grown to a wide discipline with that possesses its own techniques, across professional disciplines, consensus, over the fundamental practices and concepts, (Hillson, 2003). The manner in which an organization perceives risks influenced by several factors which can be categorized broadly into three themes namely :risk appetite, risk threshold and risk tolerance (PMI,2013).Risk appetite refers to the extent to which an organization anticipates for a reward. The volume of risk that an organization can withstand is referred to as risk tolerance.

The presence of project risk creates uncertainties throughout the life cycle of a project. This influences all the components ranging from market timing, technical feasibility to cost, strategic objectives and financial performance (Thamhain, 2013). Due to increased globalization of business activities, firms have been forced to venture into partnerships with other businesses to deliver project objectives and leverage on such partnerships over shorter time spans. This has subsequently resulted in more risks since risks do not only arise from the project's technical part but now involve cultural, social, organizational and technological factors (Thamhain, 2013).This project risk approach has resulted to the diversion of a project risk management paradigm to a different dimension of risk management as a means used by the organization attain strategic goals through undertaking projects (Hillson,2013).Figure 1 illustrates that in order for a strategy to change a vision into realizable benefits their needs to be implementation of programs and projects. The programs and projects will provide deliverables aligned with organization’s

strategy. The methods of managing programs and projects to achieve the deliverables are at the tactical level. The deliverables can be new products or services or increased competitive strengths or even maximizing throughput from existingoperations.

Figure 1: Strategy-Vision-Benefits and Tactics-Project-Deliverables.



Adapted from *Integrated Risk Management as a Framework for Organisational Success,* RetrievedMay2016from theProjectManagement InstituteWebsite: http://www.pmi.org/learning/integrated-risk-management-framework-organizational-success-7980. Copyright 2006 by Project Management Institute.Adapted withpermission.

Figure 2 illustrates how effective project risk management at the tactical level enhances the likelihood of realizing the deliverables and therefore expected business benefit to the organization.

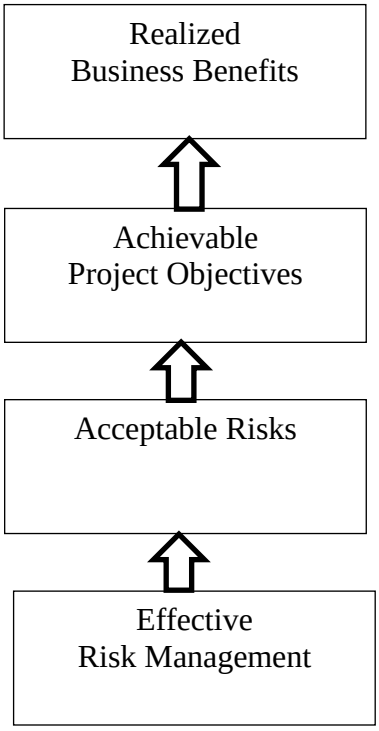


Figure 2: Link between Risk management and Business benefits.

Adapted from *Integrated Risk Management as a Framework for Organisational Success,* by D.Hillson.RetrievedMay2016from theProjectManagementInstituteWebsite: http://www.pmi.org/learning/integrated-risk-management-framework-organizational-success-7980.Copyright 2006 by Project Management Institute.Adapted withpermission.

2.3 Economic Risk Factors and ProjectPerformance

Projects are financial and strategic investments initiated to improve shareholder value and can only be successful when they deliver their expected business returns (Kay, 2014).Economic viability of a project will primarily depend on the project's output marketability, in terms of price and volume (Finnerty, 2013).To evaluate marketability, the sponsor of the project will apply financial engineering techniques to help in identifying the essential components to be considered by decision-making process and risks. The components to be considered include the projected demand and supply conditions over the expected life of the project facility, review of competitors' products and cost of production, analysis of the anticipated life cycle for project output, projected prices , expected sales volumes and possibility of technological obsolescence.

The study analyses whether under given economic conditions, demand for goods or services from the project asset will be at a price that will cover the full cost of production, enable the project to service its debts and provide an acceptable return to the project sponsor. The element of risk and uncertainty therefore comes into play when attempting to judge whether a project is economically viable. A properly designed risk analysis paints a picture of a variety of possible outcomes and explores a variety of input outcomes and the likelihood of those outcomes occurring (Heerkens, 2014). The outcomes to understand are expressed in form of business metrics such as Net Present Value (NPV), internal rate of return, total cost of ownership or pay back period. Payback period, also known as time-to-money period, is a measure of risk and more aligned with organizational liquidity. The longer the payback period, the riskier the project becomes. A risk adverse company may have a smaller payback period stipulation, perhaps a cutoff period of less than two years, than one more tolerant and open to more risk (Kay,2014).

A decision to start a project and even hold on to the facility requires only one instance in which the present value of continuing to hold the asset exceeds the residual or scrap value (Farrell, 2002). Sensitivity factors are used in the calculation of these business metrics. When analyzing the benefits side of the benefit-versus-cost equation, the logical possibilities could entail increase in margins, increase in revenue, materials savings, lower distribution costs, cost avoidance and head count reduction (regulatory penalties/ precluding legal. Sensitivity factors related to short- and long-term items of cost could be project implementation costs, increases in support costs, increase in operating costs through inflation, productivity losses, warranty work and cost of poor quality (Heerkens, 2014). Understanding costs and identifying risks are among the first steps when taking on any project and it requires an in-depth assessment of any new or unknown variables. The less one knows about the benefits and costs associated with a project, the more likely an unviable project could beapproved.

It should be noted that the flip side to economic risk is economic opportunities. If there is an increased demand for products or services from a project asset, then increasing the project scope is valuable because it gives the project sponsor room to increase production if market conditionsturn out to be favorable. Economic viability will be demonstrated by the project asset generating sufficient revenues to cover all capital and operating costs and to service project debt in a timely manner (Finnerty, 2013). Mitigation of economic risks involves project sponsors employing hedging purchase of product contracts, tariffs to secure future revenue margins (Finnerty, 2013). A case study in Thailand where a power plant project secured guarantees from key customers before ground was broken, assuring a fair return on investment. However, local dissenters in the form of local environmentalists blocked the roads to the proposed power plant on environmental grounds and caused delays in its construction, this resulted to return on investments projections quickly become moot. Interest is accruing on the loan whether or not crews are working. Indeed, the World Bank estimates that delays totalling one year can lower projected returns by up to one- fifth (Ingebretsen, 2002).

A similar situation may prevail here in Kenya where the Government of Kenya sourced for private developers to operate coal fired power station in Lamu. In September 2014, the development rights were awarded to a consortium, Amu Power Company, to commence development of the Lamu coal plant. The project is expected to cost USD 2BN with Chinese banks providing sixty per cent of the funding. However environmental and legal challenges from within and without Lamu threaten to delay the commencement. The health of the global economy influences the continuity of projects. In many countries, economic volatility is wreaking havoc on projects. A study into the economic trends enables project managers to stand out since they have the capacity to easily handle challenges. In Portugal, member of the European Union, public projects are being suspended all over for reassessment, and more than 20 public- private partnerships are being re-analyzed with banking and public-sector projects being rescheduled and reorganized. This has made it necessary for the construction sector tore- evaluate their investments, because they are the partners in most of the public-private partnerships (Hunsberger,2011).

2.4 Completion Risk Factors and ProjectPerformance

Completion risk examines the likelihood of a project not being completed. Both financial and technical aspects are intertwined in the completion risk of a project cycle. The completion risk's financial aspect occurs when there is a rise in the costs required to undertake the project rise due to due to shortages of critical supplies in undertaking the project, rise in inflation, underestimation of construction costs which make the continuity of the project impossible. The completion risks technical aspects occur when the technical processes applied in the execution of the project environmentally objectionable and technically infeasible (Odeh and Battaneih, 2002). The mitigation measures that can be undertaken in this two scenarios include the provision of guarantees in the adopted technology during operation and execution, performance guarantees by project contractors to mitigate risks before due completion of the project (Finnerty,2013).

A case study on effects of completion risks on projects is the proposed Umaa dam in Kitui County. Umaa dam is to be located along River Nzeu, 7kms north east of Kitui town. The 28m high dam when completed was intended to store 870,000m^3 of water and inject an additional 2,500m^3/day of water to Kitui town and serve about 75,000 people. However due to design flaws and differences in implementation methods between the contractor and National Water Conservation and Pipeline Corporation, construction work at the site has been suspended for the past five years. To revive the project, the original project cost of Kshs 825MN will need to be increased to Kshs1.4 BN due to cost overruns (Ochami, 2011). A second case study on completion risk is the construction a new runway at Denver International airport to accommodate large wide bodied commercial jets like the Airbus 380. However, several challenges occurred which threatened the completion date including the September 2001 terrorist attacks, varying soil conditions at the project site, inhibited funding from the aviation authority, revised completion schedules from the project sponsor and severe cold weather (Allshouse et al, 2004). The project was however completed ahead of schedule due to prudent management by the project contractor. The project was completed and opened for commercial air traffic on Sept. 4, 2003, eighteen days ahead of the original schedule.

To ensure success, in terms of meeting tight deadlines and maximize the probability of success, the project planner must first establish a realistic expected completion date — defined by theproject's Critical Path — with no regard for an arbitrary end date. Selectively compress the required sequence of tasks by judicious resource management and prudent risk taking. To ensure "on time" project completion, the plan must also accommodate the uncertainties of task execution. This is achieved by compressing the Critical Path to meet an earlier end date than specified — effectively establishing a schedule contingency (Hamburger,1987).

2.5 Regulatory Risk Factors and ProjectPerformance

In earlier years of the 60s,70s and as late as the 90s in developed and developing countries such as Kenya, during implementation of industrial construction projects such as large power distribution substations, the project manager concerned himself with traditional items such as financing, technical scope and specifications, staffing, and other traditional problems. Matters concerning obtaining environmental permits were unfamiliar and unheard of. However, in recent years ensuring that a project complies with legal and regulatory requirements is the norm rather than exception. Failure to do so can mean the difference between a viable project and one which is not implementable. The regulatory process includes, at a minimum, the development of environmental impact reports or statements, permit applications, public hearings, and permit issuance. It also includes compliance with other miscellaneous requirements of agencies having jurisdiction over the siting, engineering, construction, startup, and operation of a new facility, (Eveld, 1981).

Compliance to legal and regulatory requirements is a must irrespective of the project size. It is important to recognize that the regulatory process starts at the inception of any project. From the project owner's viewpoint, it is in his best interest to involve professionals early, even before site selection. Real and emotional problems connected with the project have to be considered. The Project owner needs to engage qualified staff or expert consultants for these services. The project manager should pay particular attention to requirements of the regulatory process during proposal preparation. The

proposal should include allocations of resources for regulatory process activities. Consequently, the project manager should take special care to advise the owner of any problems associated with compliance to regulatory and legal requirements, especially if the project has a tight schedule. The time delays and added requirements inherent in the implementation of the regulatory process may become more critical than the execution of other work, (Finnerty, 2013).

Regulatoryriskiscloselyalignedtopoliticalriskinthesensethatregulationscanbevaried by authorities to the disadvantage of project implementation and eventual use. The project manager should learn as much as possible about the laws, regulations, policies, and precedents applicable to a project since the opposition groups are usually well informed on such matters. If the project manager is not prepared to answer questions which the opposition groups will raise, his credibility will be in serious jeopardy. Opposition groups frequently use the regulatory agencies as an umbrella to stop or delay programs. In other words, they may use certain procedures and permit requirements to thwart the program. For example, local residents can lobby their political leadership to block implementation of a project on fears of environmental damage. In other instances, government may decline to approve higher prices for services or products, generated by the project asset and used by the public, to avoid economic and political chaos. It therefore requires a project leader to evangelize a clear vision to stakeholders, understand the project objectives and align them with stakeholders' values and monitor how project decisions directly affect stakeholder value (Turner, 2007).Mitigation of regulatory risks is through : study and know the laws and regulations applicable to the project, including which courts may get involved in case of litigation, make early contact with representatives of the appropriate agencies to determine and verify their agency's requirements and discern whether the attitude of the agency toward the proposed project is favorable, unfavorable, or undecided, recognizing the changing attitudes and even jurisdictions of the groups and public bodies which will be affected by the project, monitoring the attitude of the regulatory agencies, legislators, local agency representatives, and changing legislation and regulations, including in the project's technical documentation, the conditions precedent to the approvals obtained from the regulatory and having people who are

recognized in their particular field as experts but yet have the ability to listen intelligently and sympathetically to the public. KPLC as part of measures in ensuring regulatory approvals are obtained in a timely manner released a Resettlement Policy Framework for power projects in 2012 (KPLC, 2012) to assuage concerns of multilateral donors such as the World Bank.

Policy framework seeks to clarify organizational arrangements, resettlement principles, and the ideal design criteria to be adopted at KPLC projects that have high likelihood of involuntary resettlement. Management of regulatory risks includes aspects of safety and health of project team members and that of the public within the project environment. Planning for safety entails all safety conditions at the site of the project. Adequate planning increases both the likelihood of possibility of injuries and project delays and increases the likelihood of success among participants (Bonyuet,2001).Safety planning is used to protect the project team staff, anticipate possible dangerous situation and bypass hazards, guide evaluation of the safety condition of the project environment, determine minimum requirements, equipment and tool needed to perform specific activities and meet or exceed legal obligations for safety and health conditions in the work place. In respect to safety and health, KPLC, in 2007, established a dedicated Health, Safety and Environment ("HSE") department headed by a manager and staffed by environmental and social specialists, socio- economists, safety engineers and officers. The department was established purposely to provide guidance to project and operations teams on aspects of socio-environment regulatory requirements and safety at workplace and monitor adherence to set regulatory requirements.

A case study of how regulation poses risk to an organization's ability to finance its program and projects is when Kenya Power Lighting Company (KPLC) submitted a request to the regulator ERC for an upward adjustment of electricity retail prices on 04thFebruary, 2011.The regulator turned down the request citing inefficiencies in the electricity distribution sector. An uproar was raised by the public over the KPLC request for tariff increases. The objections by the regulator and the public culminated in the request been shelved for two years, by which time the financial health of KPLC was

declining under the weight of increased operational and capital expenditure costs. In 2013, an urgent request was brought up by KPLC management, to the ERC, for an increase in retail electricity tariff rates, who projected declining revenues and increasing operating costs would hamper growth of the company (Odhiambo, 2013). It required a lot of effort from management to convince the regulator and the incoming Jubilee government to approve the request for a raise of retail electricity tariffs, albeit in two stages (KPLC, 2014,pp.16).

A second case involved introduction of the legal framework related to the regulatory governance of the energy sector in Kenya through an act of parliament, the Energy Act of 2006. The act consolidated all laws relating to energy and provided for among other things: creation of the current regulator ERC and the splitting of KPLC, which previously handled generation, transmission and distribution of electricity to form a new entity called KenGen. KenGen which was purposed to take-over and carry on the business of generation which hitherto was been handled by KPLC.

2.6 Technological Risk Factors and ProjectPerformance

The development and implementation of new technologies in the execution of activities is a continuous process that is closely associated with the logistical and technological knowledge gaps. This leads to risks due to inadequate knowledge and thus uncertainty (Regev et al, 2006). Under scenarios where it is necessary that an unproven technology or new technology is applied on a project, it is necessary to construct a pilot test to ascertain the required processes' feasibility (Finnerty, 2013). Technology risk accrues when a weak technology is used on the proposed scale experiences obsolescence prematurely or fails to perform as expected. Pilot testing reduces the risks and uncertainties associated with the introduction of a particular type of technology. The technical feasibility and design of a project is affected by factors such as the costs and environment of the new technology. More risks are attributed with higher project returns as the use of efficient technology leads to increased productivity.

The use of external consultants helps project managers to reduce technological risks since they inform them on the efficiency of new technologies and offer a guarantee of operational performance to the project contractor and ensures that all the stakeholders, including lenders, customers, project sponsors and customers, are trained on the benefits of the new technology (Finnerty, 2013; Woody and Pourian, 2015). Every risk project level is explained by three components: M-market, P-product, and T-technology also referred to as the MPT. This implies that newly developed product in the market has a lower MPT, (Pourian and Woody, 2015). The perceived risk of the project increases as the product technology increases. The rate of return required by the lenders is high when the "MPT is higher.

A classic case of introduction and application of new technologies is the on-going Mombasa- Nairobi Standard Gauge Railway (SGR) rail track project been undertaken by China. The single- track standard gauge railway between Nairobi and Mombasa will have a total length of 609km and route length of 472 km. It cross the following counties, Makueni, Kajiado, Nairobi, Machakos, Taita taveta, Kwale, Kilifi and Mombasa. Construction of the 609km-long line began in October 2013 and is is due for completion

by December 2017, ("Mombasa-Nairobi Standard Gauge", n.d.). The Nairobi- Mombasa SGR is the largest infrastructural project in Kenya since independence. It is anticipated t reduce the time used by the passengers from Nairobi to Mombasa and vice-versa. The expected duration for the journey is eight hours at most. The Class 1 line will have a low-maintenance requirement and superior design catering to robust.. At some sections, it will deviate to attain the desired curvature or gradient. In the rail industry, a complicated vehicle acceptance process, the proliferation of standards and the desire to attend the rail infrastructure for the purposes of testing all creates delays and generates the need for more design modifications during project execution and contribute technological risks and uncertainties. Another key attribute of complicated projects is the desire of more knowledge that highlights areas where the project recipient, Kenya Railways, previously has little or no experience. This will demand that technology transfer by way of training in design, operation and maintenance of such new technologies be incorporated in the overall project planning and implementation including provisions of technical guarantees onperformance.

A second case study in introduction of new technologies in the electrical power utility involves the successful design, installation and commissioning of the first gas insulated distribution substation (GIS), with a capacity of 90MVA, in Kenya. The substation located in Upper Hill, Nairobi was commissioned in May 2014 and contract conditions required major technical guarantees to be provided by the project contractor, from China, to ensure the substation performance and benefits were achieved as per agreed design specifications. The benefits included reduced demand for land as the substation required forty to fifty per cent less space than a similar sized Air Insulated Substation (AIS). As in the case of SGR, technology transfer is a requisite condition.

2.7 TheoreticalFramework

The project management theory developed by Hanisch and Wald (2011) provides a suitable framework for this study as it brings to the fore the effects of a project on surroundings and surroundings on a project. The theory describes and explains these effects in three dimensions namely: design, goal and context. The design dimension

indicates the endogenous factors of project management and can be further sub-divided into the sub-dimensions of: -strategy and structure, organization and culture, social processes and project management. Goal dimension is a view which regards projects as value addition processes for an organization. This dimension views project success not only as fulfillment of the triple constraints of time, budget and scope but also stakeholder satisfaction. Project objectives is the desired outcome of the the project subsumed within the sub-dimensions of value addition and adaptability. According to the theory, the goal dimension is dependent on the external effects and design dimension measures from the context dimension.

The context dimension refers to exogenous factors influencing projects and project management. The factors are external to the project and cannot be influenced directly but have to be integrated into the management of the project if it is to achieve the set goals and objectives. These factors comprise the economic, political, technological, social, legal and environmental elements that shape the organization's macro environment. Hanisch and Wald further categorized the context dimension into sub-dimensions of complexity, dynamics and uncertainty.Complexity and dynamics lead to higher uncertainty and therefore risks. Figure 2.3 is a pictorial showing how the endogenous dimensions of design and goal and exogenous dimension of context relate to each other and their interdependence. It provides a framework illustrating how project performance is influenced by the dimensions of goal, design andcontext.

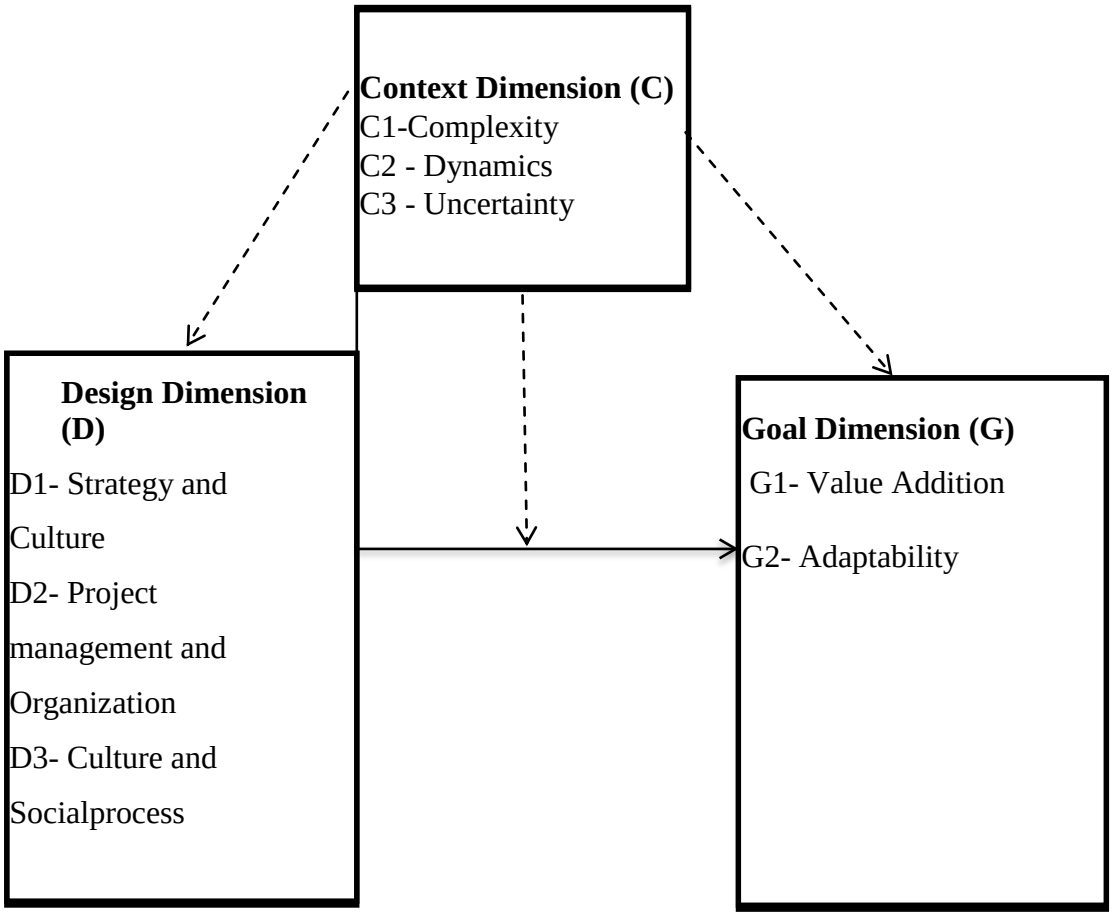


Figure3: Theoretical Framework.

Adapted from *A project management research framework integrating multiple theoretical perspectives and influencing factors* by B. Hanisch and A. Wald.Retrieved May 2016 from the Project Management Institute Website *Project Management Journal, 42(3), 4- 22.doi.10.1002/pmj.20241*.Copyright 2011 by Project Management Institute.Adapted with permission.

2.8 ConceptualFramework

The conceptual framework in figure 2.4 shows the interrelationships between the variables. Independent variables are factors influencing the dependent variable in the study. The independent variables are parameters to be measured and their effect on the dependent variable –project performance-determined. The moderating variable is risk management quality. From the literature review, five independent variables have been identified-economic, completion, regulatory and technological risks.

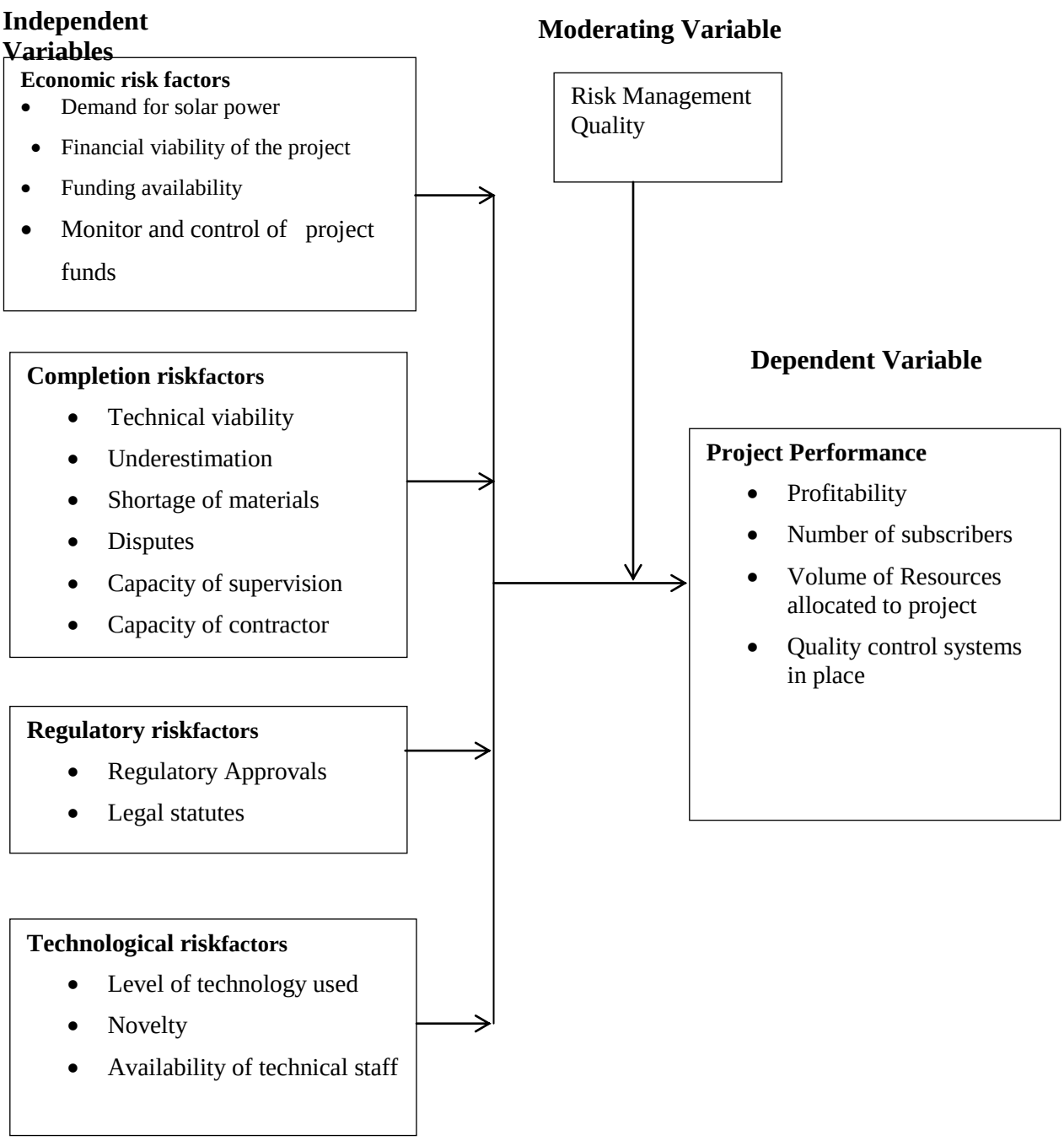


Figure 4: Conceptual Framework.

2.9 Knowledge Gap

The independent variables in this research expected to influence project performance are economic, completion, regulatory and technological risks. The expected outcome is successful project performance when the four risks are assessed and managed effectively in an integrated manner. Ondari and Gekara (2014) in their study on factors influencing road completion success, observed that inadequate funding, capacity of contractor, capacity of supervision and design specifications were a major source of failure to complete road projects. These factors have been identified, in this research, as sources of completion risk. The study by Ondari and Gekara was however limited to road construction projects. Ngugi and Macharia (2014) in their study on determinants of successful completion of power projects in KPLC observed that information technology was a determinant in successful project completion among other variables. Their study however did not consider other risks- economic, completion and regulatory risks- that were been considered in this study. Furthermore, their study confined itself to information technology when considering technological risks. Ndirangu (2013) in his study on how project management skills, politics, socio-economic factors and government bureaucracy influenced successful completion of projects implemented by KPLC on behalf of the government of Kenya. The study was restricted at the corporate and national level. In addition, the research project did not study the causal effect between specific risks and project performance and completion. It is hoped this study will yield new knowledge on how the combination of specific types of risk-economic, completion, regulatory and technological risks influence performance of distribution projects in Nairobi County.

2.10 ChapterSummary

This chapter has reviewed concepts of risk and uncertainty in project management, responses to risks and opportunities by organizations, benefits in applying risk management techniques and tools, types of risks and mitigation measures. In addition, the theoretical and conceptual framework for the study is examined in this chapter. A review of the theoretical framework has examined the interdependency of dimensions in project content and context and how risk fits in the overall picture. The conceptual framework

has examined how types of risk influence project performance. The next chapter looks at the research methodology including the study design, study population, sampling technique, data collection and analysis.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research methodology that was used to carry out the study. Here, the researcher aims at explaining the research design method, selection of target population, calculating the sample size and sampling procedure adopted, the data collection methods and procedure and the research instruments tools that were used. Further it describes how validity and reliability was enhanced in the study, methods of data collection as well as data analysis procedure. The chapter concluded with an explanation of how ethical issues were adheredto.

3.2 ResearchDesign

A descriptive survey design was employed in this study. In descriptive research, the data is collected without changing the environment. The descriptive survey research describes the state of affairs as it existed during the time of survey. The main attributes of this research technique is that the researcher does not determine the direction of other variables. The researcher can only report on what is happening or has happened. Survey was preferred in this study since it sought information on an existing phenomenon with regard to identifying the effect of risk management on the distribution projects' performance in Nairobi County.

3.3 Target Population

According to Mugenda ad Mugenda (2003), a target population refers to the set of population to that the investigator seeks to generalize the findings derived from the inquiry. The target population in the study was 149 personnel, working for Mkopa solar headquarters. The personnel were identified from a staff list maintained by the Human Resources division. Their duties entail all project undertakings such as planning and project implementation of projects, approval of project finances, supervising internal and external contractors, legal, property, logistics and procurement, data collection, health, safety and environment. The target population was divided into eight strata as illustrated in Table 3.1.

Table 3.1: Composition of Target population.

Strata	Frequency	Percentage (%) of Total Target Population
Planning, Design and Maintenance	51	34
Finance	12	8
Procurement and Logistics	7	5
Programs	40	27
Data collection and Survey	12	8
Property, Risk and Legal, Insurance	12	8
Safety, Health and Environment	8	5
Customer Service and Marketing	7	5
Total	**149**	**100**

3.4 Sample Size and Sample SelectionProcedure

This section describes the sample size and sample selection used in the study.

3.4.1 SampleSize

Kothari (2004) defines a sample size as the number of items to be selected from the target population to constitute a sample. For this study, the researcher adopted the Krejcie and Morgan (1970) method as shown below, for calculation of the sample size, S as follows: -

Eqn 1 Sample Size Formula

$$SS = \frac{XX^2(1 - NN)}{dd^2(NN - 1) + XX^2NN(1 - NN)}$$

Where N,Populationsize = 149

P is proportion of units in sample size possessing the variables under study, for this research study it is set at 50% (0.5);

X^2 is the table value for chi squared at one degree of freedom at the desired confidence

level of 95% = 1.96^2= 3.8416

d is the degree of precision desired for the research study which is set at 5% (0.05)

From a target population of 149, 5% precision level and 95% confidence level, the formula yields a sample size, S, of108.

3.4.2 Sample SelectionProcedure

The study adopted a stratified random sampling in recognition that the population from which the sample was drawn is not homogeneous. As shown in Table 3.2, the size for each stratum in the sample is proportional to its percentage share of the targetpopulation.

Table 3.2 Sampling Frame

Strata		Sample Size
Planning, Design and Maintenance		37
Finance	9	
Procurement and Logistics	5	
Programs		29
Data collection and Survey	9	
Property, Risk and Legal, Insurance	9	
Safety, Health and Environment	5	
Customer Service and Marketing	5	
Total	**108**	

3.5 Data CollectionInstruments

The questionnaires were utilized in the collection of primary data. The questionnaire for this study composed of both closed questions and multiple responses. The respondents were required to choose the response that fits their situation from the multiple answers section while they had to select only one option from a variety of alternatives in the close ended section. A similar type of questionnaire was administered to all the respondents.

3.6 Piloting of theStudy

The instrument for capturing the primary data- the questionnaires were tested before they were used. The pilot test brings to light the weaknesses, if any, of the questionnaire and checks if the questionnaire contains simple but straight forward directions for the respondents so that they may not experience any difficulty in answering the questions. The aspects evaluated in the pilot test included: availability of the subjects under the study, acceptability of the questions, willingness to co-operate of the potential respondents, potential errors in the instrument and correction of the errors or format of the questionnaire. According to Mugenda and Mugenda (2003), a pre-test sample of a tenth of the sample size, for each stratum with homogeneous characteristics, was considered for the pilot study. For the study, 11 staffs, from the targeted population, were chosen. The questionnaire was administered twice over a period of one week. Staffs chosen for the pilot study were subsequently excluded from the sample. The study

adopted

theCronbach'sAlpha(α)methodasameasureofinternalconsistencyforreliability.Avalueof0.7 was used as the cut-off for reliability of the study. The results of the calculations using SPSS are shown in Table 3.2

Table 3.3 Cronbach's Alpha (α) Test Results

Cronbach's Alpha	Number of Items	Cronbach's Alpha (α)
Project Performance	4	0.779
Economic Risk	4	0.715
Completion Risk	6	0.744
Regulatory Risk	3	0.807
Technological Risk	7	0.764

3.7 Validity of theInstrument

Validity is the degree to which an instrument measures what it is supposed to measure. Kothari (2004) describes it as the extent to which differences found with a measuring instrument reflect true differences among the sample or target population being tested. The aspect of validity to be considered in this study is content validity of the instrument. Content validity is considered suitable for this study as the target population are familiar with distribution project activities and associated project risks and participate in implementation of various aspects of distribution projects in their daily duties. The issues addressed in regard to content validity were: adequate coverage of the research topic by the questionnaire, how comprehensive was the questionnaire in gathering of data needed to address the purpose and goals of the study? In order to test and enhance the validity of the questionnaires, the researcher selected at least two Mkopa employees randomly, from each stratum, and discussed the contents of the questionnaires. The comments from the Mkopa employees and the project supervisor's advice was used to make necessary corrections to the instruments to ensure they conform to the study objectives and answer the research questions adequately.

3.8 Reliability of theInstrument

The consistence of the results is tested using a measuring instrument. A reliable

measuring instrument contributes to validity. The reliability's reliability aspect is concerned with securing consistent findings with repeated measurements of the same person using the same instrument (Cronbach, 1951). The degree of stability is determined by comparing the results of repeated measurements. The closer the value of Cronbach's Alpha is to unity, the more reliable the instrument. For this study, a value of 0.716 was achieved during piloting of the study.

3.9 Data CollectionProcedure

In order to collect primary data from the targeted respondents, the researcher acquired a letter of authority from the University of Nairobi after examination and approval of the research proposal. The letter enabled the researcher to obtain a permit from NACOSTI under the Ministry of Education, Science and Technology. The letter was presented to the Chief Executive Officer, Human Resources and Administration who issued a letter of authority for data collection at Mkopa solar headquarters, Nairobi County. This allowed the researcher to conduct the research freely. An introductory letter accompanying each questionnaire was sent to respondents within the sample. The questionnaires were administered through drop and pick method. To ensure a high response rate, the researcher responded to clarifications sought by the respondents.

3.10 Data AnalysisTechniques

This refers to the computation of specific indexes so as to determine the associations that exist among variables (Kothari, 2004). Mugenda and Mugenda (2003) observe that data analysis is the process of creating meaning to the entire data collected. The data analysis process involved the process of coding, editing, data entry and monitoring of the collected data. The filled questionnaires were coded in the MS Excel and SPSS software for the purpose of analysis. Data was then analyzed to generate tables, frequencies and percentiles and counts. Generalizations on the associations between statements were analyzed using the qualitative data. Inferential analysis was used to identify emerging patterns and develop them into themes. Pearson's Product Moment Correlation was used to determine whether there is any positive or negative relationship between the dependent and independentvariables.

A multiple regression model was used to link the independent variables to the dependent variable as follows;

$$Y = \beta 0 + \beta 1 X_1 + \beta 2 X_2 + \beta 3 X_3 + \beta 4 X_4 + \mu$$

Where;

Y =Project Performance X_1 = Economic Risk

X_2 = Completion Risk

X_3 = Regulatory Risk

X_4 = Technological Risk

Where;

$\beta 0$ -constant term

βi where i = 1….4 independent variables

Y- dependent variable.

μ -error term

3.11 Operationalization ofVariables

Table3.4 Operationalization ofVariables

No.	Variable Name	Nature of Variable	Variable Indicators	Unit of Measure	Data Collection Method	Type of Scale	Type of Analysis	Level of Analysis
1.	EconomicRisk factors	Independent	Demand for solar energy Financial viability ofthe project Funding availability	5-point Likert Scale	Questionnaire	Ordinal for primary data	Quantitative Qualitative	Frequencies Descriptive analysis Inferential analysis
2.	Completion Risk factors	Independent	Technicalviability Underestimation Shortage of materials Management of Contract disputes Capacity of Supervision Capacity of Contractor	5-point Likert Scale	Questionnaire	Ordinal for primary data	Quantitative Qualitative	Frequencies Descriptive analysis Inferential analysis
3.	Regulatory Risk factors	Independent	Regulatory approvals Legal Statutes Safety, health andEnvironment	5-point Likert Scale	Questionnaire	Ordinal for primary data	Quantitative Qualitative	Frequencies Descriptive analysis Inferential analysis
4.	Technological Risk factors	Independent	Adequate tools and equipment Innovation Availability of skilledPersonnel	5-point Likert Scale	Questionnaire	Ordinal for primary data	Quantitative Qualitative	Frequencies Descriptive analysis Inferential analysis
5.	Performance of Project	Dependent	Profitability Number of subscribers Volume of resources allocated to project Quality control systems in place	5-point Likert Scale	Questionnaire	Ordinal for primary data	Quantitative Qualitative	Frequencies Descriptive analysis Inferential analysis

3.12 EthicalConsiderations

This refers to the appropriateness of the behavior of the researcher with regards to the rights of the potential respondents, and the research work itself. Ethics accrue due to value conflicts that can be demonstrated in different ways: the rights of individuals to future welfare versus immediate relief, openness and replication versus confidentiality, and privacy versus the undesirability of manipulation. The voluntary participation principle was examined in this study through seeking informed respondent consent, providing an assurance to the respondent regarding confidentiality of information that was obtained as well as an assurance phrase in the introductory letter and on thequestionnaire.

CHAPTERFOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents the empirical findings of the study and results of the application of the variables using techniques used in chapter three. The data analysis was based on specific objectives, where patterns were examined, interpreted and implications drawn on them.

4.2 Questionnaire ReturnRate

Table4.1Questionnaire ReturnRate

Response Rate	**Frequency**	**Percentage (%)**
Returned	82	75.93
Unreturned	26	24.07
Total	**108**	**100**

Table 4.1 summarizes the questionnaire return rate.108 questionnaires were distributed to randomly selected respondents in the target population. 82 were duly completed and returned. A response rate of 75.93% was therefore achieved. Mugenda and Mugenda (2003) and Kothari (2004) define a 50% response rate as considered good enough for a descriptive study. The results indicate that the respondents appreciated the importance of the study and were willing to contribute and learn from the results of thestudy.

4.3 Demographic Characteristics ofRespondents

The preliminary information gathered regarding the characteristics of the respondents were: gender, years employed in the organization, level of education, position in the organization and the department one belongs. The information was meant to give an insight into the nature of the respondents.

4.3.1 Gender ofRespondents

The respondents were asked to indicate their gender. The results of their responses are shown in Table 4.2

Table4.2 Gender of theRespondents

Gender	Frequency	Percentage (%)
Male	59	72.22
Female	23	27.78
Total	**82**	**100**

The results show that 52 (72.22%) respondents were male and 23 (27.78%) respondents were female. This indicates that majority of staff engaged in activities related to solar energy distribution projects, in Nairobi County, are male. The finding indicates that despite increased numbers of women joining the technical training schools, the proportion of female staff in the technical field was still a minority.

4.3.2 Length ofEmployment

The respondents were asked to indicate the years of service they have been in the employment of the organization. The results of their response are shown in Table 4.3.

Table4.3Length of Employment atMKOPA

Length of Employment	Frequency	Percentage (%)
Less than 1 year	9	10.98
2 to 4 years	37	42.12
4 to 6 years	15	18.29
Over 6 years	21	25.93
Total	**82**	**100**

The results indicate that 9 (10.98%) respondents had worked at Mkopa solar for less than a year, 37(42.12%) respondents had worked for a period of between two to four years, and 15 (18.29%)respondents had been in service for a period of between 4 to 6 years while 21 (25.93%) respondents had been in the organization for over 6 years. The findings indicate that at least 71% of the employees have been serving the organization for more than 6 years. This implies that the respondents have a good working knowledge of the activities and processes related to solar energy distribution projects in Nairobi County. This reflects the organization's ability to retain qualified human resource necessary to implement project goals and strategies set by the organization.

4.3.3 Education Level ofRespondents

The respondents were requested to state their highest level of education. The results of their responses are shown in Table 4.4.

Table4.4Level ofEducation

Education Level	**Frequency**	**Percentage (%)**
Postgraduate	6	7.41
Undergraduate	43	51.85
Diploma	33	40.74
Other	0	0
Total	**82**	**100**

Study findings indicate that 6 (7.41%) respondents had attained postgraduate qualification, 43 (51.85%) respondents had attained an undergraduate degree and 33 (40%) respondents had attained a diploma level. The findings imply that the respondents had attained the requisite level of education necessary for one to effectively participate in activities related to solar energy distribution projects. This included training in electrical engineering, project management and finance. This confirms the need for the organization to recruit in skilled manpower capable of using existing and new technologies during implementation of distribution projects. The observed level of

education contributed to receiving better quality responses to the survey questionnaire.

4.3.4Position ofRespondents

The respondents were requested to indicate their positions in the organization. The results of their responses are shown in Table4.5.

Table4.5Position ofRespondents

Education Level	**Frequency**	**Percentage (%)**
Top Management	17	20.73
Middle Management	44	53.66
Supervisory Level	9	10.98
Support Staff	12	14.63
Total	**82**	**100**

Results indicate that 12 (14.63%) respondents were support staff employees, 9 (10.98%) respondents were supervisory level and 44 (53.66%) respondents were at middle management level and 17 (20.73%) respondents were at top level management. The findings imply that the responses were well spread among staff. The findings further indicated that respondents within the organization structure appreciated the value of the feedback from the survey to themselves and other stakeholders within the organization.

4.3.5 Department of theRespondents

The respondents were requested to state the departments they work in within the organization. The results of their responses are shown in Table 4.6.

Table4.6 Department ofRespondents

Department	Frequency	Percentage (%)
Planning and Design	29	35.37
Finance	5	6.10
Procurement and Logistics	4	4.88
Programs	22	26.83
Data collection and Survey	6	7.32
Risk and Legal	7	8.54
Safety, Health and Environment	3	3.66
Customer Service and Marketing	3	3.66
Property	2	2.44
Insurance	1	0.93
Total	**82**	**100**

Results in Table 4.6 indicate that 29 (35.37%) respondents were from planning and design, 22 (26.83%) respondents were from programs, 7 (8.54%) respondents were from risk and legal, 6 (7.32%) respondents were from data collection and survey, 5 (6.10%) respondents were from finance , 4 (4.88%) respondents were from procurement and logistics, 3 (3.66%) respondents were from safety, health and environment , 3 (3.66%) respondents were from customer service and marketing , 2 (2.44%) respondents were from property and 1 (0.93%) respondent was from insurance. The results indicate that the respondents were well spread in all departments and therefore the responses were not biased towards one organizational department. The spread further implies that the organization needs to develop and adopt a project risk management plan that has proper risk management culture and knowledge coupled with a team that will speak the same language in terms of managing potential risks as well as exploiting opportunities,(Boukhari,2013).

4.4. Descriptiveresults

This section is arranged based on the objectives of the study.

4.4.1 ProjectPerformance

The study's main objective was to ascertain the degree and influence of types of risks on the performance of distribution projects in Mkopa solar within Nairobi County. This section tested the views of the respondents regarding the performance of distribution projects in Nairobi County.

Table4.7 ProjectPerformance

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Likert Mean
The turnover/ total revenues of the company after considering project risk factors had improved.	10	6	12	40	14	3.87
There is an increase in the number of subscribers after considering project risk factors.	11	10	9	44	8	3.72
The company has instituted systems that effectively manage resources allocated to projects.	7	10	34	25	6	3.41
The company has quality control systems that enhance achievement of customer satisfaction.	9	14	21	34	4	3.46
Average	**9.25**	**10**	**19**	**35.75**	**8**	**3.62**

Results of the responses shown in Table 4.7 indicate that 54 (65.85%) respondents agreed that the organization total revenue after considering project risk factors had improved,52

(63.41%) respondents agreed that there was an increase in the number of subscribers after considering risk management factors.31(37.80%) respondents concurred that the organization put in place systems that effectively manage resources allocated to projects and 46.34% of the respondents agreed that quality control systems that ensure the attainment of customer satisfaction were present in the organisation. An aggregate mean of 3.62 was obtained from the findings. The results imply that most of the respondents agreed to the statements concerning performance of distribution projects on aspects of the turnover/ total revenues of the company improving due to the management consideration of risk factors. However, on the aspect of systems that effectively manage resources allocated to projects, the respondents disagreed with the statements. This implies that despite provision of adequate resources, the organization lack systems that effectively monitor utilization resources, with the probable cause been lack of structures that hold top management accountable.

4.4.2 Economic Risk Factors and ProjectPerformance

The first objective of the study was to determine the influence of economic risk on the performance of distribution projects in Nairobi County.

Table 4.8 Economic Risk Factors.

Economic Risk Factors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Likert Mean
Mkopa has systems that will make it the preferred choice by Kenyans for solar energy supply in a competitive environment.	3	18	30	24	7	3.22
Mkopa has systems to ensure financial viability of projects priorto commencement.	6	13	18	35	10	3.52
Mkopa funding is adequate for approved projects	3	19	15	32	13	3.44
Mkopa has adequate monitoring and reporting systems to ensure proper usage of budgeted project funds.	4	9	22	41	6	4.07
Average	**4**	**14.75**	**21.25**	**33**	**9**	**3.56**

Table 4.8 shows that 31 (37.81%) respondents agreed that Mkopa solar had systems that made it the preferred choice of power supply in a competitive environment, 45 (54.88%) respondents agreed that Mkopa solar had systems to ensure financial viability of projects prior to commencement,45 (54.88%) respondents agreed that Mkopa solar funding is adequate for approved projects, 47 (57.32%) agreed Mkopa solar has adequate monitoring and reporting systems to ensure proper usage of budgeted project funds. Overall, 42 (51.22%) respondents, agreed that management of economic risk had an effect on project performance. The average mean of 3.56 confirms that slightly over half of the respondents were in agreement that the organization gave priority to ensuring that there was adequate financing from internal and external resources. The results imply that on the overall, Mkopa solar is managing economic risks reasonably well. However, the respondents expressed disagreement with Mkopa solar been the preferred supplier of solar energy in a competitive environment.

4.4.3Completion Risk Factors and ProjectPerformance

The second objective of the study was to determine the influence of completion risk on the performance of distribution projects in Nairobi County. The results of the finds are shown in Table 4.9.

Table4.9 CompletionRisk Factors

Completion Risk Factors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Mkopa has systems which ensure projects are technically viable.	3	6	9	58	6	3.76
Mkopa has systems which check and control preparation ofproject estimates.	12	4	18	38	10	3.80
Mkopa Procurement systemsadequately address material requirements for projects.	5	24	19	30	4	3.11
Mkopa has systems to effectively handle disputes in projects	10	15	24	32	1	3.35
Mkopa has effective supervisory capacity to ensure smooth implementation and completion of projects.	9	19	15	30	9	3.44
Mkopa has systems to ensure Contractors engaged to implement projects have effective capacity to implement projects to completion.	7	21	21	24	9	3.11
Overall Index	**7.67**	**14.83**	**17.67**	**35.33**	**6.5**	**3.43**

Table 4.9 indicates that 78.49% of the respondents agreed that Mkopa solar had systems which ensured projects were technically viable58.54% of the respondents agreed that there were systems in place which checked and controlled preparation of project estimates33 (40.24%) respondents agreed that Mkopa solar had systems to effectively handle disputes in projects, , 41.46% respondents agreed that procurement systems adequately addressed material requirements for projects, 40.24% of the respondents agreed that there were systems to ensure contractors seek to implement projects had effective capacity to implement projects to completion and 47.56% respondents of the respondents agreed that there was enough supervisory capacity to ensure smooth implementation and completion of projects. The aggregate mean was 3.43. The results imply that Mkopa solar has adequate systems for establishing technical viability, controlling development of project estimates. However, on the aspect of supervisory capacity, engagement of qualified contractors and handling of disputes, the respondents disagreed with the statements and this implies that Mkopa solar systems are weak in management of completion risks on the aspects of supervision, engagement of qualified contractors and disputes handling.

4.4.4 Regulatory Risk Factors and ProjectPerformance

The third objective of the study was to establish the extent to which regulatory risk influenced the performance of Mkopa solar distribution projects in Nairobi County. The results are shown in Table4.10.

Table 4.10 Regulatory Risk Factors

Regulatory Risk Factors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Mkopa has systems which ensure regulatory approvals for projects are obtained in a timely manner.	11	12	15	35	9	3.62
Mkopa has systems which ensure compliance to existing regulations and laws when planning andimplementing projects.	10	3	26	33	10	3.74
Mkopa has effective Safety, Health and Environment systems toensuresafeworkingplacefor staff and public safety.	3	3	4	48	24	4.11
Overall Index	**8**	**6**	**15**	**38.67**	**14.33**	**3.82**

Results indicated that 44 (53.66%) respondents agreed that there were systems which ensured regulatory approvals for projects were obtained in a timely manner, 43 (52.44%) respondents agreed that there were systems which ensured compliance to existing regulations and statutes during planning and implementing of projects while 72 (87.81%) respondents agreed that there were adequate systems to ensure a safe, healthy and clean environment for staff. The mean obtained was 3.82. This implies that the respondents were in strong agreement that management of regulatory risk within the organization was effective and this ensured improved project performance.

4.4.5 Technological Risk Factors and ProjectPerformance

The fourth objective of the study was to establish the influence of technological risk on the performance of distribution projects in Nairobi County. The results are shown in Table 4.11.

Table4.11 TechnologicalRisk Factors

Technological Risk Factors	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean
Mkopa has adequate tools and equipment to enable effective use of technology in project implementation.	3	12	17	43	7	3.53
Mkopa encourages innovation of new methods in implementationof projects.	9	9	29	29	6	3.49
Mkopa has systems which ensure it has trained personneltohandle technological changes.	12	14	9	41	6	3.62
Overall Index	**8**	**11.67**	**18.33**	**37.67**	**6.33**	**3.55**

Results from the study, indicate 60.98% of the respondents agreed that there are adequate tools to enable effective utilization of technology in project implementation, 42.68% of the respondents agreed that Mkopa solar encourages new methods in implementation of projects and 57.32% of the respondents agreed that there are systems which properly trains its personnel to manage technological changes. An average of 53.66% agreed that organizational systems for the management of technological risk to improve the project performance. This is evidenced by an aggregate mean of 3.55. The results imply that the respondents were in strong agreement that management of technological risk within the organization, on the aspects of adequacy of tools and equipment and availability of trained personnel to handle technological challenges was effective. However, in terms of encouraging innovation of new methods, the respondents did not identify the organization systems as providing a conducive environment for developing innovative processes towards improved performance of projects.

4.5 Inferential StatisticsAnalysis

This section presented the correlation and regression analysis.

4.5.1 BivariateCorrelation

Table 4.12 displays the results of correlation test analysis between the dependent variable, the independent variables and the correlation among the independent variables themselves.

Table4.12 BivariateCorrelation

Variable		Project Performance	Economic Risk	Completion Risk	Regulatory Risk	Technological Risk
Project Performance	Pearson Correlation	1				
	Sig. (2-tailed)					
Economic Risk	Pearson Correlation	0.178	1			
	Sig. (2-tailed)	0.109				
Completion Risk	Pearson Correlation	0.472	0.303	1		
	Sig. (2-tailed)	0.000	0.006			
Regulatory Risk	Pearson Correlation	0.206	0.213	0.610	1	
	Sig. (2-tailed)	0.063	0.055	0.000		
Technological Risk	Pearson Correlation	0.396	0.207	0.516	0.469	1
	Sig. (2-tailed)	0.000	0.062	0.000	0.000	

Results on Table 4.12 indicate that a positive correlation exists between the dependent variable- project performance- and the independent variables - Economic risk, Completion risk, Regulatory risk and Technological Risk. The bivariate Pearson Correlation produces a sample correlation coefficient, r, which measures the strength and direction of linear relationships between pairs of continuous variables. The positive correlation coefficients (r) imply that a positive change in management of economic, completion, regulatory and technological risks will lead to an improvement in

performance of projects. Correlation, in this study is considered, significant if the significance is less than 0.01, for a 2-tailed test. The implication of the results indicates that completion and technological risks have a stronger correlation to project performance when compared with economic and regulatory risks. In addition, the results imply that there is a strong correlation between completion risk on one hand and regulatory and technological risks on theother.

4.5.2 RegressionAnalysis

So as to ascertain the the statistical significance of the independent variables on the dependent variable-project performance-regression analysis wasutilized. The regression equation took the following form:-

$Y = \beta 0 + \beta 1 X_1 + \beta 2 X_2 + \beta 3 X_3 + \beta 4 X_4 + \mu$

Where;

Y= Project Performance X1 = Economic Risk

X2 = Completion Risk

X3 = Regulatory Risk

X4 = Technological Risk.

To determine the coefficients and constant term, SPSS was used to compute the terms and the results are shown in Table 4.13.

Table4.13 RegressionCoefficients

Variable	B (Unstandardized Coefficient)	Standard Error	t	Significance (p)
Constant	7.681	1.717	4.474	0.000
Economic Risk	0.019	0.063	0.306	0.760
Completion Risk	0.313	0.091	3.429	0.001
Regulatory Risk	0.253	0.166	1.526	0.131
Technological Risk	0.282	0.134	2.113	0.038

The overall model as shown in Table 4.13 indicated that completion risk and technological risk were highly significant at p=0.001 and p=0.038 respectively. However economic risk and regulatory risk were significant at p=0.760 and p=0.131. The fitted model was:

$Y = 7.681 + 0.019X_1 + 0.313X_2 + 0.253X_3 + 0.282X_4$

Table 4.13 displays the regression coefficients of the independent variables. The results reveal that economic risk is statistically significant in explaining project performance (beta=0.019, p value 0.760). The findings imply that an increase in management of economic risks by one unit leads to an increased project performance effectiveness by 0.019 units. Regression results indicate that management of completion risks and project performance had a positive and significant relationship (beta=0.313, p value 0.001). The findings imply that an increase in management of completion risks by one unit leads to an increase in project performance effectiveness by 0.313 units. Results further indicate that management of regulatory risk and project performance had a positive and significant relationship (beta= 0.253, p value 0.131). The findings imply that an increase in management of regulatory risks by one unit leads to an increase in project performance by 0.253 units. Finally, the results indicated that management of technological risk and project performance (beta=0.282, p value 0.038) had a positive and significant relationship. The findings imply that an increase in management of technological risk by one unit leads to an increase in project performance by 0.282units.

4.5.3 Regression ModelFitness

The results of the regression model obtained from SPSS calculations are shown in Table 4.14.

Table4.14 Regression ModelFitness

Indicator	Coefficient
R	0.526
R Square	0.277
Standard. Error of the Estimate	2.189

Table 4.14 shows that the coefficient of determination, also called the R square, is 0.277. This means that the combined effect of the predictor variables-economic risks, completion risks, regulatory risks and technological risks- explains 27.7% of the variations in project performance. The correlation coefficient of 0.526 indicates that the combined effect of the predictor variables has a strong and positive correlation with project performance. This confirms that a positive change of the predictor variables-economic risks, completion risks, regulatory risks and technological risks- has a strong and a positive effect on performance of distribution projects.

4.5.4 Analysis ofVariance

An Analysis of Variance (ANOVA) was computed, using SPSS, to determine the combined effect of the management of economic, completion, regulatory and technological risks in explaining significant changes in performance of distribution projects. The results are shown in Table 4.15

Table 4.15 Analysis of Variance (ANOVA), F-Test

Indicator	Sum of Squares	Degrees of Freedom	Mean Square	F	Significance
Regression	141.340	4	35.335	7.374	0.000
Residual	368.965	77	4.792		
Total	**510.305**	**81**			

The results show that the combined effect of management of economic, completion, regulatory and technological risks was statistically significant in explaining changes in performance of distribution projects. The results indicate that the model fit is significant at a p value of 0.000, which is less than the acceptance critical value of 0.05 for this study, at 81 degrees of freedom. This implies that management of economic risk, completion risk, regulatory risk and technological risk have significant and positive combined effect on performance of distribution projects.

CHAPTER FIVE
SUMMARY OF FINDINGS, CONCLUSIONS, DISCUSSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of key findings, discussions, conclusions and recommendation in accordance to the study's objective.

5.2 Summary ofFindings

5.2.1 ProjectPerformance

The main finding was that Mkopa solar employees participated in the process of distribution projects' implementation in Nairobi County and their main concern was the projects' performance. This confirmed their determination to the projects undertaken were in line with the organizations' goals and objectives. This was shown by the degree of agreements of agreement with the constructs in the questionnaire in support of adequate provision of resources towards ensuring improved project performance. However, the respondents expressed negative sentiments towards the ability of the organization to monitor and control the quality of its operations.

5.2.2 Economic Risk Factors and ProjectPerformance

The first study's objective was to establish the influence of economic risk on the performance of distribution projects by Mkopa solar in Nairobi County. Results indicated that an average of 42 (51.22%) respondents agreed that existing organizational systems managed economic risks well and this influenced project performance positively. Furthermore, 45 (54.88%) respondents agreed that Mkopa solar funding for projects was adequate. The findings were also supported by the correlation coefficient and regression results which indicated that there wasa positive and significant relationship between project performance and management of economic risk factors (r = 0.178, beta=0.019, p value 0.760).

5.2.3 Completion Risk Factors and ProjectPerformance

The second study's objective was to examine the influence of completion risk on the

performance of distribution projects by Mkopa solar in Nairobi County. The study findings indicated that completion risks influenced project performance. Results indicated that an average of 42 (51.01%) respondents agreed that management of completion risk influenced project performance positively. The results further confirmed that 34 (41.46%) respondents agreed that procurement systems were adequate and 39 (47.56%) respondents believed that the supervisory capacities of Mkopa solar staff were adequate. Correlation coefficient and regression results indicated that there was a positive and significant relationship between project performance and management of completion risk factors (r =0.472, beta=0.313, p value =0.001).

5.2.4 Regulatory Risk Factors and ProjectPerformance

The study's objective was to establish the influence of regulatory risk on the performance of distribution projects by Mkopa solar in Nairobi County. The findings indicated that management of regulatory risks influenced project performance positively. This was supported by the overwhelming responses from the respondents- an average of 53 (64.63%) respondents - who agreed that the existing organizational systems for managing regulatory risks had a positive influence on performance of distribution projects.44 (53.66%) respondents agreed that existing systems ensured compliance to existing regulations and laws when planning and implementing projects Correlation coefficient and regression results indicated that there was a positive and significant relationship between project performance and management of regulatory risk factors (r = 0.206, beta= 0.253, p value0.131).

5.2.5 Technological Risk Factors and ProjectPerformance

The fourth and last study's objective was to establish the influence of technological risk on the performance of distribution projects in Nairobi County. The findings revealed that 60.98% of the respondents agreed Mkopa solar had adequate tools to allow for effective technology use during the implementation of projects, 42.68% of the respondents agreed that the organization agreed with the innovation of new methods in implementation of projects and 57.43% of the respondents agreed that the existing systems ensured availability of trained personnel to handle technological changes. Correlation coefficient

and regression results indicated that there was a positive and significant relationship between project performance and management of technological risk factors (r = 0.396, beta= 0.282, p value 0.038).

5.3 Discussions

This section describes the importance of the study's finding in accordance to the study's objective. It elaborates on the findings and examines the implication of the findings and shades more light into the subject being examined.

5.3.1 ProjectPerformance

The findings imply that in spite of Mkopa total revenue after considering project risk factors improving, as well as increase in the number of subscribers after considering project risk factors. The organization systems are experiencing challenges in effectively monitoring the resources available to projects. Mkopa solar needs to improve the organizational systems and processes in aspects of monitoring and control the performance of projects and quality control of projects deliverables and inputs during project implementation. In other words, Mkopa solar needs to embrace fully modern project management techniques, including risk management, (Hurley, 2010). Cheruiyot (2013) in his study on the influence of enterprise risk management on strategic management process at KPLC noted that employees are the ones who eventually implement the organization's risk management policy and therefore it was necessary their involvement is sought towards ensuring risk management systems are implemented successfully. Failure to institute effective systems for quality control and monitoring and control during project implementation increases the likelihood that types of risks may arise, preventing delivery of project goals and quality of deliverables. Margules, (2013) posited that excellent project risk management enables a project better probability of staying on track, project team members to be empowered in their decision making ability and eventually being successful and have an impact on customer satisfaction.

5.3.2 Economic Risk Factors and ProjectPerformance

The results from the study indicate that Mkopa solar has established systems to ensure financial viability, through adequate funding as well as having an adequate monitoring

and reporting systems to ensure proper usage of budgeted project funds. The results further confirm findings byKamwanaandMuturi(2014)whonotedthatKPLCwasabletoattractexternalfundingfrommultilateral donors for financing distribution projects. However, the results have established that should there be a competitor in the solar energy retail market Mkopa solar risks losing customers to potential competitors. This would affect its revenue base and subsequently its ability to fund projects. An open, vibrant solar power retail market would therefore impinge on the organization's revenue base and affect its ability to raise funds internally and borrow from without to fund distribution projects. Finnerty, (2013) posited that economic viability of a project will primarily depend on the marketability of the project's output, terms of price and volume and cost of maintenance of the project facility This places an onus on Mkopa solar to ensure that solar power sales to its customers within Nairobi County and Nationwide grows while offering the service at competitive prices and at minimal cost on maintenance of the distribution facilities established within the County. A similar conclusion can be drawn for the rest of East Africa where Mkopa solar operates a similar line ofbusiness.

5.3.3 Completion Risk Factors and ProjectPerformance

The findings of the study confirmed that management of design processes and technical planning for project distribution within Mkopa solar ensured that completion risks brought about by poor design and planning were contained. This concurs with Finnerty (2013) who stated the importance of proper planning of technical planning, design and implementation of a project. Management of completion risk requires that Mkopa solar invests in a capable and able human resource base by recruiting qualified personnel and ensuring they are adequately trained. This is corroborated by findings in a study conducted by Amboka and Ssemugenyi (2014) on effects of human resources management practices on employee retention in KPLC. However, in respect to procurement systems, the findings implied that organizational systems for handling procurement of materials were weak. This conforms to the findings by Oginda (2013) argued that the existing procurement systems at KPLC hindered by many factors which prevents timely delivery of materials. The constraints included: corruption among

procurement officers and suppliers. Concerning the dispute resolution handling systems, the respondents lacked confidence on the conflict resolution mechanisms which greatly affected project implementation by the project managers. The results also highlighted weaknesses in the technical processes utilized at the time of project execution, including under-estimation of construction costs such as poor estimates which escalates misunderstanding with the contractors .(Finnerty, 2013). There is therefore need for Mkopa solar to improve its systems for handling project management systems. Furthermore, the KPLC's supervisory personnel capabilities of both the external and external contractors need to be improved management training and additional research (Battaneih and Odeh, 2002).

5.3.4 Regulatory Risk Factors and ProjectPerformance

The study findings confirmed that Mkopa solar has a good track record in management of regulatory risk. In order for Mkopa solar to successfully undertake distribution projects it is imperative that the organization manages regulatory risks. This concurs with statements by Eveld, (1981) who noted that failure to comply to regulatory requirements could mean the difference between a viable project and one which is not implementable This is further confirmed by Turner, (2007), who stated that the project team needed to have a clear vision to present to stakeholders, understand the project objectives and align them with stakeholders' values and monitor how project decisions directly affect stakeholder value. The study findings confirmed that Mkopa solar has adequate systems, which promote and ensure adherence to regulations concerning safety and health. This concurs with Bonyuet (2001) who stated that a good safety plan increases the potential for project success and the confidence of team members. Nzuki (2011) stated that running a utility organization such as KPLC, should be in a manner that not only ensured but also enhanced the safety and health of the workers, visitors, customers, the public and the environment in line with the relevant government legislation, regulation and international best practices.

5.3.5 Technological Risk Factors and ProjectPerformance

The results of the study imply that Mkopa solar has seeks to ensure provision of

equipment and tools to its personnel as part of the necessary steps for successful technology application in project performance. This concurs with recommendations of Macharia and Ngugi (2014) who stated that integration of information technology in the implementation of projects had apositive influence on successful completion of projects. This study finding and earlier findings are confirmed by the organization's provision of modern computer firmware, including computers, computer aided design and accounting software, to enhance quality of service to internal and external customers and achieve project goals. The same deduction can be derived from the provision of modern tools by the organization to ensure efficient, effective and safer methods are employed in project implementation processes such as construction and maintenance of distribution substations and lines. However, on the aspect of encouraging innovation of new methods in implementation of projects the study findings indicated a need for Mkopa solar to improve on the capability of its staff, through in-house and external training, on technical and non-technical aspects of project planning, financing and implementation. The training should enable project teams to be innovative in developing efficient and effective processes with a view of improving project performance. This finding is confirmed by Wekesa (2012), in his study on the management of technological change in KPLC, where he stated that continuous training and communication was essential towards creating capacity for successful technological change implementation.

5.4 Conclusions of theStudy

The study's objective was to examine the impact of four main types of risks affecting the performance of distribution projects in Nairobi County. The study considered the economic, completion, regulatory and technological risks. Below were the conclusions derived .

5.4.1 ProjectPerformance

The study affirmed that economic, completion, regulatory and technological risks have a strong effect on distribution projects' performance within Nairobi County. It was also concluded that deficiencies exist in the organizational processes that handle quality of project performance, projects inputs and deliverables.

5.4.2 Economic RiskFactors and ProjectPerformance

The study ascertained that Mkopa solar has adequate systems to ensure financial viability of projects, adequate funding for projects and a robust monitoring and reporting system of project funds. However, in the event of a liberalized market in the retail solar power distribution in the county, Mkopa solar would lose market share for its services and this would impinge on the organization's ability to raise funds, generated internally or borrowed, to financeprojects.

5.4.3 Completion Risk Factors and ProjectPerformance

It was affirmed from the study that Mkopa solar organizational systems were sufficient in ensuring the viability of projects. However, there are many challenges in the supervisory capabilities of staff that supervise the implementation of distribution projects at Nairobi County.

5.4.4 Regulatory RiskFactors and ProjectPerformance

It was confirmed from the study that Mkopa solar has adequate systems which ensure regulatory approvals for projects are obtained in a timely manner. The study further confirmed that the organization gives high priority to issues of acquisition of necessary approvals and regulatory requirements prior to implementing a project. This reflects the degree of involvement between the organization and relevant stakeholders when it seeks to implement distribution projects.

5.4.5 Technological Risk Factors and ProjectPerformance

It was affirmed from the study that Mkopa solar has managed technological risks aspects, through provision of tools that allow foe efficient technology use in projects. Mkopa solar management should however develop and sustain innovation among the staff involved in the execution of projects. Mkopa should further train the project team on the development, planning financing and project development.

5.5 Recommendations of theStudy

Given the findings and conclusions, the study recommends the following measures for implementation to address the factors affecting the performance of distribution projects

by Mkopa solar within Nairobi County: -

5.5.1 ProjectPerformance

Mkopa solar needs to improve the organizational processes and systems in aspects of monitoring and control of project performance and quality control of projects inputs and deliverables during project implementation. This will ensure adequate co-ordination and control of projects. Proper monitoring and control systems will enable the organization to identify challenges before-hand and also document previous challenges thereby institutionalizing knowledge management and create the ability to resolve similar challenges in future. In other words, Mkopa solar needs to embrace fully modern project management techniques, including risk management.

5.5.2 Economic Risks Factors and ProjectPerformance

Mkopa solar needs to continually improve on its internal mechanism towards maintaining good relationship with its customers for sustained future growth in revenue base. This will ensure availability of revenue to sustain increasing demands for funding expansion of the distribution network in Nairobi County. A similar conclusion can be inferred for the organization's business operations in the rest of the country and East Africa.

5.5.3 Completion Risk Factors and ProjectPerformance

Mkopa solar management needs to improve the organizational procurement systems to ensure it is responsive to users and able to forecast needs and requirements in a timely and responsive manner. Furthermore, training of Mkopa solar staff in management of contracts and contractors is necessary to address challenges in supervision of contractors, project scope and disputes as part of efforts towards mitigating completion risks. It is imperative Mkopa solar engages contractors who have the necessary capacity to implement projects to completion. This will eliminate delays while ensuring that projects are done under minimum supervision but with the bestresults.

5.5.4 Regulatory Risk Factors and ProjectPerformance

There is no doubt Mkopa solar has responded well to the challenges of managing

regulatory risk through a proactive manner such as establishing a department to address safety, health and environment issues. In addition, policies have been institutionalized to ensure full compliance toregulatory requirements necessary to achieve successful performance of distribution projects. However, given the dynamic nature and demands by various stakeholders-including the government, the public, customers and the energy regulator ERC-Mkopa should ensure it maintains vigilance through: studying, understanding and adhering to, the laws and regulations applicable to distribution projects, including conditions precedent to approval of a project and possibility of legal litigation. Mkopa should establish internal mechanisms to ensure early and regular contacts with representatives of the appropriate agencies including county governments, the public and their political and social representatives to ensure any objections are responded to promptly and appropriately. This vigilance should apply to aspects of safety and health during implementation of distribution projects.

5.5.5 Technological Risk Factors and ProjectPerformance

The study noted that Mkopa solar needed to appreciate and improve on the capability of its staff towards learning, developing and applying new and innovative methods of implementing distribution projects. This should be considered as a part of managing technological risk and improving project performance. The training can be achieved through in-house training and use of external consultants and trainers. There is need for Mkopa solar to encourage innovation, among its project team members, of new methods in implementation of projects. This needs to be emphasized by projects managers and their subordinates. Innovation has a variety of benefits, including achieving project performance and completion in a cost effective manner, completion of projects ahead of schedule and saving on materials among others.

5.6Suggestions for FurtherStudies

This study having researched on the influence of types of risks on the performance of distribution projects, by Mkopa solar, in Nairobi County suggests further studies on the following two phenomena:

i. Influence of Organizational Culture and Styles on Quality of Distribution Project

Risk Management within Nairobi County.

ii. How management of Project Requirements Influences Performance of Distribution Projects by within Nairobi County.

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APPENDICES

APPENDIX 1: LETTER OF INTRODUCTION

Philip NdunguMwaura

L50/82179/2017

7thAugust 2017

Dear Respondent

RE: REQUEST FOR RESEARCH DATA

I am a student in the Master of Arts in Project Planning and Management in the University of Nairobi.

I am required to submit as part of my coursework assessment a research project report on the influence of risk management on performance of distribution projects. In order to ensure that my study is complete, I am required to seek information from Mkopa Solar Ltd Nairobi County and use the information to write the academic research project.

You have been identified to participate in the ongoing research study. I am therefore requesting your assistance to enable me collect data in your organization. Kindly provide as accurate and honest answers as possible.

As a confidentiality measure your name will not be required and the information that you provide will be treated with uttermost confidentiality and used solely for academic purposes. A copy of this letter of request for questionnaire administration together with an approval from your employer permitting this research will be availed to you as part of the questionnaire package.

Thank you,

Regards

....

Philip NdunguMwaura Dr.DorothyKyalo

STUDENT **SENIORLECTURER**

APPENDIXII: QUESTIONNAIRE FOR EMPLOYEES OFMKOPA SOLAR

The purpose of this questionnaire is to collect information pertaining to how risk management influences performance of off-grid energy distribution projects within Nairobi County. Information collected will be treated with utmost confidentiality and will be used only in this study.

Instructions

Complete this questionnaire as honestly as possible by ticking in the appropriate box. Do not write your name on the questionnaire.

SECTION 1

GENERAL INFORMATION

1) Indicate your Gender. []Male [ ]Female
2) How long have you been employed withMkopa?
    a. Less than1year []
    b. 2 to4years []
    c. 4 to6years []
    d. Over6years []
3) What is your highest level ofeducation?
    a. Postgraduate []
    b. Undergraduate []
    c. Diploma []
    d. Other []
4) What is your position in theorganization?
    a. TopManagement []
    b. MiddleManagement []
    c. SupervisoryLevel []
    d. Union []
5) Please indicate which department you workin.
    a. PlanningandDesign []
    b. Finance []
    c. ProcurementandLogistics []

d. Property []
f. Insurance []
g. Safety, Health and Environment []
h. Programs []
i. Data collection andSurvey []
j. Customer Service and Marketing []

SECTION 2

RISK FACTORS AND PROJECT PERFORMANCE

PART A: Project Performance

This part is concerned with assessing the performance of distribution projects at Mkopa solar within Nairobi County. Please mark (x) in the box which best describes your agreement or disagreement to each of the following statements.

Project Performance Indicators	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	1	2	3	4	5
The turnover/ total revenues of the company after considering project risk factors has improved.					
There is an increase in the number of subscribers after considering project risk factors.					
The company has instituted systems that effectively manage resources allocated to projects.					
Mkopahas quality control systems that ensure achievement of customer satisfaction.					

PART B: Economic Risk factors and Project Performance

This part is concerned with assessing influence of economic risk factors on the performance of distribution projects at Mkopa solar within Nairobi County. Please mark (x) in the box which best describes your agreement or disagreement to each of the following statements.

Economic Risk factors and Project Performance	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	1	2	3	4	5
Mkopa has systems that will make it the preferred choice, for solar energy supply in a competitive environment.					
Mkopa has systems to ensure financial viability of projects prior to commencement.					
Mkopa funding is adequate for approvedprojects.					
Mkopa has adequate monitoring and reporting systems to ensure proper usage of budgeted project funds.					

PART C: Completion Risk factors and Project Performance

This part is concerned with assessing influence of completion risk factors on the performance of distribution projects at Mkopa solar within Nairobi County. Please mark (x) in the box which best describes your agreement or disagreement to each of the following statements.

Completion Risk factors and Project Performance	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	1	2	3	4	5
Mkopa has systems which ensure projects are technically viable.					
Mkopa has systems which checkand control preparation of project estimates.					
Mkopa procurement systems adequately address material requirements for projects.					
Mkopa has systems to effectively handle disputes in projects.					
Mkopa has effective project supervisory capacity to ensure smooth implementation and completion of projects.					
Mkopa has systems to ensure Contractors engaged to implement projects have effective capacity to implement projects to completion.					

PART D: Regulatory Risk factors and Project Performance

This part is concerned with assessing influence of regulatory risk factors on the performance of distribution projects at Mkopa solar within Nairobi County. Please mark (x) in the box which best describes your agreement or disagreement to each of the following statements.

Regulatory Risk factors and Project Performance	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	1	2	3	4	5
Mkopa has systems which ensure regulatory approvals for projects are obtained in a timely manner.					
Mkopa has systems which ensure compliance to existing regulations and laws when planning and implementing projects					
Mkopa has effective Safety, Health and Environment systems to ensure safe working place for staff and public safety.					

PART E: Technological Risk factors and Project Performance

This part is concerned with assessing influence of technological risk on the performance of distribution projects at Mkopa solar within Nairobi County. Please mark (x) in the box which best describes your agreement or disagreement to each of the following statements.

Technological Risk factors and Project Performance	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	1	2	3	4	5
Mkopa has adequate tools and equipment to enable effective use of technology in projectimplementation.					
Mkopa encourages innovation of new methods in implementation of projects.					
Mkopa has systems which ensure it has trained personnel to handle technological changes.					

THANK YOU FOR YOUR PARTICIPATION

Appendix III: Research Authorization Letter

NATIONAL COMMISSION FOR SCIENCE,
TECHNOLOGY AND INNOVATION

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

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

Ref No.

Date

NACOSTI/P/16/33548/11193

Philip Ndungu Mwaura
University of Nairobi
P.O. Box 30197-00100
Nairobi.

2nd August 2017

Re: RESEARCH AUTHORIZATION

Following you application for authority to carry out research on **"influence of risk management on performance of distribution projects: A case of M-kopa Solar Company Ltd in Nairobi County,"** I am pleased to inform you that you have been authorized to undertake this research in **Nairobi County** for the period ending **2nd August 2018.**

You are advised to report to the **Chief Executive Officer, M-kopa Solar Company Ltd and the County Commissioner and the County Director of Education, Nairobi County** before embarking on the research project.

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

Boniface Wanyama
For: Director –General/CEO

Copy to:

The Chief Executive Officer
M-kopa Solar Company Ltd.

The County Commissioner
Nairobi County.

Appendix IV: Data Collection Letter

UNIVERSITY OF NAIROBI
OPEN DISTANCE AND e- LEARNING CAMPUS
SCHOOL OF OPEN AND DISTANCE LEARNING
DEPARTMENT OF OPEN LEARNING
NAIROBI LEARNING CENTRE

Your Ref:
Our Ref:
Telephone: 318262 Ext. 120

Main Campus
Gandhi Wing, Ground Floor
P.O. Box 30197
NAIROBI

1st November, 2017

REF: UON/ODeL/NLC/27/465

RE: PHILIP NDUNGU MWAURA- REG NO.L50/82179/2015

The above named is a student at the University of Nairobi Open Distance and e-Learning Campus School of Open and Distance Learning, Department of Open Learning pursuing Master of Arts in Project planning and Management.

He is proceeding for research entitled **"Influence of risk management on performance of Distribution projects" Case of Mkopa Solar Company Ltd in Nairobi County.**

Any assistance given to him will be appreciated.

UNIVERSITY OF NAIROBI CEES
P.O. Box 30197
01 NOV 2017
NAIROBI
NAIROBI EXTRA MURAL CENTRE

CAREN AWILLY
CENTRE ORGANIZER
NAIROBI EXTRA-MURAL CENTRE