ASSESSMENT OF RELATIONSHIP BETWEEN QUALITY MANAGEMENT AND PERFORMANCE OF THE ENERGY INFRASTRUCTURE COMPONENT IN THE ENERGY FOR RURAL TRANSFORMATION PROJECT IN UGANDA

By

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DECLARATION

I, Richard Ebong hereby declare that this dissertation is my own original work arrived at through reading and research, and has never been published or submitted to any University or Higher institution of learning for any academic award whatsoever.

Signed: …………………………… Date: ………………………

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APPROVAL

This dissertation has been submitted by Mr. Richard Ebong with our approval. He was under our close supervision during his research period.

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DEDICATION

To my late mother Mrs. Helen Opio-Okodi, the perfect mother. May her soul rest in peace.

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ACCRONYMS

APL	Adoptable Program Lending
BS	British Standard
CAS	Country Assistance Strategy
CBOs	Community Based Organisations
CEO	Chief Executive Officer
CPM	Critical Path Method
CVI	Content Validity Index
DV	Dependent Variable
EFQM	European Foundation for Quality Management
ERT	Energy for Rural Transformation
GHG	Green House Gases
ICT	Information/ Communication Technologies
ISO	International Organisation for Standardisation
IV	Independent Variable
MBNQA	Malcolm Baldrige National Quality Award
MEMD	Ministry of Energy and Mineral Development
MFPED	Ministry of Finance, Planning and Economic Development
MOES	Ministry of Education and Sports
MOH	Ministry of Health
MOWE	Ministry of Water and Environment
MTR	Mid -Term Review
MV	Moderating Variable
NGOs	Non-Governmental Organizations
PERT	Program Evaluation and Review Technique
PMBOK	Project Body of Knowledge
PRSP	Poverty Reduction Strategy Paper

PV	Photo voltaic
QM	Quality Management
QMS	Quality Management Systems
REA	Rural Electrification Agency
SPSS	Special Package for Social Science
TQM	Total Quality Management
UBOS	Uganda Bureau of Statistics
UECCC	Uganda Energy Credit Capitalisation Company
UMI	Uganda Management Institute

ABSTRACT

This study examined the influence of quality management on the performance of the Energy Infrastructure component in the Energy for Rural Transformation (ERT) project in Uganda. The project which was launched in 2001 had a vision of using energy schemes to reduce poverty and cause rural transformation in Uganda. The purpose of this study was to assess the influence of quality management on the performance of the Energy Infrastructure component in the project in Uganda. The methodology employed in this study was a cross-sectional design applying both qualitative and quantitative approaches; data was collected from key stakeholders of the project in Kampala and the surrounding areas using self-administered questionnaires and interviews. Qualitative data was analysed using content analysis meanwhile quantitative data was analysed using SPSS. The findings of the study indicated a positive significant relationship between quality assurance and performance; and a weak positive relationship between quality planning, quality control and funding guidelines with project performance. The study concluded that quality management i.e. quality planning, quality assurance and quality control had an effect on performance. The major limitations of the study were: inability to cover all the geographical areas where the project was implemented, confinement of the study within only the Energy Infrastructure component which makes the results not to be easily generalizable the other components of the projects. The study recommended that the Energy Infrastructure component in the ERT project in Uganda should plan and incorporate quality management activities in the projects, then revisit the definitions of program outputs to include meeting specifications not only targets in terms of coverage (quantity).

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This study examined the influence of quality management on the performance of the Energy Infrastructure component in the Energy for Rural Transformation (ERT) project in Uganda. In this study, quality management was considered as the independent variable (IV) and performance of the project was the dependent variable (DV).This chapter presents the background of the study, statement of the problem, the purpose and objectives of the study, research hypothesis, scope of the study, the significance, justification, operational definitions of terms, and the conceptual framework.

1.2 Background to the study

1.2.1 Historical Background

Quality Management began from inspection and ended in total quality management. During the early days of manufacturing, an operative's work was inspected and a decision made whether to accept or reject it. Pyzdex (2003) argues that as businesses became more complex full time inspection jobs were created under production, but because of conflict of interest such as pressure to accept defective goods to increase output, inspection and production were separated and the quality control department evolved with responsibility for the inspection services and quality control engineering

In the early 20th Century, Frederick Taylor (1856–1915) developed the principles of scientific management as a result of his work studies where he applied scientific reasoning, which showed that labour can be analysed and improved by focusing on its elementary parts. Henry Gantt (1861–1919) also studied the order of operations in work and developed his charts complete with task bars and milestone markers that outline the sequence and duration of all tasks in a process which is very useful in displaying project schedules as cited by Wilson & James (2003).

In mid-20th century after World War II, Program Evaluation and Review Technique (PERT) charts and the Critical Path Method (CPM) were introduced, giving managers greater control over extremely complex projects. In an article on Program Evaluation and Review Technique (Fazar, 1959) pointed out that these techniques rapidly spread to all types of industries as business leaders sought new management strategies and tools to handle their growth in a quickly changing and competitive world In 1924 Shewhart made the first sketch of a modern control chart as statistical theory began to be applied effectively to quality control leading to the development of the theory of Statistical Process Control (SPC) which is one of the tools in quality control today (Deming, 1982).

In 1937 Joseph Juran introduced the Pareto principle as a means of narrowing on the vital few, in 1940 Harold F Dodge and Harry G Roming developed the Acceptance Sampling Plan, and in 1943 Kaoru Ishikawa developed the Cause and Effect Diagram. According to Juran et al, (1999), all these were efforts to ensure quality

Project management, in its modern form, began to take root only a few decades ago. In the early 1950s, quality management practices developed rapidly in Japanese plants and by 1960, quality control and management had become a national preoccupation. In the West, quality revolution began in the early 1980's as companies introduced their own quality programmes and initiatives to counter the Japanese success.

In 1983 the United Kingdom launched the National Quality Campaign using BS5750 for quality systems as its main theme. The aim was to bring to the attention of industry the importance of quality for competitiveness and survival in the world market place. In 1987 ISO 9000 Quality Management Systems standards were issued. Since then the International Standardisation Organisation (ISO) 9000 has become the international organization focusing on the importance of quality to the performances of individual companies and products/services.

In 1987 the Malcolm Baldrige National Quality Award was established (ASQ, 2013). And on 15th September 1988 Presidents of 14 European companies came together to create the European Foundation for Quality Management as cited in an article titled "History of Quality" by Directorate of Trade and Industry, (2009).

Total Quality Management (TQM) has been at the centre of these drives in most cases and is now part of a much wider concept that addresses overall organisational performance and recognises the importance of processes. Today, the project is managed by a Project Manager, who puts together a team and ensures the integration and communication of the workflow horizontally across different departments (Sila and Ebrahimpour, 2005).

In 2001 the Energy for Rural Transformation (ERT) Project a ten years three phase adaptable program was launched with the vision to use energy schemes to reduce poverty and cause rural transformation. World Bank, 2009 in report for implementation completion and results indicates that at the time of launch, Uganda's rural development lagged behind urban areas with the quality of rural life severely constrained by lack of electricity in rural public institutions. Less than 1 % of the rural population had access to grid supplied electricity and there was growing pressures to address issues impeding the development of energy sector.

The Implementation started slowly with most components not ready for implementation at the time of approval in December 2001. The Mid-Term Review (MTR) of first phase (ERT I) in October 2004 indicates that less than 10% of the funds had been disbursed these led to late completion of ERT I. The first phase of the project had a time overrun of 2.5 years and was also completed at an extra project cost of United State dollar 80.9 million projecting even higher total project cost at completion (World Bank, 2009).

In spite of the interventions of ERT I from 2002, the impact assessment indicated no impact; on rural household connection, reduction on expenditure on electricity and enterprises location on project grid areas (UBOS, 2010). The second phase is still running three years when all the three phases should have been completed as such the researcher developed interest in was sought to investigate the cause of the delays.

1.2.2 Theoretical Background

This study was guided by Quality Management (QM) Theory and the Convergence Theory of Management. The QM theory was developed from three sources: contributions from quality gurus (Deming, 1982), (Juran, 1988), formal assessment processes (EFQM, MBNQA, and Deming prize), and measurement studies (Saraph et al, 1989). The QM theory identifies several QM dimensions that may be used to measure the QM levels in the context of performance. These includes: (i) People Management (involvement and training), (ii) Information and Analysis (quality data, measurement, process control, feedback and benchmarking), (iii) Customer Focus (customer relationships), (iv) Leadership (Top Management commitment), (v) Process Management (service delivery and improvement), (vi) Supplier Management (relational practices associated with suppliers), (vii) Planning (definition, communication and review of objectives and plans), and (viii) Product Design (departments involvement in design reviews, clarity of specifications and emphasis on quality (Directorate of Trade and Industry,2011).

The Convergence Theory asserts that learning will lead managers from different cultures to adopt the same efficient management practices (Form, 1979). Due to the cultural and contextual variables, firms would be less or more enthusiastic about pursuing certain management practices. While it is expected that firms may adopt or emphasize different management practices, these practices tend to converge over time to resemble the best industry practices. The Convergence Theory of the firm incorporates both the culture-free and culture-specific perspectives in the evolution and development of management practices

(Ralston et al. 1997, Rao et al. 1999). This perspective to management of quality provides an appropriate theoretical framework to explain differences in management practices due to cultural and contextual factors (at their early stage of implementation) while addressing the convergence of these practices over time as the result of market forces and competition.

1.2.3 Conceptual Background

This study was conceived based on the conventional Qquality Management system and frameworks stemming from the Quality Management theory. Whereas Mahour (2012) contents that the conventional Quality Management models and frameworks have been proposed based on the findings from organisations in the developed nations and thus only applicable to developed countries, the trend towards outsourcing and globalization facilitates the implementation of Quality Management across nations and industries. Researchers have used the Convergence Theory of management arguing that, to address the generalizability of Quality Management practices and its implementation across industries and nations (Mellat-Parast et al.2006, Schniederjans et al. 2006).

With the belief that Quality Management practices converge over time across industries and nations, especially in industries that have a track record of competing in the international markets. And that Quality Management principles and practices have been transferred within the projects and across nations due to the long-term presence of multi-national corporations in the projects. Also realising that Quality Management theory has identified too many dimensions to be fitted and certainly very difficult to approach the measurement of the performance based on issues of dimensionality. The researcher has modified the Quality Management theory based on Dr Joseph M Juran's developed quality trilogy – quality planning, quality control and quality improvement. Juran believed that good quality management requires quality actions to be planned out, improved and controlled. The process achieves control at one level of quality performance, and then plans are made to improve the performance on a project by project basis, using tools and techniques such as Pareto analysis. The performance of Rural Energy infrastructure in ERT is conceived as meeting starting and completing the project activities within the scheduled project time, at budgeted cost and delivering specified quality product.

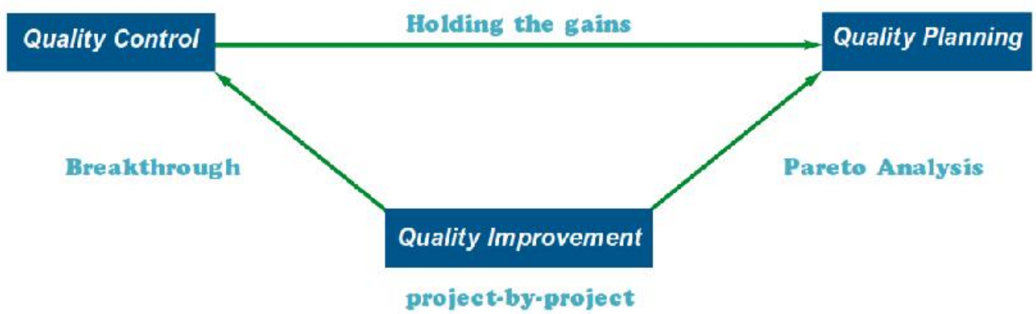

Figure 1: Quality trilogy

1.2.4 Contextual Background

Although some studies have been conducted on the role of project quality management and performance of projects, (Bible ,(2012), Bible et al,(2011), Idrus et al,(2011)), no study has been conducted to assess quality management and performance of the Energy Infrastructure component in the Energy for Rural Transformation (ERT) project in Uganda. The ERT program was launched in November 2001 to develop Uganda’s energy and information/communication technologies (ICT) sectors so that they facilitate a significant improvement in the productivity of enterprises and the quality of life of households. It is a ten-year Adaptable Program Lending (APL) divided into three phases. Being a loan, it has got to be paid with interest, the Bank assistance was based on the Country Assistance Strategy1 (CAS).

ERT was sought to build on the 1997-2000 CAS by continuing to focus on poverty reduction through sustained growth basing on The Government's Poverty Reduction Strategy Paper (PRSP) key pillars to: Directly increase the ability of the poor to raise their income by promoting the use of smart subsidies for rural electrification, which would encourage entrepreneurs to invest in power infrastructure in rural areas, Directly increase the quality of the life of the poor, by targeted improved delivery of public education, health, and potable water and sanitation services, Create an enabling environment for economic growth and structural transformation and Ensure good governance and security by improving public service delivery, decentralization, and reducing corruption.

At the time of launch in 2001, Uganda's rural development was lagging behind urban areas with the quality of rural life severely constrained by lack of electricity in rural public institutions. Less than 1 % of the rural population had access to grid supplied electricity and there was growing pressure to address issues impeding the development of the energy sector (World Bank 2009).

The first phase of the programme was intended to put in place an enabling environment and a capacity for commercially oriented, sustainable service delivery of rural/renewable energy and ICTs. However, according to the World Bank implementation and completion report, 2009, its implementation started slowly with most components not ready for implementation at the time of approval in December 2001. The Mid - Term Review (MTR) of first phase (ERT I) in October 2004 indicated that less than 10% of the funds had been disbursed these led to late completion of ERT I by 2.5 years and affected the schedules of subsequent phases. It was also completed at an extra project cost of United State Dollars 80.9 million projecting even higher total project cost at completion (World Bank, 2009). In spite of the interventions of ERT I from 2002, the impact assessment indicated no impact on; rural household connection, reduction on their monthly expenditure on electricity and enterprises location on project grid areas (UBOS, 2010).

The second phase was intended to accelerate investments and increase regional coverage through the institutional framework. And the third phase will focus on rapid growth in investments so as to reach the Government's long-term targets for rural electrification and renewable energy development.

ERT I had six components that included Capacity Building, Technical Assistance and Training, which had been separated out to focus on building the frameworks in the first phase. But now ERTII is having three components namely: (i) Rural Energy Infrastructure, (ii) Information and Communication Technologies, and (iii) Energy Development, Cross-Sectoral Links, and Impact Monitoring.

In 1999, the government approved a power sector restructuring strategy involving the unbundling of its main utility, the Uganda Electricity Board (UEB) into separate 'business' activities: generation, transmission, and distribution. Despite these reforms, there continued a growing economic, social and political pressures to address some of the long-standing issues impeding the development of Uganda's energy sector such as; Inadequate and unreliable electricity supply caused by a chronic shortage of generating capacity that was stifling economic growth, low rural access to electricity adverse development impact on rural areas as a result of the lack of adequate investment in rural infrastructure, of which electricity was a key component and renewable energy resource potential was under-utilized.

Under ERT I the Ministry of Education and Sports (MOES) signed in September 2008, their first set of contracts with the private sector to provide for implementing electricity systems in rural schools ERT I implementation period was seven years instead of the four originally anticipated. ERT II and III are each estimated to require four years for implementation. Hence, the total ERT APL period will require 15 years instead of the originally planned 10 years.

1.3 Statement of the problem

Many projects globally are not completed within the scheduled time, at the budgeted cost and the right product quality specification. Sheree, (2013) argues that the exact failure rate of projects is difficult to capture, but studies place it somewhere between 40% and 70 % while there is no consensus on the failure rate, there is consensus about what is needed to improve success. In 2001 the ERT Project, a ten year three phase adaptable program was launched in Uganda with the vision to use energy schemes to reduce poverty and cause rural transformation in Uganda. At the time of launch Uganda's rural development lagged behind urban areas with the quality of rural life severely constrained by lack of electricity in rural public institutions. Less than 1 % of the rural population had access to grid supplied electricity and there was growing pressure to address issues impeding the development of the energy sector (World Bank, 2009).

The implementation started slowly with most components not ready for implementation at the time of approval in December 2001. The Mid Term Review (MTR) of the first phase (ERT I) in October 2004 indicated that less than 10% of the funds had been disbursed this led to the late completion of ERT I by 2.5 years; affecting the schedules of subsequent phases. It was also then completed at an extra project cost of United State Dollars 80.9 million as indicated in World Bank,(2009) projecting even higher total project cost at completion and yet this is a loan which has got to be paid back with interest. In spite of the interventions of ERT I from 2002, the impact assessment indicated no impact; on rural household connection, reduction on their monthly expenditure on electricity and enterprises location on project grid areas (UBOS, 2010).

Despite the strict donors requirements and financial lending institution guidelines in addition to government structures to monitor performance, many projects including the ERT project continue to perform poorly in terms of project time, cost, and product scope. For instance, the energy balance in Uganda shows an increase of 0.2 cited in the MEMD Annual Report, 2011. What makes it worse is that there is no clear definition of "rural" versus "urban" as far as the Rural Electrification Programme is currently concerned, as reported in the Energy and Mineral Sector Performance Report 2008/09- 2010/11. And there seems to be no end in sight to these phenomena.

1.4 Purpose of the study

The purpose of this study was to assess the relationship between quality management and the performance of the Energy Infrastructure component in the Energy for Rural Transformation (ERT) project in Uganda

1.5 Objectives of the study

The objectives of the study were:

i. To find out the relationship between quality planning and the performance of the Energy Infrastructure component in the ERT project in Uganda,

ii. To examine the relationship between quality assurance and the performance of the Energy Infrastructure component in the ERT project in Uganda,

iii. To establish the relationship between quality control and the performance of the Energy Infrastructure component in the ERT project in Uganda, and

iv. To assess the moderating effects of funding policy on the Energy Infrastructure component in the ERT project in Uganda.

1.6 Research Questions

The research questions formulated for the purpose of conducting this research were;

i. How does quality planning enhance the performance of the Energy Infrastructure component in the ERT project in Uganda?

ii. How does quality assurance enhance the performance of the Energy Infrastructure component in the ERT project in Uganda?

iii. What is the relation between quality control and the performance of the Energy Infrastructure component in the ERT project in Uganda?

iv. What is the effect of funder guidelines on the performance of the Energy Infrastructure component in the ERT project in Uganda?

1.7 Research hypotheses

The research hypotheses of the study were;

i. There is a significant relationship between quality planning and performance of the Energy Infrastructure component in the ERT project in Uganda,

ii. There is a significant relationship between quality assurance and performance of the Energy Infrastructure component in the ERT project in Uganda,

iii. There is a significant relationship between quality control and performance of the Energy Infrastructure component in the ERT project in Uganda, and

iv. There is significant relationship between quality management and performance of the Energy Infrastructure component in the ERT project in Uganda.

1.8 Conceptual framework

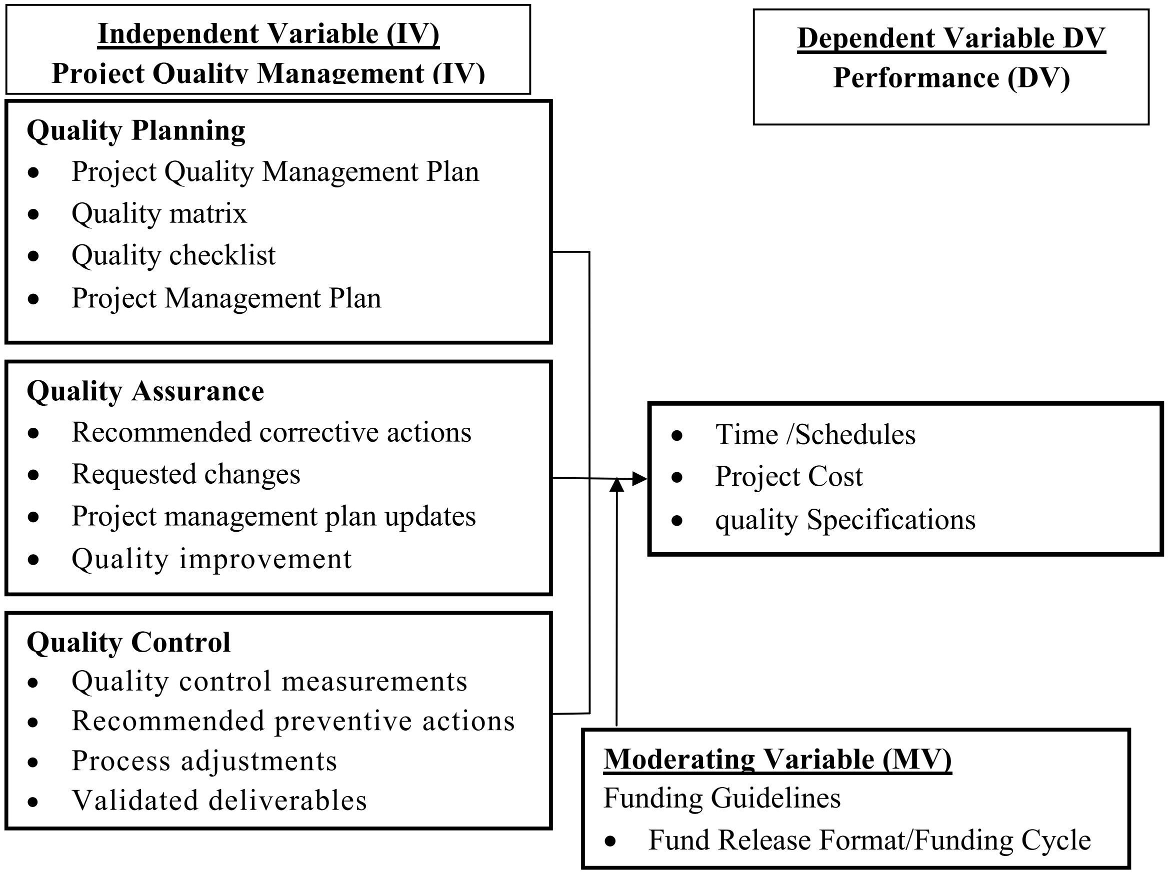

Figure 2: Conceptual framework of quality management (DV) and performance (IV)

Source: *Adopted and developed fromDr Joseph M Juran quality trilogy*

1.9 Significance of the study

The researcher anticipates that the dissemination of this study report can assist project managers, donors, recipient organisations such as non-governmental organisations/community based organisations, civil society organisations and government bodies/authorities to develop criteria that are suitable for developing countries such as Uganda in ensuring successful project management. It may also help prospective project developers and government to better understand how quality management systems impacts on their performance thus redirecting their commitment in achieving the best out of projects.

Additionally the study may assist experts involved in developing standards to develop standards that are applicable to local conditions. Additionally the researcher will have met the requirement for award of the Degree of Masters of Management Studies-Project Planning and Management of UMI thereby adding to the number of Project management professionals in the country. Finally the study shall act as a benchmark for researchers in conducting further research in the area of quality management and project performance.

1.10 Justification of the study

Currently Uganda's rural development lags behind urban areas with the quality of rural life severely constrained by lack of electricity in rural public institutions (World Bank, 2009). The Government of Uganda recognized the importance of energy in transforming the quality of life (National Energy Policy, 2002). The Rural Electricity Strategy and Plan 2001 were aimed at increasing electricity access to 10% by 2010 later revised to 2012 as compared to 2001. And recently through National Development Plan (NDP) government set an ambitious plan of electricity for all by 2035. Government projects keeps on having time overrun and completed at higher cost than budget and yet there are no significant impact in terms of project deliverables. After the project termination the situation reverts back because of lack of quality.

This study was timely because it tried to understand the linkage between QM and projects and the findings may inform decision makers and project managers on achieving the high project performance/success in the Energy sector in particular and multi-billion dollar projects in general.

1.11 Scope of the study

This section deals with the geographical coverage; time-frame and content scope issues in assessing the influence of quality management on the performance of the Energy Infrastructure component in the ERT project in Uganda

1.11.1 Geographical Scope

Geographically, this study was conducted in Kampala and its sounding areas located above the northern shores of Lake Victoria just above the Equator because these were the areas where the project coordination was located: the Project Management Team, implementing agencies and project financiers who were more knowledgeable about the project and have keen interest in project performance and success were all based here.

1.11.2 Content Scope

This study was limited to assessing the role of quality management in enhancing the performance of the Energy Infrastructure component of the ERT project in Uganda. It focused on quality planning, quality assurance and quality control because they have been found to be major in project quality management processes according PMBOK, 2004.

1.11.3 Time Scope

The study considered the period of ten years ranging from 2001 to 2011 because this was the period that was initially planned for ERT project and also the period Uganda experienced the worst energy crisis.

1.12 Operational Definitions

For the purpose of this study the following definitions applied;

Assessment: systematic investigation and analysis of the project process and components. In this study, these processes are management processes that facilitate the execution of the rural energy infrastructure component of ERT project.

Energy: energy that is got from sources that are in exhaustible such biomass, sun lights and water. In this study renewable energy is specifically limited to Solar Photo Voltaic (PV) and grid power.

Energy Infrastructure: facilities that provide or are used in the provision of electrical power. In this study it includes Solar Home Systems that are capable of providing light and running or charging simple electrical/electronic appliances, and power grid (power lines).

Rural Transformation: changing the quality of life of rural poor by improving their livelihood and making rural areas more economically productive. These include increased household access to electricity, attracting investments and improving the quality of services in rural institutions such heath centres and schools.

Quality Management: efforts to ensure that the organizational structure, procedures, processes and resources needed for performance enhancement are in place and are functional. This includes: putting in place a system to ensure quality that is meeting and/or exceeding the stakeholders' needs. In brief quality management is the assurance that the stakeholders requirements detailed within the project scope documents are met. Quality management implies the ability to anticipate situations and prepare actions that will help bring the desired outcomes

Quality: the degree to which a set of inherent characteristics fulfill requirements. It the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs. It is also defined as the "Conformance to requirements or fitness for use" meeting the customer's needs and expectations or exceeding it by way of deliverables and activities performed to deliver those deliverables.

Quality planning: identifying the deferent quality standards which are relevant to the project and determining ways of certifying them,

Quality assurance: evaluating the overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards.

Quality control: monitoring of specific project deliverables to evaluate whether they comply with the project's quality standards and to identify how to permanently remove sources/causes of unsatisfactory performance,

Performance: meeting the project timelines within the budgeted cost and delivering the product/service that meets the specified requirements. The included completing the project with the project plan period, at the amount budgeted and meeting the specification,

Project management: the application of knowledge, skills, tools, and techniques to project activities to meet project requirements,

Project Quality Management: description of the process required to ensure that the project satisfies the needs for which it is undertaken. It consists of quality planning, quality assurance, and quality control.It includes all the activities of the overall management function that determine the quality policy, objectives, and responsibilities and implementing them within the quality system

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Introduction

This chapter analyses the concepts and variables of the study, reviews the theories of quality management and the related literature on project quality management (independent variable) linking each dimension to the dependent variable (project performance). The chapter also presents the moderating variable of study (funding guidelines) and how it interacts with the independent variable to influence the dependent variable. This literature review presents the analysis of works that were already done on quality management and performance of projects through a review of journals, books, articles, publications and reports. The quality management theory advanced by the quality gurus Deming, 1982 and Juran, 1988 guided this study and to show how it informed the study. The chapter provided critical analysis of ideas from other researchers and scholars in the field of quality management arranges them in themes based on the objectives of the study.

2.2 Theoretical review

There are several theories that explain quality management and project performances. However, this study was guided by the Quality Management (QM) Theory and the Convergence Theory of management (Deming, 1982; Juran, 1988; Saraph et al., 1989). Quality management is a management philosophy based on four principles i.e. appreciation of systems, knowledge of variation, theory of knowledge and psychology (Deming, 1996). These four principles are the main factors in building a good organisation/project and cooperative relationship between managers and workers.

The QM theory identified several QM dimensions that may be used to measure the QM levels in the context of performance. These include: People Management (involvement and training); Information and Analysis (quality data, measurement, process control, feedback and benchmarking); Customer Focus(customer relationships); Leadership (Top Management commitment); Process Management (service delivery and improvement); Supplier Management (relational practices associated with suppliers); Planning (definition, communication and review of objectives and plans); and Product Design (involvement of departments in design reviews, clarity of specifications and emphasis on quality) as pointed out by Directorate of Trade and Industry,2011.

The Deming theory is consistent with the five principles of total quality management namely customer satisfaction, organisation culture, Top Management commitment, teamwork and employee involvement (Deming, 2000) The theory explains and substantiates the manner in which quality management practices or dimensions are related to bring about improved project performance as was cited by Oswald, (2009) . The Theory also explains an understanding of the overall process involving the suppliers i.e. service providers to the project such as contractors and sub-contractors, project implementers (project team/managers), the donors, and the customers who are the project beneficiaries.

The American style of management was transformed because of Deming's management and his ideas also had a great impact on Japan. He convinced the Japanese business community that it was always cheaper to do the job right the first time than to let defects enter in the production process. His advice was that focussing on quality and producing products that did not fail would make businesses a force in the world market. Adopting Deming's idea and principles, the Japanese businesses embarked on a quality journey which made Japan an enormous industrial world power that has dominated the consumer goods market and the success is linked to product quality. He emphasized product reliability which is achieved through statistical analysis and work management cooperation (Deming, 2000).

Deming believes that quality is a learning process in which managers take the responsibility of control of quality and busting productivity. As such managers must adopt a new philosophy and transform the management practices into new styles of management in order to be successful. His strategies were based on his “Plan-do-check-Act (PDCA)” cycle (Hunt, 1992) and his “14 points” to management to achieve this transformation (Deming, 2000).

Likewise, the Convergence Theory asserts that learning will lead managers from different cultures to adopt the same efficient management practices (Form, 1979) though, due to the cultural and contextual variables, organisations would be less or more enthusiastic about pursuing certain management practices.

While it is expected that firms may adopt or emphasize different management practices, these practices tend to converge over time to resemble the best industry practices. The Convergence Theory of the firm incorporates both the culture-free and culture-specific perspectives in the evolution and development of management practices (Ralston et al., 1997; Rao et al., 1999). This perspective of management of quality provides an appropriate theoretical framework to explain differences in management practices due to cultural and contextual factors (at their early stage of implementation) while addressing the convergence of these practices over time as the result of market forces and competition.

This study therefore assessed a relationship between quality management in the performance of Energy for Rural Transformation project in Uganda.

2.3 Conceptual review

Project Quality Management in this study was viewed as a means to ensure that the project will satisfy the needs for which it was undertaken. It includes all activities of the overall management function that determine the quality policy, objectives, and responsibilities and implements them by means such as quality planning, quality control, quality assurance, and quality improvement, within the quality system (PMBOK, 2004).

According to ISO 9001,(2008) an appropriate documented Quality Management System will help an organisation not only achieve the objectives set out in its policy and strategy, but also, and equally importantly, sustain and build upon them. It is imperative that the leaders take responsibility for the adoption and documentation of an appropriate management system in their organisation if they are serious about the quality journey. The Systems section discusses the benefits of having such a system, how to set one up and successfully implement it.

Project quality management dimensions are conceptualised as quality planning, quality assurance and quality control activities while project performance was conceptualised as time performance, cost performance and product performance (quality specification/requirements). It was further conceptualised that funding policy/guidelines would influence the independent and the dependent variables and this was the moderating variable. However, the study focused on the assessment of quality management (IV) and performance (DV) of Energy Infrastructure component of the ERT project in Uganda.

2.4 Quality Planning

According to PMBOK, (2004), quality planning in projects involves identifying the relevant quality standards to the project and determining how to satisfy them. It is one of the key facilitating processes during project planning and should be performed regularly and parallel to other project planning processes. The ISO 9001:2008 Quality Management Systems Standard which aims at continual improvement is built on the concept of the "Plan-Do-Check-Act" quality approach of Deming which is similar to the project processes and stress on quality planning. Quality planning could greatly enhance the performance of the Energy

Infrastructure Component of the ERT project in Uganda. The project team must be aware of one of the tenets of modern quality management "quality is planned in, not inspected in". According to the PMBOK Guide, in quality planning there are inputs required, tools and techniques to be used in order to get the outputs (see figure 2). The Energy Infrastructure component of the ERT Project should have or has to develop a quality management plan, operational definition and a checklist that inputs to the other processes.

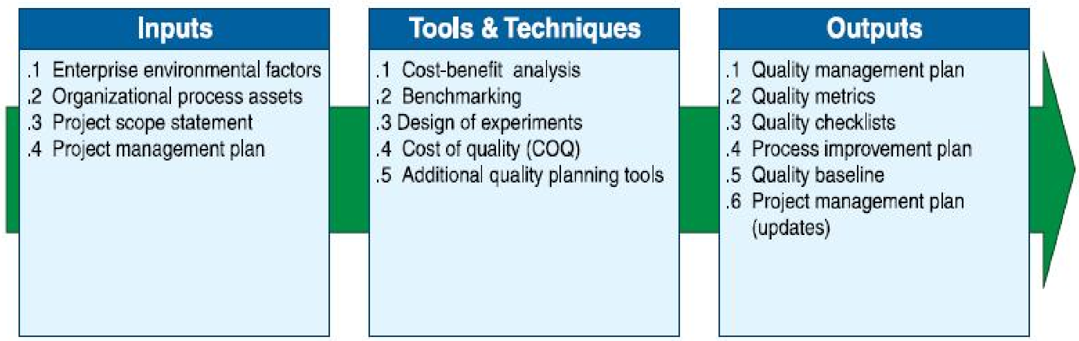

Figure 3: Perform Quality planning — Inputs, Tools & Techniques, and Outputs

The purpose of project quality plan is to define these activities or tasks that are intended to deliver outputs while focusing on achieving customers/stakeholders expectations. These activities are defined on the basis of the quality standards set by the organizations (Visitask, 2010). The quality plan also includes the procedure to ensure that the quality standards are being followed by all the project staff. The plan includes the steps required to monitor, control quality and approval processes to make changes to quality standards and quality plan (Crosby, 2002).

Juran's quality principles are built around the practices of quality planning, quality control and quality improvement (Juran, 1989). Therefore, The Energy Infrastructure component of the ERT Project should have or has to develop a quality management plan, operational definition and a checklist that inputs to other processes. Like Deming, Juran believes that the customer must be the focus of quality planning. His strategies were focused on the involvement of the Top Management, planning quality improvement project by project and developing a training programme for staff. Like Deming, he emphasizes the need for continuous process improvement of management in producing quality goods and services in an organization where the focus lies on customer expectation and needs. To Juran quality is fitness for use not merely meeting the specifications.

As is the case in the Deming "Plan-Do-Check-Act" planning quality improvement, implementing the plan, analyzing the result and re-planning is a cycle that leads to continuous improvement. This should be deployed at all levels of project management. Quality plans are established periodically based on quality policy. The feedback on quality problems encountered in the past projects or expected in the future are collected and based on these, quality objectives involving every function are set. Quality objectives are set within regards to the procedures, quality cost, documents, emerging technologies and quality plans are monitored and reported directly to the Top Management. A systematic planning is a basic requirement for effective project quality management

2.4.1 Quality Management Plan

One of the major outputs of quality planning is the quality management plan (PMBOK, 2004). This document describes how the project manager and the project team will fulfill the quality policy. In an ISO 9000 environment, the quality management plan is referred to as the "project quality system." The quality management plan addresses three things about the project and the project work i.e. Quality control, quality assurance and quality improvement. It's the basic document for project quality in the quality management plan. It is one of the several subordinate management plans within the project plan (Kenneth, 2006). According to PMBOK, Guides (2004), a quality management plan should describe how the project management team will implement its quality policy.

Quality policy is the overall intentions and direction of an organization with regard to quality, as formally expressed by top management" (ISO 9000:2000). The PMI guidelines argue that the quality policy of the performing organization can often be adopted "as is" for use by the project. However, if the performing organization lacks a formal quality policy, or if the project involves multiple performing organizations (as with a joint venture), the project management team will need to develop a quality policy for the project. The ERT project is a multi-stakeholder implementing project and thus the project team should develop one. The quality plan should describe the project quality system: “the organizational structure, responsibilities, procedures, processes, and resources needed to implement the quality management”. The quality management plan provides input to the overall project plan. It must address quality control, quality assurance, and quality improvement for the project.

According to PMBOK, 2004 the project management team is responsible for ensuring that the project stakeholders are fully aware. Michelle of the project portfolio Office at the University of Ballarat (Michelle, June 2011), the quality management plan documents the organization’s quality management policy for effective execution of projects. It also provides guidelines to the project management team to record and effectively cross-reference the project activities in accordance with the stated project objectives. It states the quality objectives in terms of the project objectives and/or the organizational objectives, determine quality objectives for the product with the client. He added that there may be overall organizational quality objectives or policies that the project can reference.

The quality management plan should identify which quality standards are relevant to the project and how to satisfy them. It should also identify and define appropriate quality metrics and measures for standards for project processes, product functionality, regulatory compliance requirements, project deliverables, project management performance, documentation, testing, etc. And quality management plan should list and define the quality tools that will be used to measure project quality and level of conformance to defined quality standards/metrics. BIS (2010) guidelines for managing projects also asserts that without careful planning it is likely that your project will fail to achieve its objectives.

2.4.2 Quality Matrix/Operational definitions

Operational definitions, also known as metrics, are the quantifiable terms and values to measure a process, activity, or work result. Matrices that define the project processes, their attributes, and units of measure that are needed for quality assurance. An operational definition describes, in very specific terms, what something is, and how it is measured by the quality control process (PMBOK, 2004). The Quality Plan has to be comprehensive and like planned meeting schedule dates, should indicate every activity, duration, start and end time, or only finish on time; whether individual activities will be measured or only certain deliverables, and if so, which ones.

According to the World Bank Implementation and Completion Report, 2009, implementation started slowly with most components not ready for implementation at the time of approval in December 2001. This could have been due to lack of quality planning in general and specifically, lack of operational definitions. The Mid Term Review (MTR) of the first phase (ERT I) done in October 2004 indicated that less than 10% of the funds had been disbursed this led to the late completion of ERT I by 2.5 years; affecting the schedules of the subsequent phases.

2.4.3 Quality Checklists (Insert Paragraphs please!!)

According to Kenneth (2006), a checklist is used to establish things to do. PMBOK, (2004) defines a checklist as a structured tool, usually industry- or activity-specific, used to verify that a set of required steps has been performed. Checklists are simple approaches to ensure work is completed according to the quality policy. It's usually a list of activities that workers will check off to ensure each task has been completed.

Checklists can be quick instructions of what needs to be done to clean a piece of equipment, or questions that remind the employee to complete a task, e.g. "Did you turn off the printer before opening the cover?" Developing a comprehensive standardized checklists for the Energy Infrastructure component with imperatives phrased such as "Do this!" or interrogatories "Have you done this?" may simplify and improve the quality assurance and quality control activities which could lead to improved performance.

PMBOK, 2004 guides states that if the project is using checklists to ensure project work is completed, a copy of the checklists will be needed as part of quality control. The checklists can serve as an indicator of completed work and expected results. And if the project is using checklists to confirm the completion of work, then the completed checklists should become part of the project records. Some project managers require the project team member completing the checklist to initial them.

2.4.4 Project Management Plan

The PMBOK (insert year of publication) Guide's definition of a project management plan is a single formal document that lays down how a project is to be managed, executed and controlled. Throughout the project, it is 'progressively elaborated' put simply, after its creation, it is continually refined, revised and updated. The project management plan consists of three baselines; that is Cost, Schedule and Scope as well as ten management plans; requirements, scope, cost, quality, risk, change, configuration, schedule, procurement, and communications. It also contains the human resource plan and the process improvement plan.

Project management professionals assert that before you tackle any questions regarding the project management plan, you need to be clear about the following concepts and uses: once created and approved, the project is managed against the project management plan; the project management plan is a living document, and should be updated to reflect current progress and future forecast; that the project management plan should be realistic and achievable; the project management plan must be approved by all parties, and they too, must believe that it is achievable and also be clear about the actions needed to create a realistic project plan.

2.5 Quality Assurance

Quality assurance is part of quality management focused on providing confidence that quality requirements will be fulfilled. According to ISO 9001:2008, quality assurance is defined as a planned and systematic activity implemented within the quality system to provide confidence that the project will satisfy the relevant quality standards. It should be performed throughout the project.

If ERT project developers had incorporated the Quality Assurance aspect the project would have created the intended impact and avoided the time and cost overrun that occurred in ERTI. Quality assurance is often provided by a Quality Assurance Department or similarly titled organizational unit. It can be provided by the project management team or by the management of the performing organization (internal quality assurance) or it may be provided to the customer and others not actively involved in the work of the project (external quality assurance). Project quality management professionals assert that, quality assurance is a process (see figure 2) that has Inputs and using tools and techniques there by leading to quality improvement PMBOK, (2004).

Figure 4: Perform Quality Assurance — Inputs, Tools & Techniques, and Outputs

The inputs to quality assurance include; quality management plan, the results of quality control measurements which are derived from quality control records as defined in the operational definitions of the organization/project.

Many scholars believe that quality planning tools and techniques can as well be used for quality assurance. ISO Quality Management Systems (QMS) put as a requirement the quality audits (ISO 9001:2008). A quality audit is a structured review of other quality management activities. ISO 9001 requires that the organization conducts internal audits at planned intervals to determine whether the quality management system a) conforms to the planned arrangements to the requirements of the Standard and to the quality management system requirements established by the organization, and b) is effectively implemented and maintained.

The objective of a quality audit is to identify lessons learned that can improve performance of this project or of other projects within the performing organization. Many projects including ERT, conduct quality through monitoring and evaluation just for the purpose of meeting the donor requirement and requesting for more funding. ISO 19001 provides guidelines for auditing of QMS. Quality audits may be scheduled or random and they may be carried out by properly trained in-house auditors or by third parties such as quality system registration agencies.

Kenneth, (2005) asserts that monitoring specific project results serves several important purposes. Results may confirm that all is well. If results are within specifications (no variance from specifications is indicated), the project team knows that performance is proceeding according to plan. Results may provide the basis for corrective action. If results do not conform to specifications (some degree of variance is indicated), the project team knows that something has gone wrong or is going wrong.

The project team must take corrective action to fix the existing variance from the plan. The team must also identify the source of the variance and take corrective action to prevent it from recurring. Results provide feedback to the quality assurance process. Results obtained during quality control provide data that are examined during quality audits. Performance that does not conform to specifications indicates that the quality assurance activities associated with that performance are not having the desired effect.

Quality assurance activities are intended to ensure conforming performance. If they do not, the project team must analyze the data, determine the shortcoming, improve the quality assurance activities, and update the quality assurance plan.

2.5.1 Recommended Corrective Actions

Corrective action is anything done to bring expected future project performance in line with the project plan (PMBOK, 2004). PMBOK, 2004 guides, assert that the causes of variance, the reasoning behind corrective action chosen as well as other types of lessons learned from scope change and control should be documented so that this information becomes a historical database for both this project and other projects of the performing organization.

According to ISO 9001, 2008 QMS requirements organization are required to take action to eliminate the causes of nonconformities in order to prevent recurrence. It demands that corrective actions should be taken and that they should be appropriate to the effects of the nonconformities encountered. However in many circumstances when non-conformity occurs in the project, the corrective actions taken are not appropriate leading to poor performance in terms of time, cost and product requirements. The items inspected will be either accepted or rejected. In quality control, limits have to be set to allow for facilitation of decision making. Rejected items may require rework. This means that there must be a way of quality control measurement in place

Westcott, (2005) in his article on the quality progress argues that corrective action should: locate and document the root cause of the non-conformity; scan the entire system to ensure no other similar non-conformity could occur; analyze the effect such a non-conformity may have had on a product or service produced before the non-conformity was discovered and take action appropriate to the severity of the situation by either recalling the product, notifying the customer, downgrading or scrapping product; and establish thorough follow-up to ensure the correction is effective and recurrence has been prevented.

He added that a single occurrence of a non-conformity that involves little risk need not be recorded but a more serious non-conformity involving some risk that requires action to prevent recurrence must be recorded. Westcott asserts that documenting and controlling corrective and preventive actions ensure appropriate action is taken within a reasonable timeframe and the resulting changes work.

2.5.2 Requested Changes/ variations

A requested change is a formal proposal for an alteration to some product or system. According to Department for Business, Innovation and Skills (2010) in project management, a change request often arises when the client wants an addition or alteration to the agreed-upon deliverables for a project. Such a change may involve an additional feature or customization or an extension of service, among other things. Because change requests are beyond the scope of the agreement, they generally mean that the client will have to pay for the extra resources required to satisfy them.

2.5.3 Project Management Plan Updates

According to PMBOK (2004), Quality Management Plan update is part of quality assurance. This is also in agreement with Kenneth, (2005), who asserts that monitoring specific project results serves several important purposes. Results may confirm that all is well. If results are within specifications (no variance from specifications is indicated), the project team knows that performance is proceeding. Deviation from the plan, therefore, calls for updating of the plan in order to control the process.

2.5.4 Quality Improvement

Quality gurus such as Deming, (1982); Juran, (1988); Saraph et al., (1989) believe in quality improvement. ISO 9001:2008 QMS aims at continual improvement focusing on meeting and exceeding customer satisfaction while meeting the regulatory requirements. PMBOK, (2004) guides asserts that quality control should, first and foremost, result in quality improvement.

The Project Manager and Project Team, based on the results of the tools and techniques to implement quality control, apply corrective actions to prevent unacceptable quality and improve the overall quality of the project management processes. The corrective actions the Project Manager and the Project Team want to incorporate into the project may require change requests and management approval. The value and importance of the change should be evident so the improvement to quality is approved and folded into the project.

The way to improve quality is through quality planning, quality assurance and control. The PMBOK, (2004), asserts that quality improvement includes taking action to increase the effectiveness and efficiency of the project to provide added benefits to the project stakeholders. This is also in agreement with ISO which states that part of quality management should be focused on increasing the ability to fulfill quality requirements which can be related to any aspect such as effectiveness, efficiency or traceability (ISO 9000:2008).

2.6 Quality Control

The PMBOK (2004) Guide defines quality control as "monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance." This is an action process in which the project team looks at results and determines necessary corrective action. Quality control as part of quality management is focused on fulfilling quality requirements (ISO 9000, 2008). It can also be defined as "the curative steps taken to identify the quality of the actual deliverable delivered and eliminate any variances from the quality targets set". Quality control is used to verify that deliverables are of acceptable quality, complete and correct. This therefore means that there must be a dedicated effort towards meeting quality requirement (PMBOK, 2004).

Quality control involves monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory results. Project quality management professionals contend that quality control should be performed throughout the project (PMBOK, 2004). If ERT is to succeed quality control is needed in order to achieve the project results that include both product results such as deliverables and management results such as cost and schedule performances.

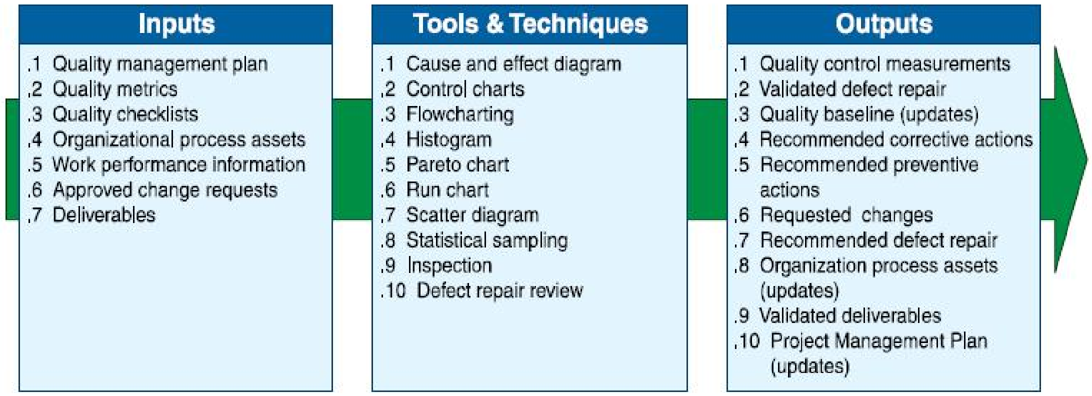

Figure 5: Perform Quality Control —Inputs, Tools & Techniques, and Outputs

2.6.1 Quality Control Measurements

The PMBOK Guide, (2004), describes records of quality control measurements as records of quality control testing and measurements in the format of compression and analysis. Atkinson, (1999) asserts that the overarching purpose of a measurement system should be to help the team rather than top managers, gauge its progress. He contends that a truly empowered team must play the lead role in designing its own measurement system because the team is responsible for a value-delivery process that cuts across several functions, it must create measures to track that process. If results do not conform to specifications (some degree of variance is indicated), the project team knows that something has gone wrong or is going wrong.

The project team must take corrective action to fix the existing variance from the plan. The team must also identify the source of the variance and take corrective action to prevent it from recurring. Results provide feedback to the quality assurance process. Results obtained during quality control provide data that are examined during quality audits and as such quality control measurements are of paramount importance Atkinson, (1999).

2.6.2 Recommended Preventive Actions

ISO 9000, (2005), defines preventive action as an action to eliminate a potential non-conformity (non-fulfilment of a requirement) or other undesirable potential situation. It notes that there can be more than one cause for a potential nonconformity. Preventive action is taken to prevent occurrence whereas corrective action is taken to prevent recurrence.Westcott, (2005), in his article argues that corrective action should take proactive steps to ensure a potential non-conformity does not occur; and employ process and system analysis to determine how to build in safeguards and process changes to prevent nonconformance. For example, use a failure mode and effects analysis to identify risks and potential deficiencies and to set priorities for improvement.

Use the name of the author adds that preventive actions should: initiate an improvement on a project, with project plans, justification for planned expenditures, resource controls and evaluation. It contains a related series of actions, often separated by long periods so project team can wait and see progress and results. it should use a variety of appropriate disciplines at different times during the project and establish a means for communicating what has been done as well as what has to be done to facilitate communication about changes to project team members and include a clear trail of actions taken and decisions made to substantiate the decision to proceed, document lessons learned. Preventive action should avoid needless reinvention on future similar projects. Wescott (2005) stressed that documenting and controlling corrective and preventive actions ensure appropriate action is taken within a reasonable timeframe and the resulting changes work.

2.6.3 Process Adjustments

When results of inspections indicate quality is out of control then process adjustments may be needed to make immediate corrective actions or planned preventive actions to ensure quality improves. Process adjustments, depending on the nature of the adjustment, may qualify for a change request and be funneled through the Change Control System as part of integration management. Process adjustments involve immediate corrective or preventive action as a result of quality control measurements (PMBOK, 2004). In some cases, the process adjustment may need to be handled according to procedures for overall change control. These require a baseline in order to determine the progress and deviation from the baseline. In the ERT project which is an Adaptable Program Lending by the World Bank, this makes it easier to adjust process. However, there must be a procedure in place for overall control change. It also makes it quite challenging to control quality of the project especially where there was no baseline set.

2.7 Funding Guidelines (MV)

Rwothungeyo, (2012) reported in the New Vision of December 30, 2012 under the headline "Delayed funding affecting contracts — World Bank" that delayed and erratic release of funds from the Ministry of Finance, Planning and Economic Development to Procurement and Disposal Entities (PDEs) was adversely affecting contract management. The ERT project actually runs on the funds release through the Ministry of Finance Planning and Economic Development and thus these kinds of delays and erratic fund release may affect the performance of the project. It's even more shocking to note that "The standard contracts state that the contractor must be paid interest in the case of a delayed payment; of a right, without having to claim for it or provide any justification. There were no records of interest payments, so it is assumed there was no interest paid" Rwothungeyo, (2012). This directly affects project performance. Thus the fund release format/cycle may affect the Energy Infrastructure component of the ERT project in Uganda.

2.8 Project Performance (DV)

According to Milton D., & Gregory D. (2005), the triple constraints help the project team to evaluate expectations for product performance and compare them with the expectations for delivery time and cost. The triple constrain is a project management term for a framework consisting of three parameters of project performance, commonly called product performance (the term product means any result, tangible or intangible delivered by the project to the user), the time schedule and cost budget. They assert that projects are work systems with multiple dimensions of performances where managers balance competing demands.

2.8.1 Project Time Performance (Time/schedule)

Almost everyone values time and each of us occasionally gets impatient. Time is the most important measure of project performance but not the only criterion for good project performance.

2.8.2 Project Cost Performance

For many projects and organization, the cost budget is more important than timing. Milton and Gregory argue that if the project consumes more resources than estimated, the average will come from one or more of the five sources i.e. the profit margin, a price increase, people's personal time, reducing the product scope or "deferring" work (many people put off immediate work but end up expending considerably more resources performing rework).

2.8.3 Project Quality Performance /Quality Specification

Ultimately a project deliverable must satisfy its initial objectives and thus a product that satisfies its requirement is critical. What good is a project deliverable if it doesn't work, is unacceptable, or faulty? Project quality management ensures that the deliverables project teams create meet the expectations of the stakeholders. Quality means delivering the project at the exact level of the design specifications and the project scope. No more, no less (PMBOK, 2004).

Quality planning happens before project work begins but also as work is completed. Quality planning can confirm the preexistence of quality or the need for quality improvements. Quality is planned into a project, not inspected in. However, quality control uses inspections to prove the existence of quality within a project deliverable. The cost of quality is concerned with the monies invested in the project to ascertain the expected level of quality. Examples of this cost include training, safety measures, and quality management activities. The cost of nonconformance centers on the monies lost by not completing the project work correctly the first time.

Optimal quality is reached when the cost of the improvements equals the incremental costs to achieve quality. Marginal analysis is the study of when optimal quality is reached. Ideally, the cost of quality is earned back because the deliverables of the project are better and more profitable than if the quality of deliverables were lacking.

Therefore emerging from the triple constraint, the product performance developed for the team’s capture of the product’s functional and performance requirements. the time performance is where the project time determined by taking a list of activities and estimating their duration and analyzing the critical path. And the cost performance where the estimated cost of the project are computed through cost-estimating practices have been considered as the dimension of project performance.

2.9 Summary of Literature Review

The discussions in the literature above highlighted the importance of Project Quality Management in the performance of projects and brought out key areas where employing project quality management would be useful in improving of performance in the Energy Infrastructure Component of the ERT Project in Uganda. The scholars advanced that quality planning is a key facilitating processes during project planning and should be performed regularly and parallel to the other project planning processes (PMBOK, 2004). And that quality planning leads to continual improvement employing the Deming quality approach "Plan-Do-Check-Act" under pinning the importance of quality planning in enhancing project performance.

The importance of understanding quality planning as a process that requires inputs and use of tools and techniques in order to get the outputs which is a project quality plan was brought out. The chapter also stressed the importance of a quality policy for the project and clearly apportioning the responsibility of dissemination of the policy to the project team (PMBOK, 2004).

The unique importance of operational definition describing, in very specific terms, what something is, and how it is measured by the quality control process (PMBOK, 2004) was brought out. PMBOK, (2004) brought out the importance of having a standardised checklist to facilitate quality assurance and control.

The benefits of quality control involves monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory results was discussed, (PMBOK, 2004). The need to take action to eliminate the causes of nonconformities in order to prevent recurrence and enhance performance as pointed out in ISO 9001, 2008 QMS requirements for organization was highlighted.

The literature review also revealed and underscored the need to have a procedure for handling process adjustment for overall change control (PMBOK, 2004). A report from the New Vision newspaper hinted on the delayed and erratic release of funds to projects in Uganda.

It can be deduced from the literature reviewed that gaps do exist in the project quality management of the Energy Infrastructure Component of the ERT project in Uganda and the importance of quality planning, quality assurance and quality control issues need to be taken seriously. The reviewed literature also revealed that gaps do exist in the funding guideline and needs to be addressed fund release may affect the performance of a project. In short, all effort should be taken to improve the project quality management in the ERT project.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents methodology that was adopted for data collection. It discusses the research design, the study population, the sample size and the sampling strategies, the data collection methods and instruments, the procedures used to ensure the validity and reliability, the measurement of variables, the procedure and techniques that was used for data analysis.

3.2 Research Design

Kothari, (1985) defines a research design as a conceptual structure within which research is conducted and constitutes the blue print of collection, measurement and analysis of data. In this study the researcher used a cross-sectional design applying both qualitative and quantitative approaches. According to Sekaran (2003) a cross-sectional study is where data is gathered just once over of a period of time which may range days, to a month in order to answer a research question.

A cross-sectional survey was used because data were collected once over a specific period of time on the events that had been happening for some time to answer the research questions and assessed the influence of quality management on the performance of the Energy Infrastructure component in the Energy for Rural Transformation (ERT) project in Uganda. It gives a detailed description of events as they were at the time as reported by a cross section of people involved in and/or with informed opinion about performance of projects focusing on quality planning, quality assurance and quality control.

The justification for the choice was because this study was an in-depth investigation on the Energy Infrastructure in the ERT project in limited time period. Data collection methods and tools used were triangulated to collect both quantitative and qualitative data. This research design was further chosen because it allowed this study to be conducted within the stipulated time meeting the requirements of the awarding institution. The quantitative approach enabled the researcher to statistically analyse the data and helped him in determining the relationships between quality management and performance of the energy infrastructure component of ERT project. It facilitated him in the comparison of characteristics from the organization and agencies implementing ERT programme; and coordination ministry (MEMD).

The quantitative approach was also used to test the hypothesis. The qualitative design on the other hand enabled the researcher to investigate the perceptions, experiences, feelings, beliefs and attitudes on the influence of quality management and performance of the energy infrastructure component of ERT project as well as other attributes of respondents that could not be accurately measured in quantitative terms. The two approaches were applied because they complement each other and data was enriched and made more explicit, easy to aggregate and derive meaning as recommended by Babbie, (2007).

3.3 Study Population

According to Mugenda and Mugenda, (1999 :41) a study population is a complete set of individuals, cases or objects with some common observable characteristics. The study population of 140 people (ERT Monitoring Records, 2013) were considered.

3.4 Sample Size Determination and Selection Strategies

The sample size of 103 respondents was considered in this study derived from a population of 140 determined using sample tabled values developed by Krejice & Morgan (1970) and as cited by Amin (2005).The sample was divided into strata and sampled. According to Amin (2005), in stratified sampling, the population is divided into sub-population such as elements within each sub-population are homogeneous. Mugenda and Mugenda (2005) argue that the goal is to achieve desired representation from the various sub-groups. Subjects are selected in such a way that the existing sub-groups in a population are more or less reproduced in the sample.

The researcher employed both probabilistic and non-probabilistic sampling techniques to select elements. The six (6) different categories of respondents were treated as different strata. These categories of individuals constituted the study elements because they were believed to be informed and had relevant information regarding the Energy Infrastructure component in the ERT project in Uganda.

They included the 10 accounting officers, 14 project management staff and the coordinating team in Ministry of Energy and Mineral Development (MEMD) due to their in-depth knowledge of the project and their mandate to develop and regulate the energy sector in Uganda. The project coordinators and management teams of Ministries of Health (MOH), Education and Sports (MOES), Water and Environment (MOWE), and Local Government were also included because Rural Energy Infrastructure Components of ERT were being implemented in those Ministries. The Secretary to the treasury and the project coordinating team in the Ministry of Finance Planning and Economic Development(MFPED) were also included because of their unique responsibility in securing and monitoring government ERT funding which was(is) an Adaptable Lending to the Government of Uganda.

The Chief Executive Officers of Private Sector Foundation Uganda and Uganda Energy Credit Capitalisation Company and the technical teams in those two organisations were also included because the two are also involved in the implementation of the project. The chief Executive of Rural Electrification agency (REA) and the project team were also included in the study since REA was (is) the main implementing agency of this component of the project. A special category of stakeholders that includes the desk officer at World Bank country

Office and contractor/subcontractors were also be included because of their knowledge and interest in ERT project.

The six (6) different categories of respondents were treated as different strata. Then each stratum was subjected to simple random sampling to obtain the required number of respondents. The Permanent Secretaries, the Chief Executive Officers and Project Monitoring Team were chosen purposively because of the small number, unique knowledge and responsibilities in the project. While the category of Project Coordination Team, Project Implementation Team and the Key Stakeholders were selected using stratified random sampling.

The researcher selected a sample size of 103 respondents because of the following reasons;

a) Anticipation that the responses within a category could be similar and repetitive.
b) The short duration required to undertake and complete this research thus specified academic deadlines by the awarding institution.

Table 1: Sample frame for research

Category	Population	Method of determining the sample	Sample	Technique
Permanent Secretaries	6	Convenient	2	Purposive
Chief Executive Officers and World Bank Project Desk Officer	4		4	Census
Project Monitoring Team	6		6	Census
Project Coordination Team	8	$\frac{91}{124} \times 8 = 5.87$	6	Stratified simple random sampling
Project Implementation Staff	37	$\frac{91}{124} \times 27 = 27.1$	27	Stratified simple random sampling
Key Stakeholders (Contractor and Sub Contractors)	79	$\frac{91}{124} \times 79 = 24$	58	Stratified simple random sampling
Total	140		103	

3.5 Sampling Techniques and Procedure (insert another paragraph)

After procedurally determining the acceptable sample size of 103 respondents, the researcher clustered the respondents based on the type, quality and the quantity of the information they were expected to provide. These included top management who are the key decision makers on ERT (the Permanent Secretaries and CEO of the Ministries and Agencies participating in the coordination and implementation of this projects component); The middle level managers i.e. the Project Monitoring team who are the technocrats with in-depth knowledge on the project (The Commissioner Energy Efficiency and Assistant Commissioner MEMD, the project central coordination staff in MEMD); the project coordination team in the various Ministries and agencies involved in implementation of the project ; The project implementation team and key stakeholders which includes Contractors and sub-contractors in the project.

Because of the wide range and characteristics of the information required from different clusters grouping, the researcher used both probabilistic and non-probabilistic sampling technique. Non-probabilistic technique adopting purposive approach was applied on the top and middle level management because of their key decision making role, in-depth knowledge and their small number to avoid researcher being bias in the selection of the respondents. This was also in agreement with Amin, (2005) where he argues that purposive sampling is where a researcher chooses the sample based on who he thinks would be appropriate and when the researcher knows that the respondents have the required information. Stratified simple random samplings were used on project coordination team, Project implementation team and key stakeholder due their relatively larger numbers; this gave all the subjects an equal opportunity to participate as recommended by Mugenda &Mugenda, (1999). As indicated in the sampling frame table 1.

3.6 Data Collection Methods

Research data can basically be categorized in to two i.e. primary data and secondary data. The collection methods are intertwined in both qualitative and quantitative methods. Primary data are those that are collected fresh and for the first time, thus it is original in character whereas secondary data are those that have already been collected by someone else and have already been statistically processed (Kothari, 1985, Sekaran, 2003).

The study was interested in numeric measurements as well as understanding individual experiences related to quality management and performance of rural energy infrastructure in ERT project component. Because of the nature of the study and characteristics of the information required the researcher used triangulation methods in collecting quantitative and qualitative data. Triangulation of approaches was helpful because results from one approach helped to develop or inform those from other approaches and any inherent bias in one approach could be neutralised when used in conjunction with other approach as recommended by Amin (2005).

In this study, the researcher questioned the respondents and reviewed relevant documents as the methods of data collection. Secondary data was collected by document analysis while face to face interviews of top management and key informants was conducted; self-administered questionnaires survey for other respondents were used in the process of collecting primary data.

3.6.1 Questionnaire Survey

Questionnaire surveys were used to collect data from the respondents. Questionnaire survey was chosen because of the speed and ease of use in collecting data within a short period especially when the respondents are able to read and write as opposed to interviewing (Sekaran, 2000). Questionnaire survey is an efficient data collection method as it does not require much skills to administer when compared to an interview and are efficient data collection mechanisms when the researcher knows exactly what is required and how to measure the variable of interest (Mugenda and Mugenda, 2003) Since most of the respondents were able to read and write, the questionnaire was the most appropriate method to use.

3.6.2 Interview Survey

An interview is a form of conversation through which the interviewer can obtain first-hand information from participants through interaction (Kvale, 1996). Interviews are said to be advantageous in that "they probe deeply into the participants to obtain opinions and feelings (Gall, Borg & Gall, 1996). Interviews also offer a possibility of modifying ones line of inquiry, follow up interesting responses and investigating underlying motives in a way that self-administered questionnaires cannot. Interviews equally allow a researcher to understand the meanings that people hold for their everyday activities (Marshall & Rossman, 1999). Basing on the above argument, the researcher used face to face interview of key informants to obtain data about performance and project quality management.

3.6.3. Documentary Review.

In documentary review for data collection, researchers studies documents more specifically and more in-depth (Sarantakos, 2005). This calls for the identification, listing and shorting of the documents to be reviewed. In the study the researcher developed a checklist based on the objectives of particular interest to this study using items harmonised with the questionnaire measuring the critical indicators of variables to guide the study.

3.7 Data Collection Instruments

The data collection instruments that were used included; documentary review checklist, interview guides and questionnaires in the process of collecting the study data

3.7.1 Questionnaire

A questionnaire is a carefully designed instrument for collecting data in accordance with specific hypotheses (Amin 2005).Mugenda and mugenda (1999) contends that questionnaires enables the respondents to answer without bias, are low cost and can conveniently reach many respondents in a short time. Sekaran (2003) and Amin (2005) concurs that questionnaires are efficient and convenient in qualitative and quantitative data. In agreement with the above arguments, the researcher designed a structured self-administered questionnaire with close ended questions to aid in the quantitative data collection in the study. It was constructed with the two objectives of maximising proportion of the subjects answering the questionnaire to increase the response rate and obtain accurate relevant information in the survey.

The structured questionnaire was considered appropriate as it helps the respondents to make quick decisions to make a choice thereby saving time as well as helping the researcher to code the information quickly during analysis (Sekaran, 2003, Mugenda and Mugenda 2003). This was also supported by Amin 2005 who affirmed that a questionnaire offers greater assurance for anonymity especially when handling sensitive issues in organisation, as the case in Uganda's government programmes/projects. A five scale likert scale was used to measure the level of agreement/disagreements of the respondent's views as it was easy and quick to construct, reliable and can also be treated as an interval scale (Michelle 2008).

The questionnaire was pre-formulated with six sections as shown in appendix 1.

3.7.2 Interview Guide

In this study, the researcher designed an Interview guide which helped him collect data from very busy respondent's especially key informants. The unstructured interview guide that comprised of 36 open ended questions categorized under six sections was used in face to face interviews in obtaining data from key informants. This facilitated the researcher to get in-depth information supporting the information got from the questionnaires and allowed the collection of important information from key informants for accessing the influence of quality management and performance of rural energy infrastructure component in the ERT project as recommended by Sekaran (2003).

3.7.3 Documentation Review Check-list

The researcher developed documents review checklist that enabled him to systematically review relevant documentation that provided secondary data. The researcher used the identified documents that were listed in the checklist and reviewed them to validated information got from the questionnaires from the project. This list focused on monitoring and evolution reports, conference reports, sector performance statistics and reports, journals, text books, magazines and Newspapers relevant to quality management and performance of rural energy infrastructure in the ERT project.

3.8 Data Quality control

3.8.1 Pretesting

The instrument was pre-tested on another component of ERT project (information and communications technology) to ensure that the respondents understood the questions and the purpose of the study and ensure that the research tools generated the required information for which the study was intended to achieve (Sekaran, 2003)

3.8.2 Validity

Validity of a data collection instrument refers to the appropriateness of the instrument to measure a variable or construct and come up with the intended results (Amin, 2005) it also refers to the truthfulness or accuracy of measurement, (Norlan, 1990). The validity of the research instrument was checked using face and content validity approach by expert judgment. In order to ensure validity of the instrument, the drafted questionnaire was given to supervisors and colleagues for critical assessment of each item. They were requested to state the relevance (R) of non-relevance (NR) of each item. They were also asked to check the language and clarity of the questions. The content/coefficient validity index (CVI) was computed using standardized measures and appropriate adjustment was made. The CVI was generated from the formula below; the CVI will be generated from the formula;

$$CVI = \frac{Item \quad rated \quad relevant}{Total \quad number \quad of \quad items \quad on \quad the \quad questionnaire}$$

The items that were rated as relevant were 72 out of 72.this yielded a CVI of 0.937. According to Amin (2005), a coefficient is acceptable if it is within the statistical range 0.5 to 1 and thus for this study it is acceptable. In addition, the researcher took full control of the data collection and documentation process, including documentation of sources. After collection of data and compilation of draft study report, the key informants were given the opportunity to read copies of the report and verify whether the contents reflected the empirical material given by them, without any misinterpretations and generalizations.

3.8.3 Reliability

The reliability is the consistency of the measurement, or the degree to which an instrument measure the same way each time it is used under similar conditions with the same subject (Trochim, 2002). Reliability is about consistency and repeatability. According to Trochim, (2002), there are two way of reliability estimations i.e. by test/retest methods where the instrument is administered to a group of respondents and then administer the same test to the same respondents at a later date and internal consistency which measures consistency within the instrument and questions how well a set of items measures a particular behaviour or characteristic within the test. For a test to be internally consistent, estimates of reliability are based on the average inter-correlations among all the single items within a test(Ellen, 2011).But Rosenthal & Rosnow, 1991 as cited by Ellen, 2011 argues that the test-retest reliability technique has several limitations. Basing on the argument above, in this study the research used internal consistency using coefficient alpha that was popularized by Cronbach (1951)and now referred to as Cronbach alpha method. Cronbach's alpha is useful for estimating reliability for item-specific variance in an uni-dimentional test (Cortina, 1993). That is, it is useful once the existence of a single factor or construct has been determined (Cortina, 1993). The *Coefficients* of internal consistency however increase as the number of items goes up, to a certain point. For instance, a 5-item test might correlate .40 with true scores, and a 12-item test might correlate .80 with true scores. In this study therefore the reliability of the data was measured using the cronbach's alpha coefficient gave an acceptable estimate of at least 0.933. This was also to ensured through testing and retesting of both the questionnaires and interview guide. The supervisors also reviewed the questionnaires and the interview guide to ensure that they are capturing the right and required data.

Data collected from pilot test at the ICT component of ERT project was analysed using Statistical Package for Social Scientist (SPSS) software. The value of the cronbach's Alpha was calculated when the item deleted and used to compute the correlation value among the questions using the analysis scale Alpha which yielded the cronbach's coefficient Alpha,(α). The obtained results are show in table 2 below.

Table 2: Reliability Test Result for the Questionnaire

Item	Cronbach's Alpha coefficient , α	No. of Items
Quality planning	0.919	21
Quality assurance	0.835	18
Quality Control	0.911	16
Funding guidelines	0.798	5
Time/schedule	0.629	3
Project cost	0.609	3
Quality/specifications	0.755	3
Overall reliability of the Instrument	**0.933**	**69**

From the above table the questionnaire overall reliability alpha of 0.933, which is 93.3% indicating a very high internal consistence of the instrument. Quality planning had 21 items with an alpha of 0.919 implying 91.9% of the items where reliable. Quality assurance had 18 items with an alpha of 0.835 implying 83.5% of the items where reliable. Quality control had 16 items with an alpha of 0.911 implying 91.1% of the items where reliable. Finding guidelines (moderating variable) had five items with an alpha of 0.798 implying 79.8 % of the items where reliable. Project time/schedule had three items with an alpha of 0.629 implying 62.9% of the items where reliable. Project cost had three items with an alpha of 0.609 implying 60.9% of the items where reliable Project quality/performance had three items with an alpha of 0.755 implying 75.5% of the items where reliable The reliability coefficient alpha range from 0 to 1, with zero representing an instrument full of error 1 representing total absence of error. The value 0.7 and above was considered reliable for the research instrument (Sekaran, 2003).

3.9 Procedure for Data Collection

The data collection process started with the planning phase. The researcher forecasted on the duration taken to collect data from the different categories of respondents and develop a plan. When a plan was put in place, the reliability and the validity of the data collection tools ascertained and cleared to proceed for data collection, the researcher obtained an introductory letter from Uganda Management Institute that facilitated obtaining of information from respondents. That data was collected using tools developed and tested. These tools included questionnaires, interview guides and documentation checklist. Each questionnaire was accompanied by a letter to the respondent with instructions on how to fill the questionnaire. Each selected respondent was given ample time period of three days in which to fill the questionnaire after which they were collected for data analysis. Interviews were conducted after making appointments and scheduling the interviews. Review of documentation was done following the document review guide.

3.10 Measurement of Variables

Variables are the elements that the researcher measures, controls and manipulates. In this study the researcher used ordinal scale to measure variables. The researcher measured the variable at ordinal scale and at numerical scale. Ordinal scale was used to represent relative position or order among the values of the variables.

The numerical scale was also used to help minimize subjectivity and makes it possible to use quantitative analysis; here the rating scale used was a five-Likert like scale. According to Mugenda and Mugenda, (1999 pp 75-76) these types of scale are used to measure perception, attitude, values and behaviours.

In this study the variables were dependent, independent and moderating variables. In qualitative data collection, the likert like scale was used to measure the variables under study.

The likert like scale statement with five category continuum was used to rate the respondents' view or study variables on close ended question (Anderson, 1995). The likert like scale rang from Strongly Agree (5), Agree (4), Not Certain (3), Disagree (2) and Strongly Disagree (1) the respondent was to select the response that best described his or her opinion to each statement. Descriptive statistics were generated from the demographic characteristics of respondents and for all the four objectives. Data was further analysed using interval scale to calculate the level of significance among the variables and to measure the strength of relationship among the constructs using correlation and regression analysis. The result from quantitative date were compared with the qualitative in order to draw conclusion.

3.11 Data Management and Analysis

Data analysis is the process of bringing order, structure and meaning to the mass of information gathered (Mugenda and Mugenda, 1999) After collecting the data collection forms the field, the researcher cross checked the filled questionnaires and interview notes for completeness and accuracy. Data analysis is a process of inspecting, cleaning, transforming and modelling data with a goal of highlighting useful information suggesting conclusions and supporting decision. Analysis is ordering of data into constituent parts in order to obtain an answer to the research questions. Data was analysed in order to establish the relationship between the dependent and independent variables. The researcher analysed the data using qualitative and quantitative methods.

3.11.1 Qualitative data analysis

Data from the field were typed, cleaned and themes developed as per the guides of in-depth interviews. The researcher scrutinized the different categories of data to fit them under a particular theme. Berg (2004) points out that qualitative data analysis helps to describe opinions of respondents regarding variables under study. Further analysis followed to ascertain similarities in response from different respondents during the interviews to generate deeper understandings about issues and compare them with the literature reviewed.

3.11.2 Quantitative data analysis

This analysis was done on responses from questionnaires. The Responses were assigned codes to convert non-numeric data to numeric data. The data was checked for completeness and accuracy. The data was entered and analysed using SPSS version 19.0. Descriptive statistics in form of frequencies, standard deviation and means were generated while inferential statistics in form of Pearson product moment correlation and regression techniques were used to determine the relationship between quality management and performance existence and percentage.

The qualitative data was gathered through interviews to measure variable during in depth interpretation of quantitative data and confirmed the findings that should be measured using the ordinal and numerical scales. Themes were developed and analysed objective by objective.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION OF FINDINGS

4.1 Introduction

In this chapter, the results are presented, analyzed and the interpreted. The purpose of the study was to assess the influence of quality management on the performance of the Energy Infrastructure component in the Energy for Rural Transformation (ERT) project in Uganda. The objectives of the study were to find out the influence of quality planning on performance of the Energy Infrastructure component in the ERT project in Uganda, to examine the influence of quality assurance on performance of the Energy Infrastructure component in the ERT project in Uganda, to establish the relationship between quality control and performance of the Energy Infrastructure component in the ERT project in Uganda, and to assess the moderating effects of funding policy on the Energy Infrastructure component in the ERT project in Uganda.

The chapter highlights the response rate, demographic characteristics of the respondents and empirical findings of the study. Quantitative analysis was done using statistical package for social scientist (SPSS) version 19 which generated descriptive statistics for the various independent, and dependent variables from the completed returned questionnaires. In order to establish the relationship between the independent and dependent variables, and also the moderating effect of the moderating variable, correlations were done while the degree, strength and direction of the relationship were established using regression analysis. Quantitative data were collected using structured closed ended questions in a questionnaire attached as appendix 1. Qualitative data was collected using an interview guide and documentary review checklist attached as appendix 2 and 3 respectively.

4.2 Response rate

Response rate is the ratio of the returned answered questionnaires to the sampled respondents. It provides the perspective to data and framework in which the conclusions are made. In this study, a total 91 questionnaires were distributed to the project coordination team in various implementation ministries, organizations and agencies; project implementation staff; contractors and subcontractors of Energy infrastructure of ERT project. Out of the 91 questionnaires, 86 were completed and returned implying a generic response rate 94.04%. Also 12 respondents were sampled for interviewed as key informants and all of them were interviewed giving a response rate of 100%. in total, 98 out of 103 sampled population responded giving a combined response rate of 95.15%This response rate is very good (Lin, 1976) and it agreement with Bailey, 1999 who said a response rate of 70 and above is acceptable in social science research. Table 3 below illustrates the response rates at each category and percentages

Table 3: Response rates

Category	Sample size	Responses	Response Rate
Accounting Officers (PSs and CEOs)	6	6	100%
Project Monitoring team	6	6	100%
Project Coordination Team	6	6	100%
Project Implementation staff	27	25	92.59%
Other Key Stakeholders	58	55	94.83%
Total	**103**	**98**	**95.15%**

Source: From researcher's field data

4.3 Results on the background information on respondents

In this section, the background characteristics of the respondents are presented. A self-administered questionnaire was administered to respondents. Section A of the research instrument sought data on the demographic characteristics of the respondents. This included gender distribution, age and level of educational qualification. The researcher established the demographic characteristics of the respondents because of its importance in establishing the category of people who participated in the survey. The purpose of including demographic data in the survey was to understand the characteristics of the respondents in order to make better conclusions and relate the characteristics to quality management. The demographic characteristics of the respondents are presented and discussed below:

4.3.1 Gender of respondents

The respondents were required to state their gender. The survey comprised of 86 respondents and of these 30 was females representing 34.9% and 56 were males representing 65.1%.as illustrated in table 4.

Table 4: Gender of respondent

Gender of respondents	Frequency	Percent	Cumulative Percent
Female	30	34.9%	34.9%
Male	56	65.1%	100.0%
Total	86	100.0%	

Source: From researcher's field data

The emergent results are suggestive of gender gap in the employment of females and male in the projects. This could be because of the nature of the project being engineering in nature, most of the work is labour intensive which most females do not prefer but also may suggest that there are few ladies in the engineering profession.

4.3.2 Age of respondents

This was sought for to help the researcher to assess the level of involvement, participation and authenticity of information from the project. The age groups captured included below 18years; between 18 and 35years; between 35 and50 years; between 50 and 60 years; and above 45 years. The age distribution of the respondents is represented in table 5 below.

Table 5: Age of respondent

Age bracket of respondents (Years)	Frequency	Percent	Cumulative Percent
Below 18	2	2.3%	2.3%
18 - 35	35	40.7%	43.0%
35 - 50	30	34.9%	77.9%
Between 50 - 60	17	19.8%	97.7%
Above 60	2	2.3%	100.0%
Total	86	100.0%	

Source: From researcher's field data

The age bracket of below 18 years was included to check whether the project was employing juveniles in contravention to the labour laws. From table 5 above, it was found out that there were two respondents representing 2.3% who were below 18 years of age which is in contravention to the labour laws. However the 2.3% is very small percentage and these could possibly be students on internship assigned to the project. The researcher also included the age bracket of above 60 years to check whether the project was also employing persons who should have retired and probably have reduced productivity.

The findings was that two respondents were above 60 year representing 2.3% of the total respondents, these however could have been persons on contract providing leadership to the project and not directly involved in hard labour assignments of the project. The finding however indicated that the project had 95.4% cumulatively of people who are highly productive that is in the age range of 18-60 years. The productivity is important because it has a direct bearing on the performance and thus in line with the purpose of this study which was to assess the influence of quality management on the performance of the Energy Infrastructure component in the Energy for Rural Transformation (ERT) project in Uganda.

4.3.3 Education Level of respondents

The respondents were required to state their level of education this was done in order for the researcher to establish their literacy level in understanding and interpreting the structured closed ended questions in questionnaire and make a correct selection of response to the question to represent their opinion on the question. The findings are represented in table 6 below.

Table 6: Education Level of respondent

Education Level of respondents	Frequency	Percent	Cumulative Percent
Certificate	11	12.8%	12.8%
Diploma	37	43.0%	55.8%
Bachelor’s degree	27	31.4%	87.2%
Advanced degree (Master's & PhD)	11	12.8%	100.0%
Total	86	100.0%	

Source: From researcher’s field data

From table 6 above, the majority of the respondents had acquired academic qualification i.e. diplomas (43%) and bachelor’s degrees (31.4%), while 12.8% had advance degrees. Cumulatively 87.2% of the respondents had acquired diplomas, degrees and advance degrees suggesting that they had good understanding and interpretations of the question and therefore suggesting that the results of the survey is more reliable. Only 12.8% certificates and there was none without certificate.

4.4 Empirical Findings

This study sought to assess the influence of quality management on the performance of the Energy Infrastructure component in the Energy for Rural Transformation (ERT) project in Uganda.In order to establish this, results were obtained from both questionnaires (quantitative data) and interviews (qualitative data) so as to present empirical evidence. Four hypotheses guided the study and stated as follows;

i. There is a significant relationship between quality planning and performance of the Energy Infrastructure component in the ERT project in Uganda,
ii. There is a significant relationship between quality assurance and performance of the Energy Infrastructure component in the ERT project in Uganda,
iii. There is a significant relationship between quality control and performance of the Energy Infrastructure component in the ERT project in Uganda, and
iv. There is significant relationship between quality management and performance of the Energy Infrastructure component in the ERT project in Uganda.

The results from quantitative data are presented in the form of descriptive statistic and inferential statistics. Descriptive results are presented first followed by inferential statistics that ascertain those results. Correlation and regression analysis were used to establish the nature and magnitude of the relationship and findings presented thereafter. With the help of SPSS computer program, questions on each variable were first computed and then combined together so as to aid the researcher obtain each variable independently and later used to correlate and regress against each other. Findings from the interviews and documentary and reviews are discussed.

4.4.1 Quality Planning and Performance

The first objective of the study was to find out the influence of quality planning on performance of the Energy Infrastructure component in the ERT project in Uganda. The hypothesis that the researcher set to guide him in establishing this was that there is a significant relationship between quality planning and performance of the Energy Infrastructure component in the ERT project in Uganda. The findings from questionnaires, interviews and documentary reviews are presented and interpreted. The results are presented in descriptive statistics and inferential statistics.

In this study, the variable dimension quality planning was measured using a total of 21 items divided under four different sub-dimensions namely quality management plan, quality matrix, quality checklist and project management plan which solicited for the respondent opinion using a five point likert like scale. The four sub-dimensions were generated after assessing the measures of quality planning by analysing the inputs required, tools and techniques to be used in order to get the outputs according to PMBOK guide (see figure 2).

4.4.1.1 Quality Management Plan

The quality management plan should describe how the project management team will implement its quality policy in a project or an organization. In ISO 9000 terminology, it should describe the project quality system: "the organizational structure, responsibilities, procedures, processes, and resources needed to implement quality management" The quality management plan provides input to the overall project plan and must address quality control, quality assurance, and quality improvement for the project. As such a project quality plan is key in the project success as it provide a roadmap of quality in a project. Quality plan normally is derived from the quality policy of an organization or the project. In order for the researcher to investigate the existence of a quality plan in the rural energy infrastructure component of ERT project and he sought opinion of the respondents on four structured questions.

The respondents were required to give their opinion using a five-point likert scale with the following as possible responses: 1-Strongly Disagree, 2-Disagree, 3-Not Certain, 4-Agree, and 5-Strongly Agree. The presentation of the findings, discussions and interpretation of the results was done using descriptive statistics of frequencies, mean and standards deviation. The key outputs measured were; the existence of quality policy and quality management plan, awareness about the quality plan, and evaluation of the quality paln in rural energy infrastructure component of ERT and table 7 below presents the summary of the opinion of the respondents.

Table 7: Descriptive Statistics of Quality Management Plan

Question	SD (1)	D (2)	N (3)	A (4)	SA (5)	N	Mean	Std. Dev.
There is a quality policy for energy infrastructure component of ERT project	7 (8.1%)	48 (55.8%)	24 (27.9%)	7 (8.1%)	0 (0%)	86	2.36	0.750
The quality management plan clearly describes ways of implementing quality in Energy Infrastructure component of ERT project	11 (12.8%)	60 (69.8%)	14 (16.3%)	1 (1.2%)	0 (0%)	86	2.06	0.581
The quality plan in Energy Infrastructure component of ERT project is known to everyone in the project	19 (22.1%)	57 (66.3%)	7 (8.1%)	3 (3.5%)	0 (0%)	86	1.93	0.665
The quality plan is always evaluated for efficient and effectiveness in Energy Infrastructure project component	40 (46.5%)	41 (47.7%)	5 (5.8%)	0 (0%)	0 (0%)	86	1.59	0.602

Source: From researcher's field data

Emerging from the field results a majority of the respondents disagreed that there exist a quality policy in the rural energy infrastructure component of ERT project as evident by 48(55.8 %) disagreeing, 24(27.7%) not being certain and 7(8.1%) strongly disagreeing, 10(11.6 %). However 7 (8.1 %) agreed the there was a quality policy and no respondent strongly agreed. this was in agreement with the evident the Commissioner Energy Efficiency when he said that "*the policy was enshrined in the client charter (performance agreement)".* it was also in agreement with documents reviewed where all the project documents scanned through showed no mentioning of quality of the deliverable targets were given in terms of coverage/number not quality.

On whether the quality management plan clearly describes ways of implementing quality the Energy infrastructure component of ERT, a majority of the respondent did not think that the quality management plan was clearly describing ways of implementing quality in the rural energy infrastructure component of ERT project as evident by a cumulative percentage of 98.8 % of the respondents who were not certain and those who either disagreed or strongly disagreed. 60(69.8 %) disagree, 14(16.3 %) not certain, 11(12.8) strongly disagree and only 1(1.2) agreed that. This finding was also confirmed by Monitoring and Evaluation officer when he said that he had never seen the project quality management plan. This was confirmed by the project procumbent also who had this to say *"we actually don't have a quality management plan"*. Documentary reviewed showed that there was a project implementation guideline that was being used instead of a developed but does described ways of implementing quality in the rural energy infrastructure component of ERT project.

The respondents' opinions on whether the quality plan in the energy infrastructure was known to the project stakeholders. Majority of the respondents disagreed that the quality plan was known to the stakeholders of 86 respondents 57(66.3%) disagree and 19(22.1 %) strongly disagree and 7(8.1 %) not certain. Cumulatively, 96.5 % did not believed that the quality plan was known to the project stakeholders only 3(3.5 %) respondents agreed that the quality plan was known to the project stakeholders. This was also in agreement with the findings from face to face interview where Monitoring and Evaluation officer comments wad

" *how do the project stakeholders know quality plan when there is no quality plan"* meaning that there was no way the quality plan could be known to the project stakeholders because it is not in existence. The finding from documentary review also revealed that was that there no quality plan exist.

Evaluation of quality plan for effectiveness is very important. The respondents also required to give their opinion on whether the quality plan was always evaluated for efficiency and effectiveness in the energy infrastructure using a five-point likert scale.

From the table 7 above, no respondent believed that the quality plan was evaluated for its effectiveness and efficiency as reflected in the responses where there was no respondent who either strongly agreed or disagreed. 41(47.7%) of the respondents disagree, 19(22.1 %) strongly disagree and 5(5.8 %) not certain. Cumulatively, 100 % respondents did not believe that the quality plan was always evaluated for effectiveness and efficiency in rural energy infrastructure component of ERT project in Uganda. This was also in agreement with the findings from face to face interview where 91.67% actually mentioned that there was no quality plan and therefore there was no way of evaluating it for efficiency and effectiveness. The Monitoring and Evaluation officer when interviewed said that *"we conduct routine financial monitoring and evaluation mainly"*. Documentary review also yielded no result on previous records of evaluating the quality plan.

The analysis from table 7 indicate that all the means were below average since none was above two and half with a mean score range from 1.59 – 2.36, this is an indication the project was not performing well on each items of the quality management plan. The standard deviations were all below one and the percentages of the respondents who strongly disagree and disagree on each item were relatively high. This suggests a critical area of concern. Among those items, the most critical issues are the regular evaluations of the quality plan for efficient and effectiveness and the development and publicity (dissemination) quality plan to all the stakeholders in Rural Energy Infrastructure component of ERT project

4.4.1.2 Quality Matrix/ Operational definitions

Quality matrix /operational definition describes, in very specific terms, what something is, and how it is measured by the quality control process. For example, it is not enough to say that meeting the planned schedule dates is a measure of management quality; the project management team must also indicate whether every activity must start on time, or only finish on time; whether individual activities will be measured or only certain deliverables, and if so, which ones. A quality matrix is one of the outputs of quality planning. . In order for the researcher to investigate the existence of a quality matrix in the rural energy infrastructure component of ERT project and he sought opinion of the respondents on five structured questions.

The respondents were required to give their opinion using a five-point likert scale with the following as possible responses: 1-Strongly Disagree, 2-Disagree, 3-Not Certain, 4-Agree, and 5-Strongly Agree. The presentation of the findings, discussions and interpretation of the results was done using descriptive statistics of frequencies, mean and standards deviation. The key outputs measured were; the existence of quality matrix, quality matrix having key performance indicators, quality matrix having identifiable processes to deliver KPIs, quality matrix names of grouped and ungrouped related process, and process are known to project stakeholders in rural energy infrastructure component of ERT. Table 8 below presents the summary of the opinion of the respondents.

Table 8: Descriptive Statistics for Quality Matrix

Questions	SD (1)	D (2)	N (3)	A (4)	SA (5)	N	Mean	Std. Dev.
There is quality matrix in the Energy Infrastructure component of ERT project	7 (8.1%)	47 (54.7%)	28 (32.6%)	4 (4.7%)	0 (0%)	86	2.34	0.696
The quality matrix in Energy Infrastructure component of ERT project identifies the critical success factors/performance drivers to achieve project objectives	15 (17.4%)	58 (67.4%)	13 (15.1%)	0 (0%)	0 (0%)	86	1.98	0.573
The quality matrix in Energy Infrastructure component of ERT project has key performance indicators (KPI) of project.	25 (29.1%)	53 (61.6%)	8 (9.3%)	0 (0%)	0 (0%)	86	1.80	0.591
The quality matrix in Energy Infrastructure component of ERT project has identifiable processes that deliver Key Performance Indicators of project.	37 (43%)	45 (52.3%)	4 (4.7%)	0 (0%)	0 (0%)	86	1.62	0.577
The quality matrix in Energy Infrastructure component of ERT project has clear names of groups or ungrouped related process	51 (59.3%)	26 (30.2%)	9 (10.5%)	0 (0%)	0 (0%)	86	1.51	0.682
The names of grouped or ungrouped related processes in the quality matrix in Energy Infrastructure component of ERT project are known to all stakeholders in the project	55 (64%)	26 (30.2%)	5 (5.8%)	0 (0%)	0 (0%)	86	1.42	0.603

Source: From researcher's field data

From the table 8 above, majority of the respondents disagree 47 (54.7 %) with the existences of a quality matrix in this project, 38 (32.6) were not certain where there was a quality matrix and 7 strongly disagree. There was no respondent who strongly agree or agree that the quality matrix was there. This was also in agreement with the findings from face to face interview as was implied in the statement by Monitoring and Evaluation of was asked that *"What is a quality matrix?"* and adding that *"we have our checklist for M&E"*.

However, from the review of the monitoring checklist and the monitoring report 2014, there was M&E checklist available though it made no direct mention of quality parameters but instead emphasis was on the coverage and quality was reported as functional only and could not be assumed to a quality matrix.

on whether the quality matrix in Energy Infrastructure component of ERT project identifies the critical success factors/performance drivers to achieve project objectives. Majority of the respondents disagree 58 (67.4 %) with the quality matrix having identifying critical success factor to achieve the project quality objectives.15 (17.4%) strongly disagreed whereas 13(15.1) were not certain whether the quality matrix was identifying critical success factors of the project quality objectives. There was no respondent who strongly agree or agree believed that the quality matrix did address the project quality objectives. This was also in agreement with the findings from face to face interview where 75% mentioned that there was no quality matrix in does not identify the critical success factors to achieve the quality objective. From the review of the implementation manual, the key performance indicators are listed in the form of targets and coverage not quality.

On whether the quality matrix in Energy Infrastructure component of ERT had key performance indicators , majority of the respondents disagree 53 (61.6 %) with the statement that the quality matrix has key performance indicators (KPIs) of the project on project quality management. 25 (29.1%) strongly disagreed whereas 8(9.3 %) were not certain whether the quality matrix had KPIs of project quality objectives. There was no respondent who strongly agree or agree that the quality matrix had KPIs for the project quality management. This was also in agreement with the findings from face to face interview where 66.7% mentioned that there were not aware of quality matrix having KPIs on Project quality management. Reviewed documents also failed to identify KPIs for project quality management.

The researcher also sought the opinion of respondent on whether the quality matrix in energy infrastructure component of ERT was having identifiable process that delivers the project KPIs. The respondents were required to give their opinion on whether the quality matrix in Energy Infrastructure component of ERT had key performance indicators. From the table 8 above, majority of the respondents disagree 53 (61.6 %) with the statement that the quality matrix has key performance indicators (KPIs) of the project on project quality management. 25 (29.1%) strongly disagreed whereas 8(9.3 %) were not certain whether the quality matrix had KPIs of project quality objectives. There was no respondent who strongly agree or agree believed that the quality matrix had KPIs for the project quality management. This was also in agreement with the findings from face to face interview where 66.7% mentioned that there was no aware of quality matrix having KPIs on Project quality management. Reviewed documents also fail to identify KPIs for project quality management.

On whether the quality matrix in energy infrastructure component of ERT was having clear names of grouped and ungrouped related process, majority of the respondents strongly disagree 51 (59.3 %) with the quality matrix having clear names of grouped or ungrouped related process.26 (30.2%) s disagreed whereas 9(10.5) were not certain. There was no respondent who strongly agree or agree that the names of grouped or ungrouped related process in the quality matrix was clear in rural energy infrastructure component of ERT. This was also in agreement with the findings from face to face interview where 83.3% were not aware of the naming of the group or ungrouped process in quality matrix of rural energy infrastructure. Documentary review of the Implementation Support and Preparation Mission of November 24 – December 15, 2012 Aide Memoire for additional financing for ERT II

(Project ID: P133005) indicated that the naming was not clear and in some cases these were left to the service providers.

On whether the names of grouped or ungrouped related processes in the quality matrix in energy infrastructure component of ERT was known to the all the project stakeholder,55 (64 %) of the respondents strongly disagree with the statement that the names of group or ungroup related processes in the quality matrix was known to all the stakeholders, while 26 (30.2%) disagreed whereas 5(5.8%) were not certain. This also was in agreement with the face to face interviews where 83.3% did not believed the names of group and ungroup process in the quality matrix was known to all project stakeholders.

The analysis from table 8 indicate all the means were below average since none was above three with a mean score range from 1.42 – 2.34, this is an indication that the project was not performing well on each items of the quality matrix . The standard deviations were all below one and the percentage of the respondents who strongly disagree and disagree on each item was relatively high. This suggests a critical area of concern to the management of the project since the variation is small. It all showed that the instrument was highly reliable since the opinions of the respondents were all inclined in unified direction. Among those items, the most critical issues are; The names of grouped or ungrouped related processes in the quality matrix in Energy Infrastructure component of ERT project has got to be made known to all stakeholders in the project, the quality matrix should have clear names of groups or ungrouped related process and should have identifiable processes that deliver Key Performance Indicators of project amongst others.

4.4.1.3 Quality Checklist

A checklist is a structured tool used to verify that a set of required steps has been performed. They are usually phrased as imperatives ("Do this!") or interrogatories ("Have you done this?"). Project quality management requires a standardized checklist(s) to ensure consistency in frequently performed activities. In order for the researcher to investigate the existence of a quality checklist in the rural energy infrastructure component of ERT project and he sought opinion of the respondents on five structured questions.

The respondents were required to give their opinion using a five-point likert like scale with the following as possible responses: 1-Strongly Disagree, 2-Disagree, 3-Not Certain, 4-Agree, and 5-Strongly Agree. The presentation of the findings, discussions and interpretation of the results was done using descriptive statistics of frequencies, mean and standards deviation. The key outputs measured were; the existence of checklist of quality parameters, quality checklist show what during quality check, records show what was done during quality checks, and checklist being known to project stakeholders in rural energy infrastructure component of ERT. Table 9 below presents the summary of the opinion of the respondents

Table 9: Descriptive statistics for quality checklist

Question	SD (1)	D (2)	N (3)	A (4)	SA (5)	N	Mean	Std. Dev.
There are checklists of quality parameters to be checked in the project component	1 (1.2%)	3 (3.5%)	21 (24.4%)	59 (68.6%)	2 (2.3%)	86	3.67	0.641
The checklist shows what to do when conducting quality checks in project component	0 (0%)	5 (5.8%)	5 (5.8%)	53 (61.6%)	23 (26.7%)	86	4.09	0.746
The records shows what has been done during quality checks	2 (2.3%)	10 (11.6%)	10 (11.6%)	56 (65.1%)	8 (9.3%)	86	3.67	0.887
the checklist is followed when performing quality project component	1 (1.2%)	7 (8.1%)	17 (19.8%)	56 (65.1%)	5 (5.8%)	86	3.66	0.761
The checklist is known to everybody involved in the project component	1 (1.2%)	6 (7.0%)	31 (36%)	44 (51.2%	4 (4.7%)	86	3.51	0.747

Source: From researcher's field data

From the table 19 above, 1 (1.2 %) of the respondents strongly disagree with the statement that there were checklist of quality parameters to be checked in rural energy infrastructure of ERT project in Uganda, while 21 (24.4 %) disagreed and a majority i.e.59 (68.8%) were not certain that there were checklists of quality parameters to be checked in rural energy infrastructure of ERT project in Uganda. This also was in agreement with the face to face interviews where 83.3% did not believed that there were checklist of quality parameters to be checked in rural energy infrastructure of ERT project in Uganda as reflect in the words of Monitoring and Evaluation officer who said that "*our M&E checklist does not emphasize on quality parameters*". From the documentary review of M&E checklist, it was found out that there was no list of quality parameter checked in rural energy infrastructure of ERT project in Uganda.

On whether the checklist shows what to do when conducting quality checks in the energy infrastructure component of ERT, 5(5.8 %) of the respondents disagree with the statement that the checklist shows what to do when conducting quality checks in the energy infrastructure component of ERT, 5(5.8 %) were not certain. while a majority i.e. 53 (61.6%) and 23(26.7 %) agreed and strongly agreed respectively were not certain that the checklist shows what to do when conducting quality checks in the energy infrastructure component of ERT. The results of questionnaire survey disagrees with the results of face to face interviews findings where M&E officer said that "*the checklist does not shows what to do when conducting quality checks in the energy infrastructure component of ERT*" and also reviewing M& E motoring checklist show that the checklist was not clear on what to do when conducting quality checks in the energy infrastructure component of ERT.

On whether the records show what has been done during quality checks in Energy Infrastructure component of ERT project, 2(2.3 %) of the respondents strongly disagree, 10(11.6) disagree with the statement that the records shows what has been done during quality checks in Energy Infrastructure component of ERT project and 10(11.6 %) were not certain. while a majority i.e. 56 (65.1%) and 8(9.3 %) agreed and strongly agreed respectively with the statement. These results disagrees with the findings face to face interviews where the project component coordinator at REA said that "the records do not shows what has been done during quality checks in Energy Infrastructure component of ERT project" this was also corroborated by the statement from project coordinator from MoWE that " *the checklist do not show anything on quality check.*" Also reviewing M& E motoring checklist showed no records of quality record except when the equipment is not functioning.

On whether the checklist is followed when performing quality checks in Energy Infrastructure component of ERT project, 1(1.2 %) of the respondent strongly disagreed, 7(8.1 %) disagreed with the statement that the checklist was followed when performing quality checks in Energy Infrastructure component of ERT project. and 17(19.8 %) were not certain. while a majority i.e. 56 (65.1%) and 5(5.8 %) agreed and strongly agreed respectively with the statement. The results of questionnaire survey disagrees with the findings from face to face interviews as reflected from the words of the Commissioner Energy efficiency that *"I am not sure if the checklist was being followed when performing quality checks in Energy Infrastructure component of ERT project"*. It was also not possible to obtain evident from documents during documentary review.

On whether the checklist was known to everybody involved in ERT Energy Infrastructure component of ERT project, 1(1.2 %) of the respondent strongly disagreed, 6(8.1 %) disagreed with the statement that the checklist was known to everybody involved in ERT Energy

Infrastructure component of ERT project. and 31(36 %) were not certain. while a majority i.e. 44 (51.2%) agreed and 4(4.7%) strongly agreed with the statement. The results of questionnaire survey disagrees with the findings from face to face interviews as was muted by Commissioner Energy Efficiency when he said "*I am not sure whether the checklist was known to everybody involved in ERT Energy Infrastructure component of ERT project*" and confirmed by M&E Officer who said that *"our checklist for our M&E purpose for internal use".*

The analysis from table 9 indicates all the means were above average with the mean score range from 3.66 – 4.09, generally the project was performing well on each of the items meaning that there was very high rate of the respondents who strongly agreed and agreed on each of the item on the quality checklist. The standard deviations were all below one but slightly above 0.5 (range 0.641 – 0.887) which also creates concern and may suggest that either the checklist is not used or its focus may not be on quality as it was seen from the results face to face interviews where the results actually disagreed with the results of the questionnaire survey.

4.4.1.4 Project Management Plan

The quality planning process may identify a need for further activity in another area including the project management planning. It is only when the quality management plan has been incorporated into the project management plan that the quality issues of the project can be address during the project life cycle.

In order for the researcher to investigate the existence of a Project management plan in the rural energy infrastructure component of ERT project and he sought opinion of the respondents on six structured questions.

The respondents were required to give their opinion using a five-point likert like scale with the following as possible responses: 1-Strongly Disagree, 2-Disagree, 3-Not Certain, 4-Agree, and 5-Strongly Agree. The presentation of the findings, discussions and interpretation of the results was done using descriptive statistics of frequencies, mean and standards deviation. The key outputs measured were; the existence of project management plan, project management plan taking into consideration quality issues, publicity of the project management plan (awareness), project management plan was strictly followed, and quality management plan makes it easy to follow project management plan in rural energy infrastructure component of ERT. Table 10 below presents the summary of the opinion of the respondents

Table 10: Descriptive Statistics for Project Management Plan

Question	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**	N	Mean	Std. Dev.
There is project management plan for Energy Infrastructure component of ERT project	7 (8.1%)	27 (31.4%)	52 (60.5%)	0 (0%)	0 (0%)	86	4.52	0.646
The Project management plan takes into consideration the quality issues in Energy Infrastructure component of ERT project	14 (16.3%)	31 (36%)	38 (44.2%)	3 (3.5%)	0 (0%)	86	2.35	0.794
The project management plan is known to everybody involved in Energy Infrastructure component of ERT project	22 (25.6%)	44 (51.2%)	20 (23.3%)	0 (0%)	0 (0%)	86	1.98	0.703
The project management plan is followed in Energy Infrastructure project component	35 (40.7%)	44 (51.2%)	7 (8.1%)	0 (0%)	0 (0%)	86	1.67	0.622
The quality management plan makes it easy to follow the project management plan in Energy Infrastructure component of ERT project	19 (22.1%)	49 (57%)	18 (20.9%)	0 (0%)	0 (0%)	86	1.99	0.660
The quality plan makes it easy to check the progress the project management plan in Energy Infrastructure component of ERT project	30 (34.9%)	36 (41.9%)	20 (23.3%)	0 (0%)	0 (0%)	86	1.88	0.758

Source: From researcher's field data

From table 10 above, the majority of the respondents strongly agreed 52 (60.5 %) and 27 (31.4 %) agreed that there was project management plan for Energy Infrastructure component of ERT project while 7(8.1 %) were not certain. This was also in agreement with the face to face interviews where all the respondents acknowledge that there exist the project management plan and also reviewing of the ERT II Project Operational Manual there were some element of project management plan. It was also confirm the ERT project coordinator in MEMD who said that *"project management plan is contained is contained implementation and operational manual"*

On whether the Project management plan takes into consideration the quality issues in Energy Infrastructure component of ERT project, 14(16.3 %) of the respondent strongly disagreed, 31(36 %) disagreed with the statement that the Project management plan takes into consideration the quality issues in Energy Infrastructure component of ERT project and 38(44.2 %) were not certain. while only 3(3.5 %) respondents agreed and none strongly agreed with the statement. The results of questionnaire survey agrees with the findings from face to face interviews as was implied by the words from commissioner energy efficiency that " *the Project management plan takes into consideration the quality issues in Energy Infrastructure component of ERT project"* this was also corroborated by a statement from the project procurement officer in MEMD who mentioned that *"quality issues specification are emphasize in implementation manual"* and also there was no evidence in the documentary review which revealed the consideration of quality issues.

On whether the project management plan is known to everybody involved in Energy Infrastructure component of ERT project, majority did not believe that the project management plan is known to everybody involved in Energy Infrastructure component of ERT project as represented by 22(25.6 %) of the respondent who strongly disagreed, 44(51.2 %) disagreed,20(23.3 %) not certain and no respondent agreed or strongly agreed with the statement. This was also in agreement with the finding from face to face interviews. The commissioner energy efficiency said that "*the project management plan was known to everybody involved in Energy Infrastructure component of ERT project"*.

On whether the project management plan is followed in Energy Infrastructure project component, majorly did not believe that the project management plan is followed in Energy Infrastructure project component as represented by30 (40.7 %) of the respondent who strongly disagreed, 44(51.2%) disagreed, 7(8.1%) not certain and no respondent agreed or strongly agreed with the statement. This was also in agreement with the results of face to face interviews where 58.3 % respondents did not believed that the project management plan was followed in Energy Infrastructure project component.

On whether the quality management plan makes it easy to follow the project management plan in Energy Infrastructure component of ERT project, majorly did not believe that The quality management plan makes it easy to follow the project management plan in Energy Infrastructure component of ERT project as represented by 49 (57%) of the respondent who disagreed, 19(22.1%) strongly disagreed, 18(20.9%) not certain and no respondent agreed or strongly agreed with the statement. This was also in agreement with the results of face to face interviews where 83.3 % respondents did not believed that the quality management plan makes it easy to follow the project management plan in Energy Infrastructure component of ERT project.

On whether the quality plan makes it easy to check the progress the project management plan in Energy Infrastructure component of ERT project, majorly did not believe that The quality plan makes it easy to check the progress the project management plan in Energy Infrastructure component of ERT project as represented by 36 (41.9%) of the respondent who disagreed, 30(34.9%) strongly disagreed, 20(23.3%) not certain and no respondent agreed or strongly agreed with the statement. This was also in agreement with the results of face to face interviews where 75 % respondents did not believed that the quality management plan makes it easy to follow the project management plan in Energy Infrastructure component of ERT project.

The analysis from table 10 indicates that all the means were below average except one on the existence of project management plan for Energy Infrastructure component of ERT project which was 4.52 which means most of the respondents strongly agreed. The mean score range from 1.67 – 4.52.This suggests that the project was not performing well on each items of the project management plan. The standard deviations were all below one and the percentage of the respondents who strongly disagree and disagree on each item was relatively high. This suggests a critical area of concern to the management of rural energy infrastructure component in the ERT project. Among those items, the most critical issues are; The names of grouped or ungrouped related processes in the quality matrix in Energy Infrastructure component of ERT project has got to be made known to all stakeholders in the project, the quality matrix should have clear names of groups or ungrouped related process and should have identifiable processes that deliver Key Performance Indicators of project amongst others.

4.4.1.4 Correlation between quality planning and performance

The study aimed at establishing the relationship between quality planning and performance of the Energy Infrastructure component in the ERT project in Uganda. In order to test the hypothesis and provide information indicating direction, strength and significance of the relationship between quality planning and performance in rural energy infrastructure in the ERT project, Pearson product moment correlation was analysed and generated Pearson correlation coefficient presented in table 11 below.

Table 11: Correlations results for Quality Planning and Performance

		Quality Planning	Performance
Quality Planning	Pearson Correlation	1	0.153
	Sig. (2-tailed)		0.161
	N	86	86
Performance	Pearson Correlation	0.153	1
	Sig. (2-tailed)	0.161	
	N	86	86

Source: From researcher's field data

The Pearson Correlation coefficient results in table 11 above revealed that, there is a correlation between quality planning and performance in the rural energy infrastructure component of the ERT project. The Pearson correlation value is positive 0.153 and the significance value is 0.161. This shows a weak relationship between quality planning and performance of rural energy infrastructure in the ERT project and thus a null hypothesis is accepted.

4.4.1.5 Regression of Quality Planning and Performance

Although the correlation result between quality planning and performance were not significant, the researcher wanted to know the effect of quality planning on performance of rural energy infrastructure component of ERT project. This was done by running a regression analysis, analysis of variance (ANOVA) and calculating the coefficient of determination as indicated in table 12 below.

Table 12: Regression Model Summary Quality Planning

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.153[a]	0.023	0.012	4.28042

a. Predictors: (Constant), Quality Planning

Source: From researcher's field data

The result from the regression model summary in table 12 above revealed that the coefficient of determination i.e. adjusted R-square was positive value 0.012 or 1.2%. This implies that quality planning alone holding other variables constant would result in to performance enhancement by only 1.2% meaning that the remaining 98.8 %.is the contribution from other variables. The R-Square was 0.023(2.3 %) is a combine effect of the quality planning implying that it explains 2.3% which would further suggest that there are other factors that make a prediction this variable. The ANOVA was done to test if quality planning and performance is statistically not significant.

H_0; The regression is NOT statistically significant,

H_0; The value is NOT statistically significant different from zero

From the ANOVA table 34, p=0.161 and crosschecking with the table of regression coefficient for quality planning table 13, which is also 0.161, the data is NOT statistically significant and thus has no or little effect on the relationship and thus the null hypothesis is accepted.

Table 13: ANOVA[b] table for Quality Planning

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.686	1	36.686	2.002	0.161[a]
	Residual	1539.047	84	18.322		
	Total	1575.733	85			

a. Predictors: (Constant), Quality Planning

b. Dependent Variable: Performance

Source: From researcher's field data

Table 14: Regression coefficient table for Quality Planning

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	21.680	4.989		4.345	0.000
	Quality Planning	2.042	1.443	0.153	1.415	0.161

a. Dependent Variable: Performance

Source: From researcher's field data

The regression analysis in table 14 above confirm a positive relationship but weak significant impact of quality planning on the performance of rural energy infrastructure component of ERT beta(β) value of 0.153 (15.3%). This implies that quality planning effect on performance is 15.3% which is also in agreement with the correlation results stated earlier and therefore substantiate on the rejection of the hypothesis that there is significant relationship between quality planning and performance of rural energy infrastructure component in ERT project.

The regression further indicated a positive relationship between quality panning and performance with unstandardized coefficient of 2.042 and beta (β) of 0.153. The regression results further indicated that the probability value (p-value) of the coefficient 0.161indicating that there is no significant relationship and thus quality planning does not significantly affect performance of rural energy infrastructure component in the ERT project.

4.4.2 Quality Assurance and Performance

Quality assurance is part of quality management focused on providing confidence that quality requirements will be fulfilled. According to ISO 9001:2008 quality assurances is defined as a planned and systematic activity implemented within the quality system to provide confidence that the project will satisfy the relevant quality standards. The second objective of the study was to examine the influence of quality assurance on performance of the Energy Infrastructure component in the ERT project in Uganda. The hypothesis that the researcher set to guide him in establishing this was that there is a relationship between quality assurance and performance of the Energy Infrastructure component in the ERT project in Uganda

The findings from questionnaires, interviews and documentary reviews are presented and interpreted. The results are presented in descriptive statistics and inferential statistics. In this study, the variable dimension quality assurance was measured using a total of 18 items divided under five different sub-dimensions namely recommended corrective actions, requested changes, project management plan updates and quality improvement. The respondents were required to give their opinion using a five point likert scale.

The four sub-dimensions were generated after assessing the measures of quality assurance by analysing the inputs required, the tools and techniques to be used in order get the output and the outputs of quality assurance according to PMBOK guide (see figure 3) the researcher choose recommended corrective actions, requested changes/variations, project management plan updates and quality improvement to improvement to facilitate him in the investigation of quality assurances in rural energy infrastructure in the ERT project.

4.4.2.1 Recommended Corrective Actions

In quality assurance, quality audits are normally carried out. Quality Audits are a structured review of other quality management activities; it may be periodically or carried out randomly. They may be carried out by properly trained Internal-Auditors or by third parties such as quality systems registration agencies. When audits are conducted, normally non-conformities to quality are identified and recommendations to non-conformities are made. In order to establish whether there are recommended corrective in rural energy infrastructure component in the ERT project, the research sought the opinion of respondent on the recommended corrective actions using five close ended question and were to give their opinion using five-point likert scale.

The respondents were required to give their opinion using a five-point likert like scale with the following as possible responses: 1-Strongly Disagree, 2-Disagree, 3-Not Certain, 4-Agree, and 5-Strongly Agree. The presentation of the findings, discussions and interpretation of the results was done using descriptive statistics of frequencies, mean and standards deviation. The key outputs measured were; periodic quality audits are planned, quality audits are conducted, identification of non conformities during quality audits, recommendations are made to correct the non-conformities and recommended non conformities are documented project management plan in rural energy infrastructure component of ERT. Table 15 below presents the summary of the opinion of the respondents

Table 15: Descriptive Statistics for Recommended Corrective Actions

Questions	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**	N	Mean	Std. Dev.
There are periodic quality audits planned for project component	0 (0%)	1 (1.2%)	4 (4.7%)	25 (29.1%)	56 (65.1%)	86	4.58	0.641
Quality audits are conducted in Energy Infrastructure project component	0 (0%)	0 (0%)	3 (3.5%)	42 (48.8%)	41 (47.7%)	86	4.44	0.566
Non conformities to quality standards are normally identified during audits in project component	1 (1.2%)	3 (3.5%)	6 (7%)	51 (59.3%)	25 (29.1%)	86	4.12	0.773
Recommendations are always made to correct the non-conformities identified during quality auditing in project component	0 (0%)	0 (0%)	13 (15.1%)	63 (73.3%)	10 (11.6%)	86	3.97	0.519
The recommendations made to correct the identified non conformities during quality auditing are documented in project component	3 (3.5%)	9 (10.5%)	29 (33.7%)	40 (46.5%)	5 (5.8%)	86	3.41	0.886

Source: From researcher's field data

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From the table 15 above, a majority strongly agreed that There are periodic quality audits planned for Energy Infrastructure project component of ERT project as represented by 56 (65.1%) of the respondent strongly agreed, 25(29.1 %) agreed, 4 (4.7 %) were not certain and only one respondent representing 1.2 % disagreed and the was none who strongly disagreed. This however this results disagreed with the findings from face to face interviews as observed in the words of commissioner energy efficiency that "*no quality audits conducted, audits conducted in the project are basically financial audits*" and also confirmed by M&E officer who said that *"There was no M&E system before I was recruited, I started from zero and just trying develop a system and also consider quality issues"*. This too was in agreement with documentary review of the M&E reports which focuses on the target coverage.

On whether Quality audits are conducted in Energy Infrastructure project component of ERT project, a majority strongly agreed that there are periodic quality audits planned for Energy Infrastructure project component of ERT project as represented by 41(47.7%) of the respondent strongly agreed, 42(48.8 %) agreed, 3 (3.5 %).No respondents strongly disagreed ore disagreed none was not certain. The results however disagreed with the findings from face to face interviews as implied in the words of M&E Officer that *"There was no M&E system before I was recruited, I started from zero and just trying develop a system and also consider quality issues"*. This also agrees documentary review of the project implementation manual which also shows no evidence of periodic quality audits.

On whether Non conformities to quality standards are normally identified during audits in Energy Infrastructure project component, 51(59.3 %) agreed and 25 (29.1 %) strongly agreed that Non conformities to quality standards are normally identified during audits in Energy Infrastructure project component of ERT however 6(7 %) of the respondents were not certain. while 3(3.5 %) disagreed and 1(1.2 %) strongly disagreed with the statement that Non-conformities to quality standards were normally identified during audits in Energy Infrastructure project component of ERT did. This results disagreed with the findings from face to face interviews as observed in the words of commissioner energy efficiency that "*no quality audits conducted, audits conducted in the project are basically financial audits*" which implies that that non conformities to quality standards are not normally identified during audits in Energy Infrastructure project component of ERT since the focus were not on quality. In the documentary review of the M&E reports there was no reference to the quality standards used.

On whether recommendations are always made to correct the non-conformities identified during quality auditing in Energy Infrastructure project component, 63(73.3 %) agreed and 10 (11.6 %) strongly agreed recommendations are always made to correct the non-conformities identified during quality auditing in Rural Energy Infrastructure project component of ERT while 13 (15.1 %) of the respondents were not certain. This results agrees with the findings from face to face interviews again where 75 % respondents who agreed recommendations are always made to correct the non-conformities in the form of none functional parts of equipment/facilities identified during quality auditing in Rural Energy Infrastructure project component of ERT but at expense of the service/contractors cost because the project has no plan and budgeted provisions for it. The result also agrees documentary review of the status of ERT II investments, monitoring report.

On whether the recommendations made to correct the identified non conformities during quality auditing are documented in Energy Infrastructure project component, 51(59.3 %) agreed and 25 (29.1 %) strongly agreed that Non conformities to quality standards are normally identified during audits in Energy Infrastructure project component of ERT however 6(7 %) of the respondents were not certain. while 3(3.5 %) disagreed and 1(1.2 %) strongly disagreed with the statement that Non conformities to quality standards were normally identified during audits in Energy Infrastructure project component of ERT. This results agrees with the findings from face to face interviews again where 75 % respondents who agreed recommendations are always made to correct the non-conformities in the form of none functional parts of equipment/facilities identified during quality auditing in Rural Energy Infrastructure project component of ERT but at expense of the service/contractors cost because the project has no plan and budgeted provisions for it. the result also agrees documentary review of the status of ERT II investments, monitoring report 14 for Kiboga, Sembabule, Soroti, Pader, Gulu, Kitgum, Otuke and Nwoya districts: where there were recommendation were seen documented and the reported in March 2014.

The analysis from table 15 above indicated that all the means were above average which means most of the respondents strongly agreed. The mean score range from 3.41 – 4.58. This suggests that the project was performing well on each item of the recommended corrective actions. The standard deviations were all below one and the percentage of the respondents who strongly agree and agree on each item was relatively high.

4.4.2.2 Requested Changes/ Variations

A request change is a formal proposal for an alteration to some product or system. In project management, a change request often arises when the client wants an addition or alteration to the agreed-upon deliverables for a project. Such a change may involve an additional feature or customization or an extension of service, among other things. Because change requests are beyond the scope of the agreement, they generally mean that the client will have to pay for the extra resources required to satisfy them.

The respondents were required to give their opinion using a five-point likert like scale with the following as possible responses: 1-Strongly Disagree, 2-Disagree, 3-Not Certain, 4-Agree, and 5-Strongly Agree. The presentation of the findings, discussions and interpretation of the results was done using descriptive statistics of frequencies, mean and standards deviation. The key outputs measured were; requested changes/variations, quality audits were allowed, variation in implementation were requested for, the procedure for approval of requested changes, easy of approval of requested changes, and documented records of approved requested changes in rural energy infrastructure component of ERT. Table 16 below presents the summary of the opinion of the respondents.

Table 16: Descriptive Statistics for requested changes/variations

Questions	SD (1)	D (2)	N (3)	A (4)	SA (5)	N	Mean	Std. Dev.
variations are allowed in the Energy Infrastructure component of ERT project	0 (0%)	0 (0%)	9 (10.5%)	21 (24.4%)	56 (65.1%)	86	4.55	0.680
Any variation in the project implementation is requested for in Energy Infrastructure project component	0 (0%)	2 (2.3%)	10 (11.6%)	40 (46.5%)	34 (39.5%)	86	4.23	0.746
There is a procedure of approval of requested variation in Energy Infrastructure project component	0 (0%)	1 (1.2%)	9 (10.5%)	61 (70.9%)	15 (17.4%)	86	4.05	0.572
The requested changes are easily approved in Energy Infrastructure project component	2 (2.3%)	7 (8.1%)	14 (16.3%)	53 (61.6)	10 (11.6%)	86	3.72	0.863
The approved changes in Energy Infrastructure component of ERT project are documented/recorded	0 (0%)	4 (4.7%)	24 (27.9%)	54 (62.8)	4 (4.7%)	86	3.67	0.641

Source: From researcher's field data

From the table 16 above, 56(65.1 %) strongly agreed and 21 (24.4 %) agreed that Requested changes/variations are allowed in the Energy Infrastructure component of ERT project and 9(10.5 %) of the respondents were not certain. This results agrees with what the commission of energy efficiency said that " "*requested changes/variations are allowed in the Energy Infrastructure component of ERT project*" this was also corroborated the component coordinator in REA that *"there are always variation you cannot rule out that but they are not budgeted for and thus contractor meets the cost*".

On whether any variation in the project implementation is requested for in Energy Infrastructure project component, 34(39.5%) strongly agreed and 40 (46.5%) agreed that any variation in the project implementation was requested for in Energy Infrastructure project component the Energy Infrastructure component of ERT project. However 10(11.6%) of the respondents were not certain and 2(2.3%) disagreed with the statement. This result agrees with the what the Permanent Secretary MEMD assertion that " *This being a World Bank project we normally seek for no objection in case of variation and this is done in writing"*

On whether there was a procedure of approval of requested variation in Energy Infrastructure project component of ERT, 15(17.4%) strongly agreed and 61 (70.9%) agreed there was a procedure of approval of requested variation in Energy Infrastructure project component ERT. However 9(10.5%) of the respondents were not certain and 1(1.2%) disagreed with the statement. This result agrees with the findings from face to face as was mentioned by M&E Officer that "*the procedure is stated in the project implementation guideline*". This was also confirmed by the all the component coordinators of various implementing agencies. And it was also evident in the documentary review of the project implementation manual.

On whether the requested changes were easily approved in Energy Infrastructure project component of ERT, from the table 16 above, a majority of respondents were as represented by 10(11.6%) who strongly agreed and 53 (61.6%) who agreed that requested changes were easily approved in Energy Infrastructure project component. However 14(16.3%) of the respondents were not certain, 7(8.1%) disagreed and 2(2.3%) strongly disagreed with the statement. This result agrees with the findings from face to face interviews again where 83.3 % of the respondents were in agreement that the requested changes were easily approved in Energy Infrastructure project component.

On whether the approved changes in Energy Infrastructure component of ERT project are documented/recorded, 4(4.7%) strongly agreed and 54(62.8%) agreed that the approved changes in Energy Infrastructure component of ERT project are documented/recorded.

However 24(27.9%) of the respondents were not certain and 4(4.7%) disagreed with the statement. This result agrees with the findings from face to face interviews again where 75 % respondents who agreed that the approved changes in Energy Infrastructure component of ERT project were documented/ recorded

The analysis from table16 above indicated that all the means were above average range which means that many respondents strongly agreed. The mean score range from 3.67 – 4.55. This suggests that the project was performing well on each item of requested changes/variations. The standard deviations were all below one and the percentage of the respondents who strongly agree and agree on each item was relatively high.

4.4.2.3 Project Management Plan Updates

Project plan and must address quality control, quality assurance, and quality improvement for the project. According to PMBOK (2004) the project management team is responsible for ensuring that the project stakeholders are fully aware and thus The ERT project team. Good practice project quality management demands that quality management plan should always be evaluated for effectiveness and efficiency and as regularly update. When a quality management plan is update it inputs into the project management plan and thus leading to the update of the overall project management plan.

The respondents were required to give their opinion using a five-point likert like scale with the following as possible responses: 1-Strongly Disagree, 2-Disagree, 3-Not Certain, 4-Agree, and 5-Strongly Agree. The presentation of the findings, discussions and interpretation of the results was done using descriptive statistics of frequencies, mean and standards deviation. The key outputs measured were; indication of approved changes in project management plan, changes adjusted in the project management plan, communication on adjusted project management plan to project stakeholders, and withdrawal of the old project management plan from rural energy infrastructure component of ERT. Table 17 below presents the summary of the opinion of the respondents.

Table 17: Descriptive Statistics Project Management Plan Updates

Response	SD (1)	D (2)	N (3)	A (4)	SA (5)	N	Mean	Std. Dev.
The approved changes are normally indicated in project management plan of project	3 (3.5%)	35 (40.7%)	35 (4o.7%)	13 (15.1%)	0 (0%)	86	2.67	0.774
The changes are adjusted in project management plan for project component	11 (12.8%)	51 (59.3%)	20 (23.3%)	4 (4.7%)	0 (0%)	86	2.20	0.717
The adjusted project management plan is communicated to all the project stakeholders	23 (26.7%)	43 (50%)	20 (23.3%)	0 (0%)	0 (0%)	86	1.97	0.710
The old project management plan is withdrawn and only the updated version remains in circulation at the Energy Infrastructure project component	8 (9.3%)	14 (16.3%)	32 (37.2%)	26 (30.2%)	6 (7%)	86	3.09	1.059

From the table 17 above, 35(40.7%) respondents were not certain whether the approved changes were normally indicated in project management plan of Energy while the same number of respondents 35(40.7%) disagreed and 3(3.5%) strongly disagreed.13(15.1%) respondents did agree with the statement. This result also concurs with the what the Project procurement officer said that *"we follow the implementation manual strictly and we have no right to adjust it"* and this al concurs with what the Commissioner Energy Efficiency said that " *any changes is adjusted in future projects (phase)"* . The review of documents did not also reveal new issues of the updated project management plan.

On whether the changes are adjusted in project management plan for Energy Infrastructure project component, 51(59.3%) respondents disagree and11 (12.8%) strongly disagree with the statement that the changes were adjusted in project management plan for Energy Infrastructure project component and 20(23.3%) were not certain while only 4(4.7%) agree that the changes are adjusted in project management plan for Energy Infrastructure project component. This result also concurs with the findings from face to face interviews where 83.3 % respondents did not think that the changes are adjusted in project management plan for Energy Infrastructure project component with respect to quality.

On whether the adjusted project management plan was communicated to all the project stakeholders of Energy Infrastructure project component, 43(59.3%) respondents disagree and 23(26.7%) strongly disagree with the statement that the adjusted project management plan is communicated to all the project stakeholders of Energy Infrastructure project component and 20(23.3%) were not certain. This result also concurs with the findings from face to face interviews where the project component coordinator in Private Sector Foundation Uganda said *"you know the main implementing agency for Rural Energy Infrastructure is REA this information you can get from them"* meaning they were not informed about the update. A similar answer was also from coordinators from MoES, MoH and MoWE.

On whether the old project management plan is withdrawn and only the updated version remains in circulation at the Energy Infrastructure project component, 8(9.3%) respondents strongly disagree and 14(16.3%) disagree with the statement that the old project management plan is withdrawn and only the updated version remains in circulation at the Energy Infrastructure project component and 32(37.2%) were not certain. while 26(7%) respondents agreed and 6 strongly agreed the old project management plan is withdrawn. This result also concurs with the findings from face to face interviews where 58.33 % respondents did not believed that the old project management plan is withdrawn and only the updated version remains in circulation at the Energy Infrastructure project component. In his words, the

Project Procurement Officer mentioned that *"you can only withdraw the project plan when it is update but we have no powers to update*" mean that no withdrawal of the old project plan is done during the project implementation. The Commission also said that *" withdrawal can bring audit query"*

The descriptive statistics of the sub-dimension, project management plan updates analysis from table 17 indicate all the means were below average since with the exception of an item on the old project management plan being withdrawn and only the updated version remains in circulation at the Energy Infrastructure project component which had a mean of 3.09. The mean score range from 1.97 – 3.09; this is an indication the project was not performing well on each items of project management plan updates. The standard deviations were all above 0.7 with one item above one. The percentage of the respondents who strongly disagree and disagree on each item was relatively high. This suggests a critical area of concern to the management of the project because these relatively higher since the variation in the standards deviation.

4.4.2.4 Quality Improvement

PMBOK, 2008 asserts that Quality improvement includes taking action to increase the effectiveness and efficiency of the project to provide added benefits to the project stakeholders. This is also in agreement with ISO of part of quality management focused on increasing the ability to fulfill quality requirements which can be related to any aspect such as effectiveness, efficiency or traceability (ISO 9000:2005). Quality improvement is an output of quality assurance. Quality improvements is done by conducting management reviews of audit findings; making commitments to undertake corrective actions on the nonconformities to standards identified during quality audits and tacking action to correct the non-conformities followed by review/evaluation for effectiveness and adjustment where necessary.

The respondents were required to give their opinion using a five-point likert like scale with the following as possible responses: 1-Strongly Disagree, 2-Disagree, 3-Not Certain, 4-Agree, and 5-Strongly Agree. The presentation of the findings, discussions and interpretation of the results was done using descriptive statistics of frequencies, mean and standards deviation. The key outputs measured were; evidence of management reviews on audit findings, commitments under for corrective actions on non-conformities, evidence of actual corrective actions on non-conformities and, evidence of review of corrective actions foe effectiveness and adjustment where required in rural energy infrastructure component of ERT. Table 18 below presents the summary of the opinion of the respondents.

Table 18: Descriptive Statistics for quality improvement

Question	**SD** (1)	**D** (2)	**N** (3)	**A** (4)	**SA** (5)	N	Mean	Std. Dev.
Management reviews quality audit findings of Energy Infrastructure project component	0 (0%)	0 (0%)	4 (4.7%)	33 (38.4%)	49 (57%)	86	4.52	0.589
Commitments are undertaken for corrective actions on non-conformities to quality detected during quality audits in project component	0 (0%)	0 (0%)	5 (5.8%)	52 (60.5%)	29 (33.5%)	86	4.28	0.567
Corrections are done on non-conformities to improve the quality in project component	0 (0%)	4 (4.7%)	28 (32.6%)	44 (51.2%)	10 (11.6%)	86	3.70	0.737
Corrections are reviewed for effectiveness and adjusted where required	8 (9.3%)	20 (23.3%)	42 (48.8%)	16 (18.6%)	0 (0%)	86	2.77	0.863

Source: From researcher's field data

From the table 18 above, 49(57%) respondents strongly agreed and 33(38.4%) agreed with the statement that Management reviews quality audit findings of Rural Energy Infrastructure component in the ERT and 4(4.7%) were not certain. This result also concurs with the findings from face to face interviews as was mention by M&E officer who said *" M&E*

reports are always produced and discussed by top management of the projects" this was also confirmed by the Commissioner Energy Efficiency and Project Manager. Though 58.33 % respondents believed that Management reviews quality audit findings of Energy Infrastructure project component though audits are routine M&E reports basically focused targets and coverage inclined towards financial audits. Documentary review of minutes of management review meetings revealed that management dose review audit findings.

On whether commitments are undertaken for corrective actions on non- conformities to quality detected during quality audits in Energy Infrastructure component of ERT project, 29(33.7%) respondents strongly agreed and 52(60.5%) agreed with the statement that commitments are undertaken for corrective actions on non-conformities to quality detected during quality audits of Rural Energy Infrastructure component in the ERT and 5(5.8%) were not certain. This result also concurs with the findings from face to face interviews as implied in the words of Commissioner Energy Efficiency that *"commitments are undertaken for corrective actions on non- conformities to quality detected during quality audits of Rural Energy Infrastructure component in the ERT through requesting the service providers (Contractors/sub-contractors) to replace or put right non-function equipment/product".* Documentary review of payment scheduled revealed blocking/deferring payment till corrections have been made.

On whether Corrections are done on non-conformities to improve the quality in Energy Infrastructure component of ERT project, 10(11.6%) respondents strongly agreed and 44(51.2%) agreed with the statement that Corrections are done on non-conformities to improve the quality in Rural Energy Infrastructure component in the ERT and 28(32.6%) were not certain and 4(4.7%) disagreed. The Commissioner Energy Efficiency that *"corrective actions on non- conformities to quality detected during quality audits of Rural*

Energy Infrastructure component in the ERT through requesting the service providers (Contractors/sub-contractors) to replace or put right non-function equipment/product". Those who agreed argued that it was in the project condition whereas those who were not in agreement argue that there were no budget provision for correction and as such corrections are forced on the service providers. There was no documentary evidence seen to prove that corrections were done on non-conformities to improve the quality in Energy Infrastructure project component.

On whether Corrections are reviewed for effectiveness and adjusted where required in Energy Infrastructure component of ERT project, 16(18.6%) respondents agreed that corrections are reviewed for effectiveness and adjusted where required in rural energy infrastructure in the ERT project while 42(48.8) were not certain. 20(23.3%) disagreed and 8(9.3) strongly disagreed with the statement that Corrections are reviewed for effectiveness and adjusted where required in Rural Energy Infrastructure component in the ERT and 28(32.6%) were not certain and 4(4.7%) disagreed. Findings from face to face interviews were that 83.3% did not believed that corrections are reviewed for effectiveness and adjusted where required in Rural Energy Infrastructure component in the ERT. *"Since there is no budget allocation for correction, normally the review is not done"* the Commissioner Energy Efficiency commented. There was no documentary evidence seen to prove that corrections are reviewed for effectiveness and adjusted where required in Rural Energy Infrastructure component in the ERT.

The analysis from table 57 indicated that all the mean were above average apart from one item on review of corrections for effectiveness and adjustments where required which had a mean of 2.77. The mean score range from 2.77 – 4.52. This means that there was high rate of respondents strongly agreeing and thus indicating a better performance on quality improvement. The standard deviations were all above 0.5 but below 1 meaning there were little variations. Findings from face to face interview however cast some doubts on good performance in quality improvement as it pointed out that the focus was on quality but on targets which were based on coverage (numbers) .but quality performance.

4.4.2.5 Correlation between quality assurance and performance

The study aimed at establishing the relationship between quality assurance and performance of the Energy Infrastructure component in the ERT project in Uganda. In order to test the hypothesis and a provide information indicating direction, strength and significance of the relationship between quality assurance and performance in rural energy infrastructure in the ERT project, Pearson product moment correlation was analysed and generated Pearson correlation coefficient presented in table 19 below.

Table 19: Correlation between quality assurance and performance

		Performance	Quality Assurance
Performance	Pearson Correlation	1	0.459**
	Sig. (2-tailed)		0.000
	N	86	85
Quality Assurance	Pearson Correlation	0.459**	1
	Sig. (2-tailed)	0.000	
	N	85	85

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

Source: From researcher's field data

From the above table 19, the results indicated a correlation coefficient of 0.459 at a level of significance of 0.01. This implies that there is a positive significant relationship between quality assurance and performance in the rural energy infrastructure component of the ERT project. The Pearson product moment correlation, a measure of correlation between two variables and in this case was positive 0.459 and the significance value was 0.000 at level of significant of 0.01.

This means that the relationship between quality assurance and performance is positive implying that implementing quality assurance related activities contributes to performance enhancements in the rural energy infrastructure component in the ERT Project. The Pearson correlation value of 0.459 signifies a moderate and statistically significant relationship between quality assurance and performance. Thus the alternate hypothesis that there is a significant relationship between quality assurance and performance of the Energy Infrastructure component in the ERT project in Uganda is sustained and thus the null hypothesis is rejected.

4.4.2.6 Regression of Quality Assurance and Performance

A regression analysis was further done to determine the strength of the relationship between quality assurance and performance as illustrated below.

Table 20: Regression model for quality assurance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.459[a]	0.210	0.201	3.86943

a. Predictors: (Constant), Quality Assurance

Source: From researcher's field data

The result from the regression model summary in the table above revealed that the R-square which is the percentage of variability accounted for by the variables in the model was 0.210 or 21%. The R-squared of a regression is the fraction of the variation in the dependent variable that accounted for by the independent variable. This implies that quality assurance alone holding other variables constant would account for 21% on the total variation in the performance of rural energy infrastructure component in the ERT project meaning that the remaining 79%.is the contribution from other variables.

The ANOVA was done to test if quality assurance and performance is statistically not significant.

H_0; The regression is NOT statistically significant,

H_0; The value is NOT statistically significant different from zero

from the ANOVA table 58 below, p=0.000 thus confirming that it is statistically significant and significantly affects performance of rural energy infrastructure component in the ERT project there for the alternate hypothesis is accepted.

Table 21: ANOVA[b] table for Quality Assurance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	331.332	1	331.332	22.129	0.000[a]
	Residual	1242.715	83	14.972		
	Total	1574.047	84			
a. Predictors: (Constant), Quality Assurance						
b. Dependent Variable: Performance						

Source: From researcher's field data

Table 22: Regression coefficient[a] table for Quality Assurance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.449	4.536		1.642	0.104
	Quality Assurance	5.488	1.167	0.459	4.704	0.000

a. Dependent Variable: Performance

Source: From researcher's field data

The regression analysis in table 22 above confirms a positive relationship with a significant impact of quality assurance on the performance of rural energy infrastructure component of ERT beta (β) value of 0.459 (45.9%). This implies that quality assurance effect on performance is 45.9% which is also in agreement with the correlation results stated earlier of 0.459 (45.9%)and therefore substantiate on the acceptance of the hypothesis that there is significant relationship between quality planning and performance of rural energy infrastructure component in ERT project.

The regression further indicated a positive relationship between quality assurance and performance with unstandardized coefficient of 5.488 and beta (β) of 0.459. The regression results further indicated that the probability value (p-value) of the coefficient 0.000 indicating that there is significant relationship and thus quality assurance does significantly affect performance of rural energy infrastructure component in the ERT project.

4.4.3: Quality control and performance

The PMBOK® Guide defines quality control as "monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance." This is an action process in which the project team looks at results and determines necessary corrective action. Quality control is a process that monitors specific project results to determine if they conform to specifications and identify ways to eliminate the causes of unsatisfactory results. Kenneth, (2005) asserts that quality control results provide feedback to quality assurance; results disclose effectiveness of assurance activities

The third objective of the study was to establish the relationship between quality control and performance of the Energy Infrastructure component in the ERT project in Uganda. The hypothesis that the researcher set to guide him in establishing this was that there is a significant relationship between quality control and performance of the Energy Infrastructure component in the ERT project in Uganda

The findings from questionnaires, interviews and documentary reviews are presented and interpreted. The results are presented in descriptive statistics and inferential statistics. In this study, the variable dimension quality assurance was measured using a total of 16 items divided under three different sub-dimensions namely quality control measurement, recommended preventive actions and process adjustment. The respondents were required to give their opinion using a five point likert scale.

4.3.3.1 Quality Control Measurement

Quality control measurements are records of quality control testing and measurements in the format of compression and analysis. If results do not conform to specifications (some degree of variance is indicated), the project team knows that something has gone wrong or is going wrong. The project team must take corrective action to fix the existing variance from the plan. The team must also identify the source of the variance and take corrective action to prevent it from recurring. Results provide feedback to the quality assurance process. Results obtained during quality control provide data that are examined during quality audits and as such quality control measurements are of paramount importance. The overarching purpose of a measurement system should be to help the team rather than top managers, gauge its progress. A truly empowered team must play the lead role in designing its own measurement system. Because the team is responsible for a value-delivery process that cuts across several functions, it must create measures to track that process.

The respondents were required to give their opinion using a five-point likert like scale with the following as possible responses: 1-Strongly Disagree, 2-Disagree, 3-Not Certain, 4-

Agree, and 5-Strongly Agree. The presentation of the findings, discussions and interpretation of the results was done using descriptive statistics of frequencies, mean and standards deviation. The key outputs measured were; evidence of acceptable quality standards, evidence of routine inspection, deviations from the set standards, document records of compliance and non-compliance to standards requirements, and evidence of decisions to accept or reject the outcome in rural energy infrastructure component of ERT. Table 23 below presents the summary of the opinion of the respondents.

Table 23: Descriptive Statistics for Quality Control Measurements

Questions	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**	N	Mean	Std. Dev.
There are set acceptable quality standards in Energy Infrastructure component of ERT project	0 (0%)	2 (2.3%)	3 (3.5%)	33 (38.4%)	48 (55.8%)	86	4.48	0.681
Routine Inspections are conducted on Energy Infrastructure project component of ERT project as per the set standards	0 (0%)	1 (1.2%)	8 (9.3%)	45 (52.3%)	32 (37.2%)	86	4.26	0.672
Deviations from the set standards for activities of Energy Infrastructure component of ERT project are identified	0 (0%)	0 (0%)	11 (12.8%)	64 (74.4%)	11 (12.8%)	86	4.00	0.509
Records of compliance and non-compliance to standards requirements are kept in Energy Infrastructure project component	0 (0%)	3 (3.5%)	13 (15.1%)	67 (77.9%)	3 (3.5%)	86	3.81	0.543
Decisions to accept or reject the outcome are always taken in Energy Infrastructure project component	12 (14%)	39 (45.3%)	30 (34.9%)	5 (5.8%)	0 (0%)	86	2.33	0.789

Source: From researcher's field data

From the table 23 above, 48(55.8%) respondents strongly agreed and 33(38.4 %) agree that There are set acceptable quality standards in Energy Infrastructure component of ERT project in Uganda while 3(3.5 %) were not certain and 2 (2.3%). These Findings corroborates with the findings from face to face interviews where the Commissioner Energy Efficiency said *"world Bank gives the standards guideline"*. Documentary review only revealed guidelines but not quality standards/specifications.

On whether Routine Inspections are conducted on Energy Infrastructure project component of ERT project as per the set standards, 32(37.2%) respondents strongly agreed and 45(52.3 %) agree that Routine Inspections were conducted on Energy Infrastructure project component of ERT project as per the set standards while 8(9.3 %) were not certain and 1 (1.2%). Findings from face to face interviews in agreement with the survey with 75 % of the respondents accepting that routine Inspections were conducted on Energy Infrastructure project component of ERT project as per the set standards. The M&E officer said that *"we always conduct routine monitoring of all the project components not on ly the rural energy infrastructure"*. Documentary review of M&E did not show any reference to quality standards/specifications.

On Deviations from the set standards for activities of Energy Infrastructure component of ERT project are identified, 11(12.8%) respondents strongly agreed and 64(74.4 %) agree that deviations from the set standards for activities of Energy Infrastructure component of ERT project are identified while 11(9.3 %) were not certain. Findings from face to face interviews in agreement with the survey with 83.3 % of the respondents accepting that deviations from the set standards for activities of Energy Infrastructure component of ERT project are identified.

On whether records of compliance and non-compliance to standards requirements are kept in Energy Infrastructure project component, 3(3.5%) respondents strongly agreed and 67(77.9%) agree that records of compliance and non-compliance to standards requirements are kept in Energy Infrastructure project component while 13(15.1 %) were not certain and

3(3.5 %) disagreed. Findings from face to face interviews in agreement with the survey as mentioned by M&E officer who said "*we always document and keep M&E reports"*. accepting that records of compliance and non-compliance to standards requirements are kept in Energy Infrastructure project component.

On whether decisions to accept or reject the outcome are always taken in Energy Infrastructure project component, 39(45%) respondents disagreed and 12(14%) strongly disagree that decisions to accept or reject the outcome are always taken in Energy Infrastructure project component while 30(34.9 %) were not certain and 5(5.8 %) disagreed.

The analysis from table 23 indicated that the entire means were above average apart from one item on Decisions to accept or reject the outcome are always taken in Energy Infrastructure project component which had a mean of 2.33. The mean score range from 2.33 – 4.48. This means that there was high rate of respondents strongly agreeing and thus indicating a better performance on quality control measurements. The low mean on taking decision to accept or reject means there was high rate of disagreeing respondent and yet decision making is very critical in any management. The standard deviations were all below 1 meaning there were little variations.

4.4.3.2 Recommended Preventive Actions

Recommended preventive actions are recommendation that made to avoid errors to would cause non-conformities. Unlike corrective action which is aimed at correcting the non-conformity to quality standards, preventive action major focus is prevention of non-conformity to quality standards from occurrence by predicting and identifying the possible sources of errors and eliminating them. Preventive actions are very critical to the project success, to investigate whether there were preventive measures in the rural energy infrastructure component of ERT project in Uganda.

The research sought opinion of the respondents four items that includes; prediction of non-conformities, recommendations to prevent non-conformities, documentation of the predicted non-conformities and commitments to undertake preventive actions on potential non-conformities predicted during quality audits in rural energy infrastructure component in ERT. The presentation of the findings, discussions and interpretation of the results was done using descriptive statistics of frequencies, mean and standards deviation. Table 24 below presents the summary of the opinion of the respondents.

Table 24: Descriptive Statistics for Recommended preventive actions

Questions	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**	N	Mean	Std. Dev.
Non conformities to quality are normally predicted during quality audits Energy Infrastructure component of ERT project	0 (0%)	3 (3.5%)	7 (8.1%)	25 (29.1%)	51 (59.3%)	86	4.44	0.791
Recommendations are always made to prevent the non-conformities to quality identified during quality auditing in project component	0 (0%)	0 (0%)	8 (9.3%)	54 (62.8%)	24 (27.9%)	86	4.19	0.584
The recommendations made to prevent the identified non conformities to quality during auditing are documented in project component	0 (0%)	0 (0%)	10 (11.6%)	64 (74.4%)	12 (14%)	86	4.02	0.508
Commitments are undertaken to prevent non- conformities to quality detected during quality audits the project component	20 (23.3%)	49 (57%)	16 (18.6%)	1 (1.2%)	0 (0%)	86	1.98	0.686

From the table 68 above, 51(59.3%) respondents strongly agreed and 25(29.1 %) agree that non conformities to quality are normally predicted during quality audits Energy Infrastructure component of ERT project while 7(8.1%) were not certain and 3(3.5%) of the respondents disagree. Findings from face to face interviews in agreement with what M&E officer said that *"During the M&E advice as a preventive measure to potential non-conformity"* implying that non conformities to quality are normally predicted during quality audits Energy Infrastructure component of ERT project.

On whether recommendations are always made to prevent the non-conformities to quality identified during quality auditing in Energy Infrastructure component of ERT project, 24(27.9%) respondents strongly agreed and 54(62.8 %) agree that recommendations were always made to prevent the non-conformities to quality identified during quality auditing in Energy Infrastructure component of ERT project while 8(9.3%) were not certain. Findings from face to face interviews in agreement with the survey with 75% of the respondents accepting that recommendations were always made to prevent the non-conformities to quality identified during quality auditing in Energy Infrastructure component of ERT project.

On whether the recommendations made to prevent the identified non conformities to quality during auditing are documented in Energy Infrastructure component of ERT project, 12(14%) respondents strongly agreed and 64(74.4%) agree that the recommendations made to prevent the identified non conformities to quality during auditing are documented in Energy Infrastructure component of ERT project, while 10(11.6%) were not certain. Findings from face to face interviews in agreement with the survey with 83.3% of the respondents accepting that the recommendations made to prevent the identified non conformities to quality during auditing were documented in Energy Infrastructure component of ERT project.

On whether commitments were undertaken to prevent non-conformities to quality detected during quality audits Energy Infrastructure component of ERT project,

20(23.3%) respondents strongly disagreed and 49(57.0%) disagree that commitments were undertaken to prevent non- conformities to quality detected during quality audits Energy Infrastructure component of ERT project, while 16(18.6%) were not certain and only 1(1.2%) respondent agreed. Findings from face to face interviews in agreement with the survey with 83.3% of the respondents did not accept that commitments were undertaken to prevent non-conformities to quality detected during quality audits Energy Infrastructure component of ERT project.

The analysis from table 72 indicated that the entire means were above average apart from one item on Commitments are undertaken to prevent non- conformities to quality detected during quality audits Energy Infrastructure component of ERT project which had a mean of 1.98. The mean score range from 1.98– 4.44 meaning that there was high rate of respondents strongly agreeing and thus indicating a better performance on recommendation on preventive action. However the low mean on Commitments are undertaken to prevent non- conformities to quality detected during quality audits Energy Infrastructure component of ERT project is a serious concern to the management and stakeholders of the project. The standard deviations were all below 1 meaning there were little variations.

4.4.3.3 Process Adjustments

Process adjustments involve immediate corrective or preventive action as a result of quality control measurements. In some cases, the process adjustment may need to be handled according to procedures for overall change control (PMBOK guide, 2004). Process adjustment is one of the key outputs of quality control others being reworks, acceptances decision, quality improvement and completed checklist. Process adjustments are critical to the project success since it brings back project to control. To investigate whether process adjustment were conducted in the rural energy infrastructure component of ERT project in Uganda, the research sought opinion of the respondents seven items that includes; approved request changes, corrective actions taken on non-conformities quality standards, preventive action taken on non-conformities to quality standards, changes made, records of changes made, validation of project deliverables and records of validation of project deliverables. The respondents were required to give their opinion using a five point likert scale ranging from strongly disagree to strongly agree.

The presentation of the findings, discussions and interpretation of the results was done using descriptive statistics of frequencies, mean and standards deviation. Table 25 below presents the summary of the opinion of the respondents.

Table 25: Descriptive Statistics for Process adjustments

Question	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**	**N**	**Mean**	**Std. Dev.**
Approved requested changes /variations are complied with in the project component.	0 (0%)	1 (1.2%)	9 (10.5%)	28 (32.6%)	48 (55.8%)	86	4.43	0.728
Corrective actions are taken on the non-conformities to quality detected during audits in Energy Infrastructure component of ERT project as per the project standard	0 (0%)	1 (1.2%)	7 (8.1%)	57 (66.3%)	21 (24.4%)	86	4.14	0.597
Preventive actions are taken to prevent non-conformities in the project component	1 (1.2%)	2 (2.3%)	9 (10.5%)	59 (68.6%)	15 (17.4%)	86	3.99	0.694
Changes/Variations made in the project component are always recorded	1 (1.2%)	3 (3.5%)	10 (11.6%)	65 (75.6%)	7 (8.1%)	86	3.86	0.654
Records for the changes in project component as per the project are filed	2 (2.3%)	2 (2.3%)	15 (17.4%)	47 (54.7%)	20 (23.3%)	86	3.94	0.845
the project deliverables are validated based on the quality standards as per project component agreed standards	1 (1.2%)	2 (2.3%)	14 (16.3%)	61 (70.9%)	8 (9.3%)	86	3.85	0.660
The project deliverables validated results are recorded and records kept	1 (1.2%)	4 (4.7%)	29 (33.7%)	42 (48.8%)	10 (11.6%)	86	3.65	0.794

Source: From researcher's field data

From the table 25 above, 48(55.8%) respondents strongly agreed and 28(32.6%) agreed that whether approved requested changes /variations are complied with in Energy Infrastructure component of ERT project in Uganda, while 9(10.5%) were not certain and only 1(1.2%) respondent disagreed. Findings from face to face interviews in agreement with the survey with 83.3% of the respondents did accept that approved requested changes /variations were complied with in Energy Infrastructure component of ERT project in Uganda.

On whether corrective actions are taken on the non-conformities to quality detected during audits in Energy Infrastructure component of ERT project as per the project standard, 21(24.4%) respondents strongly agreed and 57(66.3%) agreed that corrective actions are taken on the non-conformities to quality detected during audits in Energy Infrastructure component of ERT project as per the project standard, while 7(8.1%) were not certain and only 1(1.2%) respondent disagreed. Findings from face to face interviews in agreement with the survey with 75% of the respondents did accept that corrective actions were taken on the non-conformities to quality detected during audits in Energy Infrastructure component of ERT project as per the project standard.

On whether preventive actions were taken to prevent non-conformities in Energy Infrastructure component of ERT project, 15(17.4%) respondents strongly agreed and 59(66.8%) agreed that preventive actions were taken to prevent non-conformities in Energy Infrastructure component of ERT project, while 9(10.5%) respondents were not certain, 2(2.3%) disagreed and 1(1.2%) disagreed. Findings from face to face interviews in agreement with the survey with 83.3% of the respondents did accept that preventive actions were taken to prevent non-conformities in Energy Infrastructure component of ERT project.

The respondents were required to give their opinion on whether changes made in Energy Infrastructure component of ERT project were always recorded, 7(8.1%) respondents strongly agreed and 65(75.6%) agreed that changes made in Energy Infrastructure component of ERT project were always recorded while 10(11.6%) respondents were not certain, 3(3.5%) disagreed and 2(2.3%) disagreed. Findings from face to face interviews in agreement with the survey with 75 % of the respondents did accept that changes made in Energy Infrastructure component of ERT project were always recorded. However, there was no documentary evidence seen during documentary review of the records on variation on quality.

The respondents were required to give their opinion on whether records for the changes in Energy Infrastructure component of ERT project as per the project were filed, 20(23.3%) respondents strongly agreed and 47(54.7%) agreed that records for the changes in Energy Infrastructure component of ERT project as per the project were filed, while 15(17.4%) respondents were not certain, 2(2.3%) disagreed and 2(2.3%) disagreed. Findings from face to face interviews in agreement with the survey with 83.3 % of the respondents did accept records for the changes in Energy Infrastructure component of ERT project as per the project were filed. However, there was no filed documentary evidence seen during documentary review of the records on variation on quality.

The respondents were required to give their opinion on whether project deliverables were validated based on the quality standards as per Energy Infrastructure component of ERT project agreed standards are filed, 8(9.3%) respondents strongly agreed and 61(70.9%) agreed that the project deliverables are validated based on the quality standards as per project agreed standards, while 14(16.3%) respondents were not certain, 2(2.3%) disagreed and 1(1.2%) disagreed. Findings from face to face interviews in agreement with the survey with 58.3 % of the respondents did accept the project deliverables are validated based on the quality standards as per project agreed standards.

On whether the project deliverables validated results were recorded and records kept in Energy Infrastructure component of ERT project, 10(11.6%) respondents strongly agreed and 42(48.8%) agreed that the project deliverables validated results were recorded and records kept in Energy Infrastructure component of ERT project, while 29(33.7%) respondents were not certain, 4(2.3%) disagreed and 1(1.2%) disagreed. Findings from face to face interviews in agreement with the survey with 58.3 % of the respondents did accept the project deliverables validated results were recorded and records kept in Energy Infrastructure component of ERT project. However, there was no filed documentary evidence seen during documentary review of the records of the project deliverables validated results on quality.

The analysis from table 25 indicated that the entire means were above average apart the mean score range from 3.65– 4.43 meaning that there was high rate of respondents agreeing and thus indicating a better performance on process adjustments. The standard deviations were all below 1 meaning there were little variations.

4.4.3.4 Correlation between quality control and performance

The study aimed at establishing the relationship between quality control and performance of the Energy Infrastructure component in the ERT project in Uganda. In order to test the hypothesis and a provide information indicating direction, strength and significance of the relationship between quality control and performance in rural energy infrastructure in the ERT project, Pearson product moment correlation was analysed and generated Pearson correlation coefficient presented in table 26.

Table 26: Correlation between quality control and performance

		Quality Control	Performance
Quality Control	Pearson Correlation	1	0.172
	Sig. (2-tailed)		0.116
	N	85	85
Performance	Pearson Correlation	0.172	1
	Sig. (2-tailed)	0.116	
	N	85	86

Source: From researcher's field data

From the above table 26, The Pearson Correlation coefficient results in the table above reveled that, there is a correlation between funding guidelines and performance in the rural energy infrastructure component of the ERT project. The Pearson correlation value is positive 0.172 and the significance value is 0.116 this show a weak relationship between quality control and performance of rural energy infrastructure in the ERT project.

4.4.3.5 Regression of quality control and performance

Although the correlation result between quality control and performance were not significant, the researcher wanted to know the effect of quality control on performance of rural energy infrastructure component of ERT project. This was done by running a regression analysis, analysis of variance (ANOVA) and calculating the coefficient of determination as indicated in table 27 below.

Table 27: Regression Model Summary quality control

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.172[a]	0.029	0.018	4.26706

a. Predictors: (Constant), Quality Control

Source: From researcher's field data

The result from the regression model summary in the table above revealed that the coefficient of the determination i.e. adjusted R-square was positive value 0.018 or 1.8%. This implies that quality control alone holding other variables constant would result in to performance enhancement by only 1.8% meaning that the remaining 98.2%.is the contribution from other variables. The R-Square was 0.029(2.9%) is a combine effect of the quality control implying that it explains 2.9% which would further suggest that there are other factors that make a prediction this variable. The ANOVA was done to test if quality control and performance is statistically not significant.

H_0; The regression is NOT statistically significant,

H_0; The value is NOT statistically significant different from zero

From the ANOVA table 28, p=0.116 and crosschecking with the table of regression coefficient for quality planning table 29, which is also 0.161, the data is NOT statistically significant and thus has no or little effect on the relationship and thus the null hypothesis is accepted.

Table 28: ANOVA[b] table for Quality control

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	45.858	1	45.858	2.519	0.116[a]
	Residual	1511.247	83	18.208		
	Total	1557.106	84			

a. Predictors: (Constant), Quality Control

b. Dependent Variable: Performance

Source: From researcher's field data

Table 29: Regression coefficient[a] table for Quality control

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	20.930	4.892		4.278	0.000
	Quality Control	2.090	1.317	0.172	1.587	0.116

a. Dependent Variable: Performance

Source: From researcher's field data

The regression analysis in table 29 above confirms a positive relationship of quality control on the performance of rural energy infrastructure component of ERT beta (β) value of 0.172 (17.2%). This implies that quality control effect on performance is 17.2% which is also in agreement with the correlation results stated earlier of 0.172 (17.2%). The regression further indicated a positive relationship between quality control and performance with unstandardized coefficient of 2.090 and beta (β) of 0.172. The regression results further indicated that the probability value (p-value) of the coefficient 0.116 indicating that though there is relationship and thus quality assurance does NOT significantly affect performance of rural energy infrastructure component in the ERT project.

4.4.4 Moderating effect of funding guidelines on performance

Funding of a project is very critical as most of the projects require funding for their execution. In most circumstance, these much need funds are provided by donors with conditions/guidelines that has to be strictly adhered to. These guidelines have a potential of influencing the project performance either positively or negatively. The fourth objective of this study was to assess the moderating effects of funding policy on the Energy Infrastructure component in the ERT project in Uganda. In order for the researcher to investigate the moderating effect of funding policy on rural energy infrastructure component of ERT project and he sought opinion of the respondents on five structured questions on scheduled for fund release, the existence of donor guidelines, easy of request for funds and strictness to follow the schedule. The respondents were required to give their opinion using a five point likert scale ranging from strongly disagree to strongly agree.

The researcher also sought the opinion of respondent on whether there was a schedule for releasing funds for Energy Infrastructure component of ERT project component. The respondents' opinions are presented in table 30 below.

Table 30: Descriptive Statistics for funding guidelines

Questions	**SD (1)**	**D (2)**	**N (3)**	**A (4)**	**SA (5)**	N	Mean	Std. Dev.
There is a schedule for releasing funds for Energy Infrastructure component of ERT project component	1 (1.2%)	0 (0%)	2 (2.3%)	29 (33.7%)	54 (62.8%)	86	4.57	0.660
There is a guideline from the donor for component that is strictly followed	0 (0%)	2 (2.3%)	10 (11.6%)	42 (48.8%)	32 (37.2%)	86	4.21	0.738
It is easy to request for funds release to the project component	0 (0%)	3 (3.5%)	9 (10.5%)	44 (51.2%)	30 (34.9%)	86	4.17	0.754
The approval for funds to the project component is simple	0 (0%)	15 (17.4%)	17 (19.8%)	42 (48.8%)	12 (14%)	86	3.59	0.938
The schedule for the funds release to the project is strictly followed	0 (0%)	0 (0%)	19 (22.1%)	58 (67.4%)	9 (10.5%)	86	3.88	0.562

Source: From researcher's field data

From the table 30 above, 54(62.8%) respondents strongly agreed and 29(37.2%) agreed that there was a schedule for releasing funds for Energy Infrastructure component of ERT project component while 2(2.3%) were not certain and only 1(1.2%) respondent disagreed. Findings from face to face interviews in agreement with the survey with 100% of the respondents did accept that there was a schedule for releasing funds for Energy Infrastructure component of

ERT project component. During documentary review the researcher reviewed ERT project fund release scheduled in the project implementation guidelines.

The researcher also sought the opinion of respondent on whether there was a guideline from the donor for Energy Infrastructure component of ERT project that is strictly followed, 32(37.2%) respondents strongly agreed and 42(48.8%) agreed that there was a guideline from the donor for Energy Infrastructure component of ERT project that was strictly followed while 10(11.6%) were not certain and 2(2.3%) respondent disagreed. Findings from face to face interviews in agreement with the survey with 100% of the respondents did accept that there was a schedule for releasing funds for Energy Infrastructure component of ERT project component. During documentary review the researcher reviewed a ERT project fund release conditions from the donors.

On whether it was easy to request for funds release to Energy Infrastructure component of ERT project, 30(34.9%) respondents strongly agreed and 44(51.2%) agreed that it was easy to request for funds release to Energy Infrastructure component of ERT project while 9(10.5%) were not certain and 3(3.5%) respondent disagreed. Findings from face to face interviews in agreement with the survey with 100% of the respondents did accept it was easy to request for funds release to Energy Infrastructure component of ERT project when guidelines were followed.

On whether the approval for funds to Energy Infrastructure component of ERT project is simple, 12(14%) respondents strongly agreed and 44(48.8%) agreed that it the approval for funds to Energy Infrastructure component of ERT project was simple while17 (10.5%) were not certain and 15(17.4%) respondent disagreed. Findings from face to face interviews in agreement with the survey with 75% of the respondents did accept it the approval for funds to Energy Infrastructure component of ERT project was simple.

On whether the schedule for the funds release to Energy Infrastructure component of ERT project is strictly followed, 9(10.5%) respondents strongly agreed and 58(67.4%) agreed that the schedule for the funds release to Energy Infrastructure component of ERT project is strictly followedwhile19 (22.1%) were not certain. Findings from face to face interviews in agreement with the survey with 83.3% of the respondents did accept that the schedule for the funds release to Energy Infrastructure component of ERT project was strictly followed.

The analysis from table 30 indicated that the entire means were all above average apart the mean score range from 3.59– 4.57 meaning that there was high rate of respondents agreeing and thus indicating a better performance on funding guidelines. The standard deviations were all below 1 meaning there were little variations.

4.4.4.1 Correlation between funding guidelines and performance

The study aimed at assessing the moderating effect of funding policy on the performance of rural energy infrastructure component of ERT project. In order to test the hypothesis and a provide information indicating direction, strength and significance of the moderating effect of funding guideline on performance in rural energy infrastructure in the ERT project, Pearson product moment correlation was analysed and generated Pearson correlation coefficient presented in table 31 below.

Table 31: Correlation between funding guidelines and performance

		Performance	Funding Guidelines
Performance	Pearson Correlation	1	0.150
	Sig. (2-tailed)		0.167
	N	86	86
Funding Guidelines	Pearson Correlation	0.150	1
	Sig. (2-tailed)	0.167	
	N	86	86

Source: From researcher's field data

The Pearson Correlation coefficient results in the table above reveled that, there is a correlation between funding guidelines and performance in the rural energy infrastructure component of the ERT project. The Pearson correlation value is positive 0.150 and the significance value is 0.167. This show a weak relationship between funding and performance of rural energy infrastructure in the ERT project.

4.4.4.2 Regression of Funding guidelines and Performance

A regression analysis was further done to determine the strength of the relationship between quality assurance and performance as illustrated below

Table 32: Regression Model Summary funding guidelines

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.150[a]	0.023	0.011	4.28196

a. Predictors: (Constant), Funding Guidelines

Source: From researcher's field data

The result from the regression model summary in the table above revealed that the R-square which is the percentage of variability accounted for by the variables in the model was 0.023 or 2.3%. The R-squared of a regression is the fraction of the variation in the dependent variable that accounted for by the independent variable. This implies that funding guidelines alone holding other variables constant would account for only 2.3% on the total variation in the performance of rural energy infrastructure component in the ERT project meaning that the remaining 97.7%.is the contribution from other variables.

The ANOVA was done to test if funding guidelines and performance is statistically not significant.

H_0; The regression is NOT statistically significant,

H_0; The value is NOT statistically significant different from zero

from the ANOVA table 33 below, p=0.167 which is significantly different from zero, thus confirming that it is statistically not significant and does NOT significantly affects performance of rural energy infrastructure component in the ERT project there for the null hypothesis is accepted.

Table 33: ANOVA[b] table for Funding Guidelines

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.580	1	35.580	1.941	0.167[a]
	Residual	1540.153	84	18.335		
	Total	1575.733	85			

a. Predictors: (Constant), Funding Guidelines

b. Dependent Variable: Performance

Source: From researcher's field data

Table 34: Regression coefficient[a] table for Funding Guidelines

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	22.639	4.382		5.167	0.000
	Funding Guidelines	1.486	1.066	0.150	1.393	0.167

a. Dependent Variable: Performance

Source: From researcher's field data

The regression analysis in table 34 above confirms a positive relationship with a weak significant impact of funding guidelines on the performance of rural energy infrastructure component of ERT beta (β) value of 0.150 (15%). This implies that funding guidelines effect on performance is 15% which is also in agreement with the correlation results stated earlier of 0.150 (15%).

The regression further indicated a positive relationship between quality panning and performance with unstandardized coefficient of 1.486 and beta (β) of 0.150. The regression results further indicated that the probability value (p-value) of the coefficient 0.167 indicating that funding guidelines does significantly affect performance of rural energy infrastructure component in the ERT project.

4.4.5 Project Performance

According to Milton D., & Gregory D. (2005), the triple constrains helps the project team to evaluate expectations for product performance and compare them with the expectations for delivery time and cost. From the triple constraint, the product performance developed from the team's capture of the product's functional and performance requirements; the time performance where the project time determined by taking a list of activities and estimating their duration and analyzing the critical path; and the cost performance where the estimated cost of the project are computed through cost-estimating practices have been considered as the dimension of project performance.

In this study, the variable dimension project performance was measured using a total of 9 items divided under four different sub-dimensions namely time performance, cost performance and, product performance (quality specification/requirements).The researcher sought opinion of the respondents using structured questions they were required to give their opinion using a five point likert scale ranging from strongly disagree to strongly agree.

4.4.5.1 Project Time Performance (Time/Schedule)

The researcher also sought the opinion of respondent on whether there was a schedule for Rural Energy Infrastructure Component of the ERT project in Uganda.

, 52(60.5%) respondents strongly agreed and 31(36%) agreed that there was a schedule for Rural energy Infrastructure Component of the ERT project in Uganda. project was simplewhile1 (1.2%) were not certain, 1 (1.2%) disagreed and 1(1.2%) respondent strongly disagreed. Findings from face to face interviews in agreement with the survey with100% of the respondents did accept that there was a schedule for rural energy Infrastructure Component of the ERT project in Uganda

On whether the project activities in Rural Infrastructure component of ERT project are always started on schedule, 48(55.8%) respondents disagreed and 25(29.1%) agreed that The project activities project were always started on schedule in Rural energy Infrastructure Component of the ERT project in Uganda. project was simple while 13(15.1%) were not certain. Findings from face to face interviews in agreement with the survey with100% of the respondents did not accept that The project activities project were always started on schedule for rural energy Infrastructure Component of the ERT project in Uganda. Documentary review revealed that the project activities are always delayed.

On whether the project activities in Rural Infrastructure component of ERT project were always completed on schedule, 48(55.8%) respondents disagreed and 27(31.4%) agreed that The project activities project were always completed on schedule in Rural energy Infrastructure Component of the ERT project in Uganda. project was simple while 11(12.8%) were not certain. Findings from face to face interviews in agreement with the survey with100% of the respondents did not accept that The project activities project were always completed on schedule for rural energy Infrastructure Component of the ERT project in Uganda. Documentary review revealed that the project activities were always completed late.

4.4.5.2 Project Cost Performance

The researcher also sought the opinion of respondent on project cost performance using three items using structured questions they were required to give their opinion using a five point likert scale ranging from strongly disagree to strongly agree. On whether there is a budget for rural energy Infrastructure Component of the ERT project in Uganda, 47(54.7%) respondents strongly agreed and 34(39.5%) agreed that there was a budget for the rural infrastructure component of ERT project in Uganda. project was simple while 4(4.7%) were not certain and 1(1.2%) respondent disagreed. Findings from face to face interviews in agreement with the survey with100% of the respondents did not accept that there was a budget for the rural infrastructure component of ERT project in Uganda. Documentary review revealed that the approved project budget was available.

On whether the budget of the rural infrastructure component activities is adequate, 9(10.5%) respondents strongly agreed and 22(25.6%) agreed that the budget of the rural infrastructure component activities are adequate. Which mean that the majority either disagreed or were not certain. Actually 11(12.8%) were not certain and 30(34.9%) respondent disagreed and 14(16.3%) strongly disagreed. Findings from face to face interviews in disagreed with the survey with100 % of the respondents did accept that the budget of the rural infrastructure component activities are adequate. Documentary review revealed that the approved project budget was adequate.

On whether the activities of the rural infrastructure component of ERT are always completed within the project budgeted cost, 18(20.9%) respondents strongly disagreed and 28(32.6%) disagreed that the activities of project are always completed within the project budgeted cost while 17(19.8%) respondents were not certain and 23(26.7%) of the respondents agreed. Findings from face to face interviews in agreed with the survey with 58.3 % of the respondents did not accept that the activities of project are always completed within the project budgeted cost. Documentary review revealed project cost overran.

4.4.5.3 Project Quality performance /Quality specification

The researcher also sought the opinion of respondent on project quality performance/ specification using three items using structured questions they were required to give their opinion using a five point likert scale ranging from strongly disagrees to strongly agree.

The researcher also sought the opinion of respondent on whether there were quality specifications for the outputs in the rural infrastructure component. 41(20.9%) respondents strongly agreed and 32(37.2%) agreed that there were quality specification for project component while 13(15.1%) respondents were not certain. Findings from face to face interviews in agreed with the survey with 75 % of the respondents did accept that the activities of project are always completed within the project budgeted cost. Documentary review revealed project there were no specified quality standards for rural energy infrastructure component of ERT project.

On whether the quality specifications of the outputs are crosschecked against set standards, 16(18.6%) respondents strongly agreed and 56(65.1%) agreed that the quality specifications of the outputs are crosschecked against set standards while 12(14%) respondents were not certain, 1(1.2%) disagreed and 1(1.2%) strongly disagreed. Findings from face to face interviews in agreed with the survey with 75 % of the respondents did accept the quality specifications of the outputs are crosschecked against set standards. Documentary review revealed no evidence of the quality specifications of the outputs are crosschecked against set standards in rural energy infrastructure component of ERT project.

The researcher also sought the opinion of respondent on whether the output/deliverables of rural infrastructure component of ERT meets the projects products specification.

8(9.3%) respondents strongly disagreed and 40(46.5%) disagreed that the output/deliverables of rural infrastructure component of ERT meets the projects products specification while 34(39.5%) respondents were not certain and 4(4.7%) agreed this concurs with findings from documentary review of M&E reports were there were several recommendation on replacing non-functional part of equipment meaning they were not meeting quality standards. However, findings from face to face interviews in agreed revealed that83.3 % of the respondents did accept the output/deliverables of rural infrastructure component of ERT meets the projects products specification the quality because the performance indicators of the project were more about on targets and coverage but not quality.

4.4.5 Project Quality Management and Performance

The purpose of this study was to assess the influence of quality management on the performance of the Energy Infrastructure component in the Energy for Rural Transformation (ERT) project in Uganda the research hypothesized that there is significant relationship between quality management and performance of the Energy Infrastructure component in the ERT project in Uganda. To ascertain this relationship, that the researcher correlated PQM and performance, and regressed to determine the strength and direction of the relationship.

4.4.5.1 Correlation between Project Quality management and Performance

The study aimed at establishing the relationship between project quality management and performance of the Energy Infrastructure component in the ERT project in Uganda. In order to test the hypothesis and a provide information indicating direction, strength and significance of the relationship between project quality management and performance in rural energy infrastructure in the ERT project, Pearson product moment correlation was analysed and generated Pearson correlation coefficient presented in table 35 below.

Table 35: Correlation between Project Quality Management and Performance

		Performance	PQM
Performance	Pearson Correlation	1	0.325**
	Sig. (2-tailed)		0.003
	N	86	84
PQM	Pearson Correlation	0.325**	1
	Sig. (2-tailed)	0.003	
	N	84	84

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

Source: From researcher's field data

From the above table 35, the results indicated a correlation coefficient of 0.325 at a significance level of 0.01. This implies that there is a positive significant relationship between project quality management and performance in the rural energy infrastructure component of the ERT project. The Pearson product moment correlation, a measure of correlation between two variables and in this case was positive 0.325 and the significance value was 0.003 at level of significant of 0.01.

This means that the relationship between project quality management and performance is positive implying that implementing project quality management contributes to performance enhancements in the rural energy infrastructure component in the ERT Project. The Pearson correlation value of 0.325 signifies a moderate and statistically significant relationship between project quality management and performance. Thus the alternate hypothesis that there is a significant relationship between project quality management and performance of the Energy Infrastructure component in the ERT project in Uganda is sustained and thus the null hypothesis is rejected.

4.4.5.2 Regression of Project Quality Management and Performance

A regression analysis was further done to determine the strength of the relationship between project quality management and performance as illustrated below.

Table 36: Regression Model Summary funding guidelines

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.325[a]	0.106	0.095	4.11890

a. Predictors: (Constant), PQM

Source: From researcher's field data

The result from the regression model summary in the table above revealed that the R-square which is the percentage of variability accounted for by the variables in the model was 0.0.106 or 10.6%. The R-squared of a regression is the fraction of the variation in the dependent variable that accounted for by the independent variable. The ANOVA was done to test if project quality management and performance is statistically not significant.

H_0; The regression is NOT statistically significant,

H_0; The value is NOT statistically significant different from zero

from the ANOVA table 37 below, p=0.003 thus confirming that it is statistically significant and significantly affects performance of rural energy infrastructure component in the ERT project there for the alternate hypothesis is accepted.

Table 37: ANOVA[b] table for Funding Guidelines

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	164.127	1	164.127	9.674	0.003[a]
	Residual	1391.159	82	16.965		
	Total	1555.286	83			

a. Predictors: (Constant), PQM

b. Dependent Variable: Performance

Source: From researcher's field data

Table 38: Regression coefficient[a] table for Funding Guidelines

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.348	5.899		1.754	0.083
	PQM	4.986	1.603	0.325	3.110	0.003

a. Dependent Variable: Performance

Source: From researcher's field data

The regression analysis in table 38 above confirms a positive relationship with a significant impact of project quality management on the performance of rural energy infrastructure component of ERT beta (β) value of 0.325 (32.5%). This implies that project quality management effect on performance is 32.5% which is also in agreement with the correlation results stated earlier of 0.325 (32.5%)and therefore substantiate on the acceptance of the hypothesis that there is significant relationship between project quality management and performance of rural energy infrastructure component in ERT project.

The regression further indicated a positive relationship between project quality management and performance with unstandardized coefficient of 4.986 and beta (β) of 0.325. The regression results further indicated that the probability value (p-value) of the coefficient 0.003 which is not significantly different from zero indicating that there is significant relationship and thus quality assurance does significantly affect performance of rural energy infrastructure component in the ERT project.

4.4.6 Summary of Major Findings

The major findings of the study were that:

i. There was a weak positive relationship between project quality planning and performance, and that effect of quality planning on project performance was NOT significant

ii. There was a positive significant relationship between quality assurance and project performance

iii. There was a weak positive relationship between project quality control and performance, and that the effect of project quality control on performance was NOT significant.

iv. There was a positive relationship between funding and performance, and that and that the moderating effect of funding guideline on performance was NOT significant.

CHAPTER FIVE

SUMMARY, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study was an assessment of project quality management and performance of the energy infrastructure component in the energy for rural transformation project in Uganda. This has six key sections; the summary of the research process and findings, the discussion of results, conclusions, limitations, contributions, recommendations arising from the study findings, the sections will be organized on objective by objective basis.

5.2 Summary of Findings

The purpose of this study was to assess the relationship between quality management and the performance of the Energy Infrastructure component in the Energy for Rural Transformation (ERT) project in Uganda. The data collection process was a triangulation of qualitative and quantitative approaches.

The quantitative data was collected using self-administered questionnaire, coded and entered in the computer and analysed using SPSS software. The analysis included first descriptive statistics to generate frequencies, percentages, mean, and standards deviation. This was followed by correlation analysis to establish the relationship between variables and then regression analysis to establish the magnitude and direction of the relationship and extent of the variability that can be explained from the variables under study. The qualitative data coding was done using themes and looking common patterns regarding the research variables.

5.2.1 Major Findings

5.2.1.1 Objective One

The first objective of the study was to find out the relationship between quality planning and performance of the Energy Infrastructure component in the ERT project in Uganda. The researcher looked at the four different outputs of Quality planning during the investigation. These output included; quality management plan, quality metrics (operational definitions), quality checklist and project management plan.

The study established that:

i. The study found out that there is a correlation between quality planning and performance in the rural energy infrastructure component of the ERT project. The Pearson correlation value is positive 0.153 and the significance value is 0.161 implying that when project quality planning is done the project performance will improve by 1.2%.

ii. The study also deduced from the regression analysis conducted that project quality planning did NOT had a significant contribution to project performance since the probability value (p-value) is significantly different from 0.000 (0.161). the hypothesis that was stated that "There is a significant relationship between quality planning and performance of the Energy Infrastructure component in the ERT project in Uganda" was rejected

5.2.1.2 Objective Two

The second objective of the study was to examine the relationship between quality assurance and performance of the Energy Infrastructure component in the ERT project in Uganda. The research looked at the four different outputs of Quality assurance during the investigation.

These output included; recommended corrective actions, requested change, project management plan and quality improvement. The study established that:

i. The study established a positive significant relationship between quality assurance and performance in the rural energy infrastructure component of the ERT project, given the Pearson correlation value of 0.459**. The relationship was statistically significant as p-value was less than 0.05(=0.000).This therefore implies that implementing quality assurance activities would enhance project performance. Therefore 21% of the variability in project performance can be explained by project quality assurance.

ii. The study also deduced from the regression analysis quality assurance had a significant contribution to project performance, since p-value was 0.000. The hypothesis which was stated that "There is a significant relationship between quality assurance and performance of the Energy Infrastructure component in the ERT project in Uganda" is sustained

5.2.1.3 Objective Three

The Third objective of the study was to establish the relationship between quality control and performance of the Energy Infrastructure component in the ERT project in Uganda. The research looked at the three different outputs of Quality control during the investigation. These output included; quality control measurements, recommended preventive actions, and process adjustments. The study established that:

i. The study further found out that there was a positive relationship between quality control and performance in the rural energy infrastructure component of the ERT project. The Pearson correlation value is positive 0.172 and the significance value is 0.116 implying that when project quality planning is done the project performance will improve by 1.8%.

ii. The study also deduced from the regression analysis conducted that project quality control did NOT had a significant contribution to project performance since the probability value (p-value) is significantly different from 0.000 (0.116). The hypothesis that was stated that “There is a significant relationship between quality control and performance of the Energy Infrastructure component in the ERT project in Uganda” was rejected.

5.2.1.4 Objective Four

The third objective of the study was to assess the moderating effects of funding policy on the Energy Infrastructure component in the ERT project in Uganda.

The study established that:

i. The study found out that there was a positive relationship between funding and performance in the rural energy infrastructure component of the ERT project. The Pearson correlation value is positive 0.150 and the significance value is 0.167 implying that when project funding guidelines is done the project performance will improve by 1.1%.

ii. The study also deduced from the regression analysis conducted that project quality control did NOT had a significant contribution to project performance since the probability value (p-value) is significantly different from 0.000 (0.167).

5.3 Discussion of Findings

The study was conducted on rural energy infrastructure component of energy for rural transformation in Uganda. It covered 98 respondents consisting of 6 accounting officers, 6 project monitoring team, 6 project coordinating team, 27 project implementation team and 58 service providers the project that includes constructors and sub-constructors. The discussion of the findings was based on the objectives that were set in chapter one and arranged in the way it flows in chapter four.

5.3.1 Quality Planning and Performance

The first objective of the study was to find out the relationship between quality planning and performance of the Energy Infrastructure component in the ERT project in Uganda. Findings of the study established that there was a weak positive relationship between project quality planning and performance, quality planning explained only up to 1.2% of performance of rural energy infrastructure component in the ERT project in Uganda. Project quality planning effect on the performance of rural energy infrastructure component in the ERT project in Uganda was NOT significant. This implies that 98.8% of the performance variation in rural energy infrastructure can be explained by other factors. Qualitative results indicated case of variation on planning based on targets and coverage and not quality, and lack of qualified staff in project management.

This finding tends to contradict common understanding of project quality management such as the definition of project quality planning described by project management institute (PMI)that involves identifying the relevant quality standards to the project and determining how to satisfy them (PMBOK, 2004) this description of quality planning also concurs with BIS (2010) guidelines for managing projects which asserts that without careful planning it is likely that your project will fail to achieve its objectives and this also agrees with Milton & Gregory (2005) who said that project success doesn't just happens it comes from people using common sense tools that are suited for special nature of project and applied in an organization environment. It also does not follow Deming's strategies based on his "Plan-do-check-Act (PDCA)" cycle (Hunt, 1992) and his "14 points" to management to achieve this transformation (Deming, 2000). Michelle (June 2011), asserts that the quality management plan documents the organization's quality management policy for effective execution of projects which is also in agreement with Alzahrani, & Emsley (June 2012) who identifies amongst the most significant factors affecting projects success It also provides guidelines to the project management team to record and effectively cross reference the project activities in accordance with the stated project objectives. Without quality management plan in rural energy infrastructure component of ERT, it is difficult to cross reference the project activities in accordance the quality objectives. The absence of key documents such quality policy and quality management plan which guide in quality planning and provides outputs quality planning in rural energy infrastructure component in the ERT project need a deep and a more involving.

5.3.2 Quality Assurance and Performance

Quality assurance is likely to have a relationship with performance of the Energy Infrastructure component in the ERT project in Uganda. The correlation results of this study established that there was a positive significant relationship between quality assurance and project performance. This means that the more increase in quality assurance activities, the more the project performance will improve in terms of project cost, time and meeting the specification Quality assurance explained up to 21% on the total variation in the performance of rural energy infrastructure component in the ERT project meaning that the remaining 79%is the contribution from other variables. This could partly explain the other factors such as past performance, environment, management and technical aspects, resource, organization, experience, size/type of pervious projects, and finance identified by Alzahrani, & Emsley (June 2012) amongst the most significant factors affecting projects success. This result agrees with Steyn (2008) work about providing a managerial framework for managing quality on several specific projects and concurs with the quality management principles in ISO 9000 which is a base of an efficient, effective and adaptable QMS and are applicable throughout industry, commerce and the service sectors. According to the department of trade and industry in the United Kingdom, a QMS enables an organisation to achieve the goals and objectives set out in its policy and strategy.

According PMBOK 2004, Quality management plan update is part of quality assurance. The study revealed that project management plans are not updated in Rural Energy Infrastructure component in the ERT project which is a gap between project planning and execution/implementation. This is also in agreement with Kenneth, 2005 asserts that monitoring specific project results serves several important purposes. Results may confirm that all is well. If results are within specifications (no variance from specifications is indicated), the project team knows that performance is proceeding according to plan. Qualitative results indicated laxity on the part of the project monitoring team and the service provider coupled by lack of quality planning.

The study earlier on established a positive significance between quality assurance and performance of the project; the findings of the study therefore coupled with the views of those other scholars define the importance of project quality assurance in particular and project quality management as a critical knowledge area in project management that must be focused.

5.3.3 Quality Control and Performance

The third objective of the study was to establish the relationship between quality control and performance of the Energy Infrastructure component in the ERT project in Uganda. Findings of the study established that there was a weak positive relationship between project quality control and performance, quality control explained only up to 1.8% of performance of rural energy infrastructure component in the ERT project in Uganda. Project quality control effect on the performance of rural energy infrastructure component in the ERT project in Uganda was NOT significant. This implies that 98.2% of the performance variation in rural energy infrastructure can be explained by other factors. The study revealed that the project does have quality control measurements and Qualitative results indicated case of variation on control based on targets and coverage and not quality; and lack of qualified staff in project management. This confirms the study findings that the project component did not have quality standards specifications for the project. This findings disagrees with Kenneth (2014) who defines Quality control as a process that monitors specific project results to ensure that results conform to specifications, who concurs with PMI (PMBOK,2004) definition of quality control as monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance thus without the quality standards in place it may not be possible to conduct quality control.

This disharmony between the study finding and the literature suggest that project quality control may not be well understood the project environment are ignored or taken for granted. A critical examination of the tools and methodology used may assist to come out with more authoritative explanations on the dimension.

5.3.4 Moderating effect of Funding Guidelines on Performance

The third objective of the study was The Third objective of the study was to assess the moderating effects of funding policy on the Energy Infrastructure component in the ERT project in Uganda. Findings of the study established that there was a weak positive relationship between funding guidelines and performance; funding guidelines explained only up to 1.1% of performance of rural energy infrastructure component in the ERT project in Uganda. The moderating effect of funding guidelines on the performance of rural energy infrastructure component in the ERT project in Uganda was NOT significant. This implies that 98.9% of the performance variation in rural energy infrastructure can be explained by other factors. The study revealed that there are clear funding guidelines that are always followed and thus the problem is not the funding guideline but implementation. According to World Bank (2009) implementation and completion report, 2009 its Implementation started slowly with most components not ready for implementation at the time of approval in December 2001. This also agrees with the Midterm Review (MTR) of first phase (ERT I) in October 2004 indicates that less than 10% of the funds had been disbursed. The study however revealed that there were no budget provisions for project quality management related issues including adequate and competent personnel and these could have some influence the performance there for changing the status quo.

5.4 Conclusion

The following logical conclusions were drawn from the study in the objective chronology.

5.4.1 Quality Planning and Performance

The first objective of the study was to find out the relationship between quality planning and performance of the Energy Infrastructure component in the ERT project in Uganda**.**

The study established that Rural Energy Infrastructure component in the ERT project does not have a quality management plan in place. This means that the project manager and the project team may not fulfill the quality policy and yet quality policy gives the overall intentions and direction of a project with regard to quality. The study also revealed that Rural Energy Infrastructure component in the ERT project does not have a quality metrics in place.

Meaning that the project team may not know in very specific terms, the activities in the project and how to measure the during the quality control process (PMBOK, 2004).

The study further revealed that Rural Energy Infrastructure component in the ERT project has quality checklist in place. This suggests that the project team may neglect checking quality or may not be consistent. The found out that Rural Energy Infrastructure component in the ERT project has project management plan in place which does not take into consideration the quality aspects of the parameter and there project quality cannot monitored.

From the analysis of quantitative data, the researcher concluded that project quality planning does NOT have significant relationship with project performance as attested by only 1.2% of variability in performance that can be explained by quality planning. The study however revealed that there was a positive relationship between quality planning and performance of the project which means that could be some other sub-dimensions of quality planning that the researcher did not explore that could cause more variability of performance as the researcher sees disagreement between the findings and literature. This may be due to some the exclusion of other outputs of quality planning such quality baseline and process improvement plan that the researcher did not consider in the study and did not collect data about them. It may suggest that the respondents had reservation while giving their opinions.

5.4.2 Quality Assurance and Performance

The second objective of the study was to examine the relationship between quality assurance and performance of the Energy Infrastructure component in the ERT project in Uganda.

The findings of the study showed that recommended corrective actions are allowed and takes place in Rural Energy Infrastructure component in the ERT project. It also revealed that request for change are made in the project component. This implies that quality assurance activities are implemented in Energy Infrastructure component in the ERT project in Uganda.

The study however revealed that Project Management plans are not updated in Rural Energy Infrastructure component in the ERT project. This there for implies that there are no adjustments to the project in terms of correction or prevention to non-conformities. The study found out that quality improvement in Rural Energy Infrastructure component in the ERT project.

The researcher concluded that project quality assurance has significant contribution to project performance as attested by21% of variability in performance that can be explained by quality assurance. And that a positive relationship between quality assurance and performance of the project exist.

5.4.3 Quality Control and Performance

The third objective of the study was to establish the relationship between quality control and performance of the Energy Infrastructure component in the ERT project in Uganda.

From the study findings, there was evident that Rural Energy Infrastructure component in the ERT project does have quality control measurements. This implies that the project team does monitor quality. The study however found out that recommended preventive corrective actions are allowed and takes place and that Process adjustments take place in Rural Energy Infrastructure component in the ERT project.

The study however revealed that there was a positive relationship between quality control and performance of the project which means that could be some other sub-dimensions of quality control that the researcher did not explore that could cause more variability of performance as the researcher sees disagreement between the findings and literature.

From the findings, the researcher concluded that project quality control does NOT have significant contribution to project performance as attested by only 1.8% of variability in performance that can be explained by quality control.

5.4.4 Moderating effect of Funding Guidelines on Performance

The fourth objective of the study was to assess the moderating effects of funding policy on the Energy Infrastructure component in the ERT project in Uganda. The study found out that Rural Energy Infrastructure component in the ERT project has funding guidelines and that there was a positive relationship between funding and performance. It further revealed that there was a positive relationship between funding and performance in the rural energy infrastructure component of the ERT project.

From the finding the researcher concluded that funding guidelines does NOT have significant contribution to project performance as attested by only 1.1%of variability in performance that can be explained by funding guidelines.

5.5 Recommendations

The following recommendations were proposed for implementation by key stakeholders in rural energy infrastructure component in the ERT project in Uganda

5.5.1 Quality Planning and Performance

In relation to objective one of the study which was to find out the influence of quality planning on performance of the Energy Infrastructure component in the ERT project in Uganda. And the finding which shows that there was a weak positive relationship between project quality planning and performance implying Project quality planning effect on the performance of rural energy infrastructure component in the ERT project in Uganda was NOT significant and in line with the literature which disagrees with the quantitative findings, though the quantitative results showed little influence of quality planning on the project component performance qualitative results and documentary review results indicated that it does significantly influence the performance of the project component. The researcher recommends that another study be conducted considering other quality planning output of quality baseline and process improvement plan using different methodology to validate the study. The researcher's recommendation is also that quality planning should be incorporated as core activity of the project in order to enhance project performance.

5.5.2 Quality Assurance and Performance

In relation to objective two of the study which was to examine the influence of quality assurance on performance of the Energy Infrastructure component in the ERT project in Uganda**.** The study findings revealed a significant relationship with a positive relationship between quality assurance and performance of the project of the Energy Infrastructure component in the ERT project in Uganda. An also in line with literature that quality management should be focused on increasing the ability to fulfill quality requirements which can be related to any aspect such as effectiveness, efficiency or traceability (ISO 9000:2008).

The researcher's recommendation is that quality assurance should be incorporated as core activities of the project in order to enhance project performance. Quality assurances activities alone explained up to 21% on the total variation in the performance of rural energy infrastructure component in the ERT project.

5.5.3 Quality Control and Performance

In relation to objective three of the study which was to establish the relationship between quality control and performance of the Energy Infrastructure component in the ERT project in Uganda. And that that project quality control does NOT have significant contribution to project performance but with a positive relationship. And in line with the literature which disagrees with the quantitative findings, though the qualitative results and documentary review indicated lack of capacity. The researcher's recommendation is that provisions should be made to incorporate quality control in the project in order to enhance project performance.

5.5.4 Moderating Effect of Funding Guidelines on Performance

In relation to objective four of the study which was to assess the moderating effects of funding policy on the Energy Infrastructure component in the ERT project in Uganda, the quantitative results showed little influence of funding guidelines on the project component performance qualitative results and documentary review indicated lack of focus on issues related to project quality management, the major focus is on the targets in terms of coverage not quality. Documentary review also revealed that there was no budget allocation for scope change that arose from Monitoring and Evaluation for quality and also the researcher noted lack of funding guidelines to build capacity in terms of competent personnel to handle project quality management. The researcher's recommendation is that there should be clear guidelines on funding for value for money emphasis on specification for the deliverables. Also the researcher recommends that funding guidelines should specify that there are always budget allocations for monitoring and evaluating project quality management and also for correcting non-conformity to standards specification or prevention of non-conformities to standards specifications.

5.6 Limitation of the study

The geographic scope of the study was limited to Kampala and its sounding areas located above the northern shores of Lake Victoria just above the Equator, valuable information would have been unveiled if the data was collected country wide where ERT project is being implemented. Also there may be also be discrepancy between the data collected and the reality on ground at the project implementation site therefore giving a wrong impression of the project performance.

Secondly the study was limited to assessing only the Energy Infrastructure component in the ERT project in Uganda. Therefore the results may not apply to the other components of the projects (Component 2: Information Communications Technologies and Component 3: Energy Development, Cross-Sectoral Links, and Impact Monitoring).

Third the study was assessing a government project where the researcher noted reservation of opinions by some potential respondents as result of history of several investigations of mismanagement of government projects/programmes. The implication is that some credible date may have been withheld and thus not giving a true picture of the project.

5.7 Contribution of the study

Past research in project management were mainly focused on the project “triple constraint” that includes time, cost, and scope as Elements of equal importance to project success. They also mainly focused on other project knowledge areas such as project scope management, project time management and project cost management. This research has been a ground breaking endeavor on assessing the influence of quality management on the project performance and has demonstrated that the project quality management i.e. quality planning, quality assurance and quality control does influence project performance (check font size).

The study has gone a long way in ensuring that project success comes when there functional quality assurance in place as suggested by Kenneth, (2005) a project manager should never, never, ever trade off quality during project implementation.

Another key contribution has been clearly bringing the practical linkages between quality management and the scope which should is based on customers' requirements/quality specification. This will guide project developers/designers, donors, and implementer in the planning and execution of projects especially engineering projects in Uganda and other developing countries.

Theoretically, the study contributes to the body of knowledge regarding the positive influence of project quality management on the performance enhancement of projects.

5.8 Areas recommended for further research

Considering the literature reviewed, methodology used, and the findings of the study, the researcher finds it imperative to recommend the following areas of further research;

Further research needs to be done on this same subject but considering a wider period of time, other than the ten years this study restricted its self to see whether the findings hold true.

Further research needs to be done on this same project but considering other project components, other than Energy Infrastructure component in the ERT project in Uganda this study restricted its self to see whether the findings hold true.

A similar study should be done using other study designs to find out whether the same results will be generated.

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Appendix I: Detailed Study Statistical Analysis Results

Response on Quality Policy

Response	Frequency	Percent	Cumulative Percent
strongly disagree	7	8.1 %	8.1 %
disagree	48	55.8 %	64.0 %
not certain	24	27.9 %	91.9 %
agree	7	8.1 %	100.0 %
Total	86	100.0 %	

Quality Management Plan clearly describes ways of implementing quality

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	11	12.8 %	12.8 %
Disagree	60	69.8 %	82.6 %
Not Certain	14	16.3 %	98.8 %
Agree	1	1.2 %	100.0 %
Total	86	100.0 %	

The Quality Plan is known to everyone in the project

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	19	22.1 %	22.1 %
Disagree	57	66.3 %	88.4 %
Not Certain	7	8.1 %	96.5 %
Agree	3	3.5 %	100.0 %
Total	86	100.0 %	

The Quality Plan is always evaluated for efficient and effectiveness

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	40	46.5 %	46.5 %
Disagree	41	47.7 %	94.2 %
Not Certain	5	5.8 %	100.0 %
Total	86	100.0 %	

There is Quality Matrix

Responses	Frequency	Percent	Cumulative Percent
Strongly Disagree	7	8.1	8.1
Disagree	47	54.7	62.8
Not Certain	28	32.6	95.3
Agree	4	4.7	100.0
Total	86	100.0	

The Quality Matrix identifies the critical success factor

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	15	17.4 %	17.4 %
Disagree	58	67.4 %	84.9 %
Not Certain	13	15.1 %	100.0 %
Total	86	100.0 %	

The Quality Matrix has key performance indicators (KPI) of project

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	25	29.1 %	29.1 %
Disagree	53	61.6 %	90.7 %
Not Certain	8	9.3 %	100.0 %
Total	86	100.0 %	

The Quality Matrix has identifiable processes that deliver KPI of project

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	37	43.0 %	43.0 %
Disagree	45	52.3 %	95.3 %
Not Certain	4	4.7 %	100.0 %
Total	86	100.0 %	

Quality Matrix has clear names of groups or ungrouped related process

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	51	59.3 %	59.3 %
Disagree	26	30.2 %	89.5 %
Not Certain	9	10.5 %	100.0 %
Total	86	100.0 %	

Names of grouped or ungrouped related processes are known

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	55	64.0	64.0
Disagree	26	30.2	94.2
Not Certain	5	5.8	100.0
Total	86	100.0	

There is checklist of quality parameters to be checked

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	1.2 %	1.2 %
Disagree	3	3.5 %	4.7 %
Not Certain	21	24.4 %	29.1 %
Agree	59	68.6 %	97.7 %
Strongly Agree	2	2.3 %	100.0 %
Total	86	100.0 %	

Checklist shows what to do when conducting quality checks

Response	Frequency	Percent	Cumulative Percent
Disagree	5	5.8 %	5.8 %
Not Certain	5	5.8 %	11.6 %
Agree	53	61.6 %	73.3 %
Strongly Agree	23	26.7 %	100.0 %
Total	86	100.0 %	

Records shows what has been done during quality checks

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	2	2.3 %	2.3 %
Disagree	10	11.6 %	14.0 %
Not Certain	10	11.6 %	25.6 %
Agree	56	65.1 %	90.7 %
Strongly Agree	8	9.3 %	100.0 %
Total	86	100.0 %	

Checklist is followed when performing quality checks

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	1.2 %	1.2 %
Disagree	7	8.1 %	9.3 %
Not Certain	17	19.8 %	29.1 %
Agree	56	65.1 %	94.2 %
Strongly Agree	5	5.8 %	100.0 %
Total	86	100.0 %	

The checklist is known to everybody involved

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	1.2 %	1.2 %
Disagree	6	7.0 %	8.1 %
Not Certain	31	36.0 %	44.2 %
Agree	44	51.2 %	95.3 %
Strongly Agree	4	4.7 %	100.0 %
Total	86	100.0 %	

There is Project Management Plan

Response	Frequency	Percent	Cumulative Percent
Not Certain	7	8.1 %	8.1 %
Agree	27	31.4 %	39.5 %
Strongly Agree	52	60.5 %	100.0 %
Total	86	100.0 %	

Project Management Plan takes into consideration the quality issues

Response	**Frequency**	**Percent**	**Cumulative Percent**
Strongly Disagree	14	16.3 %	16.3 %
Disagree	31	36.0 %	52.3 %
Not Certain	38	44.2 %	96.5 %
Agree	3	3.5 %	100.0 %
Total	86	100.0 %	

Project Management Plan is known to everybody involved

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	22	25.6	25.6
Disagree	44	51.2	76.7
Not Certain	20	23.3	100.0
Total	86	100.0	

The Project Management Plan is followed

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	35	40.7	40.7
Disagree	44	51.2	91.9
Not Certain	7	8.1	100.0
Total	86	100.0	

The Quality Management Plan makes it easy to follow the project management plan

Response	**Frequency**	**Percent**	**Cumulative Percent**
Strongly Disagree	19	22.1	22.1
Disagree	49	57.0	79.1
Not Certain	18	20.9	100.0
	86	100.0	

Quality Plan makes it easy to check the progress the project management plan

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	30	34.9	34.9
Disagree	36	41.9	76.7
Not Certain	20	23.3	100.0
Total	86	100.0	

There are periodic quality audits planned

Response	Frequency	Percent	Cumulative Percent
Disagree	1	1.2	1.2
Not Certain	4	4.7	5.8
Agree	25	29.1	34.9
Strongly Disagree	56	65.1	100.0
Total	86	100.0	

Quality Audits are conducted

Response	Frequency	Percent	Cumulative Percent
Not Certain	3	3.5	3.5
Agree	42	48.8	52.3
Strongly Agree	41	47.7	100.0
Total	86	100.0	

Non conformities to quality standards are normally identified during audits

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	1.2	1.2
Disagree	3	3.5	4.7
Not certain	6	7.0	11.6
Agree	51	59.3	70.9
Strongly Agree	25	29.1	100.0
Total	86	100.0	

Recommendations are always made to correct the non-conformities

Response	Frequency	Percent	Cumulative Percent
Not Certain	13	15.1	15.1
Agree	63	73.3	88.4
Strongly Agree	10	11.6	100.0
Total	86	100.0	

Recommendations made to correct non conformities are documented

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	3	3.5	3.5
Disagree	9	10.5	14.0
Not Certain	29	33.7	47.7
Agree	40	46.5	94.2
Strongly Agree	5	5.8	100.0
Total	86	100.0	

Requested changes/variations are allowed

Response	Frequency	Percent	Cumulative Percent
Not Certain	9	10.5	10.5
Agree	21	24.4	34.9
Strongly Agree	56	65.1	100.0
Total	86	100.0	

Any variation in the project implementation is requested for

	Frequency	Percent	Cumulative Percent
Disagree	2	2.3	2.3
Not Certain	10	11.6	14.0
Agree	40	46.5	60.5
Strongly Agree	34	39.5	100.0
Total	86	100.0	

There is a procedure of approval of requested variation

Response	Frequency	Percent	Cumulative Percent
Disagree	1	1.2	1.2
Not certain	9	10.5	11.6
Agree	61	70.9	82.6
Strongly Agree	15	17.4	100.0
Total	86	100.0	

The requested changes are easily approved

Response	Frequency	Percent	Cumulative Percent
Strongly disagree	2	2.3	2.3
Disagree	7	8.1	10.5
Not certain	14	16.3	26.7
Agree	53	61.6	88.4
Strongly Agree	10	11.6	100.0
Total	86	100.0	

The approved changes are documented.

	Frequency	Percent	Cumulative Percent
Disagree	4	4.7	4.7
Not certain	24	27.9	32.6
Agree	54	62.8	95.3
Strongly Agree	4	4.7	100.0
Total	86	100.0	

The approved changes are normally indicated

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	3	3.5	3.5
Disagree	35	40.7	44.2
Not Certain	35	40.7	84.9
Agree	13	15.1	100.0
Total	86	100.0	

The changes are adjusted in Project Management Plan

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	11	12.8	12.8
Disagree	51	59.3	72.1
Not Certain	20	23.3	95.3
Agree	4	4.7	100.0
Total	86	100.0	

Adjusted Project Management Plan is communicated

	Frequency	Percent	Cumulative Percent
Strongly disagree	23	26.7	26.7
Disagree	43	50.0	76.7
Not certain	20	23.3	100.0
Total	86	100.0	

Old project management plan is withdrawn and replaced by updated version

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	8	9.3	9.3
Disagree	14	16.3	25.6
Not certain	32	37.2	62.8
Agree	26	30.2	93.0
Strongly agree	6	7.0	100.0
Total	86	100.0	

Management reviews quality audit findings

Response	Frequency	Percent	Cumulative Percent
Not certain	4	4.7	4.7
agree	33	38.4	43.0
Strongly Agree	49	57.0	100.0
Total	86	100.0	

Commitments are undertaken for corrective actions on non- conformities to quality

Response	Frequency	Percent	Cumulative Percent
Not certain	5	5.8	5.8
Agree	52	60.5	66.3
Strongly Agree	29	33.7	100.0
Total	86	100.0	

Corrections are done on non-conformities to improve the quality

Response	Frequency	Percent	Cumulative Percent
Disagree	4	4.7	4.7
Not Certain	28	32.6	37.2
Agree	44	51.2	88.4
Strongly Agree	10	11.6	100.0
Total	86	100.0	

Corrections are reviewed for effectiveness and adjusted where required

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	8	9.3	9.3
Disagree	20	23.3	32.6
Not Certain	42	48.8	81.4
Agree	16	18.6	100.0
Total	86	100.0	

There are set acceptable quality standards

Response	Frequency	Percent	Cumulative Percent
Disagree	2	2.3	2.3
Not Certain	3	3.5	5.8
Agree	33	38.4	44.2
Strongly Agree	48	55.8	100.0
Total	86	100.0	

Routine Inspections are conducted

Response	Frequency	Percent	Cumulative Percent
Disagree	1	1.2	1.2
Not certain	8	9.3	10.5
Agree	45	52.3	62.8
Strongly Agree	32	37.2	100.0
Total	86	100.0	

Deviations from the set standards for activities

Response	Frequency	Percent	Cumulative Percent
Not Certain	11	12.8	12.8
Agree	64	74.4	87.2
Strongly Agree	11	12.8	100.0
Total	86	100.0	

Records of compliance and non-compliance to standards requirements are kept

Response	Frequency	Percent	Cumulative Percent
Disagree	3	3.5	3.5
Not Certain	13	15.1	18.6
Agree	67	77.9	96.5
Strongly Agree	3	3.5	100.0
Total	86	100.0	

Decisions to accept or reject the outcome are always taken

Response	Frequency	Percent	Cumulative Percent
Strongly disagree	12	14.0	14.0
Disagree	39	45.3	59.3
Not Certain	30	34.9	94.2
Agree	5	5.8	100.0
Total	86	100.0	

Non-conformities to quality are normally predicted during quality audits

	Frequency	Percent	Cumulative Percent
Disagree	3	3.5	3.5
Not Certain	7	8.1	11.6
Agree	25	29.1	40.7
Strongly Agree	51	59.3	100.0
Total	86	100.0	

Recommendations are made to prevent the non-conformities

Response	Frequency	Percent	Cumulative Percent
Not Certain	8	9.3	9.3
Agree	54	62.8	72.1
Strongly Agree	24	27.9	100.0
Total	86	100.0	

Recommendations made to prevent the identified non-conformities are documented

Response	Frequency	Percent	Cumulative Percent
Not certain	10	11.6	11.6
agree	64	74.4	86.0
Strongly agree	12	14.0	100.0
Total	86	100.0	

Commitments are undertaken to prevent non- conformities to quality

	Frequency	Percent	Cumulative Percent
Strongly Disagree	20	23.3	23.3
Disagree	49	57.0	80.2
Not Certain	16	18.6	98.8
Agree	1	1.2	100.0
	86	100.0	

Approved requested changes /variations are complied

Response	Frequency	Percent	Cumulative Percent
Disagree	1	1.2	1.2
not certain	9	10.5	11.6
Agree	28	32.6	44.2
Strongly Agree	48	55.8	100.0
Total	86	100.0	

Corrective actions are taken on non-conformities to quality

Response	Frequency	Percent	Cumulative Percent
Disagree	1	1.2	1.2
Not Certain	7	8.1	9.3
Agree	57	66.3	75.6
Strongly Agree	21	24.4	100.0
Total	86	100.0	

Preventive Actions are taken to prevent non-conformities

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	1.2	1.2
Disagree	2	2.3	3.5
Not certain	9	10.5	14.0
Agree	59	68.6	82.6
Strongly Agree	15	17.4	100.0
Total	86	100.0	

Changes/Variations made always recorded

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	1.2	1.2
Disagree	3	3.5	4.7
Not certain	10	11.6	16.3
Agree	65	75.6	91.9
Strongly agree	7	8.1	100.0
Total	86	100.0	

Records for the changes are filed

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	2	2.3	2.3
Disagree	2	2.3	4.7
Not Certain	15	17.4	22.1
Agree	47	54.7	76.7
Strongly Agree	20	23.3	100.0
Total	86	100.0	

The project deliverables are validated based on the per project quality standards

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	1.2	1.2
Disagree	2	2.3	3.5
Not Certain	14	16.3	19.8
Agree	61	70.9	90.7
Strongly Agree	8	9.3	100.0
Total	86	100.0	

The project deliverables validated results are recorded and records kept

	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	1.2	1.2
Disagree	4	4.7	5.8
Not Certain	29	33.7	39.5
agree	42	48.8	88.4
Strongly agree	10	11.6	100.0
Total	86	100.0	

There is a schedule for releasing funds

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	1.2	1.2
Not Certain	2	2.3	3.5
Agree	29	33.7	37.2
Strongly Agree	54	62.8	100.0
Total	86	100.0	

Guideline from the donor is strictly followed

	Frequency	Percent	Cumulative Percent
Disagree	2	2.3	2.3
Not certain	10	11.6	14.0
Agree	42	48.8	62.8
Strongly Agree	32	37.2	100.0
Total	86	100.0	

It is easy to request for funds release

Response	Frequency	Percent	Cumulative Percent
Disagree	3	3.5	3.5
Not certain	9	10.5	14.0
Agree	44	51.2	65.1
Strongly Agree	30	34.9	100.0
Total	86	100.0	

The approval for funds project is simple

Response	Frequency	Percent	Cumulative Percent
Disagree	15	17.4	17.4
Not Certain	17	19.8	37.2
Agree	42	48.8	86.0
Strongly Agree	12	14.0	100.0
Total	86	100.0	

The schedule for the funds release is strictly followed

Response	Frequency	Percent	Cumulative Percent
Not Certain	19	22.1	22.1
Agree	58	67.4	89.5
Strongly Agree	9	10.5	100.0
Total	86	100.0	

There is a Project Schedule

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	1.2	1.2
Disagree	1	1.2	2.3
Not certain	1	1.2	3.5
Agree	31	36.0	39.5
Strongly Agree	52	60.5	100.0
Total	86	100.0	

The project activities project are always started on schedule

	Frequency	Percent	Cumulative Percent
Strongly Disagree	25	29.1	29.1
Disagree	48	55.8	84.9
Not Certain	13	15.1	100.0
Total	86	100.0	

The project activities are always completed on schedule

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	27	31.4	31.4
Agree	48	55.8	87.2
Not certain	11	12.8	100.0
Total	86	100.0	

There is a budget for the rural infrastructure component of ERT project

Response	Frequency	Percent	Cumulative Percent
Agree	1	1.2	1.2
Not certain	4	4.7	5.8
Agree	34	39.5	45.3
Strongly Agree	47	54.7	100.0
Total	86	100.0	

The budgets of the Rural Infrastructure component activities are adequate

	Frequency	Percent	Cumulative Percent
Strongly Disagree	14	16.3	16.3
Agree	30	34.9	51.2
Not Certain	11	12.8	64.0
Agree	22	25.6	89.5
Strongly Agree	9	10.5	100.0
Total	86	100.0	

The activities of project are always completed within the project budgeted cost

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	18	20.9	20.9
Disagree	28	32.6	53.5
Not certain	17	19.8	73.3
Agree	23	26.7	100.0
Total	86	100.0	

there are quality specifications for project component

Response	Frequency	Percent	Cumulative Percent
Not Certain	13	15.1	15.1
Agree	32	37.2	52.3
Strongly Agree	41	47.7	100.0
Total	86	100.0	

The quality specifications of the outputs are crosschecked against set standards

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	1	1.2	1.2
Disagree	1	1.2	2.3
Not certain	12	14.0	16.3
Agree	56	65.1	81.4
Strongly Agree	16	18.6	100.0
Total	86	100.0	

The output/ meets the projects products specification

Response	Frequency	Percent	Cumulative Percent
Strongly Disagree	8	9.3	9.3
Disagree	40	46.5	55.8
Not certain	34	39.5	95.3
Agree	4	4.7	100.0
Total	86	100.0	

Appendix II: Introductory Letter from UMI

UGANDA MANAGEMENT INSTITUTE

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Telefax: 256-41-4259581 /314
E-mail: admin@umi.ac.ug

Plot 44-52, Jinja Road
P.O. Box 20131
Kampala, Uganda
Website: http://www.umi.ac.ug

Your Ref:

Our Ref: G/35

17 September 2013

TO WHOM IT MAY CONCERN

MASTERS IN MANAGEMENT STUDIES DEGREE RESEARCH

Mr. Richard Ebong is a student of the Masters Degree in Management Studies of Uganda Management Institute 29th Intake 2012/2013 specializing in Project Planning and Management, **Reg. Number 12/MMSPPM/29/029.**

The purpose of this letter is to formally request you to allow this participant to access any information in your custody/organisation, which is relevant to his research.

His Research Topic is: ***"Assessment of Quality Management and Performance of the Energy Infrastructure Component in the Energy for Rural Transformation Project in Uganda"***

Gerald Karyeija (PhD)
AG. DEAN, SCHOOL OF MANAGEMENT SCIENCES

Appendix III: Questionnaire

Uganda Management Institute
School of Management Science
Research Study for a Master's Degree in Management Studies (Project Planning and Management)

Dear Respondent,

I am a Masters student at the School of Management Science, Uganda Management Institute pursuing **a Masters' in Management Studies (Project Planning and Management option).** I am carrying out a study **to assess the influence of quality management on the performance of the Energy Infrastructure component in the Energy for Rural Transformation (ERT) project in Uganda.** You have been identified to participate in this study because of your unique knowledge and I believe that you can provide credible relevant information to enhance the study.

The information gathered in this study is purely for academic purpose and shall be treated with uttermost **confidentiality.**

Thanks in advance for accepting to respond to this questionnaire and looking forward for your continuous cooperation.

Yours Sincerely,

Richard Ebong (**Researcher)**
Reg. No: 12/MMSPPM/29/029

Questionnaire

SECTION A. Background Information (*Please tick the appropriate box corresponding to a particular question.)*

A.1 Gender				
Male ☐	Female ☐			
A2. Age group (*tick appropriate group*)				
Below 18 ☐	Between 18 and 35 ☐	Between 35 &50 ☐	Between 50 and 60 ☐	Above 60 ☐
A3. Education Level (*tick appropriate group*)				
No certificate ☐	Certificate ☐	Diploma ☐	Bachelor's Degree ☐	Masters , PhD☐

For the following section B, C, D & E *Please tick the appropriate box corresponding to a particular question. The abbreviations to the right hand corner of the questionnaire mean; SD- Strongly Disagree, D-Disagree, N-Not certain, A-Agree and SA-Strongly Agree.*

Strongly Disagree Disagree Not certain Agree Strongly Agree

SECTION B: Quality Planning ***(****quality planning in a projects involves identifying the relevant quality standards to the project and determining how to satisfy them)*

		SD	D	N	A	SA
B1. Quality management plan*(describe how the project management team will implement its quality policy. And Quality policy is the overall intentions and direction of an organization with regard to quality, as formally expressed by top management)*		SD	D	N	A	SA
1	There is a quality policy for Energy Infrastructure component of ERT project					
2	The quality management plan clearly describes ways of implementing quality in Energy Infrastructure component of ERT project					
3	The quality plan in Energy Infrastructure component of ERT project is known to everyone in the project					
4	The quality plan is always evaluated for efficient and effectiveness in the project component					
B2. Quality matrix/Operation definitions *(Quality metrics describes, in very specific terms, what something is, and how it is measured by the quality control process)*[1]		SD	D	N	A	SA
5	There is quality matrix in the Energy Infrastructure component of ERT project					
6	The quality matrix in Energy Infrastructure component of ERT project identifies the critical success factors/performance drivers to achieve project objectives					
7	The quality matrix in the project component has key performance indicators (KPI) of project.					
8	The quality matrix in project component has identifiable processes that deliver Key Performance Indicators of project.					
9	The quality matrix in Energy Infrastructure component of ERT project has clear names of groups or ungrouped related process					
10	The names of grouped or ungrouped related processes in the quality matrix in the project are known to all stakeholders in the project					
B3. Quality checklist		SD	D	N	A	SA
11	There are checklists of quality parameters to be checked in the project component					
12	The checklist shows what to do when conducting quality checks in the project component					
13	The records shows what has been done during quality checks in the project component					
14	the checklist is followed when performing quality checks in the project					

		SD	D	N	A	SA
	component					
15	The checklist is known to everybody involved in the project component					
	B4. Project management plan	SD	D	N	A	SA
16	There is project management plan for Energy Infrastructure component of ERT project					
17	The Project management plan takes into consideration the quality issues in Energy Infrastructure component of ERT project					
18	The project management plan is known to everybody involved in Energy Infrastructure component of ERT project					
19	The project management plan is followed in Energy Infrastructure project component					
20	The quality management plan makes it easy to follow the project management plan in Energy Infrastructure component of ERT project					
21	The quality plan makes it easy to check the progress the project management plan in Energy Infrastructure component of ERT project					

SECTION C: Quality Assurance

	C1. Recommended corrective actions	SD	D	N	A	SA
22	There are periodic quality audits planned for project component					
23	Quality audits are conducted in the project component					
24	Non conformities to quality standards are normally identified during audits in project component					
25	Recommendations are always made to correct the non-conformities identified during quality auditing in Energy Infrastructure project component					
26	The recommendations made to correct the identified non conformities during quality auditing are documented in Energy Infrastructure project component					
	C2. Requested changes /Variations	SD	D	N	A	SA
27	variations are allowed in the Energy Infrastructure component of ERT project					
28	Any variation in the project implementation is requested for in Energy Infrastructure project component					
29	There is a procedure of approval of requested variation in the project component					
30	The requested changes are easily approved in the project component					
31	The approved changes the project component are documented/recorded					
	C3. Project Management plan updates	SD	D	N	A	SA
32	The approved changes are normally indicated in project management plan of Energy Infrastructure component of ERT project					
33	The changes are adjusted in project management plan for Energy Infrastructure project component					
34	The adjusted project management plan is communicated to all the project stakeholders of Energy Infrastructure project component					
35	The old project management plan is withdrawn and only the updated version remains in circulation at the Energy Infrastructure project component					
	C4. Quality improvement (*includes taking action to increase the effectiveness and efficiency of the project to provide added benefits to the project stakeholders*)	SD	D	N	A	SA
36	Management reviews quality audit findings of the project component					
37	Commitments are undertaken for corrective actions on non- conformities to quality detected during quality audits in Energy Infrastructure project component					
38	Corrections are done on non-conformities to improve the quality in Energy Infrastructure project component					
39	Corrections are reviewed for effectiveness and adjusted where required					

SECTION D: Quality Control *(part of quality management focused on fulfilling quality requirements)*

	D1. **Quality control measurements**	SD	D	N	A	SA
40	There are set acceptable quality standards the project component					
41	Routine Inspections are conducted on the project component as per the set standards					
42	Deviations from the set standards for activities of the project are identified					
43	Records of compliance and non-compliance to standards requirements are kept in Energy Infrastructure project component					
44	Decisions to accept or reject the outcome are always taken in Energy Infrastructure project component					
	D2. Recommended preventive actions	SD	D	N	A	SA
45	Non conformities to quality are normally predicted during quality audits Energy Infrastructure component of ERT project					
46	Recommendations are always made to prevent the non-conformities to quality identified during quality auditing theproject.					
47	The recommendations made to prevent the identified non conformities to quality during auditing are documented in Energy Infrastructure component of ERT project					
48	Commitments are undertaken to prevent non- conformities to quality detected during quality audits Energy Infrastructure component of ERT project					
	D3. **Process adjustments**	SD	D	N	A	SA
49	Approved requested changes /variations are complied with in Energy Infrastructure component of ERT project					
50	Corrective actions are taken on the non-conformities to quality detected during audits in Energy Infrastructure component of ERT project as per the project standard					
51	Preventive actions are taken to prevent non-conformities in project component					
52	Changes/Variations made in Energy Infrastructure component of ERT project are always recorded					
53	Records for the changes in Energy Infrastructure component of ERT project as per the project are filed					
54	the project deliverables are validated based on the quality standards as per Energy Infrastructure component of ERT project agreed standards					
55	The project deliverables validated results are recorded and records kept in project					

SECTION E: Funding Guidelines (MV)

	E1. Fund Release Format (Funding Cycle)	SD	D	N	A	SA
56	There is a schedule for releasing funds the project component					
57	There is a guideline from the donor for project component that is strictly followed					
58	It is easy to request for funds release to the project component					
59	The approval for funds to ERT project component is simple					
60	The schedule for the funds release to the project component is strictly followed					

SECTION F: Performance (DV)

	F1 Time /Schedules	**SD**	**D**	**N**	**A**	**SA**
61	There is a schedule for Rural Infrastructure component of ERT project					
62	The project activities are always started as per the schedule					
63	The project activities are always completed on schedule					

	F2 Project Cost	SD	D	N	A	SA
64	There is a budget for the Rural Infrastructure component of ERT project					
65	The budget of project activities are adequate					
66	The activities are always completed within the budgeted project cost					
	F3 Quality /performance specifications	**SD**	**D**	**N**	**A**	**SA**
67	There are quality /performance specification for the outputs in Rural Infrastructure component					
68	The quality specifications of the outputs are crosschecked against project set standards.					
69	The deliverables meets the projects products/services specifications					

Thank you for your response

Appendix IV: Interview Guide

1. **General**
   a) Do you appreciate the value of Project quality management in ERT project?
   b) How can it facilitate the improvement of performance of ERT Energy Rural Infrastructure project component?
2. **Quality planning**
   a) Is there quality policy for ERT Energy Rural Infrastructure project component?
   b) How is quality planning done for ERT Energy Rural Infrastructure project component?
   c) Who is responsible for quality planning in ERT Energy Rural Infrastructure project component?
   d) How is quality plan disseminated?
   e) Is quality plan implemented in ERT Energy Rural Infrastructure project component?
   f) Who implements the quality plan?
   g) Has quality planning been of any use?
3. **Quality assurance**
   a) Who is responsible for quality assurance in ERT Energy Rural Infrastructure project component
   b) Are quality audits done in ERT Energy Rural Infrastructure project component?
   c) Who conducts the audits?
   d) Are reviews for audit finding conducted?
   e) How are audit findings handled
4. **Quality control**
   a) Are there ERT Energy Rural Infrastructure project component acceptable standards
   b) Are inspection done on project activities/deliverables in ERT Energy Rural Infrastructure project component?
   c) Who does the inspection in ERT Energy Rural Infrastructure project component?
   d) Are there inspection guideline/checklist in ERT Energy Rural Infrastructure project component?
   e) Are these guidelines followed in ERT Energy Rural Infrastructure project component?

f) Are the records of inspection kept in ERT Energy Rural Infrastructure project component?
g) How are the process adjustment done in ERT Energy Rural Infrastructure project component?
h) How are changes done in ERT Energy Rural Infrastructure project component?
i) Who approves requested changes in ERT Energy Rural Infrastructure project component?

5. **Funding Guidelines**
   a) Are there donor guidelines on ERT Energy Rural Infrastructure project component?
   b) Is there procedure of releasing funds to ERT Energy Rural Infrastructure project component?
   c) What is the procedure of funds approval to ERT Energy Rural Infrastructure project component?
   d) How are fund release schedules and accountability of the funds

6. **Performance**
   a) Are there specific timelines for the projects ?
   b) How are they followed?
   c) Is there a specific vote/budget allocation for Rural infrastructure component?
   d) Is it adequate?
   e) Are there project specification for the project deliverables?
   f) How is it monitored?

Appendix V: Documentation Review Check-list

Category	Tick
Reports	✓
Minutes of meetings	✓
Monitoring and Evaluation findings	✓
Project PAD	✓
Strategic Plans	✓
Work plans	✓
Project Procurement Records	✓

Analysis criteria:

1. Check for relevance of contents of document for this study
2. Verify authenticity
3. Check for issues on stakeholders engagement and sustainability
4. Identify outstanding issues
5. Extract relevant information

Thank you for your responses

Appendix VI: R.V. Krejcie and D. W. Morgan (1970) Table determining Sample size

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	301	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	100000	384

Source:V: *R.V. Krejcie and D. W. Morgan (1970),*