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GRADUATE SCHOOL

ASSESSMENT OF FACTORS INFLUENCING PERFORMANCE OF ROAD CONSTRUCTION PROJECTS IN UGANDA: A CASE STUDY OF MINISTRY OF WORKS AND TRANSPORT

BY

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A DISSERTATION SUBMITTED TO KYAMBOGO UNIVERSITY GRADUATE SCHOOL IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT DEGREE OF KYAMBOGO UNIVERSITY

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Certification

The undersigned certify that they have read and hereby recommend for acceptance by Kyambogo University a dissertation /thesis titled; assessment of factors influencing performance of road construction projects in Uganda: a case study of Ministry of Works and transport; in fulfilment of the requirement for the award of a degree of Masters of Science in Construction Technology and Management of Kyambogo University.

Signature ……. Date…….

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Signature……...Date……

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Declaration

I, Stephen Seninde, declare that this submission is my own work and that to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree of the University or other institute of higher learning, except where due acknowledgement has been made in the text and reference list.

Signature …… Date: …….

SENINDE STEPHEN.

Reg. 17/U/14664/GMET/PE

Dedication

This dissertation report is dedicated to my wife, Sarah Nakamya without whose moral support, understanding, patience, inspiration and encouragement this work would have been difficult to accomplish. She had to handle some of my duties just to enable me to concentrate on my studies.

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List of Abbreviations

CBE	Civil and Building Engineering
ECI	Early Contractor Involvement
ESI	Early Supplier Involvement
GNP	Gross National Product
IT	Information Technology
KPIs	Key Performance Indicators
KYU	Kyambogo University
MOWT	Ministry of Works and Transport
PGD	Postgraduate Diploma
PPM	Project Planning and Management
RII	Relative Importance Index
PPI	Project Performance Indicators
UMI	Uganda Management Institute

Abstract

The road construction projects in Uganda suffer from many problems and complex issues in performance such as; cost, time, scope and quality. The aim of this study was to assess the factors influencing performance of road construction projects in Uganda. The study adopted a descriptive research design and data were collected using questionnaires from 147 purposively selected respondents from Local construction companies, consultancy firms, and government officials from Ministry of Works and District Local governments. Relevant literature was reviewed to establish actual factors influencing performance of road construction projects in Uganda. Data were coded and entered into statistical packages for social scientists (SPSS) version 25. A total of 43 performance factors were identified and categorized into five factor groups. The data were analyzed descriptively using statistical correlation and regression analysis, multi-variate analysis and relative importance index (RII) was used to rank the identified factors. The study revealed five most significant and influential factors; contractors, clients/owners, contractor's ability to mobilize to site, availability of funds, and cash flows, and three least influential factors; inadequate mobilization of resources, inadequate geotechnical and hydrological studies and lack of equipment. The study concluded that; contract management factors, project stake holders' factors, and project financing factors significantly influence the performance of road construction projects in Uganda. The research study also recommended among others; setting aside finances for the project before commencement, putting in place competent supervision team for contract management, ensure fair and transparent procurement processes for proper performance of road construction projects.

Key Words: Assessment, Performance, Road construction projects, relative importance index.

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CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

In the world over, construction industry is the sector involved with the erection, repairs, and demolition of buildings and civil engineering structures in the economy (Nyangwara *et al.,* 2015). Road construction industry plays a major role in development and achievement of the goals of a society. Construction is one of the largest industries and contributes about 10% of the gross national product (GNP) in industrialized countries (Navon and Isaac, 2014).

Generally, the construction works are increasing rapidly to meet the growing needs of the population and to keep up with global development. Construction industry is complex in its nature as it involves number of parties such as clients, contractors, consultants, stakeholders, and regulators. These parties affect the performance of projects through many related topics and factors such as; time, cost, quality, client satisfaction, productivity and safety. There are other genuine reasons like closures, modification of drawings and changes of design. Other grounds affecting road construction projects performance are poor management and guidance, poor relations and coordination, lack of motivation, control, monitor, or decision-making systems, inadequate infrastructure, political problems, cultural problems and economic conditions (Alias *et al.*, 2017).

The development in the construction industry is increasing in size, technological complexity, interdependencies and variations in demand from the client. Success criteria which relate to construction project often changes from project to project

depending on participants, scope of services, project size and sophistication of the owner related to the design of facilities, technological implication and variety of other factors.

A research done by Rowlinson and Lingard (2008), observed that project stakeholders, project procedures, human aspects and environment may affect project performance. These factors may be associated with the different parties who participate in construction projects and each of them will play their individual roles contributing to the success of the project. The team of a construction project is normally formed by the client, design professionals who consist of architect, civil and structural engineers, and construction professionals who are formed by main contractors and subcontractors, suppliers, surveyors, among others. It is also widely believed that the performance of projects consists of performance of all the stages with each other to result in the final performance according to time, cost, and quality and other factors (Rowlinson and Lingard, 2008). This research study therefore seeks to assess the various factors that influence performance of road construction projects in Uganda.

1.2 Statement of the Problem

Odhiambo and Munturi, (2017) and Nwachukwu *et al.*, (2010), termed a road construction project to be successfully completed if it passed four success test criteria namely, the time – completed on time; the cost or funds – completed within budget; the effectiveness – completed in accordance with the original set performance and quality standards; and client's satisfaction – accepted by the intended users or clients, whether the client is internal or from outside the organization/entity.

However, in Uganda today the road construction sector is full of projects that are completed with significant cost, scope, and time deviations, a case of Kanoni – Sembabule – Villamaria (120 KM) and Hima – Katunguru (58KM) construction projects were investigated due to implementation irregularities in the order of Ushs 322 billion (US 87,278million) Mwelu *et al.,* (2019). Most road construction projects are eventually completed more or less to specification, although they are seldom on time and within budget. When a road project is not completed according to the initial time plan, a delay occurs and increases project cost which causes poor project outcomes and service delivery to project beneficiaries.

Previous studies show and prove that the failure of any project is mainly related to the problems and failure in performance (Duggan and Elisa, 2019). In road construction industry there are factors that have affected performance of road construction projects. Many road construction projects have been affected by various challenges, greatly influencing performance of road construction projects. It is a major concern for every stakeholder in a road construction industry to understand these factors (Hemanta, 2013).

Thus, if the key factors of influence that attribute to the performance of road construction projects continue to be taken very lightly, government will remain to lose billions of shillings in failed or poorly executed road projects. This research therefore further, sought to look at the factors that influence performance of road construction projects, that stakeholders need to address. It is hoped that in addressing these factors the performance of road construction projects will greatly be enhanced.

1.3 Objectives of the Study

1.3.1 Main Objective

The main objective of the study was to assess the factors influencing the performance of road construction projects in Uganda.

1.3.2 Specific Objectives

The specific objectives of the study were:

i) To establish the factors influencing the performance of road construction projects in Uganda;

ii) To establish the extent of impact of the factors of influence on performance of road construction projects in Uganda;

iii) To determine the relationship between the factors influencing performance and the performance of road construction projects in Uganda; and

iv) To develop a framework to improve the performance of road construction projects in Uganda.

1.4 Research Questions

Based on the objectives stated in 1.3.2 above, the research has attempted to answer the following questions:

i) What are the factors influencing performance of road construction projects in Uganda?

ii) What is the extent of impact of the factors of influence on performance of road construction projects in Uganda;

iii) What is the relationship between factors influencing project performance and the performance of road construction projects in Uganda?

iv) What can be done to improve the performance of road construction projects in Uganda?

1.5 Research Justification

This research dissertation is very important to address the causes of poor execution of road projects, to avert project cost overruns, time overruns, out of scope and quality standards. The practices concerning the key performance indicators (KPI) such as time, cost, scope, project owner satisfaction, and quality of output and safety checklist have been assessed in order to know the main practical problems of influence in the performance of road construction projects, and then develop the framework to improve performance of road construction projects in Uganda as well as the region and subsequently improve on travel costs, travel time and vehicle maintenance costs.

1.6 Significance

The output of this research is contributing to the understanding of the factors influencing the performance of road construction projects in the road sector of the developing countries like Uganda.

The result of the research is vital to other researchers who are involved in formulation of policies, and make contributions to literature with more data on the factors influencing performance of road construction projects in the construction industry. This study can be merged with others done in other nations/regions for comparison of factors influencing performance of road construction projects in order to facilitate worldwide exploration on the strategies to improve performance of road construction contracts/projects.

1.7 Scope of the Study

1.7.1 Content Scope

The study focused on the factors influencing performance of road construction projects as the independent variables and the performance of road construction projects as the dependent variables. The independent variables were identified through the review of literature and interviewing experts, while the dependent variables were based on the major key performance indicators which included timely delivery, effectiveness and efficiency, quality of work and customer satisfaction. The variables considered were used to examine the relationship between the factors influencing performance and key performance indicators (KPIs) of the road construction projects in Uganda.

1.7.2 Geographic Scope

The study was carried out within the Ministry of Works and Transport – Uganda, focusing on the interconnectivity project implemented and funded directly by central government through MOWT. The interconnectivity project was under implementation for 10 years and was concluded in 2019. The central government is represented by MoWT which is responsible for transport policy and the development of national roads as stipulated by the constitution through, the Roads Act, the UNRA Act, and the Local Government Act.

1.7.3 Time scope

In order to effectively capture data relating to the factors influencing performance and key performance indicators, the research study took 9 months during 2018 - 2019 academic year.

1.8 Conceptual framework

The conceptual frame work was developed to show the relationship between independent variables (factors influencing performance), dependent variables (performance of road construction projects - key performance outputs) as well as the moderating variables aimed at providing guidance to the study. According to Kisavi *et al.,* 2019, a conceptual frame work is useful in portraying the relationship between the independent and dependent variables under study. This study focused on factors influencing performance of road construction projects as the independent variables. The identified independent factors included; procurement factors, project management factors, risk occurrence factors, project financing factors and project stake holders' factors. The conceptual framework for the study is depicted as indicated in Figure 1.1.

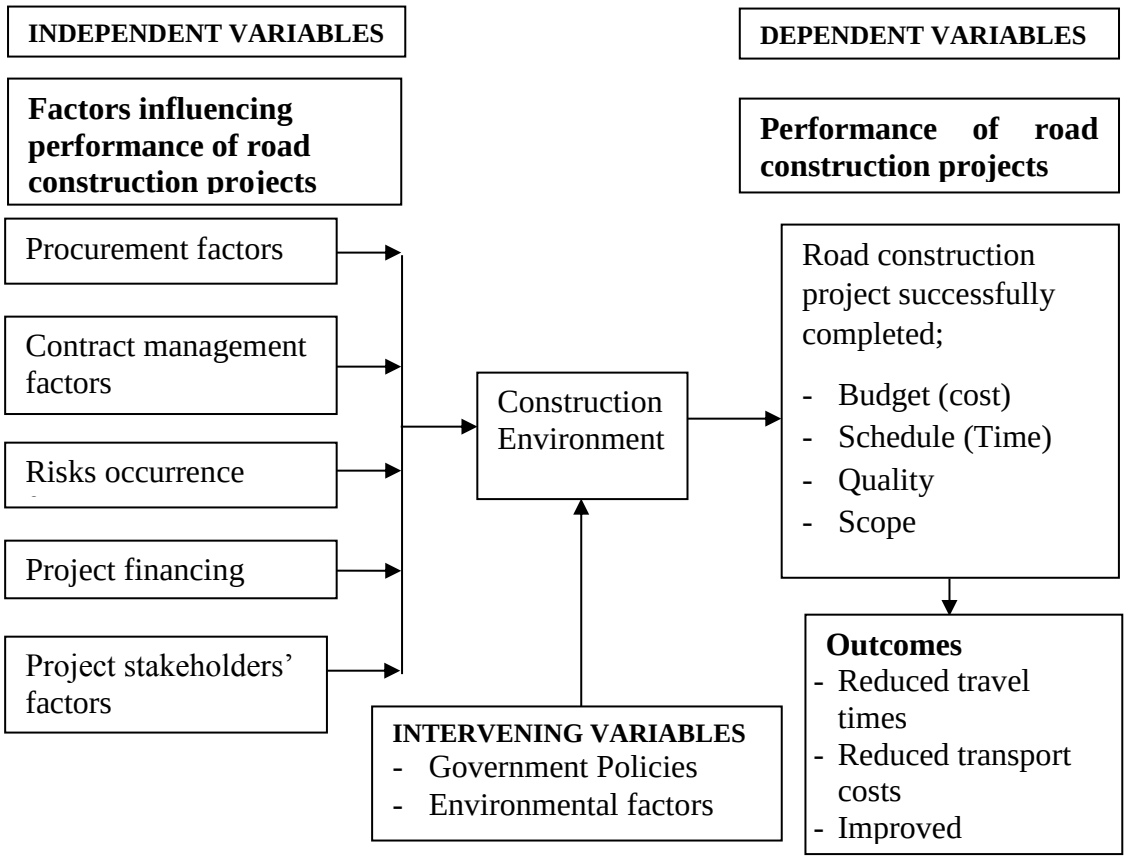

Figure 1. 1 Conceptual frame work of the study

1.9 Chapter Summary

This chapter looked at the introduction to the research study which included discussion of the background information in relation to the challenging factors and successes in the road construction sector; globally, regionally and Uganda in particular. The introduction highlighted that in Uganda most road construction projects are completed with cost overruns, out of quality, beyond time of completion, and out of scope.

The major aim of the research study was highlighted as to assess factors influencing performance of road construction projects in Uganda and specifically; to establish the factors, their impact, determine the relationship between the factors and the performance of road construction projects in Uganda, and to develop a frame work to improve the performance of road construction projects in Uganda.

This chapter also discussed the significant output of this research as, contributing to the understanding of the factors influencing the performance of road construction projects in the road sector in particular developing countries like Uganda. The conceptual framework was developed to show the relationship between the factors influencing the performance of road construction projects (independent variables) and the performance of road construction projects (dependent variables).

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter analyses past literature on factors influencing performances in the road construction sector with particular focus on factors influencing performance of road construction projects. Some of the key concepts used in the research are highlighted including some theoretical contributions from literature. A literature review helps in the development of understanding of previous research that has been done relating to the objectives, aims and helps in refinement of the ideas to which the research will be built. The literature review was obtained from secondary sources; relevant magazines and journals, institutional research publications and reports, financial text books, government publications and projects among others.

2.2 Definition and Concepts

Okuwoga (2014), stated that the performance of the construction industry is considered as the source of concern to both public and private sector clients. Karim and Morosszeyky (2009), studied performance measurement using Key performance indicators (KPIs). KPIs enable a comparison between different projects and enterprises to identify the existence of particular patterns. The specialist contractors hoped that the data trends observed would provide insight into certain inefficiencies that are prevalent in the market. They intend to use the data to expose these inefficiencies and as a basis for industry development.

Key performance indicators (KPIs) include factors such as time, cost, quality, client satisfaction, client changes, business performance and safety in order to enable measurement of project and organizational performance throughout the construction

industry. This information can then be used for benchmarking purposes, and will be a key component of any organization move towards achieving best practices (Duggan and Elisa, 2019). Lehtonen (2001), stated that performance measurement is a current issue in academia, as well as in business community. Samson and Lema (2002) stated that KPIs are very important in order to deliver value to stakeholders. So, companies must be sure they have right processes and capabilities in place. The KPIs also allow to trace which processes and capabilities must be competitively and distinctive, and which merely need to be improved or maintained.

Performance measurement and its indicators had been studied for several years. Karim and Marosszeky (2009), defined performance measurement as an operational management accounting including financial and non-financial performance indicators. Karim and Marosszeky (2009), stated that performance measurement is a process of re-thinking and re-evaluation of business processes to achieve significant performance improvement of projects. Reichelt and Lyneis, (2009) defined performance measurement as a model which treat project as the complex dynamic system.

Chan and Kumaraswamy (2000) remarked that project performance measurement includes time, budget, safety, quality and overall client satisfaction. Thomas (2002) defined performance measurement as monitoring and controlling of projects according to regular basis. Kuprenas (2003), stated that project performance measurement means an improvement of cost, schedule, and quality for design and construction stages. Long *et al.*, (2004), stated that a project performance measurement is related to many indicators such as; time, budget, quality, specifications and stakeholder' satisfaction. Early Contractor Involvement (ECI) and Early Supplier Involvement (ESI) give

contractors and suppliers the opportunity to give advice and/or specific ideas earlier to enhance performance.

According to previous studies, concepts and definitions, it can be said that the performance measurement is a process that include factors as Key Performance Indicators (KPIs) such as time, cost, quality, client satisfaction; productivity and safety in order to enable measurement of current organizational project performance and to achieve significant performance improvements of future projects.

2.3 Problem of Performance in Construction Industry

The failure of any construction project is mainly related to the problems and failure in performance. Moreover, there are many reasons and factors which attribute to such problems. Ogunlana *et al.,* (2015), stated that the construction industry performance problems in developing economies can be classified in three layers: problems of shortages or inadequacies in industry infrastructure (mainly supply of resources), problems caused by clients and consultants and problems caused by contractor incompetence/inadequacies. Okuwoga (2014), identified that the performance problem is related to poor budgetary and time control. Long *et al.,* (2004), remarked that performance problems arise in large construction projects due to many reasons such as: incompetent designer/contractors, poor estimation and change management, social and technological issues, site related issues and improper techniques and tools. Navon and Isaac (2014), stated that the main performance problem can be divided into two groups: (a) unrealistic target setting (i.e., planning) or (b) causes originating from the actual construction (in many cases the causes for deviation originate from both sources).

2.4 Construction Management and Performance

There is a strong relation between project management and project performance. Management in construction industry is considered as one of the most important factors affecting performance of works. Brown and Adams (2000), studied a new approach to the measurement of the effect of Building Project Management (BPM) on time, cost and quality outputs using 15 ‘case’ derived from UK data. The evaluation undertaken demonstrates that BPM as it is presently implemented in the UK fails to perform as expected in relation to the three predominant performance evaluation criteria; time, cost and quality (Brown and Adams, 2000). Lehtonen (2001), obtained a model for performance measurement which assist both firms’ top management and operational managers for continuous feedback on operational activities. Documenting and archiving performance data could be useful for future reference, such as for settling disputes on claims, maintenance and repair works (Thomas *et al.*, 2002). Kuprenas (2003), remarked that quantification of the impacts of the project management processes are identified through three steps of analysis: comparison of summary statistics of design performance, proof of statistical significance of any differences and calculation of a least squares regression line of a plot of design performance measurement versus amount/application of project management as a means to quantify management influence to design phase cost performance.

2.5 Information Technology and Construction Projects Performance

Information technology technique is very important in the entire world. Information technology (IT) opens new visions in the business and industries performance of the world. The construction industry is considered as one of the industries using IT

technique such as software management systems, database and communications (Olanipekun *et al.,* 2017). For many years, many processes, functions, operations were done difficulty because of absence of IT field. In addition, most of the work was done manually which lead to more cost, time and poor performance. Furthermore, IT usage in the construction industry leads to many changes, innovations and developing in many aspects which lead finally to good and strong performance. There are many benefits and relations of using IT in the construction projects such as: greater use of IT correlates with better project performance, owners and contractors realize meaningful benefits, IT affects schedule compression beneficially, and overall project cost savings which lead to a success performance of projects (Schwegler *et al.,* 2016)

2.6 Factors Affecting Performance of Managers

Ogunlana, *et al.,* (2015) recommended the need for focused effort by economy managers and construction industry associations to provide the infrastructure needed for efficient project management and performance. Dissanayaka and Kumaraswamy (1999), stated that the knowledge that would influence potential performance enables project managers to pay special attention to control performance more effectively. Chan and Kumaraswamy, (2006), remarked that effective communication and fast information transfer between managers and participants help to accelerate the building construction process and performance. Kuprenas (2003), studied the impact of the use of a project management based organizational structure, project manager training, frequency of design meetings, and frequency design reports on design phase cost performance. The process of a design team meeting frequency and the process of

written reporting of design phase progress were found to be statistically significant in reducing design phase costs.

2.7 Factors Affecting Cost and Time Performance

Ugwu and Haupt (2016), remarked that studies in various countries appear to have contributed significantly to the body of knowledge relating to time performance in construction projects over the past three decades, while Iyer and Jha (2005) remarked that project performance in term of cost is studied since 1960s. These studies range from theoretical work based on experience of researcher on one end to structured research work on the other end. Moreover, Pheng and Chuan (2006), stated that there have been many pasts studied on project performance according to cost and time factors.

Chan and Kumaraswamy (2000), stated that a number of unexpected problems and changes from original design arise during the construction phase, leading to problems in cost and time performance. Muizz *et al.*, (2020), stated that poor site management, unforeseen ground conditions and low speed of decision making involving all project teams are the three most significant factors causing delays and problems of time performance in local building works. Thus the effects of delay may include time and cost overruns, litigation and project abandonment. Okuwoga (2014), stated that cost and time performance has been identified as general problems in the construction industry worldwide. Karim and Morosszeyky (2009), remarked that project complexity, client type, experience of team and communication are highly correlated with the time performance; whilst project complexity, client characteristics and contractor characteristics are highly correlated with the cost performance. Reichelt and

Lyneis (2009), obtained that project schedule and budget performance are controlled by the dynamic feedback process. Those processes include the rework cycle, feedback loops creating changes in productivity and quality, and effects between work phases.

2.8 Measurement of Project Performance

Karim and Morosszeyky (2009), stated that performance measurement systems have been one of the primary tools used by the manufacturing sector for business process re-engineering in order to monitor the outcomes and effectiveness of implementation. Brown and Adams (2000), obtained an evaluation framework to measure the efficiency of building project management (BPM) by using conventional economic analysis tools such as time, cost and quality. Lehtonen (2001), stated that performance measurement systems are imminent in the construction firms. Samson and Lemma (2002), stated that effective and efficient management of contractor' organizational performance requires commitment to effective performance in order to evaluate, control, and improve performance today and in the future. Tangen (2004), remarked the choice of suitable measurement; the level of detail required; the time available for the measurement; the existence of available predetermined data; and the cost data; and the cost of measurement.

2.9 Key Performance Indicators

Karim and Marosszeky (2009), defined the purpose of KPL's as to enable a comparison between different projects and enterprises to identify the existence of particular patterns. Dissanayaka and Kumaraswamy (1999), used different representation values to evaluate time and cost performance such as project characteristics, procurement system, project team performance, client representation's

characteristics, contractor characteristics, design team characteristics, external condition. Karim and Marosszeky (2009), stated that the development and use of key performance indicators to measure performance such as cost of pricing the tender as a percentage of contract value, cost of pricing the tender as a percentage of contract value, number of times base tender price changed, time from the first tender to actual award of contract, average delay in payment of base claim, average delay in payment of agreed variations, average time for approval of agreed variations.

Samson and Lema (2002), remarked that characteristics of emerging performance measurement indicators need analysis of both organizations and environment such as nature of work, global competition, quality awards, organizational role, external demands and power of IT. The indicators should be able to identify causes of problems, address all possible performance drivers, and identify potential opportunities for improvement.

2.10 Project Success and Project Performance

Al-Momani (2000), stated that the success of any project is related to two features, which are service quality in construction delivered by contractors and the project owner's expectations. Managing the construction so that all the participants perceive equity of benefits can be crucial to project success. It is obtained that the complete lack of attention devoted to owner's satisfaction contributes to poor performance. Declining market shares, low efficiency and productivity, and the rapid construction cost escalation also lead to poor performance. Nitithamyong and Skibniewski (2004), remarked that the success of construction projects depends up on technology, process,

people, procurement, legal issues, and knowledge management which must be considered equally.

Pheng and Chuan (2006), defined project success as the completion of a project within acceptable time, cost and quality and achieving client's satisfaction. Project success can be achieved through the good performance indicators of the project.

2.11 Construction Participants

2.11.1 Construction clients

Studies indicate that little attention is given to the performance of the clients in the construction industry and there is a paucity of research that allows one to better understand the key roles of clients (Alinaitwe, 2008). Pheng and Chuan (2006), argue that poor project performance may not necessarily be due to the incompetence of anyone else but the client's actions before, during and after the project. Client's influence is one of the key contributing factors resulting in lack of commitment and contractor's inefficiency in the project (Hemanta *et al.*, 2012).

2.11.2 Government

The infrastructure has historically been the domain of government, from buildings roadways to waterways to subways. Safety, training, hiring, and wage bargaining are each enmeshed within the huge public sector expenditures on construction industry services (Gerald, 2015). In most countries, roads are the predominantly funded and constructed by the state and in Uganda, the MOWT's role of policy formulation regulation setting standards strategic planning monitoring and evaluation greatly influence road project performance and development.

2.11.3 Construction Consultants

The nature of the tasks assigned by the clients to consultants varies but generally consist of: project feasibility engineering investigations, coordination of designs and drawing works (Chitkara, (2005) and Anderson *et al.*, (2009)). They also estimate, plan budget, prequalify construction agencies, and award contracts to the successful bidders; designing project organization for executing works and developing standard operating procedures and systems; developing detailed construction plans; supervising works; including administration of contracts and controlling of project time, cost, quality, and scope management. These are the activities that determine the future actions and success.

2.11.4 Contractors

Construction contractors play an important role in the construction business as they execute most of the works. A competent construction contractor is one of the indispensable conditions of a proper process and completion of a construction project according to (Xiaohong, 2011).

2.12 Cost factors

Ngacho, (2014) argued that the cost management system tracks current spending and commitments and predicts ultimate cost outcome. Yafiah (2013), indicate that procurement selection criteria of cost, time, quality project characteristics and external environmental factors have effects on project performance. Tadewos and Patel (2018), found that the most common effects of cost overrun were delay, supplementary agreement, adversarial relations among stakeholders, and budget shortfalls of project owners which guides efforts to improve the performance of the construction industry

in the future. Aftab *et al.*, (2011) stated that fluctuation in price of material, cash flow and financial difficulties faced by contractors, shortage of site workers, lack of communication between parties, incorrect planning and scheduling by contractors are most severe factors while frequent design changes and owner interferences are the least affecting factors on construction cost performance. Amusan, (2011) discovered from the analysis that factors such as contractor's inexperience, inadequate planning, inflation, incessant variation orders, and change in project design were critical to causing cost overruns, while project complexity, shortening of project period and fraudulent practices are also responsible. Abera Legesse and Fekadu Takele, (2016) discovered that the increase in material cost is the single largest contributor to cost overruns for both global and local projects. Mrema and Mhando, (2005) found that in most cases malignancy of clients to assume roles of their consultants through making decisions and changes that affect the design and the project cost has undermined the efforts to attain the intended goals. Shaban, (2008) stated that the most important factors affecting the performance of construction projects agreed by the owners, consultants and contractors were: average delay because of closures and materials shortage, availability of resources as planned through project duration, leadership skills for project manager, escalation of material prices, availability of personnel with high experience and qualification and quality of equipment and raw materials in project.

2.13 Time factors

Time is money to owners, builders, and users of the constructed facility. From the owner's perspective there is lost revenue by not receiving return on investment, cash

flow crunch, potential alienation and loss of clients/ tenants, extended interest payments and negative marketing impacts. From the user's perspective, there are financial implications similar to owners (Muir B, 2005). Aje *et al.,* (2009) showed that contractors' management capability has significant impact on cost and time performance of construction projects. Wiguna and Scott, (2005) showed the critical risks affecting both project time and cost perceived by the contractors were similar. They were: high inflation/increased material price, design change by owners, defective design, weather conditions, delayed payment on contracts and defective construction work. With respect to time delays, the most significant contributing factor for global projects was late delay in payments while for the stadia projects design-related factors caused the most delas. Baloyi and Bakker, (2011) identified the factors that contribute substantially detrimental effects to project performance, thus affecting the integrity of the construction industry.

2.14 Quality Factors

Ngacho, (2014), stated that the quality management system monitors and analyses quality of the constructed project and predicts quality problems and issues. Typical quality measures include; (i) quality control tests: the number performed, frequency and percentage passed number of non-conformance issues, number of change requests and root causes, cost of rework, number of exceptions at turn over and cost of quality (ii) Quality Assurance cost (cost of resources): quality assurance cost as a percentage of construction cost. Lepartobiko (2012), stated that quality can be assured by identifying and eliminating the factors that cause poor project performance. Iyer and Jha, (2005), found that the project managers' competence and top management

support are found to contribute significantly in enabling in enhancing the quality performance of a construction project. Lack of contractor experienced topped the quality related cause of project failure. Akomah and Jackson (2016), discovered that major enablers that lead to project success are foreign expert's involvement in the project, government officials inspecting the project and very close supervision when new construction techniques are employed. A factor which leads to poor performance is the lack of accurate data on soil, weather, and traffic conditions.

2.15 Summary of Literature Review

According to previous studies, it can be said that the performance measurement is a process that include factors or Key Performance Indicators (KPIs) evaluated in order to enable measurement of current organizational project performance and to achieve significant performance improvements of future projects. It is observed that there are many fields and topics which are related to performance such as, construction management, information technology, factors affecting performance of managers, measurement of project performance, key performance indicator and benchmarking.

The key performance indicators are used to evaluate performance of construction projects. These indicators can then be used for benchmarking purposes, and will be as a key component of any organization to move towards achieving best practices and to overcome performance problem in road construction projects. The next chapter discussed the methods used in the research study and give concise strategies of how the research was conducted.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter focused on the research methods that were used in the study and attempts to give a clear and concise strategies or the description of how the research was undertaken. It presents the research design, study population, sample and sampling procedure, data collection tools and procedure, validity and reliability of research instruments and data analysis techniques.

3.2 Research Design

Research designs can be broadly classified into quantitative and qualitative research designs. Further, research designs can be divided into five types namely; descriptive research design, experimental research design, correlational research design, diagnostic research design, and explanatory research design.

According to Kotari (2004), research design is a plan, a road map and blue print strategy of investigations conceived so as to obtain answers to research questions. It is a procedural plan that is adopted by the researcher to answer research questions objectively, accurately and economically (Kumar, 1996).

This research study adopted descriptive research design since the researcher was interested in describing the case under research study and also undertook the multivariate analysis – rankings, correlations and regressions analysis. It is a theory based research design created to gather, analyze and present data. The study was carried out based on the logical research design/flow chart shown in Figure 3.1.

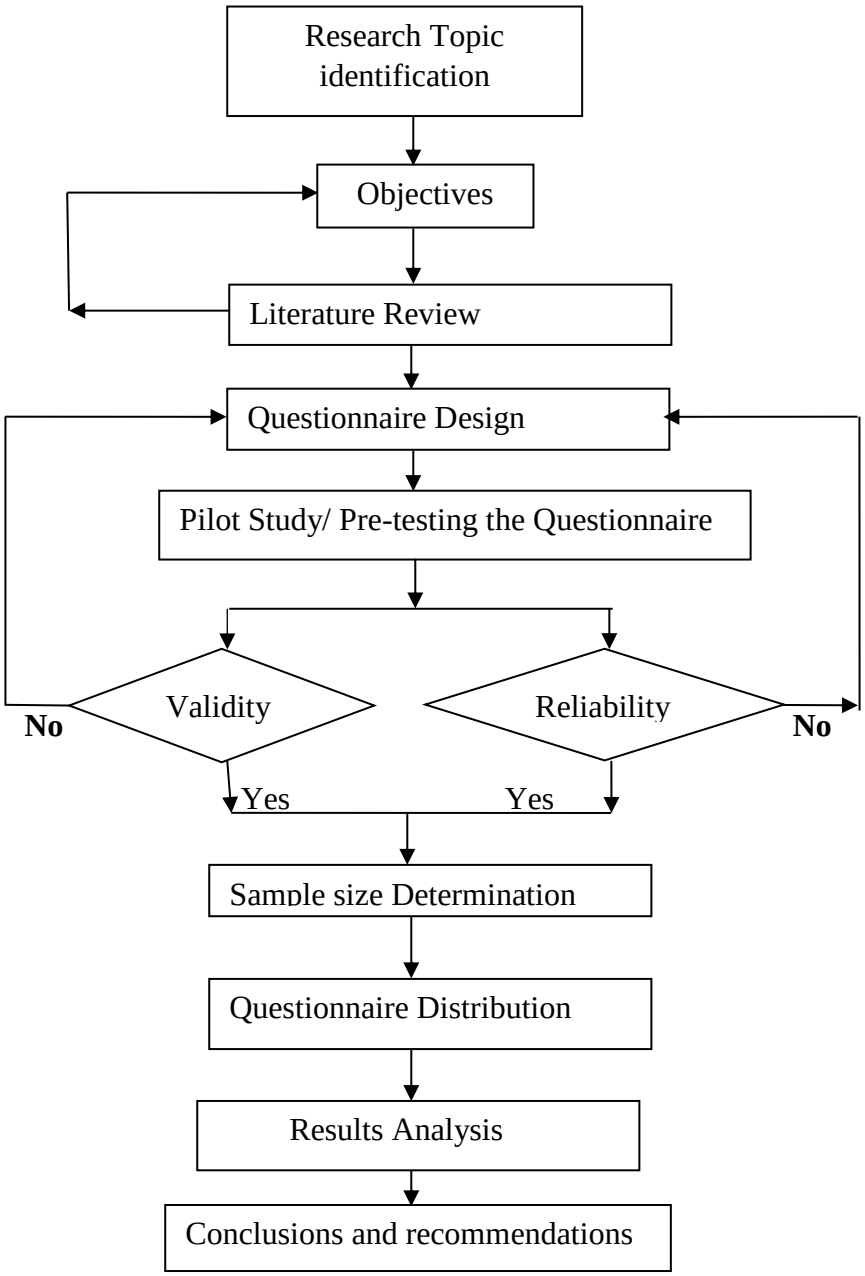

Figure 3.1 Research methodology flow chart

3.3 Research Approach/ Strategy

There are three approaches that exist in research studies; qualitative, quantitative and the mixed methods. Qualitative research is descriptive in nature, because it generally deals with non-numerical and un-quantifiable things. Whereas quantitative research is

much more numbers-driven. The emphasis is on the collection of numerical data. The conclusion then makes inferences based on that data (Amin, 2005).

The mixed methods research approach is an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks (Muleya *et al.*, 2020). The core assumption of this form of inquiry is that the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach alone.

This research used quantitative research approach in specific objective one that involved establishing the factors affecting performance of road construction projects through reviewing the literature and other documents. Quantitative research approach was used in specific objectives two and three since these involved use of numerical data to establish the impacts and relationship of the different identified factors with the performance of road construction projects. Whereas the mixed method was used in specific objective four which involved developing a framework to improve performance of road construction projects in Uganda. The basic methodology considered to achieve the objectives of this research was discussed according to each specific objective herein.

3.3.1 Establishing the factors influencing the performance of road construction projects

Literature review about the performance of road construction projects was conducted through reading the different journal papers, books, reports, and other important documents found existing in the road construction sector to establish the factors

influencing the performance of road construction projects. In addition, these factors were further confirmed through interviews of the different local experts in the area of study. The factors considered in the questionnaire were summarized and categorized according to other previous studies and other factors were added as recommended by local experts. The relative importance index (RII) values of the different factors under review were determined and their average computed. The relative importance index was computed as suggested by (Cheung *et al.,* 2004; iyer and Jha, 2005; Ugwu and Haupt, 2007), using equation 3.1.

$$RII = \frac{\Sigma W}{AxN} \quad \text{..... (Equation 3.1)}$$

Where; W is the weight given to each factor by respondents ranging from 1 to 5

A = the highest weight = 5

N = the total number of respondents

Using the RII values computed, the factors were ranked in ascending order and the factors with RII values above the average RII value were taken to be the most significant factors influencing performance of road construction projects. While those factors with their RII values below the average RII value were taken to be insignificant. Therefore, factors with RII > RII_{AV} were taken as significant factors and RII < RII_{AV} were taken as insignificant factors. The findings are presented in chapter four section 4.3.1.3.

3.3.2 Establishing the extent of impact of the factors influencing performance of road construction projects

A structured questionnaire survey approach was employed to study the impacts of the various attributes and factors influencing performance. The relative importance index

(RII) was used for ranking the various factors. The average of the RII for the various factors was computed and used as a baseline point above which they were considered as the significant factors having the most influencing impact on the performance of road construction projects. The impact of the various identified factors influencing the performance of road construction projects were categorized as low or high impact, using a Likert scale, where integers ascending or descending between 1 to 5 were used for rating the impact.

3.3.3 Establishing the relationship between the factors influencing performance and the performance of road construction projects

The degree of agreement between respondents regarding the factors influencing the performance of road construction projects in Uganda was calculated giving frequencies and their percentages. Correlation analysis was conducted using Spearman's rank correlation methods, for all the factors. This was done using SPSS and the computations presented in chapter four. The relationships of factors influencing performance and the performance of road construction projects were determined according to spearman's correlation as shown in equation 3.2

$R = 1 - [6\Sigma d^2 / n (n^2-1)]$ …….. (Equation 3.2)

Where;

R = Spearman's correlation coefficient

d = difference between ranks and d^2 = difference squared.

n = Sample population

After determining the degree of agreement between the respondents and the correlations amongst the independent variables and dependent variables, regression

analysis was conducted. Furthermore, the regression model for each group factors were developed to determine and predict the probability of their influence on performance so as to determine sub factors that matter the most, which factors can be ignored and how these factors influence each other using a general regression equation 3.3;

$Y= \beta_0+ X_1\beta_1+ X_2\beta_2 + X_3\beta_3 + X_4\beta_4 + X_5\beta_5 + X_6\beta_6 + X_K\beta_K$ ……. (Equation 3.3)

Where; Y = the dependent variable - performance of road construction projects,

β_0= the constant,

$X_{1\ldots}$. X_K = independent variables (Factors influencing performance),

β_1….. β_K = the estimates of the independent variables. i.e. the coefficients of the independent variables.

3.3.4 Developing a frame work to improve performance of road construction projects

To accomplish specific objective four, firstly the factors above the RII baseline point having impact on the performance of road construction were obtained from the results in specific objective two. Furthermore, an average RII for all sub-factors of the different group factors was computed to determine the baseline point, above which the factors were considered significant and below which the factors were considered insignificant to be employed to develop the framework to improve performance of road construction projects. The relative importance index (RII) was also used to establish the most significant factors that can be included in a framework to improve the performance of road construction projects.

In this research, Likert scales (ordinal scales) were used in specific objectives; one, two and three as shown in Table 3.1 for ranking or rating data. This normally uses integers in ascending or descending order.

Table 3.1 Ordinal scale used for data measurement

Item	Very high significance	High significance	Medium significance	Low significance	Very Low significance
Scale	5	4	3	2	1

3.4 Study Population

Barbie (2010) defined study population as the aggregation of elements from which a sample(s) is actually selected. The study population included fifty-four (54) contractors, one hundred twenty (120) technical employees from the fifty-four companies, and forty (40) consultants in the Ministry of Works and Transport (MoWT) and twenty-five (25) and fifty-three (53) government/MoWT officials and District Engineers respectively. The key respondents that informed this research included thirty (30) Contractors (managers), one hundred twenty senior employees from the sampled contractor's/construction companies, eighteen (18) MoWT officials, and twenty-five (25) consultants.

Table 3.2 Population of respondents

NO.	Respondents	Population	Sample	Selection criteria
1	Contractors	54	30	Purposive sampling
2	Four(4) Technical employees in each sampled construction company(30)	120	44	Purposive sampling
3	MoWT Officials	25	18	Purposive sampling
4	District Engineers	53	30	Purposive sampling
5	Consultants	40	25	Purposive sampling
	Total		**147**	

3.5 Sample Size and Sampling Strategies

3.5.1 Sample Size

A sample is a finite part of a statistical population whose properties are studied to gain information about the whole population. A good sample size should be adequate and representative of the underlying population. A sample of 30% is an adequate sample in a descriptive study of this nature as supported by Gay *et al* (2005). An optimum sample is one which fulfills the requirements of efficiency, representativeness, reliability and flexibility (Kothari, 2004). Amin (2005) emphasized that a researcher must determine the sample size that will provide sufficient data to answer the research problem. A sample is important to reduce costs, time, and has a high degree of accuracy (Amin, 2005).

The sample size was calculated using the following equation, in order to achieve 95% confidence level (Assaf *et al.,* 2001. Moore *et al.,* 2003).

$n = n' / [1 + (n'/N)]$ ……*(Equation 3.4)*

Where; N = total number of Population

n = sample size from infinite population

n′ = sample size from infinite population = S^2/V^2; where S^2 is the Variance of the population elements, and V is a standard error of sampling population (usually S = 0.5 and V = 0.06).

So, for 54 contractor organizations

- $n = n' / [1+ (n'/N)]$
- $n' = S^2/V^2 = 0.5^2/0.06^2 = 69.44$
- N = 54
- $n = 69.44 / [1+ (69.44/54)] = 30$

3.5.2 Sampling Strategies

- **Purposive Sampling**

Use of purposive sampling was relevant due to the need to select the most productive or knowledgeable respondents (personnel) within the sampled construction companies and the MOWT who meet the set criterion for the responses and interviews. Participants for the study were selected from the institutions identified as Ministry of works and transport, road construction consultants, and road construction firms/companies which are currently active or had previously been involved in the execution of road construction projects in the MoWT.

3.6 Area of Study

The study was conducted in the Ministry of Works and Transport under the interconnectivity project for rehabilitation of District roads focusing on contractors, consultants and engineering staff, who undertook the road construction/rehabilitation

works on District roads. The emphasis was on road construction projects undertaken within the 10 years of interconnectivity project that was implemented between 2009 and 2019 and have had construction/ implementation challenges or are currently facing challenges. Ministry of Works and Transport has bigger infrastructure development with roads that connect other parts of the country.

3.7 Data collection methods and instruments

3.7.1 Data collection Methods

Both primary and secondary data were used in this study. According to Kothari (2011), primary data are those which are collected for the first time and thus happen to be original. The primary data was collected using a semi-structured questionnaire. Mwakajo and Kidombo (2017) indicated that questionnaire is a popular method of collecting data because researchers can gather information fairly easily and the questionnaire responses are easily coded. The data was collected using the drop and pick later method. Secondary data was collected using the document analysis method and the interview method.

3.7.2 Data Collection Instruments

Primary data was collected using a combination of closed and open-ended questionnaire. The questionnaire was preferred because of its simplicity in administration and low cost in implementation. Secondary data were obtained from annual reports, MoWT data bases, and contract documents, project completion reports and progress reports of various projects in MoWT and the use of interview guide.

3.8 Validity and Reliability of Instruments

3.8.1 Validity of the instruments

Ndegwa (2013) defines validity as the degree to which the researcher has measured what he is set out to measure. Validity is the quality of a data gathering instrument that enables it to measure what it is supposed to measure (Chitkara, 2005). The methods used to validate the standard questionnaire are many and include: content validity and face validity: construct validity: factor analysis.

The researcher used face validity and involved an expert to look at the items in the questionnaire and agreed that the test was a valid measure of the concept which was being measured just on the face of it. It was also evaluated whether each of the measuring items matched any given conceptual domain of concepts.

3.8.2 Reliability of the Instrument

Reliability is a measure of degree to which a research instrument yields consistent results or data, the same way each time it is used under the same condition with the same subjects. To measure the reliability of data collection instruments, an internal consistency technique using Cronbach's alpha (α) was applied. Cronbach's α is a coefficient of reliability that gives an unbiased estimate of data generalizability.

Since the alpha value is inflated by a large number of variables then there are no set interpretations to what is an acceptable alpha value. A rule of thumb that applies to must situations is; 0.9 - 1.0 Excellent, 0.8 - 0.9 Good, 0.7 - 0.8 Acceptable, 0.6 - 0.7 Questionable, 0.5 - 0.6 Poor, 0.0 - 0.5 Unacceptable

Table 3.3: shows the values of Cronbach's Alpha for each filled section of the questionnaire and the entire questionnaire. For the filled sections, values of Cronbach's

Alpha were in the range from 0.752 and 0.901. This range is considered high; the result ensures the reliability of each filled section of the questionnaire. Cronbach's Alpha equals 0.814 for the entire questionnaire which indicates an excellent reliability of the entire questionnaire. Thus, it can be said that it was proved that the questionnaire was valid, reliable, and distributed to the population sample.

Table 3.3: Values of Cronbach's Alpha for each of the group factors

No.	**Factors influencing performance**	**Cronbach's Alpha**
1	Procurement Factors	0.811
2	Contact/Management Factors	0.843
3	Risk Occurrence Factors	0.764
4	Project Financing Factors	0.752
5	Project Stakeholder's Factors	0.901
	AVERAGE	**0.814**

3.8.3 Piloting of the instruments

A preliminary test was done on the data collection instruments and procedure to identify the likely challenges. The researcher took necessary action in time before the actual data collection. Filled questionnaires were tested on ten (10) number of respondents to determine their validity, reliability and accuracy in getting the desired results.

3.9 Data Analysis

Analysis of data included sorting, cleaning and organizing data from the questionnaires. The information was coded and entered into a spreadsheet and

analyzed using Statistical Packages for Social Sciences (SPSS) Version 25 and was also analyzed using correlations and regression analysis.

The main quantitative techniques included descriptive statistics such as absolute and relative (percentages) frequencies. Quantitative data was presented in tables and explanation presented in prose. Qualitative data was analyzed basing on the content matter of the responses. Responses with common themes or patterns were grouped together into coherent categories.

3.10 Chapter Summary

This chapter discussed the research design and approaches/ strategies used in carrying out the study. This was mainly done through the descriptive research design and looking at quantitative and qualitative data. The approach of the research study design involved looking at specific objective by specific objective using the questionnaires as the methods and instruments to collect data.

The questionnaires were administered to respondents sampled from the population comprising of contractors, consultants, and government officials from MoWT as the area of study. The instruments for data collection were checked and measured to ensure validity and reliability respectively and a preliminary test was done on the data collection instruments as a way of piloting of the instruments. Data analysis was done by use of statistical package for social scientists (SPSS) version 25, and using correlation and regression analyses, and the relative importance index and their results used to make conclusions and recommendations. The next chapter discusses, presents, and analyses results.

CHAPTER FOUR: PRESENTATIONS, ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter presents the findings which the researcher obtained from the field of study. This concerns data presentation, analysis and interpretation of the results. The objectives of the study were; to establish the factors influencing the performance of road construction projects in Uganda; to establish the impact of these factors on performance of road construction projects in Uganda, to determine the relationship between the factors influencing performance and the performance of road construction projects in Uganda and to develop a framework to improve the performance of road construction projects in Uganda.

4.2 Bio-data of the Respondents

4.2.1 Position of the respondents in the firms

Figure 4.1 explains the positions of the respondents in their respective firms/companies. Majority of the respondents were project engineers with 65% followed by supervising engineers with 30%, managing directors with 3% and lastly technical auditors with 2%. This implies that our data is reliable since majority of the respondents are involved directly in road construction projects i.e. project engineers and supervising engineers.

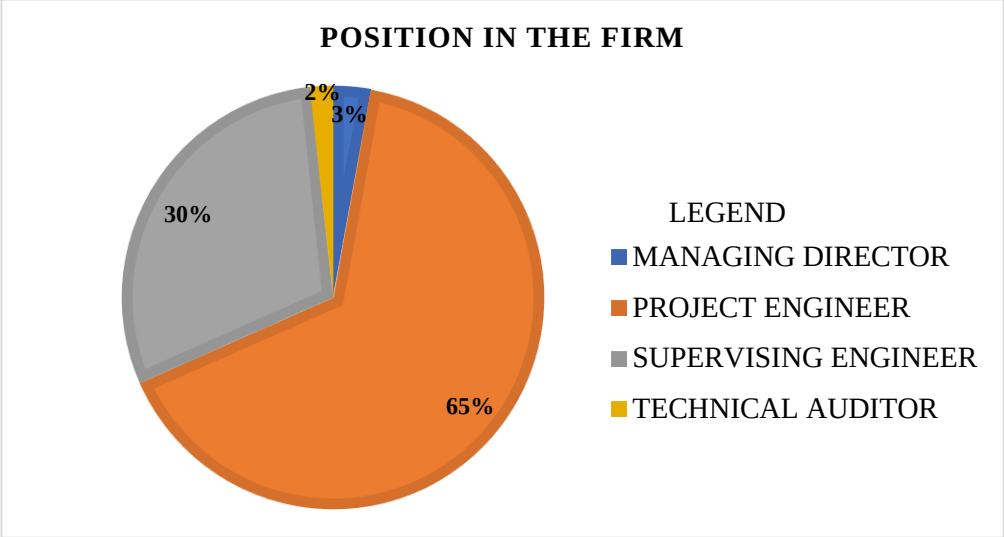

Figure 4.1: Position of the respondents

4.2.2 Organization of the respondents

Figure 4.2 provides information about the organization where the different respondents were working and majority of the respondents were working with contractors with 80%, followed by consultancy firms with 14%, then finally government institution (MoWT) with 6%. This then implies that majority of the respondents were directly involved in the road construction and hence provided reliable information on the factors influencing the performance of road construction projects in Uganda.

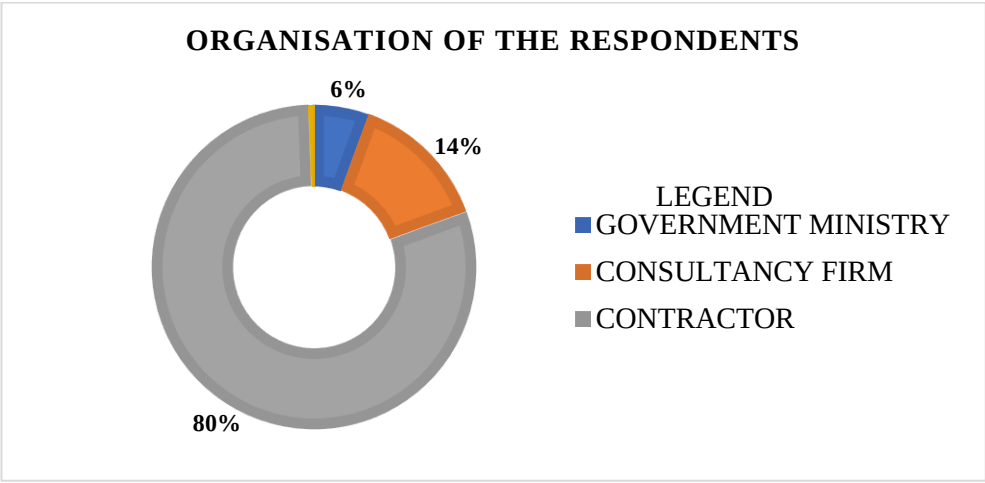

Figure 4.2: Organizations/Firms of the respondents

4.2.3 Age bracket of the respondents

Figure 4.3 provides information on the age of the various respondents and majority of the respondents lied in the bracket of 40-49 years with 53%, followed by the age bracket of 30-39 years with 35%, then 20-29 years with 9% and lastly 50 years and above age bracket with 3%. This implies that majority 88% of the respondents were between 30 and 49 years of age who have worked on various projects and therefore provided very reliable data on factors influencing the performance of road construction projects in Uganda.

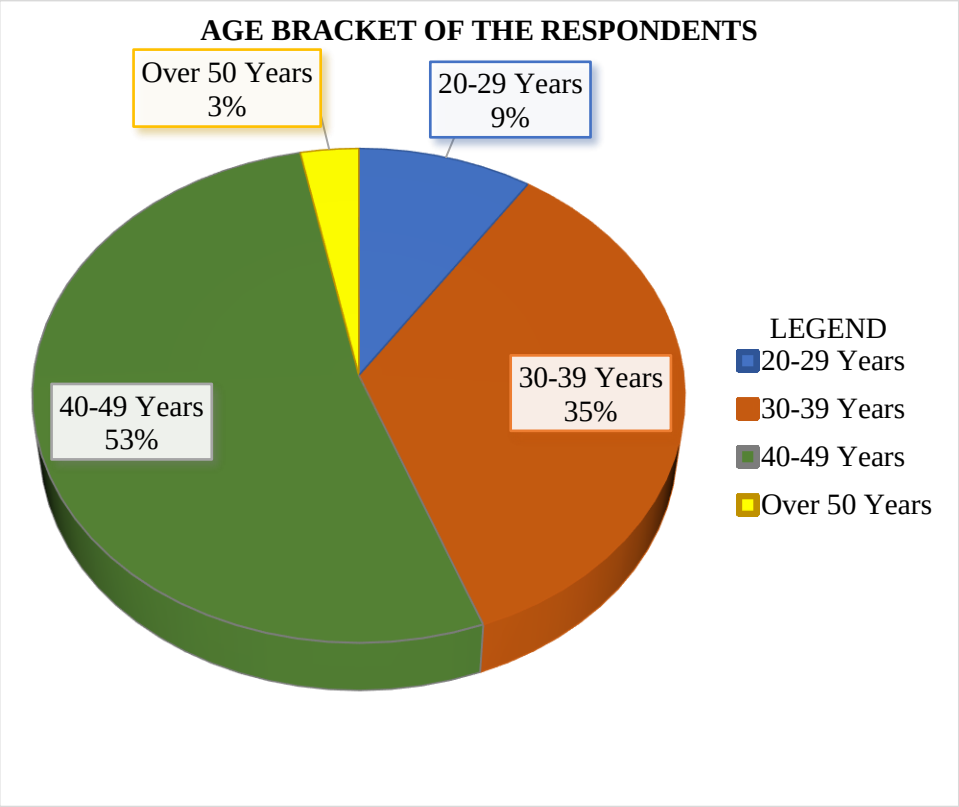

Figure 4.3: Age bracket of the respondents

4.2.4 Experience of respondents in road construction industry

Figure 4.4 below provides information on the experience of the respondents have taken in the road construction field and majority of the respondents had experiences between 11 to 15 years with 61%, followed by those between 6 to 10 years with 25%, less than

5 years with 10%, between 16 to 20 years with 3% and finally above 21 years with 1%. This implies that majority 61% of the respondents had experiences of between 11 to 15 years and therefore provided credible and valuable information to answer the specific objectives.

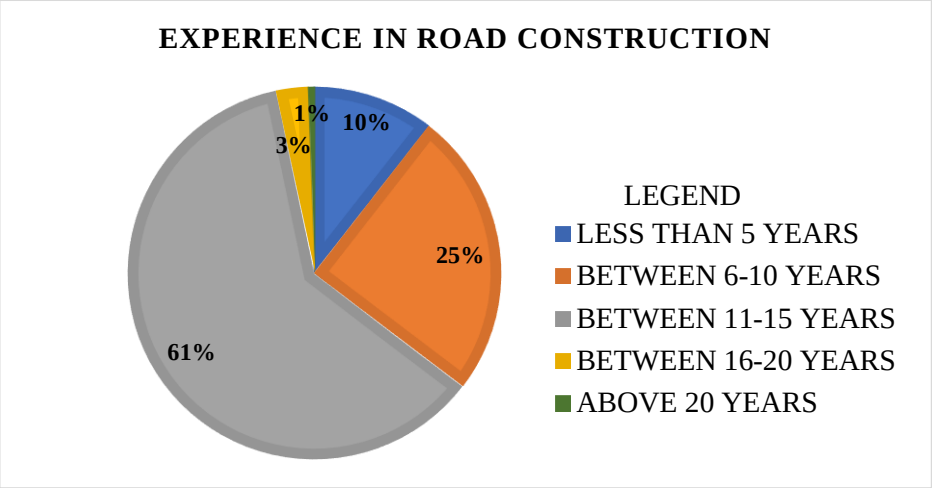

Figure 4.4: Experience in road construction industry

4.2.5 Level of education of the respondents.

Figure 4.5 below provides information on the level of education of the respondents in the road construction field and majority of the respondents were graduates with 65%, followed by Masters holders with 30%, diploma with 5%, and finally other levels of education apart from the above of 0%. This implies that majority 65% of the respondents are undergraduates who firstly are well educated to answer the questionnaires.

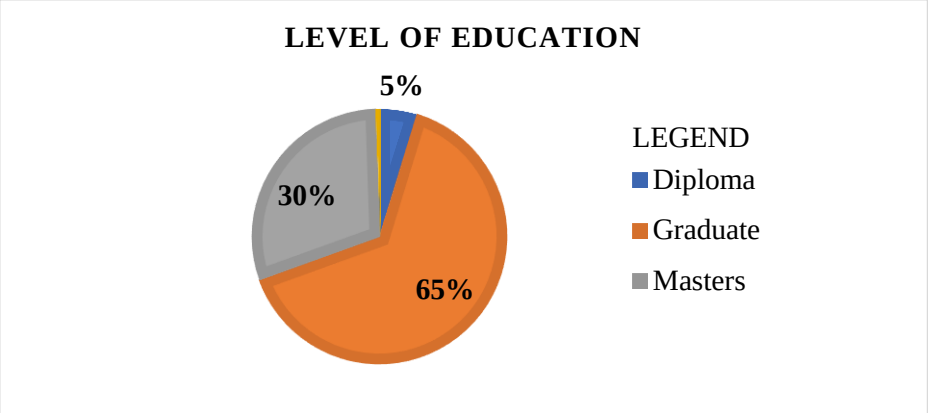

Figure 4.5: Level of education of the respondents

4.3 Empirical findings

The following sections present the empirical findings from the study and have been discussed on an objective by objective basis.

4.3.1: Establishing factors influencing the performance of road construction projects in Uganda

The factors influencing performance of road construction projects were established as five main factors (procurement factors, contract management factors, risk occurrence factors, project financing factors and project stake holders' factors) and their sub factors totaling to 43 in number were established. According to the methodology, relative importance index (RII) was used to determine the most significant factors influencing performance of road construction projects as suggested by Cheung *et al.*, (2004); Iyer and Jha, (2005) and Ugwu and Haupt, (2007). Firstly, the relative importance index was determined for the main factors influencing performance of road construction projects in Uganda which included procurement factors, contract management factors, risk occurrence factors, project financing factors and project

stakeholders' factors. There after RII for all sub-factors of the above different main factors was determined.

4.3.1.1: Ranking of the main factors influencing the performance of road construction projects

From the analysis of the factors influencing performance of road construction projects, it is revealed that contract management factors influence the level of performance of road construction projects most in Uganda. This is in agreement with a research from Long *et al.,* (2004) who remarked that performance problems arise in large construction projects due to many reasons such as; incompetent designers and contractors, poor estimation and change management, social and technological issues, site related issues and improper techniques and tools as contract management issues which affect the performance of road construction projects. In contrast, a research from Rowlinson and Lingard (2008) cited that project stakeholder is the most influential factor affecting the performance of road construction projects. Thus, it is contract management factors as established in this research that influences the performance of road construction projects in Uganda. This was followed by project stakeholder's factors, risk occurrence factors, procurement factors and lastly project financing factors as revealed in the Table 4.1.

Table 4.1: Ranking according to RII of main factors

Factors Influencing Project Performance	RII	Rank
Contract management Factors	0.812	1
Project Stakeholders Factors	0.705	2
Risk Occurrence Factors	0.582	3
Procurement Factors	0.492	4
Project Financing Factors	0.472	5

4.3.1.2: Ranking of the sub-factors of all the main factors influencing the performance of road construction projects

According to the analysis of the sub-factors of all the main factors influencing performance of road construction projects, it was revealed that Contractors - a project stakeholders' sub-factor had the highest influence on the level of performance of road construction projects, followed by Clients/Owners a project stakeholders' sub-factor, Contractors ability to mobilize to site a contract administration/management factor, availability of funds a project financing sub-factor, cash flows a project financing sub-factor among others as presented in Table 4.2.

Table 4.2: Ranking according to RII of all sub-factors of the main factors

A	**Procurement Factors**	**RII**	**Rank**
A1	Pre bid meetings and minutes shared.	0.813	25
A2	Correct identification of the best evaluated bidder	0.886	16
A3	Contract negotiation	0.774	26
A4	Carrying out adequate due diligence	0.906	13
A5	Performance bond and insurances cover maintained.	0.726	30
A6	Administrative Reviews	0.620	35
A7	Under quoting during bidding process to win tenders	0.542	37
B	**Contract management factors**	**RII**	**Rank**
B1	Inadequate estimation/ Bills of Quantities	0.465	38
B2	Change of scope of Works	0.815	24
B3	Design drawings/review	0.831	22
B4	Contractor's ability to Mobilize to site	0.927	3
B5	Site instructions and Quality control	0.907	12
B6	Effective approval processes/responses	0.902	14
B7	Contract specifications	0.917	7
B8	Site meetings and Management of meetings	0.918	6
B9	Effective decision making	0.908	11
B10	Inadequate geotechnical investigations and hydrological studies	0.364	41
B11	Relocation of existing services (Electricity and water etc.)	0.764	27
C	**Risk occurrence factors**	RII	Rank
C1	Errors in designs	0.841	21
C2	Natural /External risks (Floods/earth quake, technological changes)	0.822	23
C3	Inflation	0.551	36
C4	Government regulations and political factors	0.713	32
C5	Personnel risks (Lack of skills and experience)	0.420	40
C6	Set dates and deadline risks	0.691	33
C7	Insecurity	0.459	39
C8	Political instability	0.879	19
C9	Geopolitical instability (Regional)	0.886	16
D	**4. Project Financing factors**	RII	RANK

Table 4.2 cont'd			
D1	Cash flows	0.921	5
D2	Availability of funds	0.926	4
D3	Timely payment of certificates	0.911	9
D4	Lack of equipment	0.336	42
D5	Inadequate mobilization of resources	0.309	43
D6	Financial discipline of Contractors	0.761	28
D7	Proper use of Advance payment by Contractors	0.847	20
E	**Project stakeholders' factors**	RII	RANK
E1	Contractors	0.934	1
E2	Consultants	0.914	8
E3	Clients/Owner	0.9301	2
E4	External stakeholders	0.728	29
E5	Bankers	0.911	9
E6	Insurers	0.649	34
E7	Project Affected Persons (PAPS)	0.8901	15
E8	Political Leaders	0.722	31
E9	Community beneficiaries	0.885	18

4.3.1.3: Ranking of the sub-factors of each main factor influencing the performance of road construction projects in Uganda

According to the methodology, the relative importance index RII of the various sub-factors and their average as a baseline point were computed to determine the most significant factors influencing performance of road construction projects as explained in chapter three section 3.3.2.

A) Procurement sub-factors

Table 4.2 part A, presents findings which reveal that carrying out adequate due diligence was the most important procurement sub-factor as it was ranked first and had

the highest RII value of 0.906, followed by correct identification of the best evaluated bidder with RII value of 0.886, pre-bid meetings and minutes shared with RII value of 0.813 and contract negotiation with RII value of 0.774 are the procurement factors with their RII values above the average RII value of 0.752. Performance bond and insurances cover maintained with RII value of 0.726, Administrative Reviews of 0.620 and lastly under quoting during bidding process to win tenders had RII value of 0.542, and these are the factors below the average.

B) Contract management sub-factors

The analysis of the contract management sub-factors revealed that majority of the respondents agreed to contractor's ability to mobilize to site as the most influential contract management sub-factor with the highest RII value of 0.906 which is in line with a research from Long et.al., (2004) who remarked that performance problems arise in large construction projects due to incompetent designers and contractors and on the contrary, a research in Nigeria by Okuwoga, (2014) who identified that the performance problem is related to poor budgetary and time control. It was followed by site meetings and management of meetings with RII value of 0.918, contract specifications with RII value of 0.917, effective decision making with RII value of 0.908, site instructions and quality control with RII value 0.907, Effective approval processes with RII value of 0.902, Design drawings had RII value of 0.831 and Change of scope of Works had RII value of 0.815 were the factors above the average RII value of 0.792; Inadequate estimation of Quantities with RII value of 0.465 and inadequate geotechnical investigations and hydrological studies with RII value of 0.364 have

limited influence on the performance since they are far below the average point of 0.792 as represented in Table 4.2 part B.

C) Risk occurrence sub-factors

The analysis of the risk occurrence sub-factors revealed that majority of the respondents agreed to geopolitical instability (Regional) as the most influential risk occurrence factor since it had the highest RII value of 0.886 which is in agreement with Alias et.al., (2017) who claimed geopolitical problems affects construction projects performance due to regional instability. It was followed by Political stability with RII value of 0.879, errors in designs with RII value of 0.841, natural risks with RII value of 0.822 and Government regulations and political factors with RII value of 0.713 as the risk occurrence factors having influence on the performance of road construction projects since they are above the mean RII value of 0.696. Set dates and deadline risks with RII value of 0.691, inflation with RII value of 0.551, insecurity with RII value of 0.459 and then lastly personnel risks do not have significant influence on the performance of road construction projects since they are below the average as presented in Table 4.2, part C.

D) Project financing sub-factors

The analysis of the project financing sub-factors revealed that majority of the respondents agreed to availability of funds as most influential project financing sub-factor since it was ranked first and had the highest RII value of 0.926 which is in agreement with Nyangwara, (2015) who asserted that government projects have high

budgets which cannot be financed by the government hence either government develops poor quality roads or develop few quality roads which don't fulfill the needs of the economy, followed by cash flows with RII value of 0.921, timely payment of certificates with RII value of 0.911, proper use of Advance payment by Contractors with RII value of 0.847 and financial discipline of Contractors with RII value of 0.761 are the most influential and significant project financing sub-factors since their RII values were above the average RII of 0,716. Lack of equipment had RII value of 0.336 and inadequate mobilization of resources with RII value of 0.309 were less influential and insignificant since their RII values were below the mean RII as presented in Table 4.2 part D.

E) Project stakeholders' sub-factors

Project stakeholder's sub-factors were also analyzed and their RII values and RII average determined. Table 4.2-part E, presents the ranking of the project stakeholders' sub-factors that influence the performance of road construction projects in Uganda. The results, therefore, revealed that majority of the respondents agreed to contractors as most influential stakeholders' sub-factor since it was ranked first and had the highest RII value of 0.934 which is in line with Dissanayaka and Kumaraswamy (2009) who asserted that contractors characteristics and position in a project as an initiative to evaluate and improve the time and cost performance of road construction projects, followed by Clients/Owner with RII value of 0.930, Consultants with RII value of 0.914, Bankers with RII value of 0.911, Project Affected persons (PAPS) with RII value of 0.891, Community beneficiaries with RII value of 0.885, all influence the performance of road construction projects since their RII values are above the average

RII value of 0.840 computed . Whereas the external stakeholders with RII value of 0.728, Political leaders with RII value of 0.722 and Insurers with RII value of 0.649 do not influence performance of road construction projects since their RII values are less than the average RII value.

4.3.2 Extent of impact of factors influencing performance on road construction projects in Uganda

4.3.2.1: Extent of impact of the main factors influencing performance of road construction projects

According to the analysis of the main factors, the study revealed that contract management factors have the greatest impact on performance of road construction projects since it was ranked first with RII value of 0.993. However, this finding is contrary to research by Al-Momani (2000) who stated that the success of any project is related to two features, which are service quality in construction delivered by contractors and the project owner's expectations. This was followed by project stakeholders' factors, risk occurrence factors, procurement factors and lastly project financing factors. This implies that for improvement in the performance of road construction project, the contract management factors should be given more attention before other factors influencing performance of construction projects as revealed in table 4.3.

Table 4.3: Ranking of extent of impact of the main factors influencing performance of road construction projects in Uganda

	Factors Having Impact on Performance	**RII**	**Rank**
B	Contract Management Factors	0.993	1
E	Project Stakeholder's Factors	0.886	2
C	Risk Occurrence Factors	0.727	3
A	Procurement Factors	0.624	4
D	Project Financing Factors	0.581	5

4.3.2.2: Extent of impact of the sub-factors of all the main factors influencing the performance of road construction projects

According to the analysis of the impact of all sub-factors of all the main factors influencing performance of road construction projects, it was revealed that Contractors, the project stakeholders' sub-factor had the highest impact in influencing performance of road construction projects, followed by Clients/Owners, the project stakeholders' sub-factor.

Table 4.4: Ranking of the extent of impact of sub-factors of all the main factors on the performance of road construction projects in Uganda

A	**Procurement Factors**	**RII**	**RANK**
A1	Pre bid meetings and minutes shared.	0.783	20
A2	Correct identification of the best evaluated bidder	0.883	13
A3	Contract negotiation	0.766	26
A4	Carrying out adequate due diligence	0.884	12
A5	Performance bond and insurances cover maintained.	0.783	20
A6	Administrative Reviews	0.682	34
A7	Under quoting during bidding process to win tenders	0.565	35
B	**Contract Management factors**	**RII**	**RANK**
B1	Inadequate estimation/ Bills of Quantities	0.489	38
B2	Change of scope of Works	0.768	25

Table 4.4 Continued			
B3	Design drawings/review	0.788	19
B4	Contractor's ability to Mobilize to site	0.907	5
B5	Site instructions and Quality control	0.894	10
B6	Effective approval processes/responses	0.907	5
B7	Contract specifications	0.900	7
B8	Site meetings and Management of meetings	0.893	10
B9	Effective decision making	0.823	18
B10	Inadequate geotechnical investigations and hydrological studies	0.348	42
B11	Relocation of existing services (Electricity and water etc.)	0.773	23
C	**Risk occurrence Factors**	**RII**	**RANK**
C1	Errors in designs	0.743	27
C2	Natural /External risks (Floods/earth quake, technological changes)	0.723	28
C3	Inflation	0.527	36
C4	Government regulations and political factors	0.698	32
C5	Personnel risks (Lack of skills and experience)	0.374	40
C6	Set dates and deadline risks	0.507	37
C7	Insecurity	0.388	39
C8	Political instability	0.780	22
C9	Geopolitical instability (Regional)	0.769	24
D	**4. Project Financing factors**	**RII**	**RANK**
D1	Cash flows	0.895	8
D2	Availability of funds	0.895	8
D3	Timely payment of certificates	0.876	15
D4	Lack of equipment	0.360	41
D5	Inadequate mobilization of resources	0.308	43
D6	Financial discipline of Contractors	0.717	29
D7	Proper use of Advance payment by Contractors	0.840	16
E	**Project stakeholders' factors**	**RII**	**RANK**
E1	Contractors	0.950	1
E2	Consultants	0.931	3

Table 4.4 Continued			
E3	Clients/Owner	0.939	2
E4	External stakeholders	0.705	31
E5	Bankers	0.836	17
E6	Insurers	0.689	33
E7	Project Affected persons (PAPS)	0.919	4
E8	Political Leaders	0.717	29
E9	Community beneficiaries	0.879	14

- **Most Influential and impacting factors on performance of road construction projects in Uganda**

From the analysis of the influence and extent of impact of the sub factors of all the main factors influencing performance of road construction projects, the study categorized out the ten most influential and impacting factors on the performance of road construction projects and the ten least influential and impacting factors on the performance of road construction projects in Uganda as presented in tables *4.5* and 4.*6* respectively.

Table 4.5: Ten most significant and influential factors on the performance of road construction projects in Uganda

S/No	Most influential and impacting factors	Category of factor	RII	Rank
E1	Contractors	Project stakeholders factors	0.950	1
E3	Clients/Owners	Project stakeholders factors	0.939	2
E2	Consultants	Project stakeholders factors	0.931	3
E7	Project affected persons (PAPs)	Project stakeholders factors	0.919	4
B6	Effective approval processes/responses	Contract management factors	0.907	5
B4	Contractor's ability to mobilize to site	Contract management factors	0.907	6
B7	Contract specifications	Contract management factors	0.900	7
D1	Cash flows	Project financing factors	0.895	8
D2	Availability of funds	Project financing factors	0.895	9
B5	Site instructions and quality control	Contract management factors	0.894	10

Table 4.6: Ten least and influential and impacting factors on the performance of road construction projects in Uganda

S/No	Least influential and impacting factors	Category of factor	RII	Rank
D5	Inadequate mobilization of resources	Project financing factors	0.308	43
B10	Inadequate geotechnical investigations and hydrological studies	Contract management factors	0.348	42
D4	Lack of equipment	Project financing factors	0.360	41
C5	Personnel risks (lack of skills and experience)	Risk occurrence factors	0.374	40
C7	Insecurity	Risk occurrence factors	0.388	39
B1	Inadequate estimation/Bills of quantities	Contract management factors	0.489	38
C6	Set dates and dead line risks	Risk occurrence factors	0.507	37
C3	Inflation	Risk occurrence factors	0.527	36
A7	Underquoting during bidding to win tenders	Procurement factors	0.565	35
A6	Administrative reviews	Procurement factors	0.682	34

4.3.2.3: Extent of impact of sub-factors of each main factor influencing performance of road construction projects in Uganda

According to the methodology, the relative importance index (RII), its average and ranking of impact of sub-factors on performance of road construction projects were computed to determine the factors having the most significant impacts on the performance of road construction projects as suggested by Cheung *et al.*, (2004); iyer and Jha, (2005); Ugwu and Haupt, (2007) and the analysis for the various sub-factors is presented in the next section.

A) Procurement sub-factors

For procurement sub-factors, the analysis reveals that carrying out adequate due diligence, a procurement sub factor had the highest impact on the level of influencing performance of road construction projects in Uganda as it was ranked the first sub-factor and had the highest RII value of 0.884, followed by correct identification of the best evaluated bidder with RII value of 0.883, pre-bid meetings and minutes shared with RII value of 0.783, performance bond and insurance covers maintained with RII value of 0.783 and contract negotiation with RII value of 0.766 are the procurement sub-factors having the most significant impact on the performance of road construction projects since their RII values are above the average RII value of 0.763. Administrative Reviews with RII value of 0.682 and under quoting during bidding process to win tenders with RII value of 0.565 were the procurement sub-factors with the least significant impact on the performance of road construction projects since they have RII values less than the average RII value as presented in Table 4.7.

Table 4.7: Ranking of the extent of impact of procurement factors influencing performance of road construction projects in Uganda

A	Procurement Factors	RII	Rank
A4	Carrying out adequate due diligence	0.884	1
A2	Correct identification of the best evaluated bidder	0.883	2
A1	Pre bid meetings and minutes shared.	0.783	3
A5	Performance bond and insurances cover maintained.	0.783	3
A3	Contract negotiation	0.766	5
A6	Administrative Reviews	0.682	6
A7	Under quoting during bidding process to win tenders	0.565	7
	Average	**0.764**	

B) Contract management sub-factors

Table 4.8 presents the ranking of the extent of impact of contract management sub-factors that influence the performance of road construction projects in Uganda.

The analysis revealed that contractor's ability to mobilize to site, a contract management sub-factor had the highest impact on the level of influencing performance of road construction projects since it has the highest RII value of 0.908. This finding is in agreement with Long *et al.,* (2004) who indicated that competence of the contractor is paramount in the road construction as it either improves or degrades the performance of the project. This therefore implies that contractor's ability to mobilize to site have very vital impact in influencing the performance of road construction projects, followed by effective approval processes with the RII value of 0.906, contract specifications with the RII value of 0.900, site meetings and management of meetings with the RII value of 0.894, design drawings/review with the RII value of 0.788, relocation of existing services (Electricity and water etc.) with the RII value of 0.773 and change of scope of Works with RII value of 0.768 as contract management sub

factors have the great impact of influence on the performance of road construction projects since they have their RII values above the average RII value. Inadequate estimation/ Bills of Quantities with RII value of 0.489 and Inadequate geotechnical investigations and hydrological studies with RII value of 0.348 have low impact on the performance of road construction projects since they have their RII values lower than the RII mean value.

Table 4. 8: Ranking of the extent of impact of contract management factors influencing the performance of road construction projects in Uganda

B	**Contract management factors**	RII	Rank
B4	Contractor's ability to Mobilize to site	0.907	1
B6	Effective approval processes/responses	0.906	2
B7	Contract specifications	0.900	3
B5	Site instructions and Quality control	0.894	4
B8	Site meetings and Management of meetings	0.894	4
B9	Effective decision making	0.823	6
B3	Design drawings/review	0.788	7
B11	Relocation of existing services (Electricity and water etc.)	0.773	8
B2	Change of scope of Works	0.768	9
B1	Inadequate estimation/ Bills of Quantities	0.489	10
B10	Inadequate geotechnical investigations and hydrological studies	0.348	11
	Average	**0.772**	

C) **Risk Occurrence sub-factors**

For risk occurrence sub-factors, the analysis revealed that political stability, a risk occurrence sub-factor had the highest impact on the level of influencing performance of road construction projects as it was ranked first and had the highest RII value of 0.780 which is in line with a research from (Alias *et al.*, 2015) who claimed political instability affects the performance of road construction projects, followed by

geopolitical instability with RII value of 0.769, errors in design with RII value of 0.743, errors in scope of work details with RII value of 0.724, natural /external risks (Floods/earth quake, technological changes) with RII value of 0.722 and Government regulations and political factors with RII value of 0.698 are the risk occurrence sub-factors having the most impact on the performance of road construction projects since their RII values are above the average RII value of 0.623 . Inflation with RII of 0.527, Set dates and deadline risks with RII value of 0.507, Insecurity with RII value of 0.388 and finally Personnel risks (Lack of skills and experience) with RII value of 0.374 are the risk occurrence sub-factors with the least impact on the performance of road construction projects since their RII values are below the average RII value.

Table 4.9: Ranking of the extent of risk occurrence factors influencing the performance of road construction projects in Uganda

C	**Risk occurrence Factors**	RII	Rank
C8	Political instability	0.780	1
C9	Geopolitical instability (Regional)	0.769	2
C1	Errors in designs	0.743	3
C10	Errors in scope of work details	0.724	4
C2	Natural /External risks (Floods/earth quake, technological changes)	0.722	5
C4	Government regulations and political factors	0.698	6
C3	Inflation	0.527	7
C6	Set dates and deadline risks	0.507	8
C7	Insecurity	0.388	9
C5	Personnel risks (Lack of skills and experience)	0.374	10
	Average	**0.623**	

D) Project Financing sub-factors

For project financing sub-factors, cash flows and availability of funds the project financing sub-factor were ranked number one with RII value of 0.894 indicating they

had the highest impact on the performance of road construction projects which is in line with a research from Nyangwara, (2015) who indicated that availability of project financing is the key factor that impacts on the performance of construction projects. These were followed by timely payment of certificates with RII value of 0.876, proper use of advance payment by contractors with RII value of 0.840, financial discipline of contractors with RII value of 0.717 are the project financing sub factors having the most significant impact on the performance of road construction projects because their RII values are above the average RII value of 0.699. Lack of equipment with RII value of 0.360 and finally Inadequate mobilization of resources with RII value of 0.308 are the project financing sub factors having the least significant impact on the performance of road construction projects because their RII values are below the average RII value as revealed in table 4.10.

Table 4.10: Ranking of the Project Financing Factors influencing the performance of road construction projects in Uganda.

D	**Project Financing factors**	RII	RANK
D1	Cash flows	0.894	1
D2	Availability of funds	0.894	1
D3	Timely payment of certificates	0.876	3
D7	Proper use of Advance payment by Contractors	0.840	4
D6	Financial discipline of Contractors	0.717	5
D4	Lack of equipment	0.360	6
D5	Inadequate mobilization of resources	0.308	7
	Average	**0.699**	

E) Project Stakeholders' sub-factors

For the case of project stakeholders' sub-factors, the analysis revealed that contractors had the highest impact on the performance of road construction projects amongst the stakeholders' sub-factors, as it was given the first rank and had the highest RII value of 0.950. This finding is in agreement with a research by Ogunlana *et al.,* (1996) conducted in Bangkok, Thailand who stated that contractors are the implementers and any poor performance on their side results into total failure of the entire project, followed by clients with RII value of 0.939, consultants with RII value of 0.931, project affected persons with RII value of 0.919 and community beneficiaries with RII value of 0.879 are the project stakeholders' sub-factors which have the highest impact on the performance of road construction projects in Uganda since they are above the average RII value. Bankers with RII value of 0.836, political leaders with RII value of 0.717, external factors with RII value of 0.705 and insurers with RII value of 0.689 are the project stakeholder's sub-factors which are insignificant and they have the least impact on the performance of road construction projects in Uganda since they are below the average RII value as indicated in table 4.11

Table 4.11: Ranking of the Project Stakeholders' Factors influencing the performance of road construction projects in Uganda

E	**Project stakeholders' factors**	RII	Rank
E1	Contractors	0.950	1
E3	Clients/Owner	0.939	2
E2	Consultants	0.931	3
E7	Project Affected persons (PAPS)	0.919	4
E9	Community beneficiaries	0.879	5
E5	Bankers	0.836	6
E8	Political Leaders	0.717	7
E4	External stakeholders	0.705	8
E6	Insurers	0.689	9
	Average	**0.841**	

4.3.3 Relationship between the factors influencing performance and the performance of road construction projects in Uganda

Firstly, the degree of agreement of respondents on the different independent factors influencing performance of road construction projects were calculated, giving the frequencies and/or percentages for each factor influencing the performance of road construction projects in Uganda, e.g. table 4.12. This was followed with the determination of the correlations using Spearman's rank correlation methods, for all the factors. This was determined using SPSS and the computations are in the subsequent sections and the respective tables 4.13, 4.18, 4.23, 4.28, 4.33 and 4.37.

In accordance with the data collected on the questionnaires from the respondents, the degree of agreements between respondents/parties regarding the relationships between factors influencing performance and the performance of road construction projects were analyzed and regression models for each factor were developed; identified which

sub factors matter the most, which factors can be ignored and how these factors influence each other. The different analyses, regression models and/or analysis of the relationships between the different factors influencing performance and performance of road construction projects were determined and are discussed herein.

4.3.3.1: Relationship between the procurement factors and the performance of road construction projects in Uganda.

i) Degree of agreement of the respondents (parties) on the procurement factors influencing performance of road construction projects in Uganda

The study required the respondents to indicate whether the procurement factors influenced performance of road construction projects in Uganda. 77% of the respondents agreed to procurement factors influencing performance of road construction projects while the 23.4% disagreed as displayed in the table 4.12. This is in line with a research from (Dissanayaka and Kumaraswamy, 2009) who claimed procurement factors influence the performance of road construction projects.

Table 4.12: Frequency of influence of Procurement factors on performance of road construction projects in Uganda.

	PROCUREMENT FACTORS	
	Frequency	Percent
YES	113	76.6
NO	34	23.4
NOT SURE	0	0
Total	147	100.0

ii) Correlation of procurement sub-factors influencing performance and performance of road construction projects in Uganda.

Correlation coefficient r measures the strength and direction of a linear relationship between two variables. The value of r is always between +1 and -1 where according to (Deborah J., 2016) the rule of thumb explains that; at exactly -1 there is a perfect downhill negative linear relationship, -0.70 shows a strong downhill negative linear relationship, -0.50 shows a moderate downhill negative relationship, -0.30 shows a weak downhill negative linear relationship, 0 shows no linear relationship, +0.30 shows a weak uphill linear relationship, +0.50 shows a moderate uphill positive relationship, +0.70 shows a strong uphill positive linear relationship and finally at Exactly +1 it shows a perfect uphill positive linear relationship.

Table 4.13: Correlation of procurement factors and performance of road construction projects

		PRCP	A1	A2	A3	A4	A5	A6	A7
PRCP	Pearson's correlation	1.000							
	Sig. (2-tailed)								
A1	Pearson's correlation	0.583	1.000						
	Sig. (2-tailed)	0.008							
A2	Pearson's correlation	0.701	-0.009	1.000					
	Sig. (2-tailed)	0.000	0.047						
A3	Pearson's correlation	0.012	0.468	0.066	1.000				
	Sig. (2-tailed)	0.007	0.000	0.036					
A4	Pearson's correlation	0.907	0.933	0.558	0.192	1.000			
	Sig. (2-tailed)	0.000	0.006	0.000	0.008				
A5	Pearson's correlation	0.030	0.177	-0.125	0.050	-0.114	1.000		
	Sig. (2-tailed)	0.014	0.014	0.085	0.049	0.121			
A6	Pearson's correlation	0.028	0.239	0.263	-0.006	0.013	0.033	1.000	
	Sig. (2-tailed)	0.004	0.015	0.000	0.043	0.059	0.049		
A7	Pearson's correlation	-0.031	-0.238	0.237	0.097	-0.025	-0.087	0.610	1.000
	Sig. (2-tailed)	0.001	0.001	0.001	0.182	0.000	0.000	0.000	

Where; PRCP is Performance of road construction projects, A1 is Pre bid meetings and minutes shared, A2 is correct identification of the best evaluated bidder, A3 is contract negotiation, A4 is carrying out adequate due diligence, A5 is performance bond and insurances cover maintained, A6 is administrative Reviews and A7 is under quoting during bidding process to win tenders respectively.

A correlation coefficient is a coefficient that illustrates a quantitative measure of some type of correlation and dependence, meaning statistical relationship between two or more random variables or observed data values (Mugenda and Mugenda 2009). Therefore, the study findings in table 4.13 reveals that all the correlation coefficient of the relationship between predictor variables on procurement sub-factors and

performance of road construction projects had an uphill positive significant relationship. Hence, according to the correlation analysis of the different procurement sub-factors and performance of road construction projects in Uganda, carrying out adequate due diligence had the highest spearman's correlation coefficient of 0.907 explaining and accounting for 90.7% influence on the dependent variable and the other 9.3% is the influence of the remaining procurement sub-factors on the performance of road construction projects in Uganda. This was followed by correct identification of the best evaluated bidder with coefficient of 0.701 meaning that it accounts for 70% influence on the dependent variable and the other procurement factors account for 30% of the total influence on the performance of road construction projects in Uganda. Then pre-bid meetings and minutes shared with correlation coefficient of 0.583, performance bond and insurances cover maintained with correlation coefficient of 0.030, administrative reviews of 0.028, contract negotiations of 0.012 and finally underquoting during bidding process to win tenders with correlation of -0.031. It is therefore concluded that there is a high correlation relationship between carrying out adequate due diligence and performance of road construction projects followed by correct identification of the best evaluated bidder.

iii) Regression analysis of the relationship between the procurement factors influencing performance and the performance of road construction projects in Uganda

Table 4.14: Model fitting of the relationship between procurement factors influencing performance and performance of road construction projects

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept Only	136.407			
Final	90.430	45.977	7	**.0007**
Link function: Logit.				

Model fitting information interprets how the model relates to the model with dependent variables. The model with no co-variates is represented by the "Intercept only" model and the model with co variances is represented by "Final" model. The models have hypothesis where the intercept only model assumes the independent variables of procurement sub-factors do not have any significant impact on the performance of construction projects in Uganda and the Final model assumes the independent variables have influence on the performance of road construction projects. A research by Defries, *et al.,* (2002) stated that to determine authenticity of a model the probability value (p-value) of the model should vary in the range of 0 to 0.05 and the lower the probability value, the more significant the model and the relationship between the independent variable and dependent variable are. According to the analysis, the p-value is 0.0007 (table 4.14) which shows that the model is significant and the procurement sub-factors have a great influence on the performance of road construction projects in Uganda.

Table 4.15: Goodness of fit of the relationship between procurement factors influencing performance and performance of road construction projects

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	53.393	7	.0061
Deviance	59.655	7	.0254
Link function: Logit.			

According to a research by Perry, *et al.,* (2014), the goodness of fit is calculated from the Chi-square value; where the table Chi-square value is compared with the SPSS computed Chi-Square Value. "When the chi-square value computed > chi-square value critical then the model is adequate''. From the Chi-square table (appendix B), a degree of freedom (df) of 7 (table 4.15) and a specific alpha p-value of 0.05, give a chi-square value of 14.067, compared with Chi-square value (table 4.15) according to Pearson is 53.393 which is more than 14.0671. This therefore indicates that the model is adequate and relative to a perfect model. This therefore indicates a high level of association of the procurement sub-factors influencing performance of road construction projects.

Table 4.16: Regression model to determine the relationship between the independent variables and the dependent variable

Parameter Estimates								
A) Procurement factors		Estimate	Std. Error	Wald	df	Sig (P-value)	95% Confidence Interval	
							Lower Bound	Upper Bound
	Constant	2.086	1.766	1.395	1	0.237	1.375	5.546
A1	Pre bid meetings and minutes shared.	0.059	0.285	0.043	1	0.036	0.500	0.619
A2	Correct identification of the best evaluated bidder	0.229	0.332	0.042	1	0.0091	0.880	0.423
A3	Contract negotiation	0.050	0.305	0.027	1	0.0070	0.548	0.648
A4	Carrying out adequate due diligence	0.247	0.326	0.023	1	0.0449	0.392	0.885
A5	Performance bond and insurances cover maintained.	0.134	0.296	0.206	1	0.050	0.714	0.445
Average standard error ε			0.662					
Link function: Logit.								

The table (4.16) presents the best regression model for procurement factor which was determined by first discarding the procurement sub-factors which had insignificant p-values i.e. p-values beyond the specific alpha value of 0.05 since p-values above 0.05 are taken to comply with the hypothesis that the independent variables do not apply in the model. These insignificant factors were administrative reviews and under quoting during bidding process to win tenders. The regression process was run over and over again model until the best model was determined. As per the SPSS generated table 4.16, the equation ($Y= \beta_0+ \beta_1X_1+\beta_2X_2+ \beta_3X_3 + \beta_4X_4 + \beta_5X_5 +\varepsilon$) becomes:

$$Y = 2.086 + 0.059X_1 + 0.229X_2 + 0.050X_3 + 0.247X_4 + 0.134X_5 + 0.662 \ldots \text{(Equation 4.1)}$$

Where Y is the dependent variable (Performance of road construction projects), X_1 is Pre bid meetings and minutes shared, X_2 is correct identification of the best evaluated bidder, X_3 is contract negotiation, X_4 is carrying out adequate due diligence and X_5 is Performance bond and insurances cover maintained.

The regression equation above established that taking all factors into account (Pre bid meetings and minutes shared, correct identification of the best evaluated bidder, contract negotiation, carrying out adequate due diligence and Performance bond and insurances cover maintained) constant at zero, the performance of road construction projects will be 2.086. The data summary in table 4.16 also shows that taking all other independent variables at zero, a unit increase in Carrying out adequate due diligence will lead to 0.247 increase in the performance of road construction projects, a unit increase in correct identification of the best evaluated bidder will lead to 0.229 increase in performance of road construction projects, a unit increase in performance bond and insurances cover maintained will lead to 0.134 increase in the performance of road construction projects, a unit increase in pre-bid meetings and minutes shared will lead to 0.059 increase in the performance of road construction projects and a unit increase in contract negotiation will lead to 0.050 increase in performance of road construction projects. This infers that carrying out adequate due diligence contribute most to the performance of road construction projects followed by correct identification of best evaluated bidder, while pre-bid meetings and minutes shared contributed the little to performance of road construction projects.

4.3.3.2: Relationship between the Contract management factors and the performance of road construction projects in Uganda.

i) Degree of agreement of the respondents (parties) on the contract management factors in influencing performance of road construction projects in Uganda

The study also required the respondents of this study to indicate whether contract administration/management factors influenced performance of road construction projects in Uganda. 76% of the respondents agreed to management factors influencing performance of road construction projects and the 23% disagreed as displayed in the table below.

Table 4.17: Frequency of influence of contract management factors on performance of road construction projects

CONTRACT MANAGEMENT FACTORS		
	Frequency	Percent
YES	111	75.5
NO	34	22.9
NOT SURE	2	1.6
Total	147	100.0

ii) Correlation of the management factors influencing performance and performance of road construction projects in Uganda

Table 4.18: Correlation between contract management sub-factors influencing performance of road construction project

		PRCP	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11
PRCP	Pearson's Correlation	1.000											
	Sig. (2-Tailed)												
B1	Pearson's Correlation	0.036	1.000										
	Sig. (2-Tailed)	0.621											
B2	Pearson's Correlation	-0.061	-0.128	1.000									
	Sig. (2-Tailed)	0.006	0.076										
B3	Pearson's Correlation	0.037	-0.118	0.527	1.000								
	Sig. (2-Tailed)	0.017	0.104	0.000									
B4	Pearson's Correlation	0.910	-0.353	0.317	0.183	1.000							
	Sig. (2-Tailed)	0.002	0.000	0.000	0.012								
B5	Pearson's Correlation	0.575	-0.107	-0.029	0.106	0.502	1.000						
	Sig. (2-Tailed)	0.003	0.141	0.694	0.144	0.000							
B6	Pearson's Correlation	0.804	-0.157	0.225	0.052	0.497	0.536	1.000					
	Sig. (2-Tailed)	0.002	0.029	0.002	0.474	0.000	0.000						
B7	Pearson's Correlation	0.734	-0.203	0.032	0.125	0.549	0.629	0.538	1.000				
	Sig. (2-Tailed)	0.002	0.005	0.663	0.083	0.000	0.000	0.000					
B8	Pearson's Correlation	0.587	-0.078	0.301	0.189	0.469	0.487	0.495	0.620	1.000			
	Sig. (2-Tailed)	0.004	0.283	0.000	0.008	0.000	0.000	0.000	0.000				
B9	Pearson's Correlation	0.422	-0.345	0.190	0.295	0.159	0.118	0.276	0.221	0.202	1.000		
	Sig. (2-Tailed)	0.007	0.000	0.008	0.000	0.029	0.103	0.000	0.002	0.005			
B10	Pearson's Correlation	-0.052	0.407	-0.120	0.039	-0.550	-0.458	-0.384	-0.494	-0.322	-0.061	1.000	
	Sig. (2-Tailed)	0.008	0.000	0.097	0.591	0.000	0.000	0.000	0.000	0.000	0.398		
B11	Pearson's Correlation	0.010	-0.421	0.313	0.301	0.280	-0.031	0.066	0.055	0.110	0.229	-0.261	1.000
	Sig. (2-Tailed)	0.008	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.000	

Where; PRCP is performance of road construction projects, B1 is inadequate estimation/ Bills of Quantities, B2 is change of scope of Works, B3 is Design drawings/review, B4 is Contractor's ability to Mobilize to site, B5 is Site instructions and Quality control, B6 is Effective approval processes/responses, B7 is contract specifications, B8 is site meetings and Management of meetings, B9 is effective decision making, B10 is inadequate geotechnical investigations and hydrological studies, and B11 is relocation of existing services (Electricity and water etc.).

To compute correlation (strength) of the relationship between the contract management sub-factors and performance of road construction projects in Uganda, Spearman's coefficient of correlation was used. From the findings shown in table 4.18 it was clear that there was a positive correlation between contract specifications and contractor's ability to mobilize to site and performance of road construction projects with correlation coefficient of 0.910, it was also clear that there was a positive correlation between effective approval processes/responses and performance of road construction projects with correlation coefficient of 0.804, it was also clear that there was a positive correlation between contract specifications and performance of road construction projects with correlation coefficient of 0.734, it was also clear that there was a positive correlation between Site meetings and management of meetings and performance of road construction projects with coefficient of 0.587, it was also clear that there was a positive correlation between site instructions and quality control with coefficient and performance of road construction projects of 0.575, it was also clear that there was a positive correlation between effective decision making and performance of road construction projects with coefficient of 0.422, it was also clear

that there was a positive correlation between design drawings/reviews and performance of road construction projects with correlation coefficient of 0.037, it was also clear that there was a positive correlation between relocation of existing service (Electricity and water etc.) performance bond and insurances cover maintained and performance of road construction projects with correlation coefficient of 0.030, it was also clear that there was a positive correlation between inadequate estimation/Bills of Quantities and performance of road construction projects with coefficient of 0.036, it was also clear that there was a negative correlation between change in scope of work and performance of road construction projects with coefficient of -0.061 and a negative correlation between inadequate geotechnical investigations and hydrological studies and performance of road construction projects with correlation coefficient of -0.052.

The findings therefore reveal that highest correlation was between; contract specifications, contractor's ability to mobilize to site, and performance of road construction followed by the correlation between effective approval processes/responses and performance of road construction projects while both change in scope of work and inadequate geotechnical investigations and hydrological studies had negative correlations with the performance of road construction projects, meaning that they negatively influence the performance of road construction projects in Uganda.

iii) Regression analysis of the relationship between the contract management sub-factors influencing performance and the performance of road construction projects

Table 4.19: Model fitting of the relationship between Contract management factors and performance of road construction projects

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	102.263			
Final	95.628	6.635	9	0.028

Model fitting information interprets how the model relates to the model with dependent variables. The model with no co-variates is represented by the "Intercept only" model and the model with co variances is represented by "Final" model. The models have hypothesis where the intercept only model assumes the independent variables of contract management sub-factors do not have any significant impact on the performance of construction projects in Uganda and the Final model assumes the independent variables have influence on the performance of road construction projects. A research by Defries, (1992) stated that to determine authenticity of a model the probability value (p-value) of the model should vary in the range of 0 to 0.05 and the lower the probability value, the more significant the model and the relationship between the independent variable and dependent variable are. According to our regression analysis our p-value is 0.028 which shows that the model is significant and the contract management sub-factors have a great influence on the performance of road construction projects in Uganda.

Table 4.20: Goodness of fit of the relationship between Contract management factors and performance of road construction projects

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	69.761	9	0.033
Deviance	73.116	9	0.058
Link function: Logit.			

According to a research by Perry *et al.,* (2014), the goodness of fit is calculated from the Chi-square value; where the Chi-square table value is compared with the SPSS computed Chi-Square value. From the Chi-square table (Appendix B), using a degree of freedom (df) of 9 and a specific alpha p-value of 0.05 a chi-square value of 16.919 is obtained, but then the Chi-square value (table 4.20) according to Pearson is 69.761 which is greater than 16.919 concluding that the model is adequate and relates to a perfect model. This therefore indicates a perfect model hence revealing a high level of association of the contract management sub-factors influencing performance of road construction projects.

Table 4.21: Relationship between the Contract management factors and the performance of road construction projects

Parameter Estimates								
B Contract management factors		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
	Constant	4.582	2.721	2.835	1	0.092	0.751	9.916
B4	Contractor's ability to Mobilize to site	0.522	0.201	1.003	1	0.002	0.457	1.412
B5	Site instructions and Quality control	0.196	0.219	0.072	1	0.008	0.709	0.934
B6	Effective approval processes/responses	0.362	0.271	0.170	1	0.030	0.881	0.575
B7	Contract specifications	0.349	0.438	0.594	1	0.001	0.521	1.196
B8	Site meetings and Management of meetings	0.222	0.357	0.121	1	0.002	0.575	0.823
B9	Effective decision making	0.189	0.306	0.137	1	0.003	0.487	0.713

The table 4.21 presents the best regression model for Contract Management factors which was determined by first discarding the contract management sub-factors which had insignificant p-values i.e. p-values beyond the specific alpha value of 0.05 since p-values above 0.05 are taken to comply with the hypothesis that the independent variables do not apply in the model and this contract management factors were inadequate estimation/bills of quantities, change in scope of works, design drawings and reviews, Relocation of existing services (Electricity and water etc.) and inadequate geotechnical investigations and hydrological studies. The model was run several times until the best model was determined and the results are presented in table 4.21. As per the SPSS generated table 4.24, the equation ($Y= \beta_0+ X_1\beta_1+ X2\beta_2 + X_3\beta_3 + X_4\beta_4 + X_5\beta_5 + X_6\beta_6 + X_7\beta_7 + X_8\beta_8 + X_9\beta_9$) becomes:

$Y = 4.582+0.522X_4+0.196X_5+0.362X_6+0.349X_7+0.222X_8 +0.189X_9$ ..(Equation 4.2)

Where Y is the dependent variable (Performance of road construction projects), X_4 is Contractor's ability to Mobilize to site, X_5 is Site instructions and Quality control, X_6 is effective approval processes/responses, X_7 is contract specifications, X_8 is Site meetings and Management of meetings, and X_9 is Effective decision making.

The regression equation 4.2 established that taking all factors into account (Contractor's ability to Mobilize to site, Site instructions and Quality control, Effective approval processes/responses, Contract specifications, Site meetings and Management of meetings and Effective decision making) constant at zero, performance of road construction projects will be 4.582. The findings presented in table 4.21 also show that taking all other independent variables at zero, a unit increase in contractor's ability to mobilize to site will lead to a 0.522 increase in the performance of road construction projects, a unit increase in site instructions and quality control will lead to a 0.196 increase in performance of road construction projects, a unit increase in effective approval processes/responses will lead to a 0.362, a unit increase in contract specifications will lead to a 0.349 increase in the performance of road construction projects, a unit increase in site meetings and management of meeting will lead to a 0.222 increase in performance of road construction projects and a unit increase in Effective decision making will lead to a 0.189 increase in the performance of road construction projects. This infers that contractor's ability to mobilize to site contribute most to the performance of road construction projects followed by; effective approval processes/responses, contract specifications, Site meetings and Management of meetings, then site instructions and Quality control while effective decision making contributed little to the performance of road construction projects.

4.3.3.3: Relationship between the risk occurrences sub-factors and the performance of road construction projects in Uganda.

i) Degree of agreement of the respondents on the risk occurrences factors in influencing performance of road construction projects in Uganda

The study also required the respondents of this study to indicate whether risk occurrence factors affected performance of road construction projects in Uganda and 75% of the respondents agreed to risk occurrence factors affecting performance of road construction projects with 22% disagreeing as displayed in the table 4.22

Table 4.22: Frequency of influence of Risk occurrence factors on performance of road construction projects

RISK OCCUREANCE FACTOR		
	Frequency	Percent
YES	109	74.5
NO	33	22.4
NOT SURE	5	3.1
Total	147	100.0

ii) Correlation of the Risk occurrence factors influencing performance of road construction projects in Uganda.

Table 4.23: Correlation between the risk occurrence sub-factors and performance of road construction projects

		PRCP	C1	C2	C3	C4	C5	C6	C7	C8	C9
PRCP	Correlation Coefficient	1.000									
	Sig. (2-tailed)	0.000									
C1	Correlation Coefficient	.653**	1.000								
	Sig. (2-tailed)	0.002									
C2	Correlation Coefficient	.420**	0.606**	1.000							
	Sig. (2-tailed)	0.032	0.000								
C3	Correlation Coefficient	.303	-0.094	0.027	1.000						
	Sig. (2-tailed)	0.043	0.202	0.712							
C4	Correlation Coefficient	.333	.233**	.400**	.167*	1.000					
	Sig. (2-tailed)	0.020	0.001	0.000	0.023						
C5	Correlation Coefficient	.166	0.121	-0.035	-0.121	-.287**	1.000				
	Sig. (2-tailed)	0.013	0.100	0.637	0.099	0.000					
C6	Correlation Coefficient	.394	.237**	.195**	-.556**	0.011	.398**	1.000			
	Sig. (2-tailed)	0.010	0.001	0.008	0.000	0.876	0.000				
C7	Correlation Coefficient	.510	-0.003	-.153*	.618**	-.202**	.315**	-0.120	1.000		
	Sig. (2-tailed)	0.008	0.969	0.036	0.000	0.006	0.000	0.101			
C8	Correlation Coefficient	.842**	.209**	.269**	-.454**	.271**	-.176*	.513**	-.364**	1.000	
	Sig. (2-tailed)	0.001	0.004	0.000	0.000	0.000	0.016	0.000	0.000		
C9	Correlation Coefficient	.792**	.168*	.348**	-.431**	.302**	-.323**	.307**	-.513**	.755**	1.000
	Sig. (2-tailed)	0.001	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Where; PRCP is performance of road construction projects, C1 is Errors in designs, C2 is Natural /External risks (Floods/earth quake, technological changes), C3 is Government regulations and political factors, C4 is Personnel risks (Lack of skills and experience), C5 is Set dates and deadline risks, C6 is Insecurity, C7 is Political stability, C8 is Geopolitical instability (Regional), and C9 is errors in scope details.

To compute correlation (strength) of the relationship between the risk occurrence sub-factors and performance of road construction projects in Uganda, Spearman's coefficient of correlation was used. From the findings shown in table 4.23 it was clear that there was a positive correlation between Errors in designs and performance of road construction projects with a correlation value of 0.653, it was also clear that there was a positive correlation between Natural /External risks (Floods/earth quake, technological changes) and performance of road construction projects with a correlation value of 0.420, it was clear that there was a positive correlation between Government regulations and political factors and the performance of road construction projects as shown by a correlation value of 0.303, it was also clear that there was a positive correlation between Personnel risks (Lack of skills and experience) and performance of road construction projects with a correlation figure of 0.333, there was also a positive correlation between Set dates and deadline risks and performance of road construction projects with a correlation value of 0.166, it was also clear that there was a positive correlation between Insecurity and performance of road construction projects with a correlation figure of 0.394, there was also a positive correlation between Political instability and performance of road construction projects with a correlation value of 0.510, there was also a positive correlation between Geopolitical

instability (Regional) and performance of road construction projects with a correlation value of 0.842 and a positive correlation between errors in scope details and performance or road construction projects with a correlation value of 0.792. This infers that the strongest correlation was between Geopolitical instability (Regional) and performance of road construction projects, followed by correlation between error in scope details and performance of road construction projects.

iii) Regression analysis of the relationship between the Risk occurrences sub-factors and the performance of road construction projects

Table 4.24: Model fitting of the relationship between risk occurrences factors and performance of road construction projects

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	121.629			
Final	106.238	15.391	6	0.018
Link function: Logit.				

Model fitting information interprets how the model relates to the model with no factors or co variances (null hypothesis). The model with no co-variates is represented by the "Intercept only" model and the model with co variances is represented by "Final" model. The significance of the probability that the dependent variable has feasible independent variables with the dependent variable is determined from the probability value (p-value) which is compared to a specified alpha probability value typically set at 0.05 and our p-value is 0.018 which shows that the model is excellent compared to the model with no co-variances.

Table 4.25: Goodness of fit of the relationship between Risk occurrences sub-factors and performance of road construction projects

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	84.253	6	0.022
Deviance	84.763	6	0.030
Link function: Logit.			

The goodness of fit is calculated from the Chi-square value. According to the Chi-square table for a degree of freedom (df) of 6 and a specific alpha p-value of 0.05, then the Chi-square value should be more than 12.592 to conclude that the model is adequate and relative to a perfect model. The model according to Pearson indicates a chi-square of 84.253 which therefore indicates a perfect model hence revealing a high level of association of the factors influence performance of road construction projects.

Table 4.26: Regression of the Relationship between the Risk occurrence sub-factors and performance of road construction projects

Parameter Estimates								
C	Risk Occurrence factors	Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
	Constant	1.318	1.261	1.094	1	0.06	1.152	3.789
C2	Natural /External risks (Floods/earth quake, technological changes)	0.201	0.328	0.375	1	0.0015	0.441	0.842
C7	Insecurity	1.213	0.429	7.998	1	0.005	0.372	2.053
C8	Political instability	0.586	0.356	2.711	1	0.004	0.112	1.283
C9	Geopolitical instability (Regional)	0.236	0.354	0.444	1	0.0405	0.929	0.458
C10	Errors in design details	0.174	0.267	0.421	1	0.016	0.351	0.698
Link function: Logit.								

From the regression findings, the substitution of the formula ($Y= \beta_0+ X_1\beta_1+ X_2\beta_2 + X_3\beta_3 + X_4\beta_4 + X5\beta_5 + X_6\beta_6$) becomes

$Y = 1.138 + 0.201X_1 + 0.068X_2 + 1.213X_3 + 0.586X_4 + 0.236X_5 + 0.174X_6$

Where Y is the dependent variable (Performance of road construction projects), X_1 is Natural/External risks (Floods/earth quake, technological changes), X_2 is insecurity, X_3 is political instability, X_4 is Geopolitical instability (Regional), and X_5 is errors in design details.

The regression equation above has established that taking all factors into account (Natural /External risks (Floods/earth quake, technological changes), Insecurity, Political instability, Geopolitical instability (Regional), Errors in design details account) constant at zero, the dependent variable (performance of road construction projects) will be 1.318. The findings presented as shown in table 4.26 also show that taking all other independent variables at zero, a unit increase in insecurity will lead to a 1.213 distress in the performance of road construction projects; a unit increase in political instability will lead to a 0.586 distress in the performance of road construction projects; a unit increase in geopolitical instability (regional) will lead to a 0.236 decrease in the performance of road construction projects; a unit increase in Natural/External risks (Floods/earth quake, technological changes) will lead to a 0.201 decrease in the performance of road construction and a unit increase in errors in designs details will lead to a 0.174 decrease in the performance of road construction projects in Uganda. This infers that insecurity distresses most on the performance of road construction projects in Uganda followed by; political instability, geopolitical instability (Regional), then natural /External risks (floods/earth quake, technological changes), while Errors in design details decreases little the performance of road construction projects in Uganda.

4.3.3.4: Relationship between the project financing factors and the performance of road construction projects in Uganda.

i) Degree of agreement of the respondents on the project financing factors in influencing performance of road construction projects in Uganda

The study also required the respondents to indicate whether project finance factors affected performance of road construction projects in Uganda and 81% of the respondents agreed to project finance factors affecting performance of road construction projects with 17% disagreeing as displayed in the table below.

Table 4.27: Frequency of the influence of project finance factors on the performance of road construction projects in Uganda.

PROJECT FINANCING FACTORS		
	Frequency	Percent
YES	120	81.3
NO	25	17.2
NOT SURE	2	1.5
Total	147	100.0

ii) Correlation of the Project financing factors and Performance of road construction projects in Uganda

Table 4.28: Correlation between the project financing sub-factors and performance of road construction projects

Correlations of Project Financing factors									
		PRCP	D1	D2	D3	D4	D5	D6	D7
PRCP	Correlation Coefficient	1.000							
	Sig. (2-tailed)								
D1	Correlation Coefficient	.841**	1.000						
	Sig. (2-tailed)	0.000							
D2	Correlation Coefficient	.702**	.301**	1.000					
	Sig. (2-tailed)	0.000	0.000						
D3	Correlation Coefficient	.620**	.611**	.581**	1.000				
	Sig. (2-tailed)	0.000	0.000	0.000					
D4	Correlation Coefficient	.305	-.488**	-.473**	-.613**	1.000			
	Sig. (2-tailed)	0.030	0.000	0.000	0.000				
D5	Correlation Coefficient	.300	-.523**	-.553**	-.763**	.769**	1.000		
	Sig. (2-tailed)	0.045	0.000	0.000	0.000	0.000			
D6	Correlation Coefficient	.416	.163*	.246**	.244**	-.347**	-.163*	1.000	
	Sig. (2-tailed)	0.011	0.026	0.001	0.001	0.000	0.026		
D7	Correlation Coefficient	.526	.196**	.316**	.362**	-.471**	-.371**	.330**	1.000
	Sig. (2-tailed)	0.009	0.007	0.000	0.000	0.000	0.000	0.000	
	**. Correlation is significant at the 0.01 level (2-tailed).								
	*. Correlation is significant at the 0.05 level (2-tailed).								

Where; PRCP is performance of road construction projects, D1 is Cash Flows, D2 is Availability of funds, D3 is Timely payment of certificates, D4 is Lack of equipment, D5 is Inadequate mobilization of resources, D6 is Financial discipline of Contractors, D7 is Proper use of Advance payment by Contractors respectively.

To compute correlation (strength) of the relationship between the project stakeholders' sub-factors and performance of road construction projects in Uganda, Spearman's

coefficient of correlation was used. From the findings shown in table 4.28 it was clear that there was a positive correlation between Cash Flows and the performance of road construction projects as shown by a correlation figure of 0.841, it was also clear that there was a positive correlation between Availability of funds and performance of road construction projects with a correlation figure of 0.702, there was also a positive correlation between Timely payment of certificates and performance of road construction projects with a correlation value of 0.620, it was also clear that there was a positive correlation between Lack of equipment and performance of road construction projects with a correlation figure of 0.305, there was also a positive correlation between Inadequate mobilization of resources and performance of road construction projects with a correlation value of 0.300, there was also a positive correlation between Financial discipline of Contractors and performance of road construction projects with a correlation value of 0.416 and a positive correlation between Proper use of Advance payment by Contractors and performance or road construction projects with a correlation value of 0.526. This infers that the strongest correlation was between cash flows and performance of road construction projects, followed by correlation between availability of funds and performance of road construction projects.

iii) Regression analysis of the relationship between the Project financing sub-factors influencing performance and the performance of road construction projects

Table 4.29: Model fitting of the relationship between project financing sub-factors and performance of road construction projects

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	69.595			
Final	63.597	5.998	5	0.040
Link function: Logit.				

Model fitting information interprets how the model relates to the model with no factors or co variances (null hypothesis). The model with no co-variates is represented by the "Intercept only" model and the model with co variances is represented by "Final" model. The significance of the probability that our dependent variables has feasible independent variables with the dependent variable is determined from the probability value (p-value) which is compared to a specified alpha probability value typically set at 0.05 and our p-value is 0.040 (table 4.29) which shows that the model is excellent compared to the model with no co-variances.

Table 4.30: Goodness of fit of the relationship between project financing sub-factors and performance of road construction projects

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	50.930	5	0.035
Deviance	49.841	5	0.040
Link function: Logit.			

The goodness of fit is calculated from the Chi-square value. From the Chi-square table (appendix B), a degree of freedom (df) of 5 (table 4.30) and a specific alpha p-value of 0.05, give a Chi-square value of 11.070. The chi-square value (table 4.30) according to Pearson is 50.930 which is greater than 11.070. This concludes that the model is adequate and relate to a perfect model. This therefore indicates this is a perfect model

hence revealing a high level of association of the factors influencing performance of road construction projects.

Table 4.31: Relationship between the project financing factors and performance of road construction projects

Parameter Estimates								
D	Project Finance factors	Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
	Constant	3.023	2.894	1.091	1	0.296	2.649	8.694
D1	Cash flows	0.637	0.375	0.023	1	0.008	0.791	0.678
D2	Availability of funds	0.630	0.425	2.277	1	0.00131	1.475	0.192
D6	Financial discipline of Contractors	0.299	0.356	0.705	1	0.001	0.399	0.998
D7	Proper use of Advance payment by Contractors	0.621	0.374	2.844	1	0.002	0.102	1.364
Link function: Logit.								

From the regression findings, the substitution of the formula ($Y= \beta_0+ X_1\beta_1+ X_2\beta_2 + X_3\beta_3 + X_4\beta_4$) becomes

$Y= 3.023 + 0.637X_1 + 0.630X_2 +0.299X_3 +0.621X_4$

Where Y is the dependent variable (Performance of road construction projects), X_1 is Cash flows X_2 is Availability of funds X_3 is financial discipline of contractors and X_4 is proper use of advance payment by contractors

The regression equation above has established that taking all factors into account (cash flows, availability of funds, financial discipline of contractors, and proper use of advance payment by contractors) constant at zero, the dependent variable performance of road construction projects will be 3.023. the findings presented as shown in table 4.31 also shows that taking all other independent variables at zero, a unit increase in

cash flows will lead to a 0.637 increase in the performance of road construction projects; a unit increase in availability of funds will lead to a 0.630 increase in the performance of road construction projects; a unit increase in financial discipline of contractors will lead to a 0.299 increase in the performance of road construction projects; a unit increase in proper use of advance payments will lead to a 0.621increase in the performance of road construction projects in Uganda. This infers that cash flows contribute most to the performance of road construction projects followed by availability of funds then financial discipline of contractors while proper use of advance payments contributed a little to the performance of road construction projects in Uganda.

4.3.3.5: Relationship between the project stake holders' factors and the performance of road construction projects in Uganda.

i) Degree of agreement of the respondents on the project stake holders' sub-factors in influencing performance of road construction projects in Uganda

The study also required the respondents of this study to indicate whether project stakeholders' factors affected performance of road construction projects in Uganda and 83% of the respondents agreed to project stakeholders' factors affecting performance of road construction projects with 12% disagreeing as displayed in table 4.32.

Table 4.32: Frequency of the influence of project stakeholders' sub-factors on the performance of road construction projects

PROJECT STAKEHOLDER FACTOR		
	Frequency	Percent
YES	122	83.3
NO	18	12.0
NOT SURE	7	4.7
Total	147	100.0

ii) Correlation of the project stakeholders' sub-factors influencing performance of road construction projects in Uganda

Table 4.33: Correlation of the project stakeholders' sub-factors and performance of road construction projects

Correlations of Project Stakeholders' Factors											
E		PRCP	E1	E2	E3	E4	E5	E6	E7	E8	E9
PRCP	Correlation Coefficient	1.000									
	Sig. (2-tailed)										
E1	Correlation Coefficient	.564**	1.000								
	Sig. (2-tailed)	0.000									
E2	Correlation Coefficient	.244	.477**	1.000							
	Sig. (2-tailed)	0.030	0.000								
E3	Correlation Coefficient	.831**	.507**	.516**	1.000						
	Sig. (2-tailed)	0.000	0.000	0.000							
E4	Correlation Coefficient	.350	0.075	.201**	.148*	1.000					
	Sig. (2-tailed)	0.004	0.310	0.006	0.044						
E5	Correlation Coefficient	.202**	0.143	0.143	.168*	0.066	1.000				
	Sig. (2-tailed)	0.000	0.051	0.051	0.022	0.372					
E6	Correlation Coefficient	.108	-.144*	-0.045	0.008	.461**	-.239**	1.000			
	Sig. (2-tailed)	0.031	0.049	0.537	0.917	0.000	0.001				
E7	Correlation Coefficient	.759**	.490**	.456**	.461**	0.037	.275**	-.161*	1.000		
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.613	0.000	0.028			
E8	Correlation Coefficient	.261	-0.033	0.108	-0.013	.238**	-0.023	.377**	0.001	1.000	
	Sig. (2-tailed)	0.043	0.653	0.143	0.859	0.001	0.754	0.000	0.985		
E9	Correlation Coefficient	.554**	.409**	.480**	.369**	.225**	0.075	.269**	.467**	.261**	1.000
	Sig. (2-tailed)	0.002	0.000	0.000	0.000	0.002	0.307	0.000	0.000	0.000	
	**. Correlation is significant at the 0.01 level (2-tailed).										
	*. Correlation is significant at the 0.05 level (2-tailed).										
	c. Listwise N = 187										

Where; PRCP is Performance of road construction projects, E1 is Contractors, E2 is Consultants, E3 is Clients/Owners, E4 is External stakeholders, E5 is Bankers, E6 is Insurers,

E7 is Project Affected persons (PAPS), E8 is Political Leaders, and E9 is Community beneficiaries respectively.

To compute correlation (strength) of the relationship between the project stakeholders' sub-factors and performance of road construction projects in Uganda, Spearman's coefficient of correlation was used. From the findings shown in table 4.33 it was clear that there was a positive correlation between contractors and the performance of road construction projects as shown by a correlation figure of 0.564, it was also clear that there was a positive correlation between consultants and performance of road construction projects with a correlation figure of 0.244, there was also a positive correlation between clients/owners and performance of road construction projects with a correlation value of 0.831, there was also a positive correlation between external stakeholders' and performance of road construction projects with a correlation value of 0.350, there was also a positive correlation between bankers and performance of road construction projects with a correlation value of 0.202, it was also clear that there was a positive correlation between insurers and performance of road construction projects with a correlation figure of 0.108, there was also a positive correlation between project affected persons and performance of road construction projects with a correlation value of 0.759, there was also a positive correlation between political leaders and performance of road construction projects with a correlation value of 0.261 and a positive correlation between community beneficiaries and performance or road construction projects with a correlation value of 0.554. This infers that the strongest correlation was between clients/owners' and performance, followed by correlation between project affected persons (PAPS) and performance of road construction projects.

iii) Regression of the relationship between the Project stakeholders' factors influencing performance and the performance of road construction projects

Table 4. 34: Model fitting of the relationship between project stakeholders' sub-factors and performance of road construction projects

Model Fitting Information				
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	93.513			
Final	77.692	15.822	6	0.0071
Link function: Logit.				

Model fitting information interprets how the model relates to the model with no factors or co variances (null hypothesis). The model with no co-variants is represented by the "Intercept only" model and the model with co variances is represented by "Final" model. The significance of the probability that our dependent variables has feasible independent variables with the dependent variable is determined from the probability value (p-value) which is compared to a specified alpha probability value typically set at 0.05 and our p-value is 0.0071 which shows that the model is excellent compared to the model with no co-variances.

Table 4.35: Goodness of fit of the relationship between project stakeholders' sub-factors and performance of road construction projects

Goodness-of-Fit			
	Chi-Square	df	Sig.
Pearson	76.379	6	0.089
Deviance	62.181	6	0.034
Link function: Logit.			

The goodness of fit is calculated from the Chi-square value. According to the Chi-square table (Appendix B), with a degree of freedom (df) of 6 and a specific alpha p-value of 0.05 gives a chi-square value of 12.592, but then our Chi-square value (table

4.35) according to Pearson is 76.379 which is greater than 12.592 concluding that the model is adequate and relative to a perfect model. This therefore indicates a perfect model hence revealing a high level of association of the factors influence performance of road construction projects.

Table 4.36: Relationship between the project stakeholders' sub-factors and the performance of road construction projects

Parameter Estimates								
E Project Stakeholders' factors		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
	Constant	1.094	2.476	0.715	1	0.398	1.948	2.760
E1	Contractors	0.106	0.946	0.013	1	0.011	0.749	1.961
E3	Clients/Owner	0.946	0.659	2.057	1	0.052	0.238	1.347
Table 4.39 cont'd								
E7	Project Affected persons (PAPS)	0.991	0.748	1.757	1	0.0015	0.474	2.457
E9	Community beneficiaries	0.819	0.472	3.017	1	0.052	0.743	0.105
	Average		0.913					
Link function: Logit.								

From the regression findings, the substitution of the formula ($Y= \beta_0+ X_1\beta_1+ X_2\beta_2 + X_3\beta_3 + X_4\beta_4$) becomes

$Y = 1.094 + 0.106X_1 + 0.946X_2 + 0.991X_3 + 0.819X_4$

Where Y is the dependent variable (Performance of road construction projects), X_1 is Contractors, X_2 is Clients/Owner, X_3 is Project Affected persons (PAPS), X_4 is Community beneficiaries.

The regression equation above has established that taking all factors into account (Contractors, Clients/Owner, Project Affected persons (PAPS) and Community

beneficiaries.) constant at zero, the dependent variable performance of road construction projects will be 1.094. The findings presented as shown in table 4.36 also shows that taking all other independent variables at zero, a unit increase in clients/owner will lead to a 0.946 increase in the performance of road construction projects; a unit increase in project affected persons (PAPS) will lead to a 0.946 increase in the performance of road construction projects; a unit increase in community beneficiaries will lead to a 0.819 increase in the performance of road construction projects; a unit increase in contractors will lead to a 0.106 increase in the performance of road construction projects in Uganda. This infers that clients/owners contribute most to the performance of road construction projects followed by project affected persons then community beneficiaries while contractors contributed a little to the performance of road construction projects.

4.3.3.6: Correlation Analysis of the main factors influencing performance of road construction projects in Uganda

Spearman's correlation was used to determine the correlation and the level of significance of the different main factors influencing the performance of road construction projects and the analysis revealed high significant correlation between the various independent variables (the factors influencing performance of road construction projects).

Table 4.37: Spearman's rank Correlations between the main factors and performance and the performance of road construction projects in Uganda

		PRCP	Procurement Factors	Contract Mgt Factors	Risk Occurrence Factors	Project Finance Factors	Project Stakeholders' Factors
PRCP	Correlation Coefficient	1.000					
	Sig. (2-Tailed)	0.000					
Procurement Factors	Correlation Coefficient	0.426	1.000				
	Sig. (2-Tailed)	0.042					
Contract management factors	Correlation Coefficient	0.843	.900*	1.000			
	Sig. (2-Tailed)	0.000	0.037				
Risk Occurrence Factors	Correlation Coefficient	0.540	0.800	0.600	1.000		
	Sig. (2-Tailed)	0.003	0.104	0.285			
Project Finance Factors	Correlation Coefficient	0.490	.900*	1.000**	0.600	1.000	
	Sig. (2-Tailed)	0.330	0.037		0.285		
Project Stakeholders' Factors	Correlation Coefficient	0.705	0.600	0.700	0.100	0.700	1.000
	Sig. (2-Tailed)	0.002	0.285	0.188	0.873	0.188	
	*. Correlation Is Significant at the 0.05 Level (2-Tailed).						
	**. Correlation Is Significant at the 0.01 Level (2-Tailed).						

For computation of correlation (strength) of the relationship between the main factors and performance of road construction projects in Uganda, Spearman's coefficient of correlation was used. From the findings shown in table 4.37 it was clear that there was a positive correlation between procurement factors influencing performance and the performance of road construction projects as shown by a correlation figure of 0.426, it was also clear that there was a positive correlation between contract management

factors and performance of road construction projects with a correlation value of 0.843, there was also a positive correlation between risk occurrence factors and performance of road construction projects with a correlation value of 0.540, there was also a positive correlation between project financing factors and performance of road construction projects with a correlation value of 0.490 and a positive correlation between project stakeholder's factors and performance of road construction projects with a correlation value of 0.705. This infers that the strongest correlation was between contract management factors and performance of road construction projects, followed by correlation between project stakeholders' and performance of road construction projects.

4.3.4 A framework to improve the performance of road construction projects in Uganda

The relative importance index (RII), its average (Baseline point) and ranking of impact of factors at and beyond the baseline point (Average) on performance of road construction projects were computed and used to determine the factors having the most and least significant impacts on the performance of road construction projects as suggested by Cheung *et al.,* (2004); Iyer and Jha, (2005); Ugwu and Haupt, (2007).

Further analysis (Table 4.38) of the sub-factors beyond the baseline points for each individual main factor; Contractors, Clients/Owner emerged the significant factors having the biggest impact the performance of road construction projects with RII of 0.950, followed by Clients/Owner with RII of 0.939, Consultants with RII of 0.931, Project Affected persons (PAPS) with RII of 0.919, Contractor's ability to Mobilize to site of 0.907, Effective approval processes/responses with RII value of 0.906, Contract

specifications with RII value of 0.900, Cash flows of with RII value of 0.895, Availability of funds with RII value of 0.895, Site instructions and Quality control with RII value of 0.894, Site meetings and Management of meetings with RII value of 0.894, Carrying out adequate due diligence with RII value of 0.884, Correct identification of the best evaluated bidder with RII value of 0.883, Community beneficiaries with RII value of 0.879, Timely payment of certificates with RII value of 0.876, Proper use of Advance payment by Contractors with RII value of 0.840.

The factors with the least impact on the performance of road construction projects are the following; effective decision making with RII of 0.823, design drawings/review with RII of 0.788, Pre bid meetings and minutes shared with RII value of 0.783, Performance bond and insurances cover maintained with RII value of 0.783, Political stability of 0.780, Relocation of existing services (Electricity and water etc.) with RII of 0.773, Geopolitical instability (Regional) with RII value of 0.769, Contract negotiation with RII value of 0.766, Errors in designs with RII value of 0.743, Natural /External risks (Floods/earth quake, technological changes) with RII of 0.722, Financial discipline of Contractors with RII of 0.717 and lastly Government regulations and political factors with RII value of 0.698 as presented in Table 4.38.

Table 4.38: Factors to be included in the framework to improve on the performance of road construction projects in Uganda

Procurement Factors	**RII**	**Rank**
Contract negotiation	0.766	24
Pre bid meetings and minutes shared.	0.783	19
Performance bond and insurances cover maintained.	0.783	19
Correct identification of the best evaluated bidder	0.883	13
Carrying out adequate due diligence	0.884	12
Contract Management factors	**RII**	
Contractor's ability to Mobilize to site	0.907	5
Effective approval processes/responses	0.906	6
Contract specifications	0.900	7
Site instructions and Quality control	0.894	10
Site meetings and Management of meetings	0.894	10
Effective decision making	0.823	17
Design drawings/review	0.788	18
Relocation of existing services (Electricity and water etc.)	0.773	22
Risk occurrence Factors	**RII**	Rank
Political instability	0.780	21
Geopolitical instability (Regional)	0.769	23
Errors in designs	0.743	25
Errors in scope details	0.724	26
Natural /External risks (Floods/earth quake, technological changes)	0.723	27
Government regulations and political factors	0.698	29
Project Financing factors	**RII**	
Financial discipline of Contractors	0.717	28
Proper use of Advance payment by Contractors	0.840	16
Timely payment of certificates	0.876	15
Cash flows	0.895	8

Table 4.38 continued		
Availability of funds	0.895	8
Project stakeholders' factors	**RII**	
Contractors	0.950	1
Clients/Owner	0.939	2
Consultants	0.931	3
Project Affected persons (PAPS)	0.919	4
Community beneficiaries	0.879	14
RII Baseline point	0.837	

The bolded factors in table 4.38 were used in developing the frame work as their values were above RII baseline point. Figure 4.6 presents a frame work factors to improve the performance of road construction projects in Uganda.

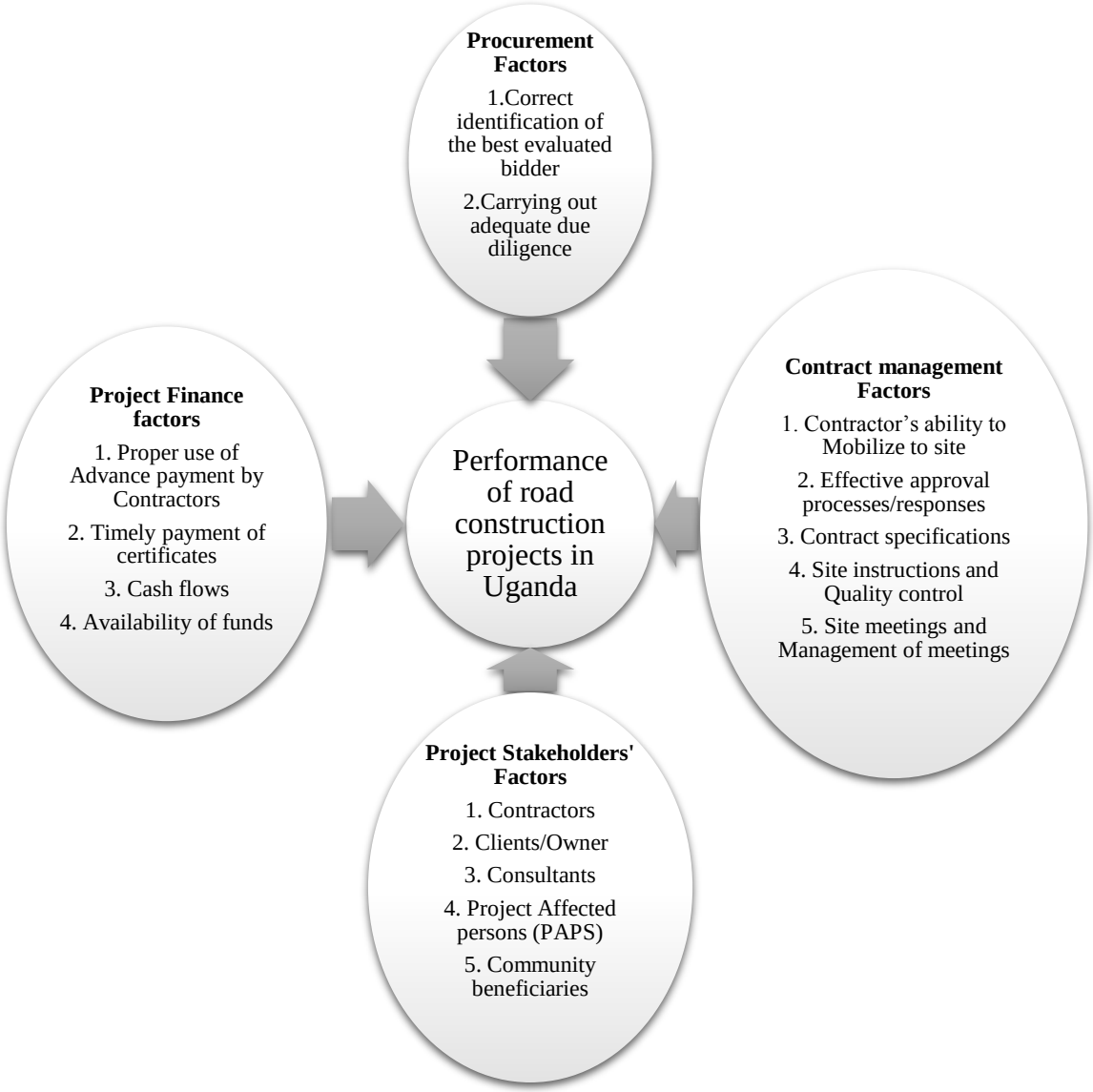

Figure 4.6: Flow chart of the Framework to improve the performance of road

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the conclusions of the findings of the research study and also highlights on a number of recommendations resulting from the study.

5.2 Conclusions

This study was about assessment of factors influencing performance of road construction projects in Uganda, with a case study of Ministry of Works and Transport. From the analysis of each objective, it was observed that; contract management factors were ranked first in influencing the performance of road construction projects, followed by project stakeholder's factors, risk occurrence factors, procurement factors and lastly project financing factors.

5.2.1 To establish the factors influencing the performance of road construction projects in Uganda

The researcher concluded that contract management significantly influences the performance of road construction projects in Uganda. It was also concluded that most significant and influential sub factors were; contractors and clients/owners for project stakeholders factor; carrying out adequate due diligence and correct identification of best evaluated bidder among the procurement factors; contractor's ability to mobilize to site and, site meetings and management of meetings among contract management factors; availability of funds and cash flows among the project financing factors, geopolitical and political stability among the risk occurrence factors.

5.2.2 The impact of factors on performance of road construction projects in Uganda

The study concluded that, contract management factors had the greatest impact on the performance of road construction projects in Uganda.

It was further concluded that, the sub factors with greatest impact on performance of road construction projects in Uganda were; contractors and clients/owners among the project stakeholders' factors; carrying out adequate due diligence and correct identification of best evaluated bidder for procurement factors; contractor's ability to mobilize to site and effective approval processes/responses among the contract management factors; availability of funds and cash flows for the contract financing factors; political and geopolitical stability among the risk occurrence factors.

5.2.3 The relationship between the factors influencing performance and the performance of road construction projects in Uganda

The research study concluded that there was a high correlation between performance of road construction projects and the contract management factors, project stakeholders' factors and project financing factors. Further analysis of relationship between each sub-factor and the performance of road construction projects;

It was concluded that for procurement factors, carrying out adequate due diligence, and correct identification of best evaluated bidder significantly influence the performance of road construction projects. Under the contract management factors, contractor's ability to mobilize to site, effective approval processes/responses and contract specification significantly influence the performance of road construction projects in Uganda.

Among the project financing factors; proper use of advance payment by contractors, cash flows, availability of funds and financial discipline of contractors significantly influence the performance of road construction projects in Uganda.

For the project stakeholders' factors; project affected persons, clients/owns, and community beneficiaries significantly influence the performance of road construction projects in Uganda. Whereas for the risk occurrence factors it was concluded that political instability negatively influences the performance of road construction projects and all other risk occurrence factors.

5.3 Recommendations

Procurement factors, contract management factors, risk occurrence factors, project financing factors and project stakeholders' factors influence the performance of road construction projects in Uganda. From the analysis there exists a strong positive linear relationship between independent factors (procurement factors, contract management factors, risk occurrence factors, project financing factors, and project stakeholders' factors) and the performance of road construction projects. The strong positive linear relationship is more with the contract management factors, followed by project stakeholders' factors, Risk occurrence factors, project financing factors, and the procurement factors. Based on the above the following recommendations are made;

- Procurement factors should be fair, transparent, and free of malpractice, such as corruption, nepotism and favoritism. Competitive tendering/bidding process should be adopted so that correct identification of the best evaluated bidder is done, and carry out due diligence to award contract to competent contractor. That is contractors with equipment, plants, financial capability, experience

competent and skilled labor force. These practices shall contribute towards influencing performance of road construction projects.

- Contract management factors such as; contractor's ability to mobilize to site, effective approval processes, contract specifications, site instructions and quality control, site meetings and management of meetings and minutes should be error free, the information they communicate should be relevant, accurate, timely, simple to understand and interpret. When submitted with errors and/or the information in them is complicated, this causes a delay while correcting, and wrong interpretation can be made resulting into rework which causes delay. Competent supervision team should also be employed so that during brain storming and meetings issues are addressed on time, hence avoiding delays.
- Risk occurrence factors can be avoided by following the standards using a lot of controls, employing skilled and competent laborers to avoid errors in designs and variations, experienced engineers should be employed to prepare bills of quantities for complex project conditions and unforeseeable natural disasters, a contingence fund of 10% should be included in the bills of quantities. For risk such as inflation include a clause to allow use of the prevailing commercial bank inflation rates to take care of changes in the prices of material, so that projects are handed over on time, projects end date is not delayed and chances are utilized. Competent project manager should be employed to manage a road construction project. Changes in technology can be addressed by reserving a contingency fund in the bills of quantities for training employees on how to use the new technology.

- To ensure that project financing factors influence the performance of road construction projects; enough finances should be set aside for the project before it can commence. During estimation stage experienced engineers should be employed to prepare the estimates, so that these estimates and the project cost do not vary. The stake holders and financiers should support the road construction project so that financing is not stopped as the project proceeds.
- The project stakeholders and clients should ensure that they support the ruling party or government or that they are in good terms with the financier so that politics does not negatively influence performance of road construction projects.
- Contractors and consultants should control time and the cost in order to achieve the performance of road construction projects in Uganda. The design control and other factors; like effective communication, competence of the project team and collaboration with other project stakeholders among others. The contractors should consider the political and geopolitical instability in their cost estimation in order to enhance the performance of road construction projects in Uganda.

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Appendix A: Questionnaire

KYAMBOGO UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

Master of Science program in construction Technology and Management

Assessment of Factors Influencing Performance of Road Construction Projects in Uganda: ***A Case Study of Ministry of Works and Transport***

Questionnaire

I am Seninde Stephen, a student of Master of Science in Construction Technology and Management at KYU, conducting a research study titled ‘‘assessment of factors influencing performance of road construction projects in Uganda’’. You have been identified as a respondent in this research study; and this questionnaire is required to be filled with exact relevant facts as much as possible. All the data included in this questionnaire will be used only for academic research. After all questionnaires are collected and assessed, interested participants of this study will be given feedback on the overall research results.

Yours faithfully; ……..

Part (1): General Information: Please add (√) as appropriate:

1. Gender Male ( ) Female ( )
2. Position in the Firm

Managing Director ( ) Project Engineer ( ) Supervising Engineer ( ) Technical auditor ( ) If other, specify …….

3. In which organization do you work?

   Government Ministry ( ) Consultancy Firm ( )

   Contractor ( ) If others, specify ……..

4. Which one best describes your age bracket?

   20 – 29 years ( ) 30 – 39 years ( ) 40 – 49 years ( ) over 50 years ( )

5. How long have you been involved in the road construction projects?

   Less than 5 years ( ) between 6 – 10 years ( ) between 11 – 15 years ( ) between 16 – 20 years ( ) above 20 years ( )

6. Indicate the level of your education?

   Diploma ( ) Bachelor's degree ( ) Masters ( ) PHD ( ) If others specify …….

Part (2): Factors influencing the performance of road construction projects:

Below are a number of factors influencing the performance of road construction projects? From your experience and using the Likert scale of 1 to 5, please express your opinion on the importance of the following factors that positively influence performance of road construction projects in Uganda. (Please tick the appropriate box).

5 = Very High importance, 4 = High importance, 3 = Medium importance, 2 = Low importance, 1= Very low importance.

A	**(1) Procurement factors (**Procurement practices)	**5**	**4**	**3**	**2**	**1**
A1	Pre bid meetings and minutes shared.					
A2	Correct identification of the best evaluated bidder					
A3	Contract negotiation					
A4	Carrying out adequate due diligence					
A5	Maintenance of performance bond/security and insurance cover.					
A6	Administrative Reviews					
A7	Under quoting during bidding process to win tenders					

B	**(2) Contact Administration/ Management factors**	**5**	**4**	**3**	**2**	**1**
B1	Inadequate estimation/ Bills of Quantities					
B2	Change of scope of Works					
B3	Design drawings/review					
B4	Contractor's ability to Mobilize to site					
B5	Site instructions and Quality control					
B6	Effective approval processes/responses					
B7	Contract specifications					
B8	Site meetings and Management of meetings					
B9	Effective decision making					
B10	Inadequate geotechnical investigations and hydrological studies					
B11	Relocation of existing services (Electricity and water etc.)					

C	(3) Risk occurrence Factors	5	4	3	2	1
C1	Errors in designs					
C2	Natural /External risks (Floods/earth quake, technological changes)					
C3	Inflation					
C4	Government regulations and political factors					
C5	Personnel risks (Lack of skills and experience)					
C6	Set dates and deadline risks					
C7	Insecurity					
C8	Political instability					
C9	Geopolitical instability (Regional)					

D	(4) Project Financing factors	5	4	3	2	1
D1	Cash flows					
D2	Availability of funds					
D3	Timely payment of certificates					
D4	Lack of equipment					
D5	Inadequate mobilization of resources					
D6	Financial discipline of Contractors					
D7	Proper use of Advance payment by Contractors					

E	(5) Project stakeholders' factors	5	4	3	2	1
E1	Contractors					
E2	Consultants					
E3	Clients/Owner					
E4	External stakeholders					
E5	Bankers					
E6	Insurers					
E7	Project Affected persons (PAPS)					
E8	Political Leaders					
E9	Community beneficiaries					

Part 3: Extent of impact of the factors that influence the performance of road construction projects:

i) Procurement Factors

Clearly state your opinion with regard to the implementation of road construction projects by the Ministry of Works and transport. Do you think that the procurement processes and practices influence the performance of road construction projects? Yes ( ) NO ( ) Not Sure ().

Using the scale of 1 to 5, rate the extent to which the following procurement factors have influenced the performance of road construction projects in Uganda:

1= Very little Extent; 2 = Little Extent; 3 = Fair Extent; 4 = Great Extent; 5 = Very Great Extent

A	1. Procurement factors (Procurement practices)	1	2	3	4	5
A1	Pre bid meetings and minutes shared.					
A2	Correct identification of the best evaluated bidder					
A3	Contract negotiation					

A4	Carrying out adequate due diligence					
A5	Maintenance of performance bond/security and insurance cover.					
A6	Administrative Reviews					
A7	Under quoting during bidding process to win tenders					

ii) Contract Administration/ Management Factors.

Clearly state your opinion with regard to the implementation of road construction projects by the Ministry of Works and transport. Do you think that the Contract administration/management factors influence the performance of road construction projects? Yes ( ) NO ( ) Not Sure ( ).

Using the scale of 1 to 5, rate the extent to which the following contract administration/management factors have influenced the performance of road construction projects in Uganda:

1 = Very little Extent; 2 = Little Extent; 3 = Fair Extent; 4 = Great Extent; 5 = Very Great Extent

B	**2. Contract Administration/ Management factors**	**1**	**2**	**3**	**4**	**5**
B1	Inadequate estimation/ Bills of Quantities					
B2	Change of scope of Works					
B3	Design drawings/review					
B4	Contractor's ability to Mobilize to site					
B5	Site instructions and Quality control					
B6	Effective approval processes/responses					
B7	Contract specifications					
B8	Site meetings and Management of meetings					

B9	Effective decision making					
B10	Inadequate geotechnical investigations and hydrological studies					
B11	Relocation of existing services (Electricity and water etc)					

iii) **Risk Occurrence Factors**

Clearly state your opinion with regard to the implementation of road projects by the Ministry of Works and transport. Do you think that the risk occurrence factors influence performance of road construction projects? Yes ( ) NO ( ) Not Sure ( ).

Using the scale of 1 to 5, rate the extent to which the following risk occurrence factors have influenced the performance of road construction projects in Uganda:

1 = Very little Extent; 2 = Little Extent; 3 = Fair Extent; 4 = Great Extent; 5 = Very Great Extent

C	**3. Risk occurrence Factors**	**1**	**2**	**3**	**4**	**5**
C1	Errors in designs					
C2	Natural/External risks (Floods/earth quake, technological changes)					
C3	Inflation					
C4	Government regulations and political factors					
C5	Personnel risks (Lack of skills and experience)					
C6	Set dates and deadline risks					
C7	Insecurity					
C8	Political instability					
C9	Geopolitical instability (Regional)					
C10	Errors in designs					

iv) Project Financing Factors

Clearly state your opinion with regard to the implementation of road projects by the Ministry of Works and transport. Do you think that the Project financing factors influence performance of road construction projects? Yes ( ) NO ( ) Not Sure ( ).

Using the scale of 1 to 5, rate the extent to which the following project financing factors have influenced the performance of road construction projects in Uganda:

1 = Very little Extent; 2 = Little Extent; 3 = Fair Extent; 4 = Great Extent; 5 = Very Great Extent

D	**4. Project Financing factors**	**1**	**2**	**3**	**4**	**5**
D1	Cash flows					
D2	Availability of funds					
D3	Timely payment of certificates					
D4	Lack of equipment					
D5	Inadequate mobilization of resources					
D6	Financial discipline of Contractors					
D7	Proper use of Advance payment by Contractors					

Project Stake Holders Factors

Clearly state your opinion with regard to the implementation of road projects by the Ministry of Works and transport. Do you think that the Project stake holders' factors influence the performance of road construction projects? Yes ( ) NO ( ) Not Sure ( ).

Using the scale of 1 to 5, rate the extent to which the following project stakeholders' factors have influenced the performance of road construction projects in Uganda:

1 = Very little Extent; 2 = Little Extent; 3 = Fair Extent; 4 = Great Extent; 5 = Very Great Extent

E	5. Project stakeholders' factors	1	2	3	4	5
E1	Contractors					
E2	Consultants					
E3	Clients/Owner					
E4	External stakeholders					
E5	Bankers					
E6	Insurers					
E7	Project Affected persons (PAPS)					
E8	Political Leaders					
E9	Community beneficiaries					

Part 4: Using your experience on the road construction projects, previously implemented under the Ministry of Works and Transport, indicate the major factors that influenced the performance of these road construction projects.

1 ……...

2 ……

3 ……

4 ……

5 ……

Appendix B: Table of critical values of the chi-square distribution with d degrees of freedom

Critical values of the Chi-square distribution with *d* degrees of freedom

	Probability of exceeding the critical value						
d	0.05	0.01	0.001	*d*	0.05	0.01	0.001
1	3.841	6.635	10.828	11	19.675	24.725	31.264
2	5.991	9.210	13.816	12	21.026	26.217	32.910
3	7.815	11.345	16.266	13	22.362	27.688	34.528
4	9.488	13.277	18.467	14	23.685	29.141	36.123
5	11.070	15.086	20.515	15	24.996	30.578	37.697
6	12.592	16.812	22.458	16	26.296	32.000	39.252
7	14.067	18.475	24.322	17	27.587	33.409	40.790
8	15.507	20.090	26.125	18	28.869	34.805	42.312
9	16.919	21.666	27.877	19	30.144	36.191	43.820
10	18.307	23.209	29.588	20	31.410	37.566	45.315

***INTRODUCTION TO POPULATION GENETICS*, Table D.1**