

**CONTRACT MANAGEMENT AND ROAD CONSTRUCTION PROJECT  
PERFORMANCE UNDER THE MUNICIPAL INFRASTRUCTURE  
DEVELOPMENT PROGRAM**

**CASE STUDY OF SOROTI MUNICIPAL COUNCIL**

**BY**

**ONYAIT JOHN STEPHEN**

**BPLM (KYU)**

**REG. NO.: 15/U/14558/GMSC/PE**

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MANAGEMENT OF KYAMBOGO UNIVERSITY.**

**NOVEMBER, 2018**

**DECLARATION**

I, ONYAIT JOHN STEPHEN, do hereby declare that to the best of my knowledge, the work contained in this dissertation report is entirely my own and has never been submitted by anyone to any institution/university before for any award.

Signature:..........Date.....30/11/2018.....

**ONYAIT JOHN STEPHEN**

**15/U/14558/GMSC/PE**

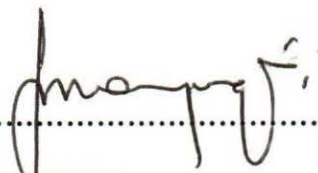
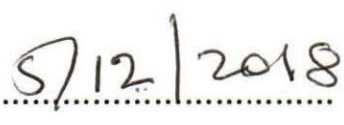
**APPROVAL**

This is to certify that this Dissertation has been done under our supervision and is now ready for submission to the Graduate School Kyambogo University in partial fulfillment for the requirements of the award of Master's Degree of Science in Supply Chain Management with our approval.

Signature.......... Date ..........

**DR. FRANCIS SSENNOGA**

**PRINCIPLE SUPERVISOR**

Signature.......... Date ..........

**DR. JACOB L. OYUGI**

**CO-SUPERVISOR**

## **DEDICATION**

I dedicate this study to my beloved family, especially my children Mark, Nathan, Patricia and lovely wife Harriet who have supported and encouraged me through my studies.

May the exceeding grace of the Lord be upon them!

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## LIST OF ABBREVIATIONS AND ACRONYMS

CVI	:	Content Validity Index
DV	:	Dependent Variable
FYR	:	Financial Year
IDA	:	International Development Association
IV	:	Independent Variable
KCCA	:	Kampala Capital City Authority
LG	:	Local Government
MDF	:	Municipal Development Forum
MLHUD	:	Ministry of Lands, Housing and Urban Development
OAG	:	Office of the Auditor General of Government
USMID	:	Uganda Support for Municipality Infrastructure Development
PDE	:	Procurement and Disposal Entity
PDU	:	Procurement and Disposal Unit
POM	:	Project Operation Manual
PPDA	:	Public Procurement Disposal Authority
SMC	:	Soroti Municipal Council

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## ABSTRACT

The general objective of the study was to establish the relationship between contract management and road construction project performance under the USMID program. The specific objectives of the study related to examining the relationship between contract implementation planning, supervision and variations management and road construction project performance in Soroti Municipal Council. A cross-sectional survey design using both quantitative and qualitative approaches was adopted. The study population included Soroti Municipal Council technical staff, elected leaders and contractor representatives. The study found a high positive and significant relationship between contract implementation planning and USMID project performance ( $r = 0.691^{**}$ ,  $p = 0.000$ ). There was a high positive and significant relationship between contract supervision and USMID project performance ( $r = 0.751^{**}$  and  $p = 0.000$ ). There was a high positive and significant relationship between variations management and USMID project performance ( $r = 0.740^{**}$  and significance  $p = 0.000$ ). It was concluded that USMID project performance was dependent on how the projects management team undertakes to effectively carry out contract implementation planning, conduct contract supervision and manage cost and price variations during contract management. To enhance the present and future USMID World Bank project time, cost and quality performance, the study recommends that the municipal project management team and contractors should adequately conduct project resource planning, by identifying and availing the necessary construction equipment and laboratory facilities for testing quality of construction works; strengthen stakeholder management through active involvement and collaboration with technical, donor and political Municipal stakeholders in USMID project implementation. On contract supervisions the projects should regularly convene progress review meetings, spot inspections with donor and Municipal political stakeholders. On management of contract variations, the project management team and contractors should promptly identify and resolve any project scope of works change, Bill of quantities, time and quality variations during contract performance; promptly identify and resolve any project cost variations arising from project scope, inflation, time and technical costs variations. The use of procurement legal provisions and industry standards could be sought for prompt project cost variations management.

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Introduction**

The study examined the relationship between contract management and road construction Project Performance under the Uganda Support to Municipal Infrastructure Development Program (USMID) a World Bank funded program under Ministry of Lands, Housing and Urban Development (MLHUD). Contract management was the independent variable while project performance was the dependent variable.

#### **1.2 Background to the study**

Project performance has its roots in construction engineering and one of the greatest wonders of the world was how the ancient Egyptian Pyramids were built without equipment and they still leave up to today undestroyed. Other notable historical monuments include the ancient city of Rome, Great Wall of China (Dart & Walker, 2011).

Modern day construction project performance equally has roots in the history of project management to the Second World War when project management techniques like the Gantt-chart or work breakdown structure, or project critical path, and PRINCE models were sought to enhance the attainment of project time, cost and quality expectations (Cleland and Irland, 2006; Bergman, et al., 2013).

Bergman, et al. (2013) specifically observed that projectification was fundamental for the survival or productivity and the ability to deliver services and customized solutions are crucial factors for success that modern day organisations faced with an increasing need to

respond to different market segment needs are increasing thus using projects as a means to respond to continuing customer demands.

However, project success as noted was still a challenge and approximately 50% of construction projects end up either with scheduled delay and cost escalation with overrun values typically between 40 and 200% (Bharti and Thakkar, 2013). In the construction sector, project success analysis by World Bank study revealed that the 900 surveyed projects, an average cost overrun of 40% over the original cost and an average time overrun of 60% over the planned completion time were reported. It has also been noted that even in a sample of successful construction project cost and schedule overruns occurred with questionable quality (Bharti and Thakkar, 2013; Naiga, 2015).

Studies point to an array of factors contributing to construction project delays ranging from project management cycle and external factors. Some studies specifically point out procurement related challenges of planning, contractor selection and contractor management constraining project performance (Rose & Manley, 2010; Mitra & Tan, 2012; Oluka & Basheka, 2013). Within procurement management, it has been noted that contract management is key to project attainment of time, cost and quality expectations especially since it provides an opportunity to re-plan before implementation and correct planning errors that could have compromised project outputs (Al-Turki, 2011). Contract management mechanisms of contractor monitoring and performance reporting equally act as gate keepers for fostering project performance (Chandola, 2011; Oluka & Basheka, 2013).

In an effort to improve urban infrastructure, the Government of Uganda entered agreement with International Development Association (IDA) an arm of World Bank in May, 2013 to enhance the Institutional capacity of the fourteen (14) program Municipal Local

Governments which are allocated 85% of the program funds to improve urban service delivery including road infrastructure. The fourteen participating Municipal Councils (Municipal LGs) are; Arua, Gulu, Lira, Soroti, Moroto, Mbale, Jinja, Entebbe, Masaka, Mbarara, Kabale, Fort-portal, Hoima and Tororo. The project became effective on September, 2013, and was implemented by the Ministry of Lands, Housing and Urban Development (MLHUD). The program was expected to run for 5 years (FYR: 2013/2014 to 2017/2018).

One of the key outputs of the USMID program of interest to this study was to increase in total planned infrastructure completed by participating Municipalities. However, Office of the Auditor General of Government audits revealed that although the USMID projects has yielded an average score of 77.5%, there were contract management and project performance gaps. These related to failure to generate project implementation report in some cases, low fund absorption and in the case of Kabale and Mbarara taking two years, delayed contractor payment (OAG on USMID, Report, 2015).

A value for Money assessment revealed significant cost variation in the actual project costs in three municipalities of Soroti, Lira and Gulu, with Soroti recording the highest variance of 63.2%. An assessment on how the municipalities provided the necessary preliminary arrangements for supervision of the projects, time control of payments and works; and the financial control of the projects revealed that the municipalities provided the necessary preliminary arrangements to supervise the projects by way of ensuring that the contractors submitted work programs, performance securities and the consultants had the necessary logistics. However, it was noted that some municipalities such as Fort Portal and Hoima did not verify the performance and advance securities submitted by the contractors.

The work programs submitted by the contractors were not followed and the progress of work was not as per the schedules (OAG on USMID, Report, 2015). A review of the work progress in selected projects is summarised in table 1.1 below.

**Table 1.1: Work progress in selected USMID projects**

<b>Municipality</b>	<b>Projected Completion date</b>	<b>Percentage of physical progress as of 2015</b>
Lira	26 <sup>th</sup> August, 2015	80%
Entebbe	30 <sup>th</sup> September, 2015	100%
Arua	3 <sup>rd</sup> April, 2016	20%
Moroto	30 <sup>th</sup> September, 2015	30%
Mbale	31 <sup>st</sup> December, 2015	35%
Hoima	13 <sup>th</sup> February, 2016	11%
Masaka	4 <sup>th</sup> January, 2016	39%
Soroti	30 <sup>th</sup> December, 2015	27%

Source: OAG Report on USMID, 2015

The table shows that most USMID projects were behind schedule and would ultimately lead to time overruns. The OAG on USMID report (2015) attributes project delays to inadequate contract management and lack of clear role definition of the Consultant within the works contract.

Effectiveness assessment based on the quality of works under implementation, usability of the infrastructure and the supervisory arrangements revealed that some materials used failed in gradation tests such as the borrow pit materials and crushed stone for base in Mbale, Tororo, Arua, Jinja and Soroti. The asphalt concrete core samples failed in air voids and indirect tensile strength tests for the roads in Lira and Gulu. The ongoing USMID project performance status and its attribution set a rich ground into an inquiry of contract management and its influence on project performance.

### **1.3 Statement of the problem**

Public Procurement Disposal Authority Regulations (2003) and the USMID project guidelines provide for contract implementation planning, contract supervision framework, payment conditions, and contract reporting to foster the attainment of project performance time, cost and quality expectations. Despite the contract management provisions, the USMID road infrastructure project performance in Soroti Municipality was constrained (OAG Report on USMID, 2015). The OAG report findings show significant time, cost and quality breaches with 73% of the road works in Soroti Municipality being late from the due dates. Similarly, cost overruns were at 63.2% yet quality of materials did not pass the quality tests. If this phenomenon of poor USMID roads projects performance was not understood and remedied, the attainment of the objectives of the USMID project would obviously be constrained. Reports attribute project under performance to project contract management practices but this had not been empirically tested. Therefore, this research intended to examine the relationship between contract management and road construction project performance under the Uganda Support to Municipal Infrastructure Development Program in Soroti Municipality.

### **1.4 Objectives of the Study**

#### **1.4.1 General Objective**

To examine the relationship between contract management and road construction project performance under the USMID program.

#### **1.4.2 Specific Objectives**

1. To examine the relationship between contract implementation planning and road construction project performance in Soroti Municipality.

2. To establish the relationship between contract supervision and road construction project performance in Soroti Municipality.
3. To assess the relationship between contract variations management and road construction project performance in Soroti Municipality.

### **1.5 Research questions**

1. What is the relationship between contract implementation planning and road construction project performance in Soroti Municipality?
2. What is the relationship between contract supervision and road construction project performance in Soroti Municipality?
3. What is the relationship between contract variations management and road construction project performance in Soroti Municipality?

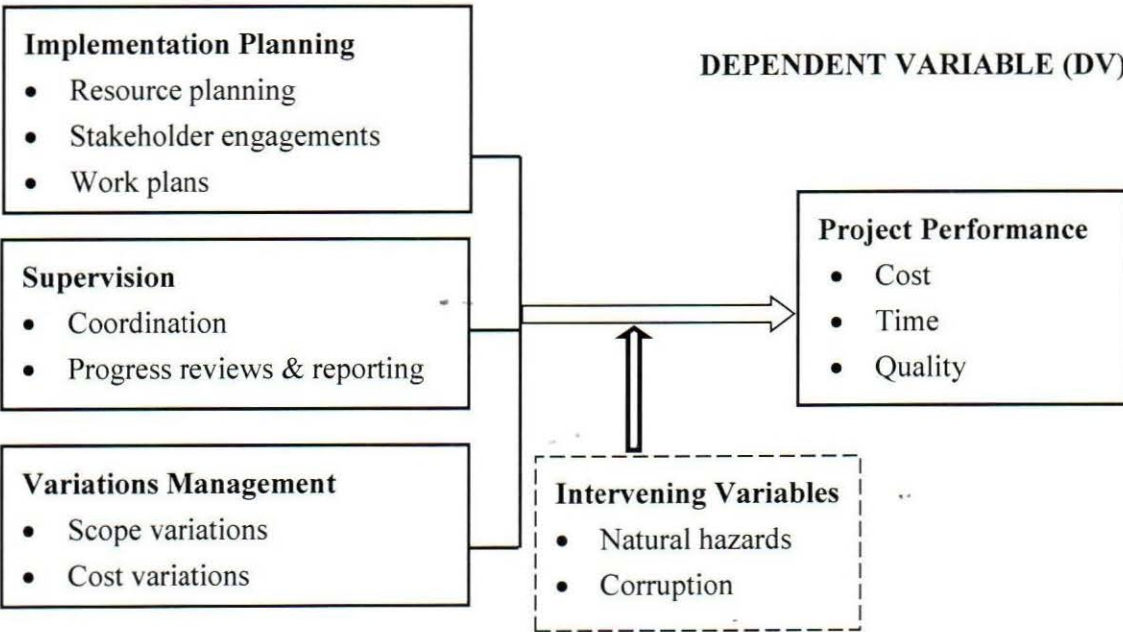
### **1.6 Conceptual framework**

The model below shows the relationship between Contract management (Independent variable) and Project performance (Dependent variable) using a many to one approach. See figure 1 next page.

**Figure 1: Conceptual Framework showing relationship between Independent and Dependent variables of the study.**

**INDEPENDENT VARIABLE (IV)**

**Contract Management**



Source: Adopted with modifications from the PPDA Regulations, 2003.

The model shows that project performance depends on contract management. Project performance has indicators of cost, time and quality expectations. Contract management has indicators of meeting dimensions of implementation planning, supervision and variations management. The model therefore suggests that effectiveness in contract implementation planning, supervision and variations management significantly contributes to the attainment of cost, time and quality performance expectations. The reverse of a poorly managed contract constrains project performance. However, the relationship may be affected by intervening variables of natural hazards and corruption. The study does not examine intervening variables.

## **1.7. Scope of the Study**

### **1.7.1 Subject scope**

The study focused on contract management dimensions of implementation planning, supervision and variations management as the Independent Variable (IV). The study also concentrated on project performance relating to fulfillment of project quality, cost and time expectations as the Dependent Variable (DV).

### **1.7.2 Geographical scope**

This study was carried out in Soroti Municipality one of the benefiting municipalities that recorded a project delay of 77% with questionable quality. Soroti Municipality is located in Soroti district in Eastern Uganda that is 294 KM from Kampala Capital City.

### **1.7.3 Time scope**

The study covered the period 2017 to 2018 the time the USMID projects was projected to end but the Soroti municipality project has not been completed.

## **1.8 Significance of the Study**

To the policy makers (Government of Uganda and Donors) sponsoring the project, the study helps evaluate and develop contract management policy interventions to strengthen the achievement of the program objectives.

To the management of municipalities and procurement professionals, the study helps develop managerial recommendations for strengthening contract management to foster project performance in USMID and related programs.

To the academia, the study helps fill knowledge and literature gaps on the relationship between contract management and project performance.

### 1.9. Definition of Key terms

For the purpose of this study the following key terms were defined to have meaning as used in this study:

**Contract management** in this study refers to the efforts to undertake contract implementation planning, contract supervision and the management of contract variations.

**Contract implementation planning** in this study refers to the efforts to put in place work plan, or in performance schedules, involvement of stakeholders and deployment of necessary resources for construction projects.

**Contract supervision** in this study refers to the actual efforts to collect data and review performance of the contractor on the basis of predetermined targets.

**Contract variations management** in this study refers to the efforts to harmonize contract variations arising from variations in scope and cost of the contract.

**Project performance** in this study refers to the fulfillment of time, cost, quality expectations to the stakeholders' satisfaction.

**Stakeholders:** Those persons and entities that have an interest in the strategy of an entity. Stakeholders normally include shareholders, customers, staff and the local community.

**Time** in this study refers to the ability to consistently deliver on the agreed due date.

**Quality** in this study refers to the degree to which construction works conform to specifications and special contract conditions.

**Cost** in this study is the ability to deliver the project outcomes to within cost or minimal variations.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter reviewed the related literature in relation to the study variables as guided by the objectives which were; to examine the relationship between contract implementation planning and road construction project performance in Soroti Municipality, to establish the relationship between contract supervision and road construction project performance in Soroti Municipality and to assess the relationship between contract variations management and road construction project performance in Soroti Municipality.

#### 2.2 Theoretical review

This study borrowed from the Principal-Agent theory proposed by Jensen & Meckling, (1976) which identifies two types of parties to a transaction. The principal is a party who wishes to secure provision of some good or service but does not have the necessary specialized knowledge, skills or assets. The principal employs an *agent* to undertake this task and in the process delegates some control to that party (Jensen & Meckling, 1976). The principal-agent theory asserts that often there will be a divergence between the actual decisions made by agents and the decisions that would maximize the principal's benefits and expected outcomes including quality. This divergence arises because, when making a decision, agents also seek to maximize their own self-interest. The principal needs to put in place plans, controls and regulations that motivate the agent to act appropriately (Jensen & Meckling, 1976; Coleman, 1990).

The principal Agent theory underpins this study as it suggests that in the context of contracts for road construction works, the municipal council action on behalf of government (principal) should exercise control over the Agents' (contractors) opportunistic behaviours.

The use of contract implementation planning, establishment of contract supervision structure with defined roles and responsibilities and the associated contract variations management are mechanism that may be employed to ensure project performance.

### **2.3. Conceptual review**

Although there is no unified definition of contract management, a review of existing definitions characterise contract management to include the process of ensuring that promises in the contract are fulfilled and involves chronological mechanisms starting from contract planning, establishment of contract governance structure, contract supervision and closure activities (Thai, 2004; Reohrich and Lewis, 2014; Davison, Sebastian & Borger, 2014).

Contract implementation planning involves the management of the PDE establishing and communicating contract performance measures or targets, resource planning, stakeholder engagements and work plans, (Thai, 2004; Davison, Sebastian & Borger, 2014). In this study contract implementation planning is conceptualised to include three indicators related to efforts to put in place resource planning, stakeholder engagement and development of contract implementation work plan.

Project implementation involves putting the project plan into action and in construction project it involves engagement of stakeholders in the project ground breaking activity, field visits, interpreting and discussing the projects design and any modification if any (Aslam, 2009; PMI, 2012). A key action point in project implementation is execution of the assigned roles in the project implementation plan by the internal and external contractors (Aslam, 2009; PMI, 2012). Effective project implementation is fostered by consideration of adequate resource planning, communication between the project stakeholders to the common goal and having clear work plans in place (Aslam, 2009; PMI, 2012). On the basis of the above

definition, this study conceptualizes project implementation in USMID to include, resource planning, stakeholder engagement and having work plans in place.

Contract supervision is the gist of the contract management and involves effort to inspect and make follow-ups on resolved contract deviations and development of progress reports for management decision-making to ensure the objectives of the procurement was achieved (Thai, 2004; Reohrich & Lewis, 2014). On the basis of the above definition, this study conceptualised contract supervision to include two indicators of coordination and progress review plus reporting.

Contract variations according to Davison & Wright (2004) may arise due to change in the scope of work after contract award as identified by either parties. It may also be changes in contract price due to poor estimation at the initial investigation and design stage (Lock, 2007). This study equally conceptualized contract variations to include indicators of scope and price variations that have to be effectively managed during contract management.

Project performance is widely defined by using the project triangle which is the extent to which the project fulfills project cost, time and quality expectations to the stakeholders satisfaction (Aslam, 2009; Robinson et al.2005). Cost refers to the extent to which the project is accomplished in the budgeted costs while time refers to the fulfillment of project schedules or simply delivery of project deliverables on the promised timelines. Quality refers to fulfillment of project specifications.

## **2.4. Empirical review**

### **2.4.1. Contract implementation planning and construction project performance**

The review of related literature is based on contract implementation planning themes of implementation, resource planning, stakeholder engagement, development of contract implementation work plan and their relationship with project performance.

#### **Resource planning and project performance**

Project implementation would require sufficient resources usually embedded in the project budget. To this effect, Olaniran (2015) study analysis of close data obtained from the survey of construction experts showed the nature of project performance problems associated with the cost based contracting to be project time delays and non-compliance with construction standards. Oluka and Basheka (2012) point out that the reasons for poor service delivery in many government projects has been due to inadequacies in resource provisions to facilitate project implementation. In complement, Choudhry, Nasir and Gabriel (2012) explored time delays overruns in highway projects in Pakistan and found that delay in making payments to contractors, the conditions under force majeure and financial difficulties faced by clients lead to project delays.

In complement, a Rwandan construction sector projects study by Gitau (2015) found that preliminary budget development process in most projects was done without the involvement of professionals. Furthermore, Zailani et al (2016) explore the relationship between delay factors and construction project performance found that resource issues negatively affect construction project performance. Project visibility and flexibility can mitigate the negative effects of resource issues on project performance.

### **Stakeholder engagement and project performance**

Stakeholder management practices of stakeholder identification, assessment and engagement are vital for project performance. Tao and Kumaraswamy (2012) attribute project performance to efforts to boost contractor input performance using a performance management framework where responsible project stakeholder monitor the project performance at their level. Yong and Mustaffa (2012) attribute project performance to a procurement relationship-based approach with greater cooperation, trust, commitment and closer relationships between project participants.

Sunjka and Jacob (2013) attribute project delays to inadequate communication between the parties leading to misunderstanding and misrepresentation of facts. This could breed conflicts and consequently hinders smooth progress of activities. The study recommends participatory planning for enhanced project time and cost performance.

Buertey, Amofa, Atsrim (2016) on project implementation stakeholders' management in Ghana equally found that project performance was affected by inadequate explanation of the background, technical and material justification for the project to the stakeholders prior to project initiation. The Buertey et al (2016) study therefore recommends early involvement of stakeholders at projects implementation to communicate their responsibilities and expectations necessary to foster project success.

A more recent study by Alamri, Amoudi and Njie (2017) attribute project delays to land acquisition process and recommends education of affected land owners on the project benefits to society and country at large while also expediting the compensation process using an accelerated compensation process before project commencement.

## **Work plan and project performance**

The role of project schedule in project performance has been highlighted in the literature. To begin with Ling and Ang (2013) in their study attribute project success to adequate project delay mitigation based on the use of adequacy of project schedule and contend that in using their predictive model schedule project was likely to achieve their desired time performance. In their study, Nguyen and Chileshe (2015) Vietnam study attribute project delays to unrealistic project schedules necessitating frequent project schedule changes which are equally costly. Furthermore, Karna and Junnonen (2017) in their study found that customer satisfaction with small and large projects construction projects depended on well-defined project schedules and how the project management teams undertakes it.

### **2.4.2. Contract supervision and construction project performance**

Two themes of coordination and progress reports formed the basis of the literature review on contract supervision and construction project performance.

#### **Coordination and project performance**

The relationship between project coordination and project performance has long been documented in literature. Muli, Bwisa and Kihoro (2016) in their Kenyan study attributes constituent development fund projects performance to efforts to coordination while a related study by Morris (2012) on his part notes that coordinating public-sector projects activities can be more difficult than the private-sector projects because they most times operate in an environment that is prone to conflicts when trying to meet the different stakeholders interests. As if in agreement with Morris (2012), Aarseth, Rolstadas and Andersen (2014) in their study report that main organizational challenges are coordinating the external stakeholders in the global project; the local government in the country, local content demand, local authorities,

local industry, and lack of support from the base organization and management. Aarseth (2012) recommend that companies need a relationship management approach to managing these challenges in global projects.

To this effect, Henjewe, et al. (2013) recommends possible tools or techniques such as search conferences, workshops, consensus conferences, focus groups to coordinate project implementation activities for enhanced project performance.

### **Progress review and project performance**

Empirical studies such as Nambuya (2014) report of significant predictive influence between contract monitoring and service delivery in KCCA predicting up to 27.1% of the variance in service delivery. Oluka and Basheka (2010) in their study found lack of regular follow-up, lack of compliance with established deadline and integrity in the contract management process, and lack of integrity in the contract management process as challenges in contract reporting in Uganda.

Marzouk, Kherbawy & Khalifa (2013) in their study found that the failure to manage project on schedule and failure to comply with the quality specifications, suppliers incompetency to deliver materials on time and failure to complete contract was responsible for poor construction project performance in their study area. In a related study, Ling & Ang (2013) attributes construction project quality outcome to the competencies of the quality manager in supervising and reviewing the performance of the project.

Similarly, Ojiambo (2016) found a high positive significant relationship between contract monitoring and procurement performance and noted that the attainment of value for money and internal customers' satisfaction with the procurement in the delivery of health services significantly depends on adequate collection of contract performance data and reporting on

contract performance. The failure to solicit for adequate contractor performance data and inappropriate contract reporting constrains the attainment of value for money and internal customer satisfaction with the procurement function in the health sector.

Nambuya (2014) lists major constraints to effective contract management to include lack of political will to monitor contracts; lack of capacity in contract management and monitoring of various stakeholders, lack of integrity in the contract management process; lack of reliable, un-costly, dispute resolution mechanisms. Nambuya (2014) recommends that KCCA should effectively monitor contract quality and contractors performance, and manage contractual conflicts that may arise during contract execution for a responsive, reliable and cost effective service delivery.

#### **2.4.3. Contract variation management and construction project performance**

Contract variance in practice arises from scope and cost variations which need to be managed for enhanced project performance. These constituted the themes in this subsections review.

##### **Scope variation and project performance**

Project scope variation also known as project creep needs to be well managed for enhanced project time, cost and quality performance. Aibinu (2014) reports that during many construction projects frequent project scope changes often result in time delays, cost overruns, quality defects and other negative impacts. To this effect, Cret et al (2011) noted that effective project creep management process encourages the construction company to identify and quantify project scope creep Construction companies that manage project scope creep effectively and efficiently enjoy financial savings, and greater productivity, improved success rates of new projects and better decision making.

Fageha and Aibinu (2014) attribute construction project success to adequate project definition detailing based on detailed needs identification, clear project scope and adequate design. However, Fageha and Aibinu (2014) note that expensive changes during construction, delays, rework, cost overruns, schedule overruns, and project failure or variations during project execution most of the time are a reflection of the unmanaged risks that occur during the early stages of the project.

Hussain (2012), examines construction project scope variations and outlines ten top reasons for project scope variations which increase contracting risk at implementation and these include; ignorance of key stakeholders until the project is underway, the project is executed after years of completion of study and scope definition, is done by the wrong people, government officials are always "ambitious" and unrealistic regarding the outcome of projects, intervention by politicians and senior government officials. By the same token, it has been noted that most managers focus on major scope changes and ignore small changes that could lead to bigger scope creep problems. The author points out the impact of scope variations in construction project to include late completion and total cost overruns than planned.

A more recent study by Karna and Junnonen (2017) found that customer satisfaction with small and large projects construction projects depended on well-defined design solutions which are flawlessness and comprehensiveness as well as the compatibility and consistency of designs as part of the project design.

### **Cost scope management and project performance**

Although project scope may arise from scope changes, other factors like inflation tend to have adverse effects on implementation at contract management stage affecting overall

project performance (Halwatura & Ranasinghe, 2013; Hussain, 2012). Halwatura and Ranasinghe (2013) reports that poor estimation was the main cause of variation in the road construction industry in Sri Lanka and reports that the consultants do not carry out adequate investigations at the initial investigation and design stage. Therefore, several site conditions rise in the construction stage. Further, clients do not have capable professional staff to carry out investigations and estimates, which are prepared by consultants and are not accurate in most cases.

A more recent study by Rostami and Oduoza (2017) equally allude to the position that the cost variations lead to delays constraining project performance in selected different culture studies.

## **2.5. Summary of Literature Review**

A review of current literature suggests narrow body knowledge on the relationship between contract implementation planning and construction project performance. Similarly, studies examining the relationship between contract supervisions and project performance are still insufficient especially in public construction works. Lastly studies examining the relationship between contract variation management and construction project performance reveal inconclusive position that has created knowledge and literature gaps that need to be filled in scope and price variations. To fill the knowledge and literature void, this study examined the relationship between contract implementation planning, supervision, management of contract variations and construction project performance in a public sector construction projects the USMID program.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 Introduction**

This chapter consists of the methodological underpinning of the study that was used to guide the data collection necessary to achieve the study objectives. It covers the research design, study population, sample size and sampling procedures, data collection methods, study instruments, reliability and validity, data management and analysis procedures, limitations of the study and ethical considerations.

#### **3.2 Research Design**

A cross-sectional survey design using both quantitative and qualitative approaches was adopted. The choice of the cross-sectional design was on the basis that justified contract management and road construction project performance was carried out at that point in time (Cohen, Manion, & Morrison, 2007). The choice of the qualitative approach was justified because it provided in-depth explanations on contract management and road construction project performance while quantitative methods provided the data needed to meet required objectives and to test relationships between the study independent and dependent variables using analytical technique such as correlation and regression analysis (Amin, 2005).

#### **3.3 Study Population**

The study was carried out on a target population of 64 respondents consisting of accounting officer, Procurement and Disposal Unit (PDU), Contract Committee (CC), works user department, elected leaders, contractor's staff and district planning official in charge of overall physical infrastructure planning. This population was considered because they are knowledgeable in contract management practice of the USMID program and therefore deemed to possess adequate experience on the subject matter.

### 3.4 Sample Size and Technique

The summary of the sample size that was selected from the study population is presented in table 2 below.

**Table 2: Population category, target population, sample size and Sampling guidelines.**

Population category	Target population	Sample	Sampling method
Accounting officer-Town clerk	1	1	Purposive
District planning officials	10	10	Purposive
Contracts committee	5	5	Purposive
PDU	2	2	Purposive
Works user department	21	18	Simple random
Elected leaders	15	14	Simple random
Contractor's staff	10	10	Purposive
<b>Total</b>	<b>64</b>	<b>60</b>	

Source: Primary data

A sample of 60 respondents from a target population of 64 was arrived at based on Krejcie and Morgan (1970) sampling guidance. The specific sample categories were selected using simple random and purposive sampling.

### 3.5 Sampling Technique and Procedure

In this study, simple random sampling was used to minimize bias by giving all the works user department and elected leaders categories equal opportunities to be considered in the study (Sekaran & Bougie, 2009). In using simple random sampling, the researcher used the lottery approach where each names is written on a tag and put in box and mixed thoroughly as suggested by Amin (2005). One name was picked without returning into the box until the required number in that specific category was obtained.

Purposive sampling was also used for the remaining categories who had specialized contract management information by virtue of their positions in the USMID project. In using

purposive sampling the researcher was relying on Sekaran and Bougie (2009) guidance that the researcher exercises personal judgment on the respondent possessing unique information which could be missed if considered in the probability sampling technique.

### **3.6 Data Collection Methods**

This study relied on primary sources mainly the questionnaire and interview administered on the selected respondents. Each of the data collection method is explained in detail below.

#### **3.6.1 Questionnaire survey**

The study used a self-administered questionnaire which was containing a set of questions from which the respondent was required to respond in writing as guided in the study instrument. The choice of the questionnaire as supported by Cresswell and Plano-Clark (2011) was that it is easier and economical to administer on a large sample and collect a reasonable amount of data in short time than any other method could provide. The use of questionnaire also removes the undue influence of the presence of the researcher that may make the respondent to fill socially accepted answers (Cresswell & Plano-Clark, 2011). The study used a drop and pick approach to administer the questionnaire where the filled questionnaire was picked one week after date of delivery. The questionnaire was issued to all categories of respondents.

#### **3.6.1. Interviewing**

The study relied on key informant interviews where the researcher met face to face with the selected interviewees and asked them a set of questions on the interview schedule from which responses were recorded in a note book as advised by (Cresswell & Plano-Clark, 2011). The choice of the interviewing methods was on the basis that it provides for more probing to gain in-depth explanations from the interviewee (Sekaran & Bougie, 2009). The study specifically

interviewed one Town Engineer, one contractor manager and one contracts committee representative as key informants.

### **3.7 Data collection Instruments**

The key data collection instruments included questionnaires, and interview guide.

#### **3.7.1. Questionnaire**

In this study, a self-administered close ended questionnaire scored on Likert scale ranging from 1 for strongly disagree, 2 = disagree, 3 = not sure, 4 = agree to 5 for strongly agree were used. The question section included background information, contract management and road construction project performance (see appendix I).

#### **3.7.2 Interview Guide**

The study used a semi-structured interview questions focusing on contract management dimensions of Implementation planning, Supervision and variations management from which the researcher drew qualitative data to complement the secondary data.

### **3.8 Validity and Reliability**

#### **3.8.1 Validity**

Validity of the study questionnaire was a measure that ascertains the relevancy of items in measuring the specific variable (Cohen et al., 2007). There are many approaches to testing of validity however for this study the expert judgment Content Validity Index (CVI) was preferred taking only variables scoring above 0.70 as suggested by Nunnally and Bernstein (1994) and the findings are tabulated in table 3 next page.

### 3.8.2 Reliability

Reliability reveals the extent to which the questionnaire items are consistent in measuring the study variables usually by way of pre-test (Cohen et al., 2007). Commonly used reliability tests include test-retest, split half but this study used the SPSS generated Cronbach's Alpha coefficient which has wide acceptance given its statistical reliance to ascertain the instrument reliability (Nunnally & Bernstein, 1994; Cohen et al., 2007). Only variables scoring above 0.70 were retained in respect of Nunnally and Bernstein (1994) guidance and the findings are tabulated in table 3 below.

**Table 3: Validity and Reliability Results**

<b>Variables</b>	<b>Content Validity Index</b>	<b>Cronbach's Alpha</b>	<b>Number of items</b>
Contract Implementation Planning	0.77	0.75	13
Contract Supervision	0.76	0.78	13
Contract Variations Management	0.78	0.8	9
Project Performance	0.75	0.79	9

Source: Primary data

Table 3 above shows that all variables yielded CVI and Cronbach's Alpha values above 0.70 suggesting that the instrument was valid and reliable in measuring contract management and road construction project performance in Soroti Municipal Council.

### 3.9 Measurement of Variables

The variables were measured by operationally defining concepts. Contract management was measured based on PPDA guidelines on contract management while project performance was measured based on time, cost, and quality.

### **3.10. Data Analysis**

#### **3.10.1. Quantitative Data Analysis**

The mean and standard deviations descriptive analysis technique was used to analyze the questionnaire responses in relation to each variable. Pearson's correlation statistics was used to test the relationships at 99 and 95 confidence limits. The resultant Pearson's correlation technique was used to determine the strength of the relationship and its direction (+ or -). A multiple regression analysis using analysis of variance statistics of adjusted  $R^2$  values, beta, t values and significance values as suggested by Cresswell and Plano-Clark (2011) was used to determine the extent to which independent variables predict the variance in the dependent variable.

#### **3.10.2. Qualitative Analysis**

The study used the content analysis technique to analyse qualitative data where themes identified in the respondent's narratives on contract management practices were analyzed for their implications, inferences and conclusions. Further qualitative analysis involved comparing the qualitative data with the quantitative findings as advised by Cresswell and Plano-Clark (2011).

### **3.11. Ethical Considerations**

The respondent's identity was protected as respondents would not fill their names on the questionnaire and interview guide as a key ethical observation. Secondly, an introductory letter was obtained from Kyambogo University Graduate School for presentation to Soroti Municipal Council management, to authorize the study. The researcher assured the respondents that the information obtained would be kept confidential and strictly for the

research purpose and participation was voluntary. The final report will be shared with management of Soroti Municipality for review and adoption of recommendations.

## **CHAPTER FOUR**

### **PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS**

#### **4.1 Introduction**

Chapter four presents, analyses and interprets the contract management and performance of the USMID project performance based on the field data obtained using the questionnaire and interviewing methods. It specifically features the response rate, profile of respondents, descriptive results on the independent and dependent variables, inferential analysis and discussions with respect to each study objective.

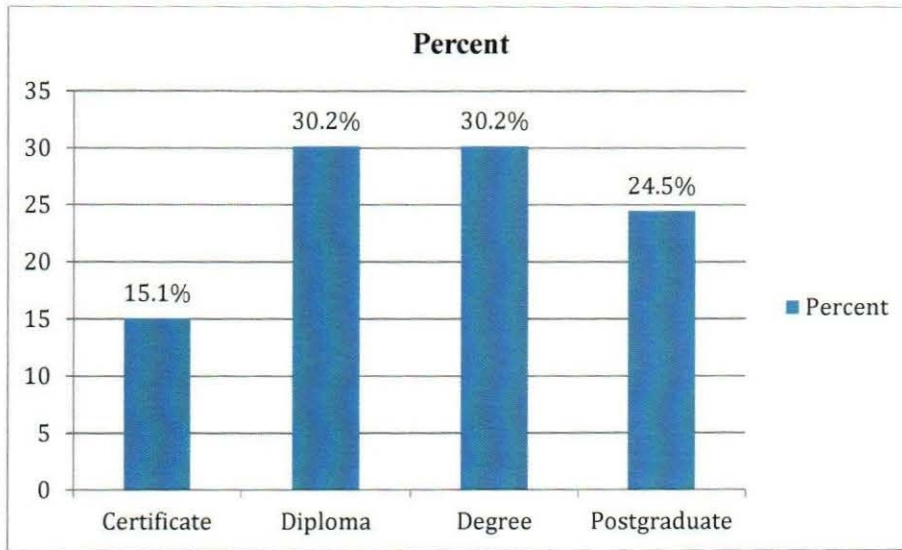
#### **4.2. Response Rate**

A total of 60 questionnaires were issued to the sample respondents of which 53 valid and useable questionnaires were returned thus 88% response rate which was reasonably high (Amin, 2005) since 9 in every 10 questionnaires issued were returned and considered in the study. Three (3) interviews were targeted and all of them were conducted giving it 100% response rate.

#### **4.3. Profile of the respondents**

Part one of the questionnaire sought to gain the profile of the respondents in relation to level of education, parent entity, position in relation to contract management function, and time worked in position as they had implications on their perceptions of contract management and project performance, figures 2 - 5 present the characteristics of the respondents.

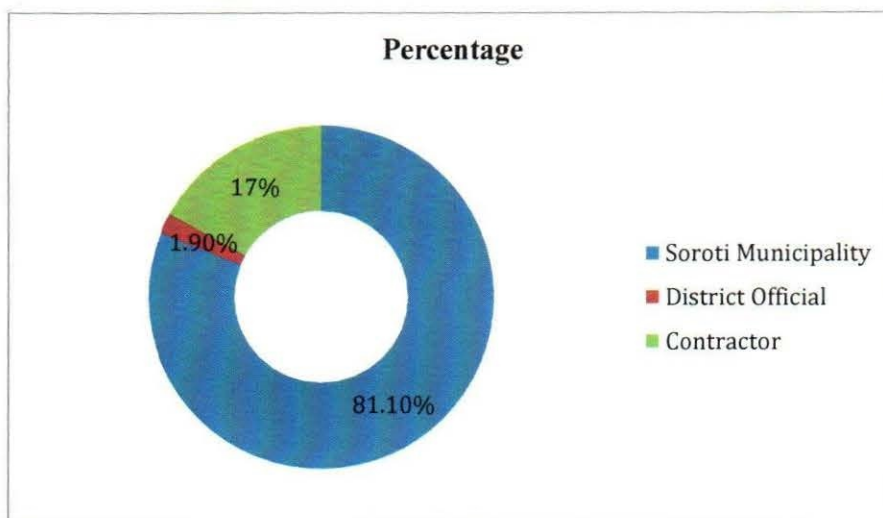
**Figure 2: Education Level**



Source: Primary data

Figure 2 above shows that only 15.1% of the respondents had attained a certificate as their high level of education. Thus 84.9% had attained diploma and above suggesting that the respondent had adequate cognitive capabilities to understand the questions on contract management and project performance by virtue of their high level of education.

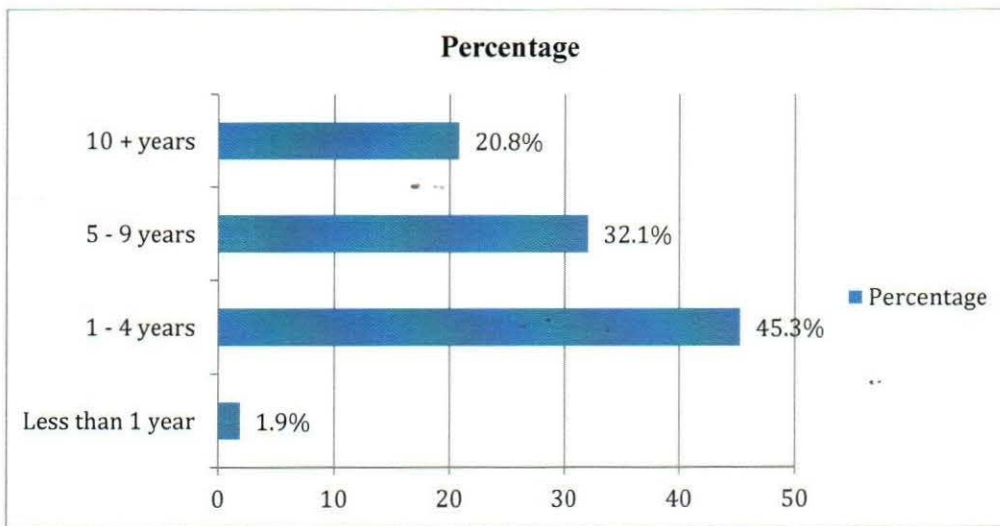
**Figure 3: Parent Organization**



Source: Primary data

Figure 3 above shows that only 18.9% of the respondents were not employed by the Municipal council but had a great hand in the USMID project in Soroti municipality. Therefore, the majority of the respondents that was 81.1% are directly employed by the Municipal council, thus had knowledge of the USMID project and provided responses that gave a clear picture of how the USMID project was handled.

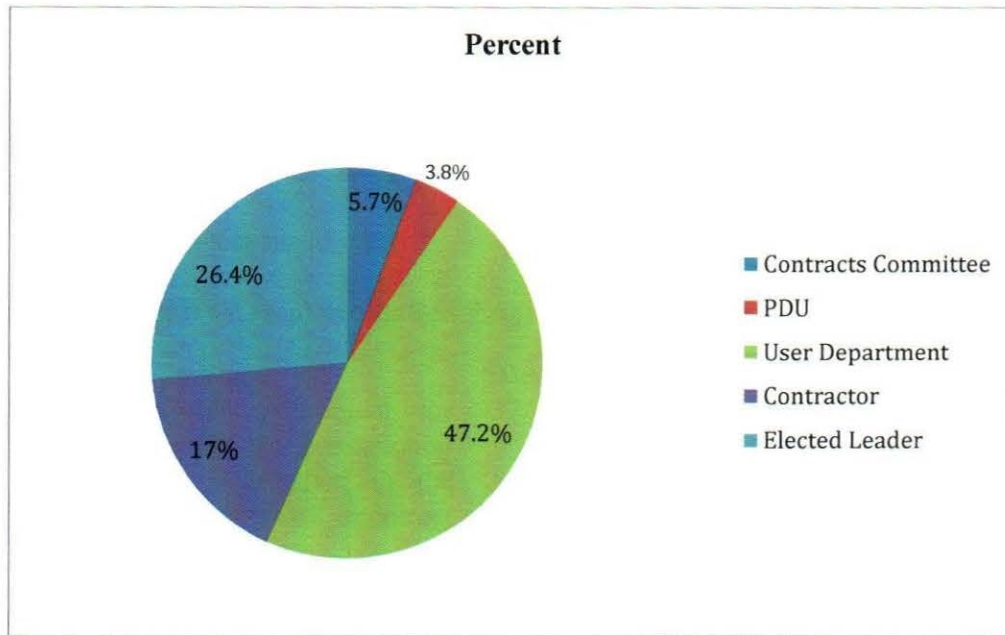
**Figure 4: Time in Position**



Source: Primary data

In Figure 4 above, the time respondents had spent in various positions working was divided into four categories as seen in the figure, only 1.9% of the respondents had spent less than 1 year in office, 45.3% having spent between 1 - 4 years and the majority 52.9% having worked in the study area for 5 years and above meaning they knew it all in regards to USMID project in Soroti municipal council. Therefore, responses from them could greatly contribute to this study.

**Figure 5: Position in Relation to Contract Management**



Source: Primary data.

Figure 5 above shows the position of the respondents in relation to contract management, indicated that the positions held by all respondents had a relation to contract management, however, the works department with the highest respondents had 47.2% meaning that their responses were technical and knowledgeable during the study. Whereas 26% being elected leaders might not have been technical in the study but politically aware of the USMID project and the 9.5% response from PDU and Contracts committee understood and participated in the contract management process of USMID project. The contractor with 17% response was also among the contract management implementation process.

#### **4.4. Contract implementation planning and road construction project performance**

The first objective of the study was to examine the relationship between contract implementation planning and road construction project performance in Soroti Municipality. Contract implementation planning had three indicators of Resource planning, Stakeholder

engagements and Work plans measured using items scored on a five point Likert scale ranging from 5= Strongly Agree, 4= Agree, 3= Not Sure, 2= Disagree, and 1= Strongly Disagree. A mean result below 3 suggests disagree while a mean result above 3 suggest agreement with that specific item.

**Table 4: Contract Implementation Planning**

<i>Resource planning</i>	<b>SDA</b>	<b>DA</b>	<b>NS</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>SD</b>
1. All necessary equipment for testing quality of construction works were identified in the USMID project contract implementation plan	37.7	22.6	9.4	26.4	3.8	2.36	1.331
2. All necessary laboratory facilities for testing quality of construction works were availed in time	32.1	30.2	13.2	15.1	9.4	2.40	1.335
3. Project funds were availed in time to facilitate project implementation	3.8	9.4	24.5	39.6	22.6	3.68	1.052
4. The specified construction equipment were availed in time to facilitate project implementation	3.8	13.2	20.8	37.7	24.5	3.66	1.108
5. The specified personnel (such as consultants) were deployed in time to facilitate project implementation	3.8	7.5	18.9	34	35.8	3.91	1.097
6. The specified inspection facilities were availed in time to facilitate project implementation	1.9	18.9	9.4	43.4	26.4	3.74	1.112
<i>Stakeholder engagement</i>							
7. The USMID project Municipal council primary stakeholders were adequately identified	3.8	7.5	20.8	32.1	35.8	3.89	1.103
8. The identified USMID project stakeholders were adequately sensitized on the USMID project implementation	5.7	15.1	15.1	35.8	28.3	3.66	1.208
9. Active involvement based on position of the stakeholders was used to engage Municipal stakeholders in USMID project implementation	37.7	22.6	9.4	18.9	11.3	2.43	1.448

10. Collaboration was used to engage stakeholders for project success	32.1	26.4	9.4	24.5	7.5	2.49	1.368
<i>Work plan</i>							
11. A work plan for implementation of the USMID project in Soroti municipality was jointly developed with the contractors	15.1	11.3	18.9	20.8	34	3.47	1.449
12. The USMID project work plan exhausted the project implementation activities	39.6	22.6	18.9	13.2	5.7	2.23	1.266
13. The USMID project work plan had realistic time schedules	34	30.2	15.1	13.2	7.5	2.30	1.280

Source: Primary data

Table findings show that the respondents agreed with adequate planning and availing project fund (mean = 3.68), construction equipment (mean = 3.66), specialised personnel including consultant (mean = 3.91) and specified inspection facilities (mean = 3.74) to facilitate project implementation. The efforts to develop a project budget and avail funds, provisions of specialized personnel and facilities should be credited as it fosters effective project implementation and success.

In an interview when asked on how USMID Project contract resources planning was undertaken interviewee A had this to say:

Resource planning was satisfactory basing on the contract documents and the bidding process which was informed by the availability of financial resources. Except at the deployment level, the human resource on ground was scanty.

Whereas the interview findings suggest satisfactory resource identification at implementation planning, the quantitative findings reveal failure to provide for quality testing equipment on site for USMID project in Soroti Municipal Council.

However, the findings in Table above show that the respondents disagreed with identification and availability of equipment for testing quality of construction works (mean = 2.36) and identification and availing of testing laboratory facilities (mean = 2.40). The

findings suggest gaps in the project implementation plan as the USMID project implementers where constrained to identify and provide for key construction quality assurance facilities for testing quality of construction works. The failure to identify and avail the key quality assurance facilities constrains project quality performance by compromising quality.

On stakeholder management during project implementation planning, although the respondents agreed with identification of primary stakeholder (mean = 3.89) and sensitization (mean = 3.66), they disagreed with active involvement of Municipal stakeholders in USMID project implementation (mean = 2.43) and adequate collaboration (mean = 2.49). These findings reveal interest in engaging stakeholders although haphazardly. The low level of primary stakeholder involvement and collaboration constrains project implementation especially when key primary stakeholders' inputs are not harnessed.

In an interview interviewee B observed:

Stakeholder engagement was done appropriately with a Municipal Development Forum (MDF) in place that comprised of 25 selected members of the community within the municipality. This Forum represented the stakeholders/community around the municipality with their leader as President. All matters concerning stakeholders for the USMID project where addressed through and by the MDF. Issues concerning affected members of the community where resolved by the same Forum.

Interviewee A pointed out challenges in USMID contract implementation planning and observed:

Poor attitude which was exhibited by the stakeholders in not believing in the change being brought by USMID project especially involving environment, cutting trees and others in the process of materials to be used for project activities.

Whereas the qualitative findings agree with the quantitative respondents that stakeholder's identification and sensitisation was satisfactory, they disagreed with involvement and collaboration where qualitative findings reveal interests in stakeholder although haphazardly with MDF still resolving issues for them.

Interviewee B noted the following on implementation planning:

There was a general lack of commitment by the design consultants to pay attention to the details in the Project Operations Manual (POM) especially project affected persons. This caused some delays in the project implementation process.

On development of work plan, whereas the respondents agreed with a joint development of work plan with the contractor and municipal management (mean = 3.47), they disagreed with the work plan exhausting project implementation activities (mean = 2.23) and realistic time schedules (mean = 2.30) for the USMID projects in Soroti Municipality. These findings reveal material weaknesses in project work plan development. Inadequate consideration of projects activities and time schedules adversely affects project implementation leading to project delays, cost overruns and compromised quality.

Asked to comment on USMID projects work plan for Soroti Municipal Council, interviewee A retorted:

The work plans of the USMID project were all in place and stated on the Project Operation Manual (POM). This manual had all the work plans clearly with scheduled time lines to be followed and it was developed during project design, although the implementation was by other project staff on the ground.

#### **4.4.1. Correlation analysis between contract implementation planning and project performance**

To test if there was a significant relationship between contract implementation planning and project performance, a correlation analysis was conducted using Pearson's correlation coefficient and significance statistics and the findings are presented in the Table .

**Table 5: Correlation Matrix between Contract Implementation Planning and Project Performance**

			Contract implementation planning	Project performance
Contract implementation planning	Pearson Correlation		1	
	Sig. (2-tailed)			
	N		53	
Project performance	Pearson Correlation		.691**	1
	Sig. (2-tailed)		.000	
	N		53	53

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

**Source: Primary data**

$P \leq 0.05$

Table shows the Pearson's correlation coefficient  $r = 0.691^{**}$  between contract implementation planning and project performance suggesting that the two variables had a positive significant relationship. The  $r = 0.691^{**}$  and significance  $p = 0.000$  between contract implementation planning and project performance suggest that there was a high positive and significant relationship between contract implementation planning and USMID project performance. The managerial implication was that a well management process of implementation planning where project resources are adequately identified and work plans developed with the engagement of stakeholders significantly contribute to USMID project performance. Inadequate contract implementation plan constrains USMID project performance.

#### 4.5. Contract supervision and road construction project performance

The second objective of the study was to examine the relationship between contract supervision and road construction project performance in Soroti Municipality. Contract supervision was conceptualized to include coordination and progress reviews & reporting indicators measured using items scored on a five point Likert scale ranging from 5= Strongly Agree, 4= Agree, 3= Not Sure, 2= Disagree, and 1= Strongly Disagree. A mean result below 3 suggests disagree while a mean result above 3 suggest agreement with that specific item.

**Table 6: Contract supervision**

<i>Coordination</i>	<b>SDA</b>	<b>DA</b>	<b>NS</b>	<b>A</b>	<b>SA</b>	<b>Mean</b>	<b>SD</b>
1.The project manager undertook to integrate the municipal technical team to ensure unity of action to implement the USMID project	7.5	5.7	11.3	52.8	22.6	3.77	1.103
2. The project manager undertook to integrate the municipal political team to ensure unity of action to implement the USMID project	35.8	26.4	3.8	26.4	7.5	2.43	1.408
3. The project manager undertook to integrate the USMID project donors to ensure unity of action to implement the USMID project	5.7	1.9	17	43.4	32.1	3.94	1.045
4. The project manager undertook to integrate the USMID project line ministries to ensure unity of action to implement the USMID project	3.8	7.5	11.3	45.3	32.1	3.91	1.045
<i>Review &amp; reporting</i>							
5. The project manager regularly convened progress review meeting between selected municipal management and contractor to review project performance	3.8	5.7	11.3	45.3	34	4.10	1.019
6. The project manager regularly convened progress review meeting between elected municipal local stakeholders and contractor to review project performance	9.4	3.8	7.5	35.8	43.4	4.00	1.240
7. The project manager regularly convened progress review meeting with donor and Municipal stakeholders to review project	26.4	35.8	13.2	11.3	13.2	2.49	1.353

performance							
8. Visual spot inspections by stakeholders were regularly conducted on the project	39.6	26.4	5.7	13.2	15.1	2.38	1.496
9. Monthly project performance reports were documented for management action	1.9	7.5	11.3	43.4	35.8	4.04	.980
10. Quarterly project performance reports were documented for management action	5.7	3.8	13.2	28.3	49.1	4.11	1.138
11. Annual project performance reports were documented for management action	3.8	5.7	9.4	45.3	35.8	4.04	1.018
12. Interim project performance reports were documented for management action	3.8	7.5	9.4	34	45.3	4.09	1.097
13. The final project performance reports was procured in time	32.1	37.7	18.9	9.4	1.9	2.11	1.031

Source: Primary data

The findings in Table show that the respondents agreed with integration of; - technical team (mean = 3.77), project donors (mean = 3.94), and line ministries (mean = 3.94) to ensure unity of action to implement the USMID project. The respondents however disagreed with project manager undertaking to integrate the municipal political team to ensure unity of action to implement the USMID project (mean = 2.43). The findings suggest although the project management team undertook to consider coordination of the different actors for unity of action for technocrats, donor and line ministries at project implementation, the municipal political leadership was not well coordinated a practice which constrains project performance. Project managers need to always coordinate all the project stakeholders to harness a unity of action for enhanced project success.

On project review, the respondents agreed with project manager regularly convening contractor progress review meeting with selected municipal management (mean = 4.10) and local stakeholders (mean = 4.00). They however disagreed with holding of review meetings with donors (mean = 2.49) and regular virtual spot inspections (mean = 2.38). The findings

suggest efforts to review project performance using stakeholders meeting a practice which leads to enhanced project performance for identification of deviations and taking of corrective actions. However, the effectiveness of project reviews in contributing to project success was limited due to less involvement of donors and regular spot inspections by the municipal technocrats, donors and elected leaders. The use of field spot inspections need to be reinforced in current and future projects.

On actual project reporting the respondents agreed with documentation of monthly (mean = 4.04), quarterly (mean = 4.11), annual (mean = 4.04) and interim (mean = 4.09) reports for management action. They only disagreed with the final project report being on time (mean = 2.11). The findings generally suggest compliance with monthly, quarterly, annual and interim reports project performance reporting a practice which fosters project performance. The management should only strive to ensure the final project report is generated at project phase-out as scheduled.

Asked to comment on project review and reporting interviewee B noted:

The progress reviews and reporting would be considered and informed at the site meeting that comprised project support team at the Ministry of Lands Housing and Urban Development, Soroti Municipal Council, contractor, consultant, councilors, MDF and the district Leadership (Chief Administrative Officer, Local Council V Chairman, Resident District Commissioner and District Internal Security Officer). Among the municipal key staff was; Engineer, Physical Planner, Environment Officer, Head PDU, Community Development Officer, Principal Treasurer and Town Clerk.

Interviewee A had this to say on project inspection:

The contract Supervision was undertaken by a consultant who was procured by Soroti Municipal Council and would route the supervision mechanisms and details to Soroti Municipal Council through the Project Manager who is the Municipal Engineer.

Both the qualitative and quantitative findings reveal that progress reviews were considered and informed at the site meeting. However, qualitative results reveal lack of integration in the Municipal and political teams during the visual spot inspection by the stakeholders.

Interviewee A outlined the following contract supervision challenges:

Poor designs of the project activities, Lack of capacity by the 1<sup>st</sup> contractor to undertake the project, under quotations/wrong bills of quantities by the contractor (inadequate/inappropriate BOQs) not conforming to the requests. Lack of cooperation by the project affected persons (not willing to accept the compensation and location that were offered in return).

Interviewee B outlined the following contract supervision challenges:

Funds not readily available donor schedules of the releases depending on assessment reports provided to the USMID secretariat; Project selection was not done well, discovered oversight projects that would have been part of the project; Designs poorly done and not harmonized by the concerned parties in the project causing delays and re-computations plus design reviews through the project time. Supervision delays by the consultant since he was not full time on site.

#### 4.5.1. Correlation analysis between contract supervision and project performance

To test if there was a significant relationship between contract supervision and project performance, a correlation analysis was conducted using Pearson's correlation coefficient and significance statistics and the findings are presented in Table .

**Table 7: Correlation Matrix between contract supervision and project performance**

		Contract supervision	Project performance
Contract supervision	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	53	
Project performance	Pearson Correlation	.751**	1
	Sig. (2-tailed)	.000	
	N	53	53

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

Source: Primary data

$P \leq 0.05$

Table shows the Pearson's correlation coefficient  $r = 0.751^{**}$  between contract supervision and project performance suggesting that the two variables had a positive significant relationship. The  $r = 0.751^{**}$  and significance  $p = 0.000$  between contract supervision and project performance suggest that there was a high positive and significant relationship between contract supervision and USMID project performance. The managerial implication was that contract supervision through effective coordination, project review and reporting significantly contribute to USMID project performance. Inadequate contract project supervision constrains USMID project performance.

#### **4.6. Contract variations management and road construction project performance**

The third objective of the study was to examine the relationship between Contract variations management considerations of scope and price and road construction project performance in Soroti Municipality. Variations management was measured using 9 items scored on a five point Likert scale ranging from 5 = Strongly Agree, 4 = Agree, 3 = Not Sure, 2 = Disagree, and 1 = Strongly Disagree. A mean result below 3 suggests disagree while a mean result above 3 suggest agreement with that specific item.

**Table 8: Contract Variations Management**

<i>Scope variations</i>	SDA	DA	NS	A	SA	Mean	S.D.
1. The USMID road construction scope of works changes were promptly resolved	30.2	37.7	9.4	17	5.7	2.30	1.234
2. The USMID road construction Bill of quantities variations were promptly resolved	32.1	34	15.1	11.3	7.5	2.28	1.246
3. The USMID supervision consulting services variation are adequately addressed	5.7	7.5	22.6	39.6	24.5	3.70	1.102
4. Construction time variations are adequately managed during contract performance	22.6	35.8	15.1	18.9	7.5	2.53	1.250
5. The USMID Project quality variations were adequately managed	7.5	18.9	28.3	30.2	15.1	3.26	1.163
<i>Price variations</i>							
6. Price variations arising from changes in scope of works were promptly identified and negotiated during contract performance	30.2	26.4	20.8	20.8	1.9	2.38	1.180
7. Price variations arising from inflation were negotiated during contract performance	26.4	30.2	24.5	17	1.9	2.38	1.113
8. Contract delay costs were promptly negotiated during contract performance	35.8	39.6	13.2	9.4	1.9	2.02	1.028
9. Technical costs were always identified in time and well negotiated	24.5	26.4	20.8	22.6	5.7	2.58	1.247

Source: Primary data

Table shows that whereas the respondents agreed with adequate handling of consulting services variation (mean = 3.70) and quality variations (mean = 3.26), they disagreed that scope of works (mean = 2.30), bill of quantities (mean = 2.28), and time (mean = 2.53) variations were adequately managed during contract performance. The findings reveal the USMID project in the study area suffered from unsatisfactory contract variation management a factor which leads to project delays and cost overruns.

Asked to comment on project cost variations, interviewee A noted:

Scope variation was handled by conducting both on and off site verification exercise which involved independent consultant who came up with new BOQs and was presented to the technical team for adoption.

Interviewee B noted

The designs on paper and the scope of works on the ground was different, thus need for all the teams involved to agree on the way forward, relocation of utilities, cutting trees all caused delays in agreeing with the affected people.

Table further shows that the respondents disagreed with prompt handling of price variations arising from;- changes in scope of works (mean = 2.39), inflation (mean = 2.38), contract delays (mean = 2.02) and technical (mean = 2.58). The findings imply that the USMID project in Soroti Municipal Council suffered from variations leading to project delays and cost overruns.

Interviewee B noted:

First Contractor under quoted in bidding prices and got stuck in the implementation and lost the contract – terminated. We re-advertised for a new contractor which took time due to mismatch in communication and in the process the contract implementation delayed due to the procurement process of the 2<sup>nd</sup> contractor. This had to involve the Ministry USMID project team to realign technical designs in the project to avoid another misshape.

Interviewee C retorted:

Most cost variations increased due to changes on designs, scope and distance in terms of where raw materials were being sourced from. Some items had to come all the way from Tororo thus making changes in the prices plus inflation. Roads covered during the project period under review include the following; Serere Road, Alanyu Road, Liverpool, Cemetery road & Central Avenue.

Whereas qualitative findings reveal changes in designs, scope and variations in activities on USMID project, they agree with finding from the quantitative respondents and therefore in tandem with results in the general findings.

#### 4.6.1. Correlation analysis between contract variations managements and project performance

To test if there was a significant relationship between contract variations management at implementation and project performance, a correlation analysis was conducted using Pearson's correlation coefficient and significance statistics and the findings are presented in the table below.

**Table 9: Correlation Matrix between variations management and project performance**

		Variations management	Project performance
Variations management	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	53	
Project performance	Pearson Correlation	.740**	1
	Sig. (2-tailed)	.000	
	N	53	53

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

**Source: Primary data**

$P \leq 0.05$

Table 9 above shows the Pearson's correlation coefficient  $r = 0.740^{**}$  between contract variations managements at implementation and project performance suggesting that the two variables had a positive significant relationship. The  $r = 0.740^{**}$  and significance  $p = 0.000$  between contract variations and project performance suggest that there was a high positive and significant relationship between variations management and USMID project performance. The managerial implication was that effective project scope creep management and price variations harmonization significantly contribute to USMID project performance. Delays in resolving contract variations constrains USMID project performance.

#### 4.7. Multiple regression model

To establish if the relationship between contract management and USMID project performance was causal, and which among the dimensions of contract management was a more significant predictor, a multiple regression was conducted and the results are tabulated below.

**Table 10: Regression model**

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.807 <sup>a</sup>	.652	.631	.38665		
ANOVA		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	13.726	3	4.575	30.604	.000 <sup>a</sup>
	Residual	7.325	49	.149		
	Total	21.051	52			
Model	Unstandardized Coefficients			Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.395	.320		1.236	.222
	Implementation Planning	.117	.123	.141	.950	.347
	Supervision	.432	.129	.422	3.345	.002
	Variations Management	.253	.123	.321	2.055	.045

a. Predictors: (Constant), Variations Management, Supervision, Implementation Planning

b. Dependent Variable: Project Performance

$P \leq 0.05$

Table shows adjusted  $R^2 = 0.631$  which suggest that contract implementation planning, contract supervision and management of variations accounted for 63.1% of that variance in USMID project performance while the remaining variables explain the remaining 38.9%. The ANOVA results of  $F = 30.604$  and sig  $0.000^a$  suggests that contract management was a significant predictor of USMID project performance.

Contract supervision was the most significant predictor of the variance in project performance as per the ( $\beta = 0.422$ ,  $t = 3.345$ ,  $\text{Sig} = 0.002$ ) which is less than the lowest significance level of 0.05. This implies that a significant change in contract supervision through enhanced coordination of project stakeholders and project activities, project performance reviews and actual reporting would result into a greatest significant change of 0.422 units in project performance than other aspects of contract management which is significant going by the sig value of 0.000.

The standardized coefficient statistics further show that variations management was the second most significant predictor of the variance in project performance as per the ( $\beta = 0.321$ ,  $t = 2.055$ ,  $\text{Sig} = 0.045$ ) which is less than the common significance level of 0.05. This implies that a significant change in variations management would result into a significant 0.321 unit change in USMID project performance which is significant ( $\text{sig} = 0.045$ ).

Contract implementation planning did not significantly impact on project performance given the  $\beta = 0.141$  and  $t = 0.950$  and significance 0.347 which is more than the acceptable minimum of 0.05. The coefficient results generally suggest that a unit increase on contract implementation planning will result into only 0.141 change in project performance which is insignificant ( $\text{sig} = 0.347$ ).

#### **4.8. Project performance**

Project performance was the dependent variable of the study and was conceptualized to include three indicators of project time, cost and quality all measured using 9 items scored on a 5-point scale and the findings are tabulated below.

**Table 3: Project performance**

	SDA	DA	NS	A	SA	Mean	SD
1. The USMID project in Soroti municipality contractor was solicited in time	32.1	30.2	11.3	9.4	17	2.58	1.247
2. The USMID project in Soroti municipality works were initiated in the specified time.	34	32.1	7.5	11.3	15.1	2.38	1.304
3. The USMID project in Soroti municipality project was completed in the specified time schedule.	35.8	41.5	9.4	3.8	9.4	2.32	1.356
4. The USMID project was accomplished in the stipulated budgeted prices according to contract plan	26.4	37.7	18.9	11.3	5.7	2.26	1.443
5. The USMID project in Soroti municipality experienced cost overruns due to lack of proper budget management	5.7	11.3	28.3	30.2	24.5	2.00	.920
6. The USMID project in Soroti municipality was completed within the estimated budget	30.2	35.8	24.5	5.7	3.8	3.57	1.152
7. The USMID project in Soroti municipality completed works suits the technical specifications	3.8	7.5	13.2	43.4	32.1	2.17	1.051
8. The USMID project in Soroti municipality completed works suits the functional specifications	5.7	3.8	17	39.6	34	3.92	1.053
9. The USMID project in Soroti municipality project is generally of good quality	7.5	5.7	22.6	43.4	20.8	3.79	1.007

Source: Primary data

Table 3 shows that respondents disagreed with contractor being solicited in time (mean = 2.58), works initiated in the specified time (mean = 2.38), and project being completed in the specified time (mean = 2.32). The findings reveal that USMID project time aspect was not managed well. They still disagreed with the project being accomplished in the stipulated budgeted prices according to contract plan (mean = 2.26) and experienced cost overruns due to lack of proper budget management (mean = 2.00). Whereas the USMID project was completed within the estimated budget (mean = 3.92). Budget prices varied, cost overruns

were experienced never the less project cost was managed within estimated budget during contract performance.

Furthermore, respondents disagreed with quality of technical specification works completed (mean = 2.17), but agreed with functional specification of works completed (mean = 3.92) and finally agreed with quality of the USMID project generally. The findings reveal the USMID project in the study area suffered from unsatisfactory time management and cost overruns, while quality of works being generally accepted in Soroti Municipal Council.

## CHAPTER FIVE

### SUMMARY, DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1. Introduction

General Objective was to examine the relationship between contract management and road construction project performance under the USMID program. The specific objectives of the study related to:

1. Examining the relationship between contract implementation planning and USMID road construction project performance in Soroti Municipality.
2. Establish the relationship between contract supervision and USMID road construction project performance in Soroti Municipality.
3. To assess the relationship between contract variations management and USMID road construction project performance in Soroti Municipality.

Chapter five presents a summary, discussion, conclusions and recommendations of the study findings on contract management and USMID road construction project performance based on the study findings in relation to each study objective.

#### 5.2. Summary of the Study Findings

##### 5.2.1. The relationship between contract implementation planning and USMID road construction project performance in Soroti Municipality

The study found out a high positive and significant relationship between contract implementation planning and USMID project performance ( $r = 0.691^{**}$ ,  $p = 0.000$ ) implying a well-managed process of implementation planning, where project resources are adequately identified and work plans developed with the engagement of stakeholders significantly contribute to USMID project performance.

### **5.2.2. Relationship between contract supervision and USMID road construction project performance in Soroti Municipality.**

There was a high positive and significant relationship between contract supervision and USMID project performance ( $r = 0.751^{**}$  and  $p = 0.000$ ) implying that contract supervision through effective coordination, project review and reporting significantly contribute to USMID project performance.

### **5.2.3. Relationship between contract variations management and USMID road construction project performance in Soroti Municipality**

The study found a high positive and significant relationship between contract variations management and USMID project performance ( $r = 0.740^{**}$  and significance  $p = 0.000$ ) implying that effective project scope creep management and price variations harmonization significantly contribute to world bank project performance. Delays in resolving contract variations constrains USMID project performance.

## **5.3. Discussion of the Study Findings**

### **5.3.1. The relationship between contract implementation planning and USMID road construction project performance in Soroti Municipality**

The study found out that USMID projects performance highly depended on how best the contract resource planning was undertaken. The study findings on relationship between contract implementation planning and project performance is supported by a Rwandan construction sector projects study by Gitau (2015) found that preliminary budget development process in most projects was done without the involvement of professionals. In complement, Zailani et al (2016) explore the relationship between delay factors and construction project performance found that resource issues negatively affect construction project performance.

The study also notes that USMID project performance highly depended on how best the stakeholders were identified and engaged in the project implementation plan. This study observations is supported by previous studies notably, Yong and Mustaffa (2012) who attribute project performance to a procurement relationship-based approach with greater cooperation, trust, commitment and closer relationships between project stakeholders. Furthermore, Buerthey, et al (2016) Ghana study found that project performance was affected by inadequate explanation of the background, technical and material justification for the project to the stakeholders prior to project initiation.

The study further noted that USMID project performance highly depended on development of a realistic project work plan in the project implementation plan. The role of project work plan in fostering construction project performance has long been highlighted in the literature. Ling and Ang (2013) in their study attribute project success to adequate project delay mitigation based on the use of adequacy of project schedule and contend that in using their predictive model schedule projects were likely to achieve their desired time performance. In their study, Nguyen and Chileshe (2015) Vietnam study attribute project delays to unrealistic project schedules necessitating frequent project schedule changes which are equally costly.

### **5.3.2. Relationship between contract supervision and USMID road construction project performance in Soroti Municipality**

There was a high positive and significant relationship between contract supervision and USMID project performance suggesting that contract supervision through effective project coordination significantly contribute to USMID project performance. The role of project coordination in fostering project performance is supported by scholars such as Muli, et al (2016) in their Kenyan study attributes constituent development fund projects performance to effective project coordination efforts to coordination and Aarseth, et al (2014) who found

report that the main organizational challenges are coordinating the external stakeholders in the global project; the local government in the country, local content demand, local authorities, local industry, and lack of support from the base organization and management. Project performance review and reporting during project supervision was equally found to contributed to USMID project performance suggesting that the efforts by the project manager to report on project performance is vital for USMID World Bank project performance. This study observation is supported by Ling and Ang (2013) who attributes construction project quality outcome to the competencies of the quality manager in supervising and reviewing the performance of the project. In a related study Marzouk, et al (2013) attributed project poor performance failure to effect project reviews to ensure compliance with the quality specifications during project implementation. Nambuya (2014) points out lack of political will to monitor contracts as a major constraint to effective contract management in the defunct Kampala City Council.

### **5.3.3. Contract variations management and USMID road construction project performance in Soroti Municipality**

The study found a high positive and significant relationship between variations management and USMID project performance implying that effective project scope variations management significantly contribute to world bank project performance. Delays in resolving contract scope variations constrains USMID project performance. The need to effectively manage project scope to foster project performance supports earlier studies such as Cret et al (2011) who noted that construction companies that manage project scope creep effectively and efficiently enjoy financial savings, and greater productivity, improved success rates of new projects and better decision making. In support, Fageha and Aibinu (2014) note that expensive changes during construction, delays, rework, cost overruns, schedule overruns, and

project failure or variations during project execution most of the time are a reflection of the unmanaged risks that occur during the early stages of the project.

The high positive relationship between variations management and USMID project performance implies that effective project cost or price variations management significantly contribute to USMID project performance. This study observation on project cost variation management and project performance is supported by Halwatura and Ranasinghe (2013) who attribute project performance in Sri Lanka how best construction consultants carry out adequate investigations at the initial investigation and design stage and manage the variations. Rostami and Oduoza (2017) equally allude to the position that the cost variations lead to delays constraining project performance in selected different culture studies.

#### **5.4. Conclusions of the Study**

##### **5.4.1. Contract implementation planning and USMID road construction project performance**

It was concluded that a well-managed process of contract implementation planning where project resources are adequately identified and work plans developed with the engagement of stakeholders significantly contribute to USMID road construction project time, cost and quality performance. Inadequacies in project contract implementation planning constrains USMID road construction project performance.

##### **5.4.2. Contract supervision and USMID road construction project performance**

The study concluded that contract supervision through effective coordination, project review and reporting significantly contribute to the USMID road construction project time, cost and quality performance. Inadequacies in project contract supervision constrains USMID road construction project performance.

#### **5.4.3. Contract variations management and USMID road construction project performance**

The study concluded that effective project scope creep management and price variations harmonization significantly contribute to USMID road construction project time, cost and quality performance. Delays in resolving contract variations constrains the USMID road construction project performance.

### **5.5. Recommendations of the Study**

#### **5.5.1. Contract implementation planning and USMID road construction project performance**

To enhance the present and future USMID World Bank project time, cost and quality performance the study recommends that:

The municipal project management team and contractors should adequately conduct project resource planning by identifying and availing the necessary construction equipment and laboratory facilities for testing quality of construction works.

The Municipal project management team and contractors should strengthen stakeholder management through active involvement and collaboration with technical, donor and political Municipal stakeholders in USMID project implementation.

The projects management team and contractors should develop and discuss the project implementation realistic work plan detailing all activities in USMID project implementation.

The use of project Ghant chart could be sought to design the project schedule.

### **5.5.2. Contract supervision and USMID road construction project performance**

To enhance the present and future USMID World Bank project time, cost and quality performance the study recommends that:

The projects management team and contractors in their project coordination mechanisms and practices should integrate the municipal political team to ensure unity of action to implement the USMID project.

The projects management team and contractors in their project review and reporting mechanisms and practices should regularly convene progress review meeting, spot inspections with donor and Municipal stakeholders to review project performance. The team should ensure prompt generation and submission of final project performance reports for accountability and management action.

### **5.5.3. Contract variations management and USMID road construction project performance**

To enhance the present and future USMID World Bank project time, cost and quality performance the study recommends that:

The projects management team and contractors should promptly identify and resolve any project scope of works change, Bill of quantities, time and quality variations during contract performance.

The projects management team and contractors should promptly identify and resolve any project cost variations arising from project scope, inflation, time and technical costs variations. The use of procurement legal provisions and industry standards could be sought for prompt project contract variations management.

### **5.6. Areas for further research**

The study modelled a direct relationship between contract management and road construction project performance. However, there could be moderating variations in this relationship. Future studies could examine the moderating role of procurement planning on the relationship between contract management and project performance since procurement planning sets ground for project implementation.

### **5.7. Contributions of the Study**

The study has helped develop managerial recommendations for strengthening contract management on World Bank donor supported public infrastructure projects on projects resource planning, work plan development, stakeholder involvement, coordination, project review and reporting, management of costs and price variations which may be relied on the second phase of USMID projects. The study has also helped to fill knowledge and literature gaps on contract management and projects performance in the road construction sector.

### **5.8. Limitations of the Study**

A key limitation of the study was its focus on only one USMID project. Consideration of selected projects would enhance the contract management and road construction project performance experiences for generalization of findings.

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**APPENDICES**

**APPENDIX I: STUDY QUESTIONNAIRE**

**Introduction**

Dear respondent,

I am **Onyait John Stephen** a student pursuing masters in Supply Chain Management of Kyambogo University. As part of the degree award am carrying out a study on contract management and road construction project performance under the municipal infrastructure development program. You have been selected as a respondent to provide us with your views on this study. Your views will be kept and treated confidentially in line with the study and at no moment will they be used against you but for purposes of achieving the objective of this study. Please answer diligently and honestly.

**SECTION I: BACKGROUND INFORMATION (tick as appropriate)**

1. Your Level of education: Certificate [  ] Diploma [  ] Degree [  ] Postgraduate [  ]  
Others (specify).....
2. Your entity: Soroti Municipality [  ] District Official [  ] Contractor [  ]
3. Time worked with the position: Less than 1 Year [  ] 1-4 Years [  ] 5-9 Years [  ] 10+ [  ]
4. Your position in relation to contract management function: Contracts Committee [  ]  
PDU [  ] User Department [  ] Contractor [  ] Elected Leader [  ]

**Section II: Contract Implementation Planning**

**Instructions**

Indicate the extent to which you agree with the following observations on contract implementation planning for the recently concluded USMID project in Soroti municipality using a scale of (1) = strongly disagree (2) = disagree, (3) = not sure (4) = agree (5) = strongly agree.

<b>Planning</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
<i>Resource planning</i>					
1. All necessary equipment for testing quality of construction works were identified in the USMID project contract implementation plan					
2. All necessary laboratory facilities for testing quality of construction works were availed in time					
3. Project funds were availed in time to facilitate project implementation					
4. The specified construction equipment were availed in time to facilitate project implementation					
5. The specified personnel (such as consultants) were deployed in time to facilitate project implementation					

<b>Planning</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
6. The specified inspection facilities were availed in time to facilitate project implementation					
<i>Stakeholder engagement</i>					
7. The USMID project Municipal council primary stakeholders were adequately identified					
8. The identified USMID project stakeholders were adequately sensitized on the USMID project implementation					
9. Active involvement based on position of the stakeholders was used to engage Municipal stakeholders in USMID project implementation					
10. Collaboration was used to engage stakeholders for project success					
<i>Work plan</i>					
11. A work plan for implementation of the USMID project in Soroti municipality was jointly developed with the contractors					
12. The USMID project work plan exhausted the project implementation activities					
13. The USMID project work plan had realistic time schedules					

## Section II: Contract supervision

### Instructions

Indicate the extent to which you agree with the following contract supervision practices for the recently concluded USMID project in Soroti municipality using a scale of (1) = strongly disagree (2) = disagree, (3) = not sure (4) = agree (5) = strongly agree.

<b>Scale</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
<i>Coordination</i>					
1. The project manager undertook to integrate the municipal technical team to ensure unity of action to implement the USMID project					
2. The project manager undertook to integrate the municipal political team to ensure unity of action to implement the USMID project					
3. The project manager undertook to integrate the USMID project donors to ensure unity of action to implement the USMID project					
4. The project manager undertook to integrate the USMID project line ministries to ensure unity of action to implement the USMID project					
<i>Progress Reviews &amp; Reporting</i>					
5. The project manager regularly convened progress review meeting between selected municipal management and contractor to review project performance					
6. The project manager regularly convened progress review meeting between elected municipal local stakeholders and contractor to review					

project performance					
7. The project manager regularly convened progress review meeting with donor and Municipal stakeholders to review project performance					
8. Visual spot inspections by stakeholders were regularly conducted on the project					
9. Monthly project performance reports were documented for management action					
10. Quarterly project performance reports were documented for management action					
11. Annual project performance reports were documented for management action					
12. Interim project performance reports were documented for management action					
13. The final project performance reports was procured in time					

### Section III: Contract Variations Management

#### Instructions

Indicate the extent to which you agree with the following observations on contract variations management in the for the recently concluded USMID project in Soroti municipality using a scale of (1) = strongly disagree (2) = disagree, (3) = not sure (4) = agree (5) = strongly agree.

Scale	5	4	3	2	1
<i>Scope variation</i>					
1. The USMID road construction scope of works changes were promptly resolved					
2. The USMID road construction Bill of quantities variations were promptly resolved					
3. The USMID supervision consulting services variation are adequately addressed					
4. Construction time variations are adequately managed during contract performance					
5. The USMID Project quality variations were adequately managed					
<i>Cost variation</i>					
6. Price variations arising from changes in scope of works were promptly identified and negotiated during contract performance					
7. Price variations arising from inflation were negotiated during contract performance					

Scale	5	4	3	2	1
8. Contract delay costs were promptly negotiated during contract performance					
9. Technical costs were always identified in time and well negotiated					

### Section V: Project performance

Indicate the extent to which you agree with the following observations on performance of recently concluded USMID project in Soroti municipality on a scale of (1) for strongly disagree, (2) for disagree, (3) for not sure (4) for agree (5) for strongly agree.

Scale	5	4	3	2	1
<i>Time</i>					
1. The USMID project in Soroti municipality contractor was solicited in time					
2. The USMID project in Soroti municipality works were initiated in the specified time.					
3. The USMID project in Soroti municipality project was completed in the specified time schedule.					
<i>Cost</i>					
4. The USMID project was accomplished in the stipulated budgeted prices according to contract plan					
5. The USMID project in Soroti municipality <i>experienced cost overruns</i> due to lack of proper budget management					
6. The USMID project in Soroti municipality was completed within the estimated budget					
<i>Quality</i>					
7. The USMID project in Soroti municipality <i>completed works</i> suits the technical specifications					
8. The USMID project in Soroti municipality <i>completed works</i> suits the functional specifications					
9. The USMID project in Soroti municipality project is generally of good quality					

## APPENDIX II: INTERVIEW GUIDE

### Introduction: Self introduction

1. Describe how the UMSID project contract implementation planning was undertaken
  - Resource planning/deployment
  - Stakeholder engagement
  - Work plans
2. What were the USMID project contract planning challenges?
3. Describe how contract supervision was undertaken for the UMSID project
  - Coordination
  - Progress reviews and reporting
4. What were the challenges in the USMID project supervision?
5. Describe how the USMID project contract variations was handled
  - Scope variations
  - Cost variations

**APPENDIX III: KREJCIE AND MORGAN TABLE FOR DETERMINING SAMPLE  
SIZE FROM A GIVEN POPULATION**

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Krejcie, Robert V., Morgan, Daryle W., *“Determining Sample Size for Research Activities”*  
Educational and Psychological Measurement, (1970).

Note: “N” is population size  
“S” is sample size.