

**FACTORS AFFECTING TRIPLE CONSTRAINTS IN PROJECT
MANAGEMENT SUCCESS: A CASE OF UNIT TRUST OF TANZANIA
PROJECTS AND INFRASTRUCTURE DEVELOPMENT**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF PROJECT
MANAGEMENT OF THE OPEN UNIVERSITY OF TANZANIA**

2019

CERTIFICATION

The undersigned certifies that has read and hereby recommend for the acceptance by the Open University of Tanzania the dissertation entitled; “Factors Affecting Triple Constraints in Project Management Success” in partial fulfillment of the requirements for the master degree in project management of the Open University of Tanzania.

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.....

Date

DEDICATION

Thank you, Edna, for your ceaseless love and support over the tenure of my studies.

This report is dedicated to my lovely kids, Jayden and Jansen.

ACKNOWLEDGMENT

First and far most, my great thanks to the All Mighty God for His omnipotent presence throughout my studies, without Him nothing could be archived. Secondly, I would like to extend my heartfelt appreciation to my supervisor Saganga Kapaya (PhD) for his timelessly support and critical ideas that contributed terrifically to the success of this work. His patience, smartness in constructive inputs and understanding were remarkable.

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ABSTRACT

The primary purpose of this study was to analyze the factors affecting Triple Constraints in Project Management Success at Unit Trust of Tanzania Projects and Infrastructure Development. This study used both primary and secondary data methods for data collection. Quantitative data were analyzed in descriptive statistics, the findings were presented in tables, graphs and multiple linear regression equation as well. Thereport revealed that TCs contributed 53.5% in PMS while other factors contributed 46.5%. The study revealed factors that affect TCs during project execution, such factors include; political interference, project financing, price fluctuation, bureaucracy and force majeure. Other factors that affect TCs due to poor management of the project managers and team members include but not limited to project change, stakeholders' interference, poor monitoring, project delays, project new designs, communication barriers, scope changes, poor contract management as well as lack of human resource. The findings also show that when the project schedule is reduced by 80%, the project budget contributed 69.2% whereas the project scope constraint contributed 79.4% in PMS. The study concluded that, price fluctuation, project changes and bureaucracy were specifically affecting the project budget constrain; project scope were affected by political interference, project new designs, project financing, project changes and communication barriers among stakeholders whereas the project schedule constraint were affected by scope change, meetings, weakness in designs and force majeure. It is therefore recommended that the government and UTT-PID should strengthen on the policies and procedures so as to have control on political interference, planning skills, effective communication and change management in order to balance the TCs in PMS.

TABLE OF CONTENTS

CERTIFICATION.....	ii
COPYRIGHT	iii
DECLARATION	iv
DEDICATION	v
ACKNOWLEDGMENT	vi
ABSTRACT	vii
TABLE OF CONTENTS.....	viii
LIST OF TABLES	xii
LIST OF FIGURES	xiii
LIST OF ABBREVIATIONS AND ACRONYMS.....	xiv
CHAPTER ONE.....	1
INTRODUCTION	1
1.1 Background to the Problem	1
1.2 Statement of the Research Problem.....	3
1.3 Research Objectives	4
1.3.1 General Research Objective.....	4
1.3.2 Specific Research Objectives	4
1.4 Research Questions	4
1.4.1 General Research Question.....	4
1.4.2 Specific Research Questions.....	4
1.5 Relevance of the Study	5
1.6 Organization of the Research Report	5

CHAPTER TWO	7
LITERATURE REVIEW	7
2.1 Theoretical Literature Review	7
2.2 Empirical Literature Review.....	10
2.2.1 Studies Worldwide	10
2.2.2 Studies in African Countries	12
2.2.3 Studies in Tanzania	13
2.3 Research Gap Identified	15
2.4 Conceptual Framework.....	15
CHAPTER THREE	16
RESEARCH METHODOLOGY	16
3.1 Overview.....	16
3.2 Research Design.....	16
3.2.1 Research Philosophy	17
3.2.2 Research Approach.....	18
3.2.3 Research Strategy.....	18
3.2.4 Research Choice.....	19
3.2.5 Time Horizon	19
3.2.6 Techniques and Procedures.....	19
3.3 Survey Population	20
3.4 Sample Size.....	20
3.5 Study Area	21
3.6 Sampling Design and Procedures.....	21
3.7 Variables and Measurement Procedures.....	21

3.7.1	Primary Data	22
3.7.2	Secondary Data	22
3.8	Data Processing and Analysis	22
3.9	Expected Results of the Study	23
CHAPTER FOUR		24
4.0 DATA ANALYSIS, PRESENTATION AND INTERPRETATION		24
4.1	Introduction.....	24
4.2	Respondent’s Demographic Information.....	24
4.3	Factors Affecting Budget Constraint in PMS	25
4.4	Factors Affecting Scope Constraint in PMS.....	27
4.5	Factors Affecting Schedule Constraint in Project Management Success.....	28
4.6	Effects of TCs on PMS	29
4.6.1	TCs Agreement before Project Execution	29
4.6.2	Regression analysis of TCs on PMS	30
4.6.3	Project Deliverables Obtained on Time.....	33
4.6.4	Customers’ Satisfaction.....	35
CHAPTER FIVE		37
SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS.....		37
5.1	Summary of Findings.....	37
5.2	Conclusion.....	37
5.3	Recommendations.....	38
5.3.1	Political / Stakeholders Interference	38

5.3.2	Planning Skills	39
5.3.3	Effective Communication	39
5.3.4	Project Change Management.....	39
5.4	Limitation of the Study	39
5.5	Areas of Future Studies.....	40
	REFERENCE	41
	APPENDICES.....	49

LIST OF TABLES

Table 2.1: Original and Actual Time for the Ten examined Projects.....	13
Table 2.2: Revised Budgets during the Construction Stage	14
Table 4.1: Respondents Demographic Information.....	24
Table 4.2: Agreement on Scope, Schedule and Budget before Project Execution.....	30
Table 4.3: Regression model summary ^b	30
Table 4.4: ANOVA ^b	30
Table 4.5: Coefficients ^a	31

LIST OF FIGURES

Figure 2.1: A Classical Triple Constraint	i
Figure 2.2: International project costs overruns in recent years.....	13
Figure 2.4: Conceptual Framework	17
Figure 3.2: Research Onion.....	19
Figure 4.1: Factors Affecting Budget Constraints in PMS	29
Figure 4.2: Factors Affecting Scope Constraint in PMS	30
Figure 4.3: Factors Affecting schedule constraint in PMS	32
Figure 4.4: Project deliverable obtained on time	37
Figure 4.5: Time/Schedule overrun responses.....	38
Figure 4.5: Customers' Satisfaction	39

LIST OF ABBREVIATIONS AND ACRONYMS

CAG	Controller and Auditor General
FGDs	Focus Group Discussions
KPMG	Klynveld Peat Marwick Goerdeler
NAO	National Audit Office
PM	Project Manager
PMI	Project Management Institute
PMBOK	Project Management Body of Knowledge
PMS	Project Management Success
PS	Project Sponsor
SPSS	Statistical Package for Social Sciences
TCs	Triple Constraints
Tshs	Tanzanian Shillings
URT	United Republic of Tanzania
UTT-PID	Unit Trust of Tanzania Projects and Infrastructure Development

CHAPTER ONE

INTRODUCTION

1.1 Background to the Problem

The Triple Constraints (TCs) are combinations of the three most significant restrictions on any project that tend to make the project succeed or fail if not maintained; that is Budget (Resource), Schedule (Time) and Scope. These constraints are sometimes referred to as the iron triangle or the project management triangle (Rouse, 2015). The budget, scope and schedule make the sides of the triangle with quality as the central and final theme of any project (Rouse, 2015).

The three constraints are interdependent; none of them can be altered without affecting one or both of the others. For example, if the scope of a project is increased, it is likely to take longer and/or cost more. Likewise, an earlier deadline is almost certain to either require more budgets or a less ambitious scope (Rouse, 2015). According to PMI, 2013; the book elaborates that, “the relationship among these constraints is such that if any one changes, at least one other constraint is likely to be affected. For example, if the schedule is shortened, often the budget needs to be increased to add additional resources to complete the same amount of work in less time. If a budget increase is not possible, the scope or targeted quality may be reduced to deliver the project’s end result in less time within the same budget amount (PMI, 2008)”.

Also Joe, 2013; “project managers who view themselves as stewards of their teams’ fiscal responsibilities often fall back on budgets to justify holding firm to changes of scope or adjustments to timelines. However, cost constraints frequently cause

managers to revisit task lists and deadlines. Cost overruns offer easy targets for administrators who see projects spiraling out of control, which is why many project management professionals put a lot of energy into staying under budget (Joe, 2013). Unexpected changes to the constraints themselves are harder to control, requiring both experience and insight from team leaders (Joe, 2013). Currently, the construction of a five star hotel in Mwanza has delayed its completion date that was scheduled to start on 1st November, 2013 and the completion date was initially scheduled to be on 28th October, 2016 but as of now the project is not yet complete (NSSF, 2019).

The relative debates on TCs in PMS as cited by Ebbesen and Hope (2013) discussed the validity of the iron triangle and the traditional triple constraints of time, cost and quality, have been debated throughout the academic and industry literature on project management. Some authors (for instance: Schwalbe, 2009; Norman et al., 2011) and researchers such as Bourne and Walker (2004) use the constraint “scope” instead of “quality” and argue that quality is one of the major components of the scope constraint. Other researchers use “schedule” instead of “time” such as (Chan et al., 2002; Jha and Iyer, 2007) and authors such as (Morris and Sember, 2008).

However it should be recognised that within these criteria there is some discussion as to their exact definitions. For example, Turner and Bredillet (2009) discuss the definition of “quality” -Does it mean meet scope/specifications, performance or functionality? They suggest that only the various stakeholders can define what quality (scope) actually means in the context of a specific project (Turner and Bredillet, 2009).

1.2 Statement of the Research Problem

TCs are all the restrictions or boundaries that are vital to conveying a project management success; they are not rocket science but keep on being a challenge on several projects (Harrin, 2017). Tsongas (2011) says the TCs are the most well known and well respected mechanisms for signifying the interaction of the key attributes of a project. The challenges raised by the project constraints have to cautiously be monitored, controlled and balanced by the project team to guarantee a flourishing project delivery. A good understanding of these constraints precedes a successful project monitoring and control effort which in turn precedes a project that is delivered on schedule, within budget and meets the agreed scope requirements (Simeon, 2016).

Roberts (2007), when judging success of projects it is essential to look for a steady stream of signals that; projects are being delivered on time (schedule), within budget (cost) and to scope/specifications. Haughey 2011 says projects must be delivered within budget, schedule and must meet the agreed scope (no more, no less). However, Lee (2010) argued that the project schedule, budget and scope alone are not enough to assess, evaluate and manage the demands of the project constraints. Project managers may have encountered certain events or challenges that affect the TCs in the course of project implementation, hence hampering project management success (Lee, 2010).

Likewise, most of projects executed in Tanzania; be it a road construction projects, building construction projects or land development projects are not completed within scope, schedule and budget (Simon, 2017). It is therefore the purpose of this study to

assess the factors affecting the TCs leading to imbalance of the three main constraints for a project management success.

1.3 Research Objectives

1.3.1 General Research Objective

To analyze factors affecting TCs in project management success at UTT PID

1.3.2 Specific Research Objectives

- i. To determine factors affecting project scope in project management success at UTT PID
- ii. To determine the factors affecting project budget in project management success at UTT PID
- iii. To determine the factors affecting project schedule in project management success at UTT PID
- iv. To assess the effects of TCs on project management success at UTT PID

1.4 Research Questions

1.4.1 General Research Question

What factors affect the project TCs in project management success at UTT PID?

1.4.2 Specific Research Questions

- i. What factors affect project budget in project management success at UTT PID?
- ii. What factors do affect the project scope in project management success at UTT PID?

- iii. What are the factors that affect the project schedule in project management success at UTT PID?
- iv. What are the effects of TCs on project management success at UTT PID?

1.5 Relevance of the Study

Omondi (2017) argued that scope, budget and schedule management are the most important areas in project management. Out of the several terms referred to in project management, the most common terms are core project process, enabling project process and core project functions. All of these terms are indicating the striking part of scope, schedule and budget management inside the project based management. Apart from making a project technologically sound and commercially profitable, triple constraints need to be effectively deployed to define realistic goals towards which the entire resources of the project are directed (Shah et al, 2012). Likewise completing projects on time while minimizing costs is imperative for projects, but these should not jeopardize overall scope (Shah et al, 2012)

1.6 Organization of the Research Report

This research report consists of the following; chapter one entails the background of the problem, statement of the research problem, research objectives, research questions and relevance of the study. Chapter two depicts the theoretical literature review, empirical literature review, research gap and the conceptual framework showing the connection between the TCs and the factors influencing changes in TCs that leads to a poor quality project management success. Chapter three shows the research methodologies that were used to respond on the general and specific research questions. Chapter four shows the data analysis, presentation and

interpretations while chapter five depicts the summary of findings, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Literature Review

The experience on project delivery shows that projects are either delivered out of schedule, budget and or scope despite of several researches that have been done on the factors associated to the successful implementation of projects in Tanzania. A number of relevant researches have been reviewed to identify the enormity of the problem in the world. The research will concentrate on the factors affecting the TCs that lead to poor project management.

According to Aftab et al., (2014), “the variations of material prices, cash flow and economic problems experienced by project managers, lack of project resources, breakages of communication among the involved parties, mistaken project planning and scheduling by project managers are the most reasons for projects to underperform/overrun in terms of budget whereas regular plan modifications and the client interferences being the slightest factors to affect the project budget performance”

PMI (2000), the projects scope depicts all that should be included or excluded in the project. The scope can be contained within clear organizational, budgetary, time and geographic boundaries (Roberts, 2007). However, TCs are the reasons for doing the project and the environment in which the project takes place. In other words, they are derived, not decided. Therefore neither the customer nor the project sponsor (PS) nor the project manager (PM) actually decide on the order of the constraints (Michael, 2004).

Larson and Larson (2009) explains that scope creep is a frightened thing that can happen on any project, wasting money, decreasing satisfaction, and causing the expected project value to not be met. Most projects suffer from it, and both project teams and stakeholders are consistently frustrated by it. Kathy (2014), any nature of project is constrained in different ways by its scope, budget and schedule goals. The restrictions are occasionally referred to in project management as the triple constraint (Kathy, 2014). In order to create a victorious project, project managers have to think about scope, time (schedule), and cost (budget) and balance these three often-competing goals.

According to PMI, the triple constraint or iron triangle referred to as the framework for evaluating competing demands within a project (Baratta. 2006). Research states this includes project scope, time (schedule), and cost (budget) management. The PMBOK has three knowledge areas that specifically provide information on these areas, which include Project Scope Management, Project Cost Management and Project Time Management respectively (PMI, 2013). The relationship between these areas are said to exist in that cost is a function of scope and time or that cost, time and scope are related so that if one changes, then another must also change in a defined and predictable way (Baratta, 2006).

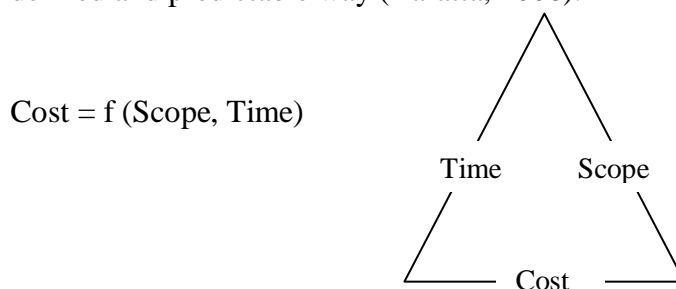


Figure 2.1: A Classical Triple Constraint

Source: Cassical Triple Constraints by Baratta (2006)

The triple constraints always face differing demands and competing priorities within the project environment. The dynamics of the TCs can be illustrated by the following three key relationships (Wyngaard, Pretorius and Leon, 2012);

1. Scope \uparrow α Time \uparrow Budget \uparrow(1)
2. Time \downarrow α Scope \downarrow Budget \uparrow(2)
3. Budget \downarrow α Scope \downarrow Time \uparrow(3)

That is Project Management Success (PMS) = Scope + Schedule + Budget (Duncan Haughey 2011), whereby the up arrows (\uparrow) indicates an increase, the down arrows (\downarrow) indicates a decrease. For the purpose of this research report, the researcher will adopt the following theories that consist of the project schedule, project budget and project scope. 1) The project schedule constraint showing the budgeted time for the project completion. 2) The project budget constraint indicating the planned funds for project activities implementation as well as the project scope that shows the specifications and boundaries of the project execution that will meet the customers demand.

According to LaPrad (2018), triple constraints project management theory says every project operates within the boundaries of budget, schedule and scope. Any change in one factor will invariably affect the other two. Maffeo, (2018) said, because all three constraints (budget, schedule and scope) relate directly to one another, achieving them in tandem yields a quality project. For example, if you are up against a hard deadline, de-scoping project tasks can cut time and costs as well. When you de-scope project tasks that are less critical in the short term, you can meet your next project milestone while also cutting costs and time. Conversely, the triple constraints say

that a negative impact on one of these constraints yields a domino effect. For instance, if you underestimate the time spent on a project, the iron triangle (triple constraint) implies that this will also hurt your project's cost, scope, or both" (Maffeo, 2018)

2.2 Empirical Literature Review

This section provides general empirical evidences regarding the subject matter under research.

2.2.1 Studies Worldwide

Velayudhan and Thomas (2016), showed that the results of '2015 Project Management Insight' conducted by Amplitude Research among different industry sectors in the U. S. indicated that one third (1/3) of the project did not complete on schedule (time) and also exceeded their approved budget (cost). However, the actual success rate of projects does not meet desired levels (Velayudhan and Thomas, 2016). When asked about how many of the projects delivered on time, with expected quality and realized benefits, only 8% of the respondents stated that most of their projects fulfilled these criteria.

Approximately 31% estimated that 50-75% of their projects achieved these criteria, while the majority of the respondents completed only less than half of their projects as planned KPMG 2015 as cited by (Velayudhan and Thomas, 2016), Also the number of projects which deliver in terms of scope (quality), schedule (time) and within budget (cost) is low even though the potential for increasing success rates is high (Velayudhan and Thomas, 2016).

Project managers regard triple constraints as key to a project's requirements and success. Optimizing these three features ascertain project quality and timely completion. All three constraints of projects - scope (quality), cost (budget) and time (schedule) have their respective effects on projects' performance but since these elements have some correlation, any one constraint bears an effect on the other two, eventually affecting projects deliverables to a greater extent (Brewer & Dittman, 2010) as cited by (Hamid, Ghafoor, and Shah, 2012).

However, the Standish Group Report (2014) reported that, "on the success side of the project, the average is only 16.2% for software projects that are completed on time and on budget. In the large companies, the news is even worse: only 9% of their projects come in on time and on budget. And, even when these projects are completed, many are no more than a mere shadow of their original scope. Projects completed by the largest American companies have only approximately 42% of the originally proposed scope. Smaller companies do much better. A total of 78.4% of their software projects will get deployed with at least 74.2% of their original scope".

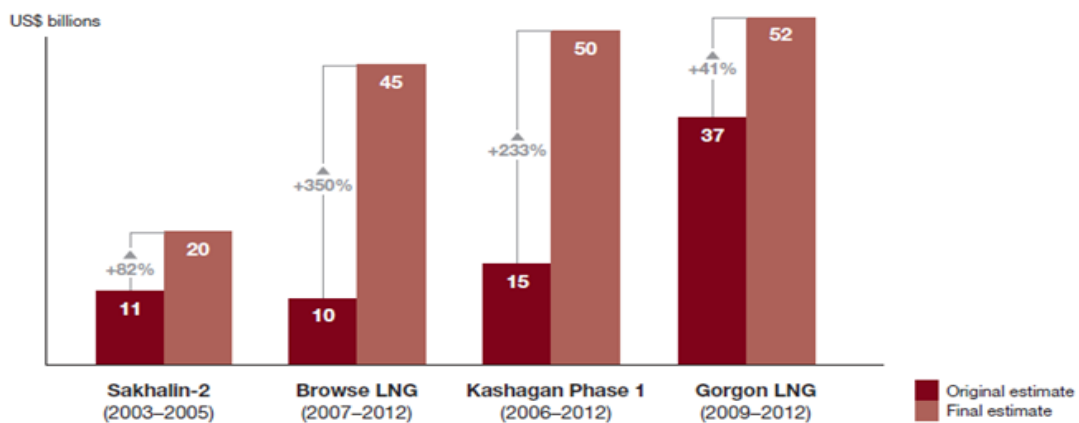


Figure 2.2: International Projects Cost Overruns in Recent Years

Source: Devanaboyina study 2016

However, a significant number of international high profile projects fail to be delivered on time and on budget due to budget overrun, compromised specifications, and missed milestones. In other words the three dimensions of project success, namely; time, cost and scope, are often in jeopardy (Hans et al., 2007) as cited by (Sylvester et al., 2011)

2.2.2 Studies in African Countries

Mokoena (2012) argued that “The TC elements restrict and dictate the actions of the project team members and work in tandem with one another. For the reason that projects are unique they will have unlike challenges i.e. different project will be derived by dissimilar TC elements. However the success of construction projects is confide to the TCs, the project successes can also be influenced by other external factors and intra-management of the TCs including trade-offs”. Also, the study found out that 81% of the respondents believed in the TCs trade-offs and 89% believed that adequate communication were well in place to address the corrective actions while 4% were uncertain of success or failure of projects and trade-offs of the TC elements (Mokoena, 2012).

However, time (schedule) and cost (budget) performance of projects in Kenya are unacceptable with over 70% of the initiated projects were likely to escalate in time with a magnitude of over 50% (Rugenyi and Bwisa, 2016). Likewise, in South Africa projects over the years failed to be completed within the specified triple constraints, the success or failure of projects is measured with scope schedule and budget at 74%, 74% and 70% respectively (Mokoena et al., 2013). Also, Nibyiza (2014), in a study conducted in Kenya found that 37% of respondents said that when

project time is increased, the material to be used will also increase in quantity, 30% of respondents said that increasing project time will make the entire project cost increased, 20% mentioned that increasing project time leads to the increase of needed labor and 13% of respondents said that time increase leads to the increase in the quality (meet project scope) of the project services.

2.2.3 Studies in Tanzania

According to URT (2010), all projects under execution exceeded the planned project schedule. The extension was quite significant for most projects. This was also the case for those projects (Somanga–Matandu and Shelui–Nzega) that were completed after a decision to reduce the scope and ambition for the projects. If those two projects were ignored it means that the actual schedule exceeded the contracted and originally set plan by more than fifty percent (i.e. 51%) as indicated in Table 2.1

Table 2.1: Original and Actual Time for the Ten examined Projects

Road project	Time to complete the road		Difference between original and actual time	
	Planned months	Actual months	Months Percentage	Months Percentage
Kyabakari –Butiama	16	17	1	6
Somanga – Matandu	30	32	2	7
Shelui – Nzega	31	36	5	16
Morogoro – Dodoma	24	32	8	33
Mutukula – Muhutwe	34	46	12	35
Nzega – Tinde – Isaka	30	42	12	40
Tinde – Shinyanga/Mwanza	30	47	17	57
Songwe – Tunduma	24	39	15	63
Muhutwe – Kagoma	12	23	11	92
Mwanza Town	30	58	28	93
Total	261	372	111	43

Source: United Republic of Tanzania Controller and Auditor General (CAG) report,

March 2010

Moreover, the CAG report indicate that most of the projects had budget overrun, and in several projects to a high degree. Two projects depict that they were under budget (spend less money than budgeted) (URT, 2010). This implies that the two projects had been limited in scope. The largest budget overruns were commonly seen in big projects as it is seen in Table 2.2.

Table 2.2: Revised Budgets during the Construction Stage (BillionTshs)

Road project	Original budget	Final cost (Budget)	Deviation (%)
Shelui – Nzega	20.7	19.5	-6
Somanga – Matandu	12.3	12.0	-2
Muhutwe – Kagoma	4.4	4.4	9
Mwanza Town	16.4	18.2	11
Kyabakari – Butiama	1.7	1.9	12
Mutukula–Muhutwe	13.8	17.6	28
Songwe – Tunduma	10.2	14.1	38
Morogoro – Dodoma	25.3	43.9	74
Nzega – Tinde – Isaka	20.6	44.2	115
Tinde – Shinyanga/Mwanza	28.3	65.2	130
Total	153.7	241.3	57

Source: United Republic of Tanzania Controller and Auditor General (CAG) report, March 2010

However, in the Controller and Auditor General report Of 2019 noted that, the construction of flyover at Ubungo (Ubungo Interchange) was delayed for more than ten (10) months, the major reason for delay being the revised work program due to adoption of the alternative design (NAO, 2019). Furthermore, Lwangili pointed out that, Magomeni quarters construction has been extended for six months due to the increase of building material costs and shortage of workers (Lwangili, 2019).

2.3 Research Gap Identified

TCs are the only things being considered as crucial for PMS, but the factors that are influencing the increase or decline of TCs remain unrecovered. Therefore, this study assessed the factors that affect TCs and address the need to consider the factors that are significant for TCs in PMS.

2.4 Conceptual Framework

The conceptual framework is the researchers' understanding on how the particular variables (independent and dependent variables) connect to each other in the study; it is the researchers' map in pursuing the study (Regoniel, 2015). The conceptual framework of this study consists of three independent variables and one dependent variable such as project scope constraint, project schedule constraint, project budget constraints and project management success respectively.

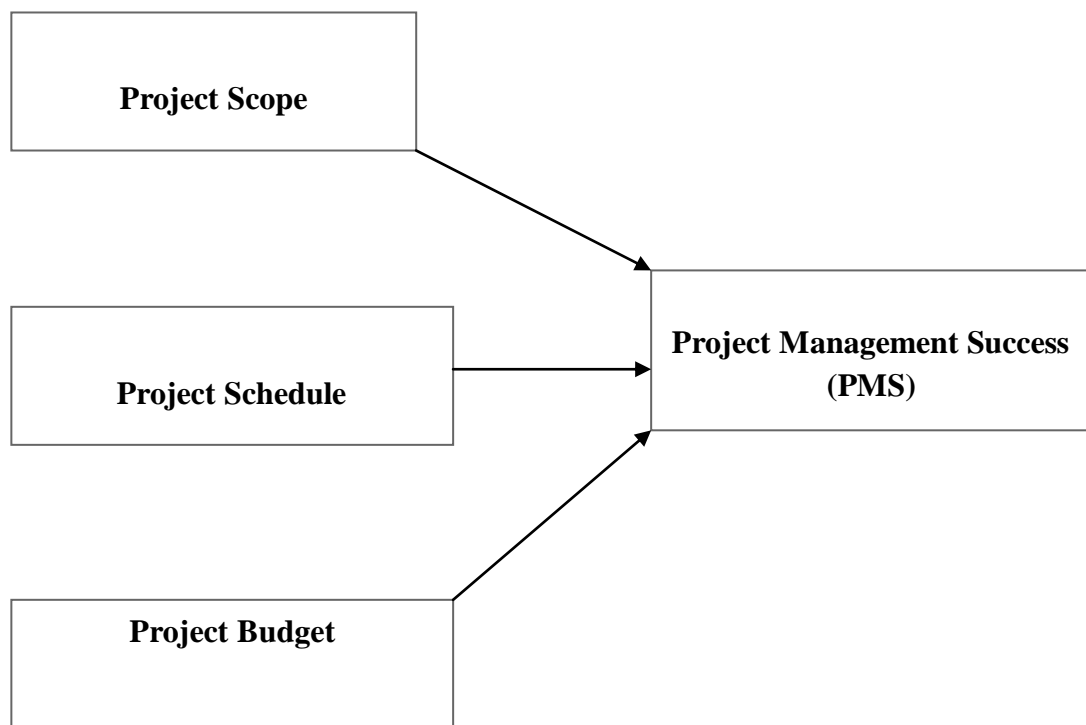


Figure 2.4: Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Overview

This chapter consists of the research methodology, research design, research philosophy, research approach, research strategy, research choice, time horizon, techniques and procedures, survey population, sample size, study area, sampling design and procedures, variables and measurement procedures, method of data collection, data processing and analysis as well as the expected results of the study.

3.2 Research Design

Saunders et al., (2009) has nicely explained the research design through concept of research onion. The processes suggested by Saunders et al., (2009) in the research onion concept are indicated in layers. This involved a series of decisions before arriving in to overall approach to the research design and data collection technique as described in figure 3.2. According to Quinlan (2011), there are two types of data that a researcher can collect; these are Quantitative data and Qualitative data. Further, the study was descriptive as it aimed at finding in its result of data analysis the description of the relationships between the dependent variable (Project Management Success) and the independent variables which are the project scope, project budget and project schedule. The descriptive design wanted to give or find out the factors affecting project triple constraints in project management success.

A research philosophy in simple terms is a belief about ways in which data or information about an object ought to be collected, analyzed and used. According to Saunders, a philosophy is a term that relates to the development of knowledge and

the nature of that knowledge (Saunders et al., 2009). In this research, a researcher adopted positivism philosophy. With this philosophy, the researcher showed a positive attitude to the information and data that were given or provided by the respondents.

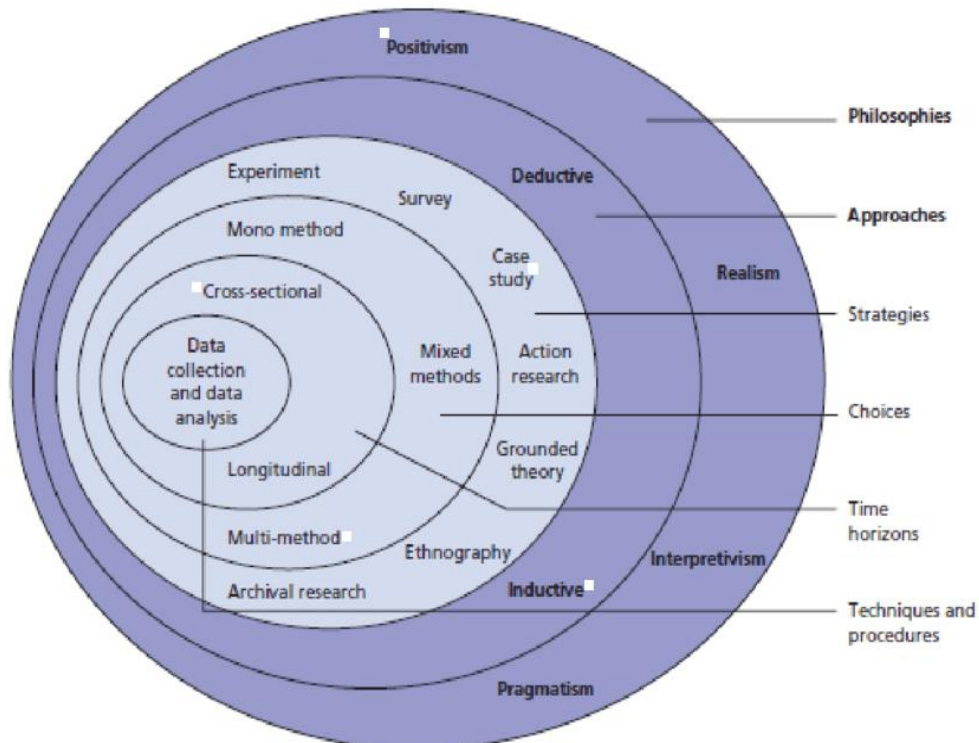


Figure 3.2: Research onion

Source: Adapted from Saunders et al., (2009).

3.2.1 Research Philosophy

Also, the researcher was independent from the study and that there were no provisions of human or researcher's interest within the study. Saunders et al, 2009 reported that, a positivistic philosophy required the researcher to be detached, neutral, independent of what is being researched as well maintaining the objective stand. However, the mixed methods, both quantitative and qualitative, were possible, and possibly highly appropriate, within the study (Creswell, 2013). Furthermore, the role of the researcher in this study was limited to data collection and interpretation in

an objective way that linked the analysis with the objectives of the study.

3.2.2 Research Approach

A research approach is a plan and procedures that consists of the steps of open assumptions to detailed methods of data collection, analysis and interpretations (Chetty, 2016), it is therefore, based on the nature of the research problem being addressed (Chetty, 2016). According to Saunders et al. (2009) explained two types of research approaches deductive and inductive. A deductive approach tests the validity of theories or hypotheses stated in a study, conversely the inductive approach contributes to the emergence of new theories and generalizations (Dudovskiy, 2018). This research aimed at generating meanings from the collected set of data in order to identify patterns and relationships to build a theory; thus, the inductive approach did not prevent the researcher from using the existing theories to generate the research questions to be examined in this study (Saunders et al., 2012). Therefore, for the purpose of this study, the researcher used the inductive approach in which the researcher collected the data from known premises to answer the research questions and generated conclusions as a result of data analysis.

3.2.3 Research Strategy

The research strategy defined a road map towards the goal of a research objective, how to achieve such goals and to answer research questions (Saunders et al., 2009). In this study a case study strategy was adopted by the researcher. A case study strategy focuses on an in-depth examination of one organization. In a case study research data or information was collected through questionnaires for primary data and documents review for secondary data. The collected data can be quantitative,

qualitative or both mixed. However, in this study the researcher dealt with a quantitative data collection method through questionnaires that allowed the researcher to distribute the questionnaires to different respondents within the organization. In a quantitative research, numbers are used to explain the findings (Kowalczyk, 2016).

3.2.4 Research Choice

In this study the researcher adopted the multi-method quantitative research choice in which the collected data were analyzed quantitatively (Yliopisto, 2010). A quantitative data collection techniques and analysis procedures were used to answer the research questions (Saunders et al., 2009). The use of quantitative data collection technique in this study was influenced by the fact that the researcher remained objectively separated from the subject matter, researcher knew clearly what to study, the study was carefully designed before the data was collected and the collected data were in the form of numbers and statistics.

3.2.5 Time Horizon

A study may be undertaken in which data are gathered once or over a period of days, weeks or months to answer research questions, such studies are called cross-sectional study (Chat, 2016). A cross sectional research is a study conducted at a particular time (Saunders et al., 2009). This research was a cross sectional study as for academic study is necessarily time constrained.

3.2.6 Techniques and Procedures

The study utilized the descriptive statistics techniques and procedures to analyze the

collected data. Descriptive statistics helped the researcher to provide summaries about the sample and the measures, together with the graphics analysis they form the basis of virtually every quantitative data analysis (Trochim, 2006). The results of data analysis in descriptive statistics are presented in frequency distribution tables, histograms and regressions.

3.3 Survey Population

Population is a group of individuals, items or objects from which samples are taken (Kombo and Tromp, 2006). According to Kothari (2004), defines population as all the items in any field of inquiry. For the purpose of this study the target population was 40 employees consisting of project managers, project officers, project accountants, marketing officers in the area of project operations and management.

3.4 Sample Size

Zamboni (2018) defined a sample size as a count of the individual samples or observations in any statistical setting such scientific experiments, researches or public opinion survey. As a general rule, one can say that the sample must be of an optimum size i.e., it should neither be excessively large nor too small (Kothari 2004). Thus, the target sample size of the study were all the employees of Unit Trust of Tanzania Projects and Infrastructure Development Plc departments with a direct link to the operations of the projects executed in the organization. The size of the sample that was used in the study was determined in consideration of the financial constraints as for large samples result in increasing cost of the sampling estimates (Kothari 2004).

3.5 Study Area

The study took place at Unit Trust Tanzania Projects and Infrastructure Development Plc (UTT PID) in Dar es Salaam. This office is dealing with several projects that are related to land development, construction and infrastructure development. The firm has variant of staff with experience in project planning and executions. UTT PID was an important office that assisted the researcher in getting the factors affecting triple constraints in project management success of this study.

3.6 Sampling Design and Procedures

Sampling design and procedures refers to the process or techniques of choosing a sub-group from a population to participate in the study; it is the process of selecting a number of individuals for a study in such a way that the individuals selected represents the population from which they were selected (Ogula, 2005). For this study census sampling was adopted, this allowed the researcher to examine all the individuals that made the entire population (Zikmund, 2014). The target sample was all gender with experience in land development, construction and infrastructure development projects, which included quantity surveyor engineer for construction projects, project manager, land officer and stakeholder with direct or indirect influence in such projects. As the number of employees at UTT PID was limited, the research used the whole population available and interacting with land development, infrastructure development as well as construction projects.

3.7 Variables and Measurement Procedures

The variables that were used to correct data for this research was the project scope, schedule and the budget of which at last affects the PMS, hence leading to poor

project performance. The data collected were analyzed to ensure that they presented information that responded to research questions and meet research objectives. The data that were collected through likert scale were measured by assigning numeric numbers to the levels of agreement/disagreement used in this study.

3.7.1 Primary Data

These were collected afresh and for the first time, and thus happened to be original in character. Descriptive words were corrected from respondents in the organization through questionnaire and examined for patterns or meaning using coding method. Coding allowed the researcher to categorize qualitative data to identify responses that were corresponding with the research questions and perform quantitative analysis.

3.7.2 Secondary Data

Secondary data were collected from the readily available sources published and unpublished materials such as organization reports, company information and internet. The secondary data was for a deeper understanding of the subject matter. A number of other sources were reviewed including thesis papers. Thus, it was important for the researcher to use a case study option with multiple sources of data that allowed the researcher to get as broader view as possible concerning the issues under study.

3.8 Data Processing and Analysis

For the purpose of responding to research questions and objectives, quantitative analysis technique such as descriptive statistics were used in order to present,

describe and examine the relationships within the collected data on the PMS by a multiple linear regression with the three variables of the TCs as follows;

Equation 1: Project management success model

$$\text{PMS} = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \alpha$$

where: –

The variables in the model are:-

PMS = the response/ dependent variable;

x_1 = the first predictor variable;

x_2 = the second predictor variable;

x_3 = the third predictor variable, and

α = the residual error

The parameters of the model are:-

β_0 = the PMS – intercept

β_1 = the first regression coefficient (scope);

β_2 = the second regression coefficient (schedule);and

β_3 = the third regression coefficient (budget)

3.9 Expected Results of the Study

The study revealed the factors that if are left uncontrolled could result into projects failure. However, the results of this study helped in making policy and procedures for project implementation that was useful in the initial stages of the project planning that lead to the control of the TCs for better PMS.

CHAPTER FOUR

4.0 DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

After the data collection process, the research was able to analyze, present and interpret the information resulted from the collected data. It was noted that out of the 40 distributed questionnaires only 39 questionnaires were filled and collected for analysis, this is equivalent to 97.5% of the respondents involved in the study. The respondent whom the questionnaire was sent by electronic mail did not respond, this made a 2.5% of the distributed questionnaires that was not collected by the researcher.

4.2 Respondent's Demographic Information

Table 4.1: Respondents Demographic Information

Respondent information	Frequency	Percent
Age		
Young Than 24	3	7.7
Older Than 24 But Younger Than 35	19	48.7
Older Than 35 But Younger Than 45	14	35.9
Older Than 45 But Younger Than 55	3	7.7
Total	39	100.0
Gender		
Female	18	46.2
Male	21	53.8
Total	39	100.0
Education		
Primary level	0	0.0
Secondary level	0	0.0
College level	8	20.5
University level	31	79.5
Total	39	100.0

Source: Research Findings, 2018

The age group of the respondents involved in this study were lead by a group of older than 24 but younger than 35 indicating 19 respondents equivalent to 48.7% of

all the respondents. The group of older than 35 but younger than 45 consisted 14 respondents equivalent to 35.9% and 7.7% of the respondents represented groups of younger than 24 as well as a group of older than 45 but younger than 55 years. The analysed data revealed out that most of the respondents were male by 53.8% whereas 46.2% of respondents were female whereas education status of respondents, 79.5% were found to be at university level while 20.5% were reported to be at college level as shown in Table 4.1.

4.3 Factors Affecting Budget Constraint in PMS

The results from this study finding demonstrated that the factors affecting project budget constraint in PMS rated by respondents as depicted in Figure 4.3 below. Of all the respondents the researcher were able to interact with 8.38% ranked price fluctuation as the most factor affecting the project budget constraint during project execution. Project changes in the course of project execution ranked at 8.09%, stakeholders' interference and mistaken / poor planning were rated at 7.95% and being the third factor-affecting project budget in PMS.

Other factors that may affect the project budget constraints are as follows: - bureaucracy affects the project budget by 7.71%, poor monitoring of the project budget affects the budget constraint by 7.66%, project new designs affects the budget constraint by 7.61%, project delays (7.04%). Also weak administration / leadership (6.94%), communication barriers among stakeholders and the interests posed on delayed payments (6.80%), risks (6.47%), additional insurance costs (5.41%) as well as the lack human resources (5.17%) being the least factor in that case.

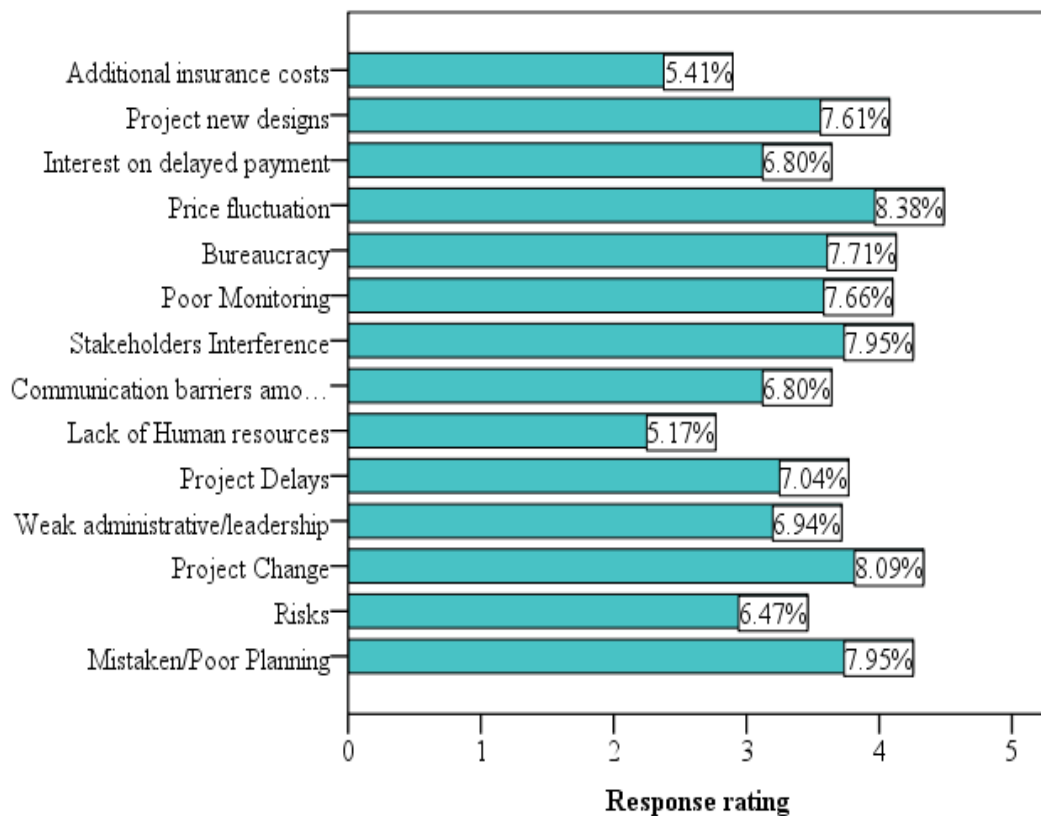


Figure 4.3: Factors Affecting Budget Constraints in PMS

Source: Research Findings, 2018

However, the findings corresponds to the study by Aftab et al., (2014) which revealed that fluctuation in price of the material is the most severe factor to project budget constraint while incorrect /poor planning, owner interference, frequent design changes and all other factors are the least affecting factors on construction cost (budget) performance in large projects. Also, Barbara and Dorota (2015) reported the frequency project changes in project scope by the customer and factors linked to project risk management were affecting the project budget constraint in information technology projects. According to Regio (2001), the project budget constraint is affected by design changes, inflations, funding problems as well as the Act of God such as extreme weather, riot, war, fire, landslip and economic instability.

4.4 Factors Affecting Scope Constraint in PMS

The study findings depicted that political interference was a severe factor affecting the project scope constraint as it was mentioned by 8.95% of the respondents as it is indicated in Figure 4.4 below. For UTT PID this was the case for their land development projects with municipal councils such as Lindi, Sengerema, Momba and Mtwara were banned due to political decisions (UTT PID report, 2013). The results also showed that stakeholders' interference affects scope constraint by 8.62%, mistaken / poor planning (8.52%), project financing and project new designs (8.02%). Moreover, project scope constraint is affected by poor monitoring (7.97%), project change (7.86%), communication barriers among stakeholders (7.64%), weak supervision / leadership (7.31%), risks (7.15%) project delays and specifications (6.93%) as well as lack of human resources as the least affecting factor of the project scope constraint respectively.

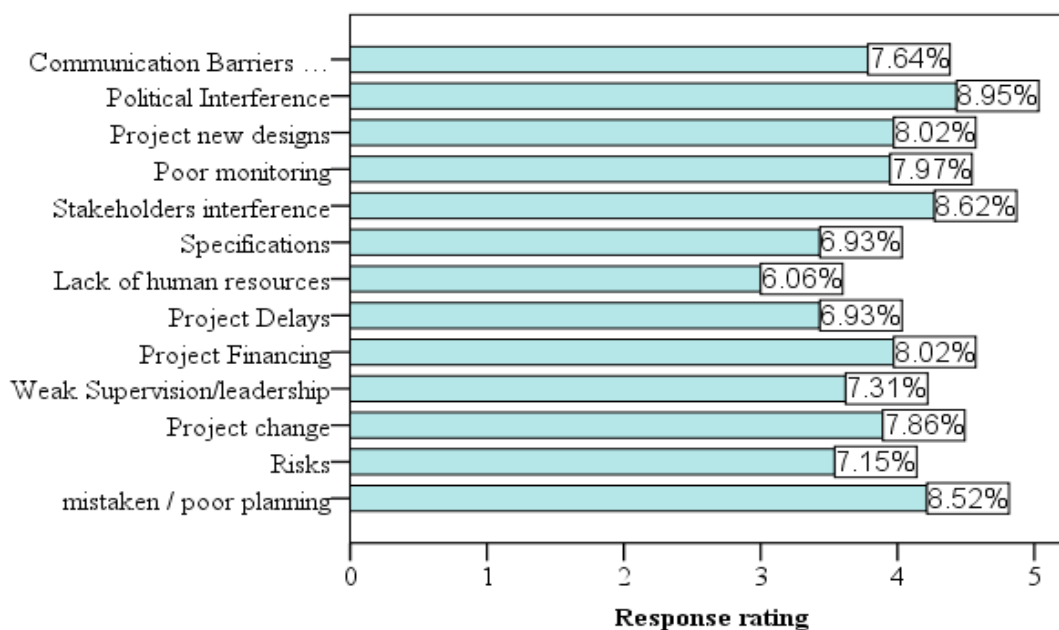


Figure 4.4: Factors Affecting Scope Constraint in PMS

Source: Research Findings, 2018

However, Rugenyi (2015) noted that project risk caused by technological changes and project changes in strategy were identified by 31% of the respondents, 27% identified risks as a second ranked factor that affect the project scope, 19% identified specifications in the aspect of poor definition of requirements, project donor requirements, and unclear specification as factors affecting project scope constraint. Poor planning was identified by 12%, and delays in execution were identified by 8% while lack of finances was identified by 4% of the respondents respectively.

4.5 Factors Affecting Schedule Constraint in Project Management Success

Stakeholders' interference was acknowledged by 8.11% of the respondents as the critical factor that affected the project schedule constraint in the course of project implementation, shown in Figure 4.5. This was the result of failure to identify fully the project stakeholders in the initiation stages of the project undertakings. Scope change was demonstrated by 7.96%, the result coincide with Rugenyi, 2015, who discovered that scope change affected the project schedule by 27%.

Project financing was recognized as a factor affecting project schedule by 7.91% of the respondents whereas force majeure (i.e. factors of nature such rain, earthquakes, etc) was noted out by 7.82% of the respondents, too many meetings for approvals and mistaken planning were notorious by 7.72%. The other factors that were identified to affect project schedule constraint were; weakness in designs (7.18%), project delays (7.13%) as well as late payment affects schedule by 6.94 percent.

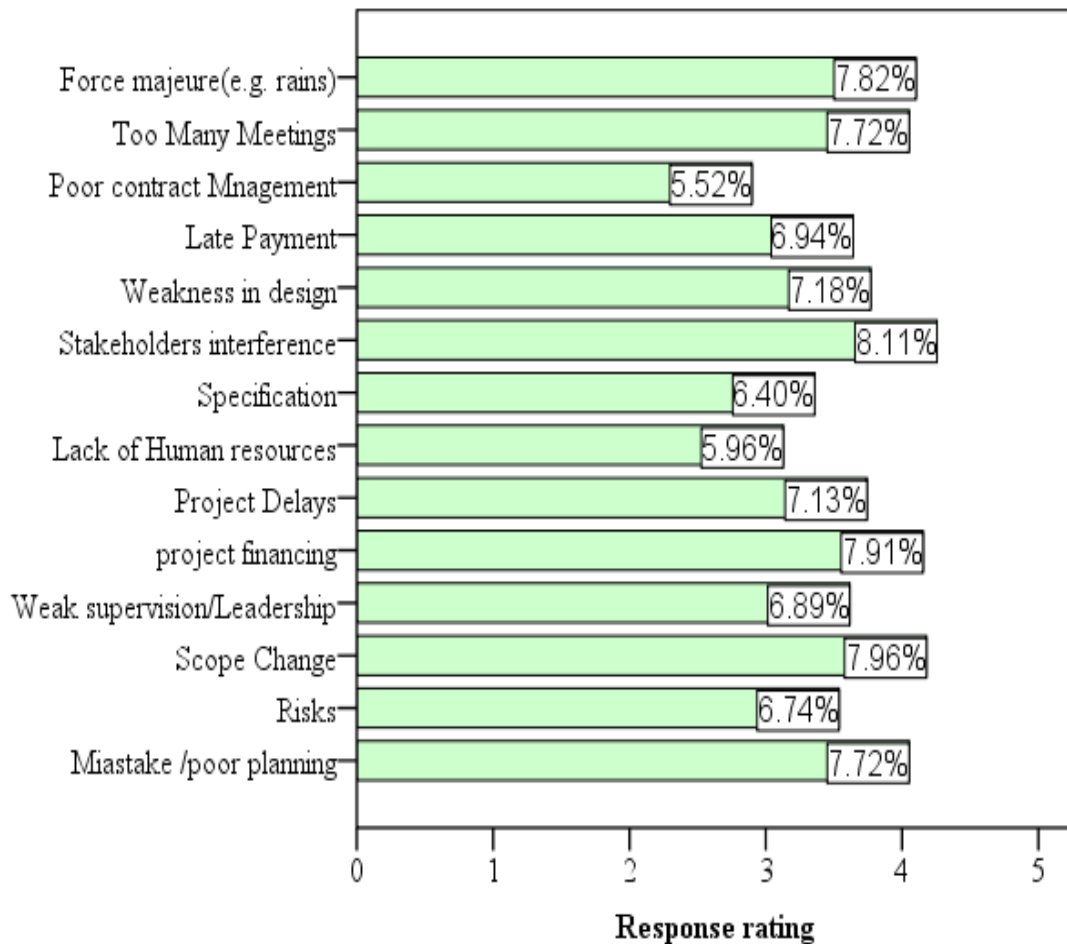


Figure 4.5: Factors Affecting Schedule Constraint in PMS
Source: Research Findings, 2018

This findings concurred with Rugenyi 2015 by 27% due to scope changes, risks (23%), project poor planning (15%), project financing (12%), delayed payment and specifications (8%) as well as lack of resources (4.0%).

4.6 Effects of TCs on PMS

4.6.1 TCs Agreement before Project Execution

The research findings from the respondents strongly agreed that before project execution all stakeholders did agree on the project TCs (scope, schedule and budget) that were influential on the PMS; this was confirmed by 74.4% of the respondents

while only 25.6% did agree too as it is seen in Table 4.2;

Table 4.3: Agreement on Scope, Schedule and Budget before Project Execution

TCs agreement before project execution	Frequency	Percent
Agree	10	25.6
Strongly agree	29	74.4
Total	39	100.0

Source: Research Findings, 2018

4.6.2 Regression analysis of TCs on PMS

Table 4.3: Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.731 ^a	.535	.495	.314
a. Predictors: (Constant), (Scope, Schedule and Budget)				
b. Dependent Variable: PMS				

Source: Research Findings, 2018

From the regression model summary in Table 4.3, it was revealed that the dependent variable (PMS) is clearly explained by the independent variables (scope, schedule and budget) by 53.5% (R Square value) and that the effect of TCs in PMS is explained by the project TCs. This shows that the remaining 46.5% of the effects of TCs in PMS can be explained by factors other than the TCs. The goodness of fit of the regression equation is reflected by the Adjusted R Square (>50%)

Table 4.4: ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.976	3	1.325	13.409	.000 ^a
	Residual	3.460	35	.099		
	Total	7.436	38			

a. Predictors: (Constant),(Scope, Schedule and Budget)

b. Dependent Variable: PMS

Source: Research Findings, 2018

The ANOVA table above indicates that the model, as a whole, is a significant fit to the data as $F\text{-test} = 13.409$ and $P\text{-value} (.000^a) < 0.0001$, therefore; at $\alpha = 5\%$ level of significance there exists enough evidence to conclude that at least one of the predictors is useful for predicting PMS; therefore the model is useful.

Table 4.5: Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.637	.818		2.002	.053
	Project Schedule	-1.153	.400	-.801	-2.886	.007
	Project Budget	.903	.319	.692	2.828	.008
	Project Scope	.903	.190	.794	4.751	.000

a. Dependent Variable: PMS

Source: Research Findings, 2018

The t-test for TCs equals 2.002, and is statistically significant, meaning that the regression coefficient for TCs is significantly different from zero. The coefficient for project schedule is -0.801, meaning that when project schedule is crashed at 80%, the project budget contributed to PMS by 69.2% as well as the project scope by 79.4%. The constant is 1.637, and this is the predicted value for PMS when all other factors equals zero at a standard error of 0.818. Therefore, the assessment of independent variables indicated that the project scope had the highest analytical influence ($\beta = 0.794$), secondly the project budget ($\beta = 0.692$) and the least was the project schedule with $\beta = -0.801$. However, Haughey (2011) said, when you reduce the project's time (schedule), you will either have to increase its cost (budget) or reduce its scope.

Equation 2: Project Management Success Multiple Regression Equation

Therefore; $PMS = 1.637 + 0.794x_1 + (-0.801)x_2 + 0.692x_3 + 0.818$

Source: Research Findings, 2018

From the regression equation above it demonstrates that, when scope was met at 79.4% and budget of a project by 69.2% the project schedule was reduced by 80% while when all other factors remains unchanged the PMS (the intercept) was archived by 163.7% at a residual error of 82%. Also, the research finding shows that PMS would be expected at 163.7% if both x_1 , x_2 and x_3 can be zero, and if all the variables (scope, schedule and budget) actually included values for x_1 , x_2 and x_3 that were near zero. This means that, when managing projects it is hard to complete the project in a balanced model (that is within scope, within schedule and within budget).

However, the research findings shows that the TCs are not supported as the critical success criteria for PMS. This is revealed in the multiple regression analyses which depicts the declined project schedule (negative project schedule) while the other two factors scope and budget are positive. With these findings, the project management success cannot always depend on the project iron triangle (i.e. TCs) rather the project can also be successful even when the project managers or project team members decides to pick two constraints among the TCs. The findings concurred to Rose (2005) who said, project managers make trade-off among the TCs in order to meet the project objectives.

Moreover, the PMS can be within budget and scope but not within the project schedule. This is shown in the research findings whereby scope is performed at 79.4% and budget at 69.2% whereas the project schedule is underperformed at 80.1% (-0.801). Similarly, project managers complete projects within budget and

schedule but not with the required specifications (scope), or within schedule and scope but not within budget. Haughey (2011) reported that project managers can have any two of the TCs; rarely do project managers find that they have the budget to deliver the top quality on time.

Fred and Bwisa (2016) in their study findings reported that, 31% of the respondents had their projects exceeding the original project schedule by 5-10%, 19% exceeded by 11-30%, 15% exceeded by <5% and 31-50%, 12% exceeded by 71-90%, while 4% exceeded by 51-70% and >90 percent. These findings indicate a weak influence of the project schedule in PMS. Likewise, Sunjka and Jacob (2013) reported that, most of the construction projects that were undertaken in Nigeria their completion schedule have, however been pushed back beyond the stipulated completion durations.

4.6.3 Project Deliverables Obtained on Time

On the assessment of the project deliverables effectiveness to customers, the following statement was presented to check if the project deliverables were obtained on time “Does the required project deliverables obtained on time?”. The response from respondents were; 54% of the respondents disagreed, 28% strongly disagreed, 5% agreed the same percentage were neutral and 8% agreed with the proposed statement as indicated in Figure 4.6 below. This shows that the project deliverables from the projects executed by UTT-PID were not timely delivered to customers.

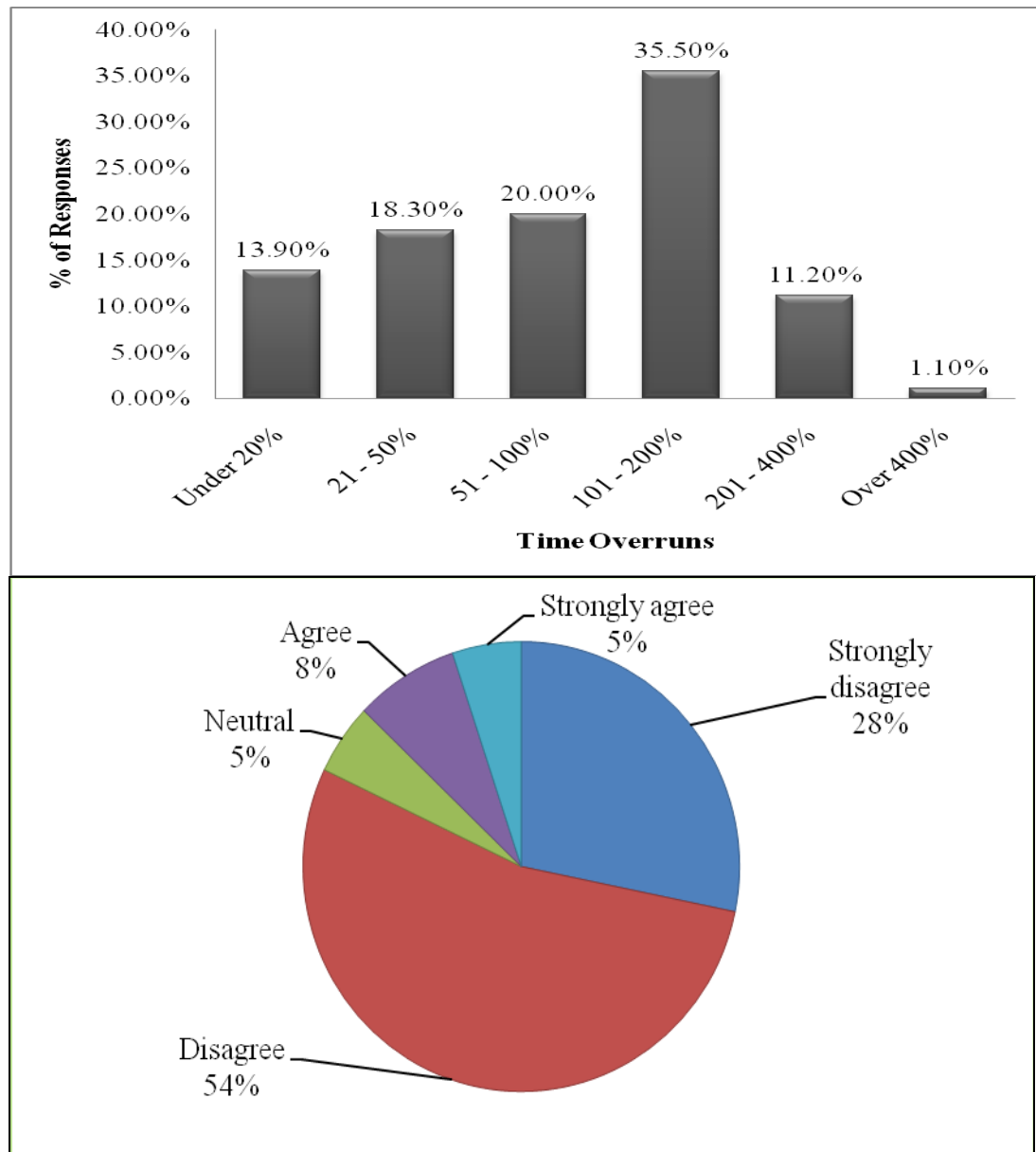


Figure 4.6: Project Deliverable Obtained on Time

Source: Research Findings, 2018

Likewise, the Standish Group report (2014) reported that, over one-third of the challenged and impaired projects experienced time overruns of 200 to 300% (see Figure 4.7).

Figure 4.7: Schedule/Time overruns responses

Source: Adapted from the Standish Group Report, 2014

4.6.4 Customers' Satisfaction

The assessment on customer satisfaction on the posed statement “the implemented projects meets / satisfies customers in terms of quality” was opposed by 36% of respondents who disagreed, 31% strongly disagreed , 23% agreed, 8% strongly agreed and only 2% of respondents were neutral as was revealed in Figure 4.8 below. This generally indicated that customers were dissatisfied with the services rendered to them.

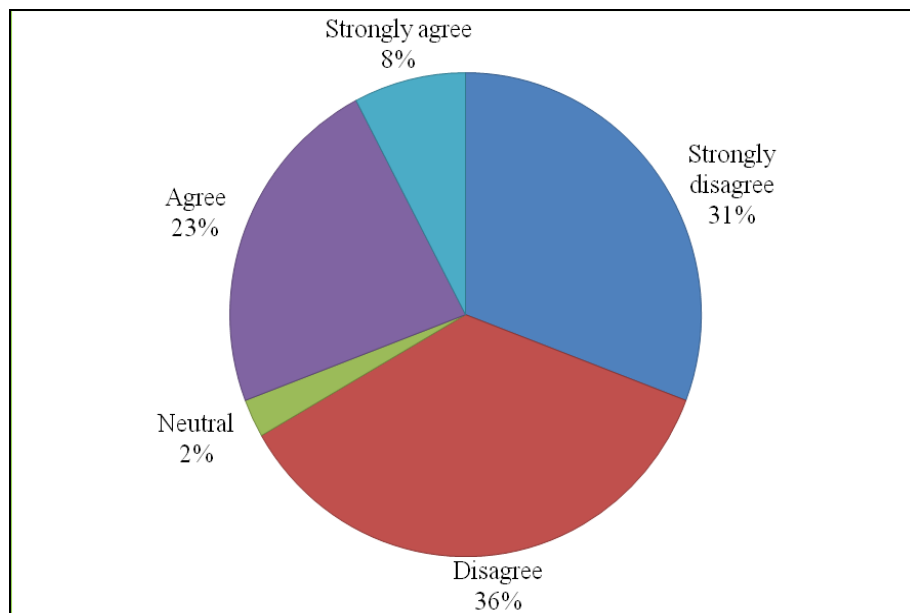


Figure 4.8: Customers' Satisfaction

Source: Research Findings, 2018

However, Khadka and Maharjan (2017) reported that, the majority of the customers were satisfied with the project services i.e. 50%, which occupied half percentage out of the total number of customers contacted, 37% were strongly satisfied, 10% were somewhat satisfied and 3% were delighted. In the study conducted by Boukanos

(2007) on the criteria of project success reported that, the user satisfaction is directly linked with the information technology project success. The software users themselves believe that the product delivered to them should entirely meet their requirement and fulfill their needs and expectations, they feel that they have the right 100% to be satisfied with the software (project) products (Boukanos, 2007).

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

From the study findings, project budget was found to be severely affected by the price fluctuation, project change and stakeholders' interference. The project scope was affected by political interference, stakeholders' interference and mistaken or poor planning whereas the project schedule were also affected by stakeholders' interference and scope change. However, the least factors that were found to affect TCs were the project specifications, lack of human resources and poor contract management. Moreover, when checking the effects of TCs on PMS, it was revealed that TCs contribute 53.5% on PMS while 46.5% can be explained by other factors. It was also noted that the project deliverables from UTT PID projects were not obtained on time and hence the research findings show that customers were not satisfied with the project result.

5.2 Conclusion

Successful project managers or project team members are appraised by being consistent and completing given projects within the agreed and approved TCs despite of the factors that happened to traumatize these TCs in the course of project execution. Project TCs were found to be affected by several factors that lead to imbalance of the three project constraints of PMS. The factors that were specifically affecting the project budget constraint were the price fluctuation, project changes and bureaucracy; scope was explicitly affected by political interference, project new designs, project financing, project changes and communication barriers among

stakeholders. Whereas the factors affecting schedule constraint were found to be the scope change, meetings, weakness in designs as well as force majeure (i.e. rains and earthquakes).

However, scope, schedule and budget were commonly found to be affected by stakeholders' interference, mistaken / poor planning, poor monitoring and lack of human resource was found to be the least factor affecting the TCs in PMS. Moreover, due to the identified factors that affected the TCs in PMS project deliverables were not obtained on time and customers were not satisfied by the services offered. Therefore, the objective of this study was significantly achieved.

5.3 Recommendations

Based on the research findings of this study, the following recommendations are made so as in the future factors affecting TCs in PMS should be controlled and mitigated so as to have projects completed within the agreed and approved project scope, schedule and budget resulting in PMS and customers' satisfaction. The following recommendations were drawn for further researches to be undertaken in this field:-

5.3.1 Political / Stakeholders Interference

For the factors that affect TCs relating to political / stakeholders' interference, the researcher recommends that before the project inauguration process PMs and project team members must involve all stakeholders including the political leaders of the project area in order to accommodate all their views and requirements before the project undertakings. Further studies should be done on the willingness of political

leaders to engage in early stages of project initiation.

5.3.2 Planning Skills

Studies should be done on the extensive planning knowledge to project managers and project team members so as to avoid or eliminate the problem of mistaken or poor planning which have been denoted as ruthless factor that affects TCs in PMS.

5.3.3 Effective Communication

Communication being one of the requirements for an effective PM, further assessment on the effective communication techniques of the PM that may break communication barriers within the project team members, among stakeholders and ways on how to improve communications should be done and sensitize on the proper methods of communicating issues within and beyond the boundaries of the project team.

5.3.4 Project Change Management

Unnecessary project changes as a result of poor monitoring and administration should be controlled in order to have projects performed according to the pre-set baselines (TCs) for satisfactorily PMS.

5.4 Limitation of the Study

During the process of data collection, the following three limitations were encountered by the researcher; First, the respondents were indisposed in filling the questionnaire as a result the researcher had to convince and assure them that the data they were providing were only meant for academic purposes and not otherwise, a

task that made the researcher to come up with the required report. Second, the timeframe made the researcher to stop the process of data collection in order to start analysing the data immediately as per timetable so as to encounter the deadline for submitting the report and third, the fact that some of the project status reports were not officially documented and therefore, it was not easy to consider them as an official reference to this study.

5.5 Areas of Future Studies

The researcher recommends that, further studies should be undertaken in the areas of effective communication within and outside the project team members in order to eliminate the case of stakeholders' and political interferences, poor planning as well as project changes during project execution.

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APPENDICES

APPENDIX 1

RESEARCH QUESTIONNAIRE

Introduction

My name is JOSIAH, Chiguru

I humbly request you to respond on the below questionnaire on the assessment of the triple constraints (Budget, Schedule and Scope) in project management success.

Questions on this questionnaire are for academic purposes only and not otherwise.

Thank you for the cooperation you have shown.

A: Demographic information

No	Category	Variables
1	Age	1. Younger Than 24 2. Older Than 24 But Younger Than 35 3. Older Than 35 But Younger Than 45 () 4. Older Than 45 But Younger Than 55 5. Older Than 55
2	Gender	1. Female () 2. Male
3	Education Level	1. Primary level 2. Secondary level 3. College level 4. University level ()

B: Factors affecting budget constraint in project management success

The enlisted factors below do affect the project budget constraint in project management success. Please indicate by placing a tick mark [√] in the provided columns for the factors that describes the knowledge you have to the factors below in relation to budget constraint in your organization

Note:-

SD = Strongly disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly agree

RQ1	Factors affecting the project budget constraint	SD 1	D 2	N 3	A 4	SA 5
1	Mistaken/ poor planning					
2	Risks					
3	Project change					
4	Weak administrative / leadership					
5	Project delays					
6	Lack of human resources					
7	Communication barriers among stakeholders					
8	Stakeholders interference					
9	Poor monitoring					
10	Bureaucracy					
11	Price fluctuation					
12	Interest on delayed payments					
13	Project new designs					
14	Additional insurance costs					

C: Factors affecting scope constraint in project management success

The following factors affect the project scope constraint in project management success. Kindly indicate by ticking [√] the appropriate response in the columns to the factors that describes your knowledge on which of the below listed affects the project scope in your organization

Note:-

SD = Strongly disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly

agree

RQ2	Factors affecting the project scope constraint	SD 1	D 2	N 3	A 4	SA 5
1	Mistaken/ poor planning					
2	Risks					
3	Project change					
4	Weak supervision / leadership					
5	Project financing					
6	Project delays					
7	Lack of human resources					
8	Specification					
9	Stakeholders interference					
10	Poor monitoring					
11	Project new designs					
12	Political interference					
13	Communication barriers among stakeholders					

D: Factors affecting schedule constraint in project management success

The below factors relate to the project scope alteration factors. Kindly show by placing a tick [√] in a column that tells the best description of your knowledge on the project schedule changing factors in your organization

Note:-

SD = Strongly disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly agree

RQ3	Factors affecting the project schedule constraint	SD 1	D 2	N 3	A 4	SA 5
1	Mistaken/ poor planning					
2	Risks					
3	Scope change					
4	Weak supervision / leadership					
5	Project financing					
6	Project delays					
7	Lack of human resources					
8	Specification					
9	Stakeholders interference					
10	Weakness in designs					
11	Late payment					
12	Poor contract management					
13	Too many meetings					
14	Force majeure (e.g. rains)					

E: Effects of TCs on Project Management Success

The below statements evaluates the effects of TCs on project management success.

You are kindly requested to place a tick [√] in the column that is describing fully on the understanding of project successful management in your organization.

Note:-

SD = Strongly disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly agree

RQ4a	TCs have effects on the PMS at UTT PID	1 Yes			2 No	
RQ4b	Statements	SD 1	D 2	N 3	A 4	SA 5
1	Before the project execution, all project stakeholders agree on project constraints (budget, schedule and scope)					
2	All completed projects are delivered within the approved project budget					
3	The completed projects are delivered within the agreed project scope					
4	The completed projects are delivered within the agreed project schedule					
5	The required project deliverables are obtained on time					
6	The implemented projects meet/satisfy customers in terms of quality					

Thank you