ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE

MA PROGRAM IN PROJECT MANAGEMENT

FACTORS CAUSING PROJECT COST OVERRUN IN CONSTRUCTION PROJECT: IN CASE OF RAMA CONSTRUCTION PLC

BY-MEDHANIT AREGA

A PROJECT WORK SUBMITTED TO ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OFMASTER OF ARTS DEGREE IN PROJECT MANAGEMENT

ADVISOR- TEMESGEN BELAYNEH (PhD)

JUNE, 2018

ADDISABABA

ADDIS ABABA UNIVERSITY
SCHOOL OF COMMERCE

MA PROGRAM IN PROJECT MANAGEMENT

FACTORS CAUSING PROJECT COST OVERRUN IN CONSTRUCTION PROJECT: IN CASE OF RAMA CONSTRUCTION PLC

BY -MEDHANIT AREGA

Approval Board of Committee:

TEMESGEN BELAYNEH (PhD)

_____ _____

Advisor **Signature**

SOLOMON MARKOS (PhD)

_____ _____

Internal Examiner **Signature**

ABDU (PhD)

_____ _____

External Examiner **Signature**

Statement of Declaration

I, Medhanit Arega Demissie, declare that the thesis entitled **"Factors causing Project Cost Overrun in Construction Project In case of RAMA Construction PLC"** is my original work. I havecarried out the present study independently with the guidance and support of the research advisor,Temesgen Belayneh (PhD).This study has not been presented for a degree in any other university and all sources of materials used for the study have been duly acknowledged.

Medhanit Arega: _____ _____

Signature Date

Letter of certificate

This is to certify that Ms. Medhanit Arega has carried out this project work entitled “Factors causing Project Cost Overrun in Construction Projects In Case of RAMA Construction PLC” is under my supervision.

This work is original and suitable for the submission in partial fulfillment of the requirement for the award of Master of Arts Degree in Project Management.

Temesgen Belayneh (PhD) _____ _____

Signature Date

Table of content Page

Acknowledgment

My first and foremost acknowledgement goes to the almighty God for Everything. I would like to forward my deepest gratitude to my advisor, Temesgen Belayneh (PhD) for his frequent follow up and offering his invaluable comments all along through the paper undertaking.

My heartfelt gratitude and love goes to my aunty, Mom and Dad for their encouraging support and guidance throughout my life. In addition, I would like to thank my sisters and my friends for the continuous support, loving and nonstop cheers.

I am endowed to thank the employees of RAMA Construction PLC. who have permitted me to make the study and showed interest by dedicating their time in filling the questionnaires and answering my interview which is the foremost reason I am able to finalize the study.

Lists of table **page**

Lists of figures **page**

Lists of Acronyms

FI - Frequency Index

SI – Severity Index

II – Importance Index

SPSS – Statistical Package for Social Science

PLC – Private Limited Company

PMBOK – Project Management Body of Knowledge

UAE – United Arab Emirate

Abstract

Construction projects routinely overrun their cost estimates. Many studies have thus been dedicated to investigate the root cause. The purpose of this study is to identify factors causing construction project cost overrun in RAMA Construction PLC. The study used a descriptive survey type for the assessment. It deploys both quantitative and qualitative research method to collect both primary and secondary sources of data. Both close ended and open ended questions were included on the questionnaire. The interview was unstructured. The secondary source of data was from different journals, study, books, and also from the internet and from these a total of 43 factors were identify which exists in the planning, design and construction phase of construction projects. The sampling technique was non-probability sampling technique, in particular purposive sampling. A total of 50 respondents were chosen and from the distributed questionnaire 43 were collected and 3 employees were interviewed. The data obtained from the questionnaire were later analyzed based on their frequency, severity and importance by using SPSS Version 20. The findings from the analysis were ranked based on their importance index it shows the Currency exchange, Underestimating time requirement, Frequent design change, Economic instability and Number of projects going at the same time are the top five factors causing the project cost overrun. In addition poor project risk management, poor financial control on site was found with highest frequency and severity index. As a result, the recommendation was provided so that the company could minimize the construction project cost form overrun.

***Keyword**: Cost Overrun, Construction Projects, Project cost*

Chapter One

Introduction

1.1 Background of the study

Construction projects in Ethiopia are one of the leading industries now days which is significantly increasing from time to time. This industry is contributing for the country GDP, increasing the number of contractors, sub-contractors and providing a job opportunity for skilled and unskilled human power. A project is said to be successfully completed when it fulfill the three constraint cost, time and quality. However these projects are commonly facing cost overrun problems.Completing a project within budget is a complex task. Even with various cost control software and techniques, cost overruns in construction projects are not uncommon all over the world (Olawale& Sun, 2010). Zhu and Lin (2004) states that cost overrun can be defined as excess of actual cost over budget. The failure of a project not to be completed with the budgeted cost is a problem now days all over the world. Cost overrun, whether they are due to delay or estimation error or any other factors, do not just happen; they are caused (Maieli, 2001). The construction industry significantly impacts the economy of all countries).Azhar and Farouqui (2008) observe that the trend of cost overrun is common worldwide and that it is more severe in developing countries.

Cost overrun can occur for a wide variety of reasons in construction projects which has led to the debate on how to minimize these projects cost overruns. However, Memon***et, al.*** (2010) states that in order to find measures of minimizing these overruns, the very first and most important step is to identify and understand the factors responsible for the overruns.

Most of the significant factors influencing project cost overrun are changes in owner's needs, unexpected site conditions, evolution in the design philosophy and design or budget errors (Harold K.2009). Cost overrun may also occur due to extreme weather or forces beyond human control, in most cases, a project cost overrun is a result of inaccurate analysis or planning before building even starts (Plan Grid Construction Productivity, Nov. 1, 2017). Research into construction projects in most developing countries indicates that by the time a project is

completed the actual cost exceeds the original contract price by 30% while change order results in 83% cost overrun (Al Momani, 1996). According to Roberts & Wallace (2004), the three variables time, cost, and quality are interrelated and a change in any single variable frequently has a significant impact on the others. This means in trying to meet schedule and quality requirements, costs increase.

In Ethiopia, construction sector is an important sector. Although not working to its fullest potential due to many reasons, it is still of prime interest to the country. Growth in this sector is critical for growth in national income as it is among the largest sectors that generates employment within the country as well as a key indicator of the economy of Ethiopia. As many other developing countries are facing also cost and time related issues among which cost overrun is quite prominent. There are several causes that are responsible for cost overruns. The aim of this research is to identify the major factors which cause project cost overrun in RAMA Construction PLC.

1.2 Statement of the problem

Cost is one of the prime measure factors for projects success. The construction industry plays a major role for a countries development by creating job opportunity for individuals and firms. A project incurring extra cost will bring associated problems if the reasons behind for the overrun are not identified and provided the necessary project management decision, otherwise this led the project to fail and create dissatisfaction for the owner of the project or client and affect other stakeholders involved. Managing cost, time and qualities are the triple constraints which inter-depend on each other. When large projects diverge from their objectives (either in cost, completion time, performance, safety or environmental effects), the damage caused obviously outdoes out of the contracting parties and affects the project stakeholders and also the public at large.

For the client the major key success factors are completing the project with the budgeted cost, with the stated time and with the quality defined, failing to meet the first two factors is what becoming a headache for almost every construction projects in our country. Among the construction projects undertaken in recent year cost overrun is one of the major problems in

Ethiopia (Ashebir ,Wubishet, and Murad, 2017: Abubekir 2015: Zinabu and Getachew 2015:Fetene 2008). This problem in turn is causing difficulties in financing of upcoming projects, timely utilization of the facility by the public and the relationship among stakeholders (Client, Contractor, and Consultant) involved in the construction process. According to Weyessa E, 2014, Addis Ababa light rail transit construction projecthad experienced cost overrun. Every project is unique PMBOK 5th, and there is no a single cause for construction project overrun. This research assumed that projects faces cost overrun in RAMA Construction PLC and there are reasons behind it.

1.3 Basic research questions

In line with the problem statement, this study attempts to address thefollowing basic research questions.

- What are the factors causing projects cost overrun in construction sector in the case of RAMA Construction PLC. ?
- Identifying factors that influence cost overrun in the construction project from the contractor perspective?
- What are the significant/important factors causing cost overrun?
- Which factors causing cost overrun are appearing frequently?

1.4 Objectives of the study

General objective

- The general objective of this research is to assess the factors causing project cost overrun in construction sector in the case of RAMA Construction PLC.

Specific objective

- To identify factors influencing cost overrun in the company.
- To identify significant factors causing cost overrun in the company.
- To identify which factors are occurring frequently in the company.

1.5 Significant of the study

Construction projects are increasing throughout the country, regardless of that every project is unique but they all share the same constraints like cost overrun and other, undertaking this research will identify the major causes for the project cost overrun in these sector as a result those identified cause will provide insight for RAMA Construction PLC. and help them to prioritize on which cause to focus and provide a corrective decision. In our country there has not been much research conducted to identify the cause of cost overrun factors. So, this study can be clarify and inspire people about the cause of cost overruns in the construction industry and it can also be used for further study.

1.6 Scope of the study

This study is limited for projects undertaken by RAMA Construction PLC. to identify factors that cause project cost overrun and to analyze them based on their level of frequency, degree of impact and importance. Even though there are key stakeholder who are responsible for the project cost overrun like Client, Consultant and Contractor, this study only focus on the contractor side. The data will be collected only from the contracting company with the persons who are believed to have a direct impact to the project the company undertaken, so it is difficult to conclude that every other construction projects faces the same causes. The 43 factors for the causes of cost overrun in the construction projects are only used, these factors are later on divided in to three based on their phase in the construction project which is planning phase, designing phase and construction phase.

1.7 Limitation of the study

The primary limitation of this study is time shortage. And also there is a shortage of studies and researches regarding it in our country.

1.8 Organization of the study

The research work consists of five chapters.

- Chapter one introduces the background of the study, followed by statement of the problem, research questions, objectives of the study, significance of the study, scope and limitation of the study and organization of the thesis.
- Chapter two deals with literature review. In this regard, the theoretical and empirical literatures are reviewed.
- Chapter three states about methodology and describes the study area, research strategy, the research design, research type, data type and source, the population and sample size, data collection instrument, method of data presentation, analysis and interpretation, ethical consideration and the measurement of reliability and validity and operationalization of variables.
- Chapter four is devoted to the analysis and presentation of the findings, interpretation of data, and the related information.
- Chapter five winds up the assessment by giving conclusions in the light of the findings. And at last recommendations are made based on the concluded findings.

Chapter two

Review of related literature

2.1 Theoretical Review

2.1.1 General concept of cost overrun

Every project is constrained by cost, time and quality, why because almost all projects fail to meet them. Especially the first two are the most important constraint that a project driven companies or anyone who is undertaking a project should give additional attention too, hence delay or increment in one of them cause direct impact on the other. The inability to complete project on time and budget continue to become a chronic problem worldwide (Ahmed et al.2002). The success criteria for projects may differ from one to another but the commons are completing the project with the predefined schedule, with the estimated cost and finally with the requirement defined by the owner. Construction project is mainly undertaken to deliver a product or facility and this industry is growing from time to time here in Ethiopia but it faces many problems among those one is cost overrun problems.

Construction projects are undertaken considering for the future, it can't be said that it will be free from uncertainties' so the project may fail due to weather conditions, owners requirement not been met and others like project complexity increases. So this days project been completed with incurring an extra cost. Studies show that in developing countries when the project is completed, the actual cost exceeds the original contract price by 30% (Al-monani, 1996). Cost overrun of 50 to 100% were common (Flyvbjerg et al.,2003). Construction and engineering projects are risky venture: 40% are late; 50 over budget; 30%fail to meet expectations of users' (Tony, 2017).

There have been many factors identified by many researchers for the cost overrun. There are different stakeholders who are involved in the project mainly client, consultant, contractor, sub-contractor, government and society, and have their own reasons which can be held responsible for project cost overrun.

Unfortunately, construction projects regularly are making news headlines, not for being remarkable engineering accomplishments that will support and stimulate economic growth and social integration of communities, but rather for being poorly managed and often over budget. A

significant number of construction projects routinely overrun their cost estimates. According to the work of Flyvbjerg et al. (2002), infrastructure projects are reported to have an 86% probability of outrunning their set cost targets. Love et al. (2012) and Odeck (2004) on the other hand found that overruns could be as high as 70% and 183% more than the initial estimates respectively. The global audit and professional services firm, Ernst and Young, reviewed the performance of 365 infrastructure projects delivered in the oil and gas industry and found that at least 64% of the projects were faced cost overruns.

2.1.2 Definitions of cost overrun

Cost overrun

A project cost is the total cost that the project to be implemented will incur until its finished and this cost is estimated by using different techniques Top-down or analogous, Bottom-up and Parametric approach at the project appraisal phase. Project cost overrun occurs when the final cost incurred is greater than the budgeted cost. A cost overrun also known as cost increase or budget overrun, involves unforeseen costs incurred in excess of estimated amount due to an underestimation of the actual cost during budgeting.

Several authors have defined cost overruns differently. For instance, Al-Najjar (2002), has defined cost overruns as the change in contract amount divided by the original contract award amount. However, Zhu and Lin (2004) are of the view that cost overruns are the excess of actual cost over budget and also called it cost increase or budget overrun. Choudhury (2004) have defined cost overruns to be the difference between the original cost estimate of project and actual construction cost on completion of works of a commercial sector construction project.MattySiemiatycki (2015), the common definition of cost overrun in most studies is a change in cost relative to the final estimate provided when the approval of or "go decision" was made until the construction is completed.Widman (2002) defined it the amount by which actual cost exceed the baseline or approved costs.

Cost overrun = Final Contract Amount – Original Contract Amount

Cost overrun is a condition which the total of money that has been used was greater than the original cost or estimated cost (Frimpong et al., 2003). According to a research by Flyvbjerg et

al. (2002) in global construction, it was found that 9 out of 10 projects had cost overrun. Infrastructure projects are reported to have 86% probability of outrunning their set cost targets. The average size of these overruns can be as high as 45% for rail projects, 34% for bridges, and 20% for road projects. Love et al. (2012) and Odeck (2004) on the other hand found that overrun could be as high as 70% and 183% more than the initial estimates.Le-Hoai, et al. (2008) considered that the magnitude of cost overruns may or may not vary depending on the size of the project, the location of the project and the type of project.

Construction projects are dynamic and risky ventures where outcomes are often uncertain. The industry is characterized by the construction of one-off bespoke buildings on site whose conditions and constraints are highly variable. Each project involves unique design and construction challenges which are typically undertaken by temporary organizations assembled for the particular project (Tony, 2017).

The increasing complexity of the construction projects shows a greater demand on construction managers to deliver projects on time, within planned budget and with high quality. Most developing countries construction project is suffering from continuing problem of project cost overrun which requires a deep analysis and planning before commencing to the execution phase.

2.1.3 Project cost

Project costs are any expenditures made or estimated to be made, or monetary obligations incurred or estimated to be incurred by the implementation of the project. Project cost has been defined as the amount of commitment in terms of money that is required to produce a construction product such as building. Project cost represents all those items included under the heading of the expenditures (Ashworth, 2004). Project cost is quantitative assessment of the likely costs of resources (labor, material, supplies, etc.) required to complete all project activities (Duncan, 1990). It is the amount of money required to complete all project activities.

2.1.4 Project cost management

Project is a series of activities at bringing about clearly specified objectives within a defined time period and with a defined budget.Every project should be well defined, have accurate time and

costs estimates and have a realistic budget. Cost is a resource sacrificed or foregone to achieve a specific objective or something given up in exchange (PMBOK Guide 2002, page 83-90)

Project cost management is primarily concerned with the cost of resources needed to complete the project activity. It includes four processes required to ensure that the project is completed within the budget. Resource planning, Cost estimating, Cost budgeting and Cost control.

Resource planning

It involves determining what physical resources (people, equipment, materials) and what quantities of each should be used and when they would be needed to perform project activities. For instance, construction team needs to be familiar with local building codes. Such knowledge is often readily available from local seller.

Cost Estimating

It involves developing approximation of the costs of the resource needed to complete project activities. In approximating cost, the estimator considers the cause of variation of the final estimate for purpose of better managing the project. Cost estimating involves developing an assessment of the likely quantitative result like how much will it cost the contracting organization to provide the product or service?

There are four tools/techniques to estimate the cost of projects namely, Analogous, Parametric, Bottom-up and Computerized tools, Parviz F. (2002).

- ***Analogousestimating***- also called top-down estimating tool, means using the actual cost of the previous or similar project as a basis for estimating the cost of the current project. It is less costly and accurate compared to the other tools but its best to use it if the project is similar to the previous.
- ***Parametricmodeling***- uses project characteristics (parameters) in a mathematical model to predict project cost. The cost and accuracy varies and its reliable when historical information is used to develop the model is accurate, the parameters used in the model are readily quantifiable, and the model is scalable
- ***Bottom-up***- involves estimating the cost of individual activities or work packages, the summarizing or rolling up the individual estimates to get a project total. The cost and

accuracy depends on the size of the activities or work package, meaning the smaller the activities the more the estimates are accurate.

- ***Computerizedestimatingtools***- such as project management software spreadsheets and simulation/ statistical tools, are widely used to assist with cost estimating.

Cost Budgeting

It involves allocating the overall cost estimates to individual activities or work package to establish a cost baseline for measuring project performance. Cost baseline is a time phased budget that will be used to measure and monitor cost performance on the project, Harold K. 2009.

Cost Control

It is concerned with influencing the factors that create changes to the cost baselines to ensure that changes are agreed up on, determining that the cost baseline has changed and managing the actual changes when and as they occur.

2.1.5 Phases in Building Construction Cost Management

Construction project management can be defined as the direction, regulation and supervision of a project from early development to completion. The ultimate goal of it is the full satisfaction of client's demands for a viable project both in terms of functionality and budget. The main concept of construction project management is closely connected to technical parameters like budget and execution but it also requires solid communication between all the agents (stakeholders, contractors, community). It is a service that uses specialized, project management techniques to oversee the planning, design, and construction of a project, from its beginning to its end (Jose, 2017).

Planning phase

It involves creating of a set of plans to help guide the project team through execution and closure phase. The plan created at this phase will help to manage time, cost, quality, change, risk and issues. It also help to manage staff and external suppliers, to ensure that the project deliver the project on time and within the budget. This is a critical stage in the cost management process; an inaccurate planning can doom a project to continual stress and compromise, neither the client,

end-user nor design team being completely satisfied at the end. A common mistake at this stage is to apply those historical data without making adjustments for the myriad factors which affect construction costs such as size of the project, location, price increases, delivery system, overall quality of the project envisioned, etc.

Design phases

The design phase begins with the approval of the project budget which includes design and associated documents, professional time for the project manager, designer and potential contractors, and design contingency. At the end of this phase the construction budget is ready for approval and the project is ready to be constructed. The deliverables of this phase are design document, construction document and preliminary contract document package. Once an initial budget has been established, the scope set and the quality expectations documented, it is important to monitor the estimated cost of the project by employing a series of increasingly precise cost estimating techniques that coincide with further development of design and construction details. Estimates are employed at various stages of project design development as part of ongoing cost management, and as a means of evaluating competing alternatives. The drawings and specifications should also go through a constructability review, wherein the construction documents are analyzed for completeness, coordination between activities, cost effective designs, and general code compliance. The specifications should also be reviewed to ensure that the general requirements included are not overly restrictive (e.g. working hours, noise restrictions and so forth), (Fetene, 2008).

Construction phase

After the construction document is completed at the design phase the project is ready to put out for bid. At the bid stage, drawings should be nearly 100% complete; however, in many instances this does not happen, leading to addenda being issued to clarify details, resolve conflicts or to complete the design. The preparation of the bidding documents is also crucial in an overall cost management strategy. Consideration should be given to contract clauses that govern changes in the work and how they will be valued; allowable mark ups on changes by the various levels of contractors and sub-contractors; notice requirements for delays; the use of unit prices for changes and any other clauses that may affect the final cost of the project. During construction, usually,

the focus shifts from predictive cost estimating to reactive cost control of any changes in the work. Changes arise from a number of different sources; unforeseen conditions, owner generated changes, drawing errors and omissions, code issues or contractual claims, etc. In addition, changes can arise from ongoing proactive cost management, generated either by the consultant, the client or by the contractor, where one of the parties proposes a better value substitution (Fetene, 2008). There are many factors for the occurrence of cost overrun at these stage and some of them are material price escalation beyond projection, escalation of labor cost/ineffective utilization of labor, design change/iteration, inadequate availability of the skilled resources, weak contract administration and claim management, contractual dispute due to poor framing of the contract documents and wrong selection of equipment (Belachew, Mengesha and Mohammed, 2017).

Project management in construction encompasses a set of objective which may be accomplished by implementing a series of operations subject to resource constraints. There are potential conflicts between the stated objectives with regard to scope, cost, time and quality, and constraints imposed on human material and financial resources. These conflicts should be resolved at the onset of a project by making the necessary tradeoffs or creating new alternatives. Project management for construction generally include the following:

1. Specification of project objectives and plans including delineation of scope, budgeting, scheduling, setting performance requirement and selecting project participants.
2. Maximization of efficient resource utilization through procurement of labor, materials and equipment according to the prescribed schedule and plan.
3. Implementation of various operations through proper coordination and control of planning, design, estimating, contracting and construction in the entire process.
4. Development of effective communication and mechanism for resolving conflict among the various participants.

2.2 Review of Empirical Study

2.2.1 Causes of cost overrun

Cost overrun is a very common phenomenon and majority of project in construction industry are facing this problem. These problems are faced by developing and developed countries. There have been many causes identified by many researches which are contributing to the cost overrun. The contractor's primary obligations are to construct the works to the specified standard within the agreed project duration. In order to achieve these objectives the contractor must co-ordinate and motivates a team of diverse subcontractors. Contractors may experience difficulties completing project on time for variety of reasons for which they responsible. These include: inadequate or incompetent staff and/or subcontractors, poor productivity and inefficient execution of the works; poor analysis of the detail of the project in producing unrealistic programs; coordination and communication problems; accidents; poor labor relations, and disputes. A particular problem arises in cases where the contractor has submitted an under-priced or unreliable cost estimate. This may have occurred as a consequence of rushed tendering time frames, indefinite and uncompleted project scope, over-optimism, inadequate contingency due to poor risk assessment (Tony,2017).

According to Matty (2015), the following four major factors were identified and those are:-

- ✓ Scope change and change orders- the specification of the project are changed following the "go decision," leading to escalating of the cost. Scope change includes major alteration of the facility and change orders may take in the form of contractor initiated variations to the approved facility design to correct errors.
- ✓ Incomplete studies prior to project approval- project approval and construction large infrastructure projects often precede before all technical feasibility and engineering studies are completed, leading to escalating costs as more details about the project are confirmed. This problem occurs because governments often expedite approvals to get urgent projects started quickly, or to make project announcements to meet program funding deadlines or election timelines.
- ✓ Inflation in labor and material costs- infrastructure projects often rely on key construction materials and workers in specialized building trades, the cost of which can escalate over the course of the project. This tends to occur when projects are built during periods of

strong economic growth and tight employment markets, which creates scarcity and drive price increases.

- ✓ Inaccurate forecasting- since large infrastructure projects are complex and take place in a context of uncertainty, accurately forecasting final project costs can be difficult. Forecasting problems include the use of inappropriate methods or inaccurate underlying assumptions because of poor-quality or incomplete data, and unforeseen, dramatic shifts in external conditions.

According to User's Guide, (2005), this are the factors identified that change the cost of the construction projects through time: poor project management, design changes, unexpected ground conditions, inflation, shortage of materials, change in exchange rates, inappropriate contractors, funding problems and force majeure. Abadir, (2011), finds out that 90% of the contractors prepare detailed estimates of cost of labor, material and machinery. However, only 75% prepare detailed budget, about 70% track cost of labor, material and machinery separately and 67% collect and use company's historical data for preparation of cost estimates. His study further indicates that only 1/3 of the contractors use computer tools for cost estimate preparation and about 2/3 update that their budget regularly at least once in a month.

Cost overrun has been attributed to several sources including scope creep and rework (Love et al. 2005), unrealistic cost targets and misguided trade-offs between project scope, time and cost (Ahiaga-Dagbui and Smith 2014), a poor understanding of the systematic and dynamic nature of projects (Eden et al. 2005), unidentified or improperly managed risk and uncertainty (Okmen and Oztas 2010) to suspicions of foul-play and corruption (Wachs 1990).

Factors influencing cost performance based on initial estimates have been widely published and primarily concern project complexity, technology requirements, vagueness in scope, and the project team requirements (Mansfield et al. 1994; Akintoye 2000; Frimpong et al. 2003). Empirical evidence suggests that contractors' efficiency in the estimating process and appropriate tender pricing depicts the cost performance in construction projects (Skimore and Wilcock 1994). Therefore, contractors' ability in using sophisticated methods and their rationalizations at the tender development stage are considered crucial in achieving cost success.

According to Fetene (2008), the most common causes of cost overrun in public projects of Ethiopia are inflation or increase in the cost of construction materials, change in foreign exchange rate (for imported materials), change orders and lack of control on excessive change orders, failure to identify problems and institute the necessary and timely actions.

Weywssa (2014), states that the main causes for cost overrun in Addis Ababa light rail transit construction projects are delay and scope change of the contract date and items of work, variation caused due to underground and elevated structures at construction stage, inadequate preconstruction study prior to the construction period which led to change in the control system and conceptual design of works and inadequate site investigation and unexpected ground conditions.

Shamble Gebre (2008), states the road construction is facing time and cost overrun. His study showed that all the 10 completed road projects overrun their time and cost estimates. The reasons were financial problems, improper planning, land acquisition and construction delay, design changes, less materials and equipment supply by contractors, incomplete design are the main source of delay and cost overrun respectively.

2.2.2 Studies of cost overrun in construction projects

There have been many studies conducted regarding factors causing cost overrun around the world and this section tries to see their findings. Muralidaran (2018) conducted a research on various factors influencing cost overrun in UAE construction industry and it was through questionnaire and interview that he data were collected. 194 responses were collected out of 295 and the findings showed that the most important causes of cost overrun were poor productivity, insufficient early planning, delayed completion, and lack of skilled resource and motivation.

Akinsiku, Akintola, Ameh and Ige, (2014) from Nigeria, conducted a survey on the factors causing cost overrun from the contractor perspective. Their study was conducted using questionnaire survey in which 100 questionnaires were distributed to contractors using purposive sampling and used descriptive statistic method to analyze the data by calculating the mean score and the result show that lack of adequate pre-contract planning and project team coordination are the most significant factor among construction professionals leading to cost overrun.

Table 2.1 factors responsible for cost overrun in building project

Factors Causing cost overrun	Mean	Ranking Index
Lack of planning and coordination	4.09	1
Additional costs due to variation works/Change order	3.96	2
Changes in plans and drawings or Design changes	3.93	3
Increase in the cost of construction materials	3.74	4
Poor cost control method	3.70	5
Inconsistent client brief	3.70	5
Changes to specification	3.69	7
Fluctuations in the cost of labor and/or material	3.61	8
Inexperienced contractor	3.60	9
Lack of control on excessive change orders	3.58	10
Inaccurate quantity estimate or excess quantity during construction	3.54	11
Inadequate site investigation	3.36	12
Delayed payments to contractors	3.30	13
Wrong method of cost estimation	3.29	14
Lack of coordination between design team and general contractor	3.26	15
Complexity of construction projects	3.25	16

Source: Akinsiku, Akintola, Ameh and Ige, (2014)

There are few studies conducted in our country on the cost overrun factors, but the following review shows some of them and their findings. Zinabu and Getachew (2015), conducted research on the causes of contractor on cost overrun in construction projects and it was administered through 140 questionnaire in order to rank the factors based on their occurrence and they were able to identify the top five factors as per the response of the contractors poor planning, fluctuation of price of materials, poor productivity, inflationary pressure and project financing in descending order and the following table shows all the findings.

Table 2.2 Contractor's response of cost overrun factors

No	Contractors response of cost overrun factors		
1	Poor planning	21	Transportation cost
2	Fluctuation of prices of materials	22	Previous experience of contract
3	Poor productivity	23	Manipulation of suppliers
4	Inflationary pressure	24	Cost of labor
5	Project financing	25	Lack of coordination between construction parties
6	Duration of contract period	26	Economic instability
7	Poor financial control on site	27	Contractual procedure
8	Monopoly by suppliers	28	Fraudulent practices and kickbacks
9	Contract management	29	Waste on site
10	Cost of machinery	30	Project location
11	Inadequate local production of raw materials	31	Frequent changes in design
12	Bureaucracy in tendering method	32	Long period between design and time of tendering
13	Currency exchange	33	Additional work
14	High machinery maintenance cost	34	Government policies
15	Lack of adequate manpower or technical staff	35	Relationship between managers and labors
16	Number of projects going at the same time	36	Effects of weather
17	Wrong estimation method	37	Level of competitors
18	Number of competitors	38	Social and cultural impacts
19	High interest rates by bankers	39	Disputes on site
20	Absence of construction-cost data	40	Cost of insurance
		41	Political situation

Source: (ZinabuTebje and ZewduGetachewTeka, 2015)

Frimpongs et al. (2003) studied 26 factors that cause cost overrun in construction of ground water projects in Ghana. It was a questionnaire survey and distributed for 125 respondents and 40 respondents were contractors and the findings show that the major factors that caused excessive cost overrun were poor contractor management, monthly payment difficulties from

agencies, material procurement, poor technical performance, escalation of material prices according to their degree of influence.

Ramabodu and verster (2010) in South Africa conducted research aiming to identify the major cost overrun factors in construction sector and it included 25 questionnaires and an interview with selected groups and there were about 21 factors identified and these factors were divided in to three categories very critical factors, moderate and less critical factors.

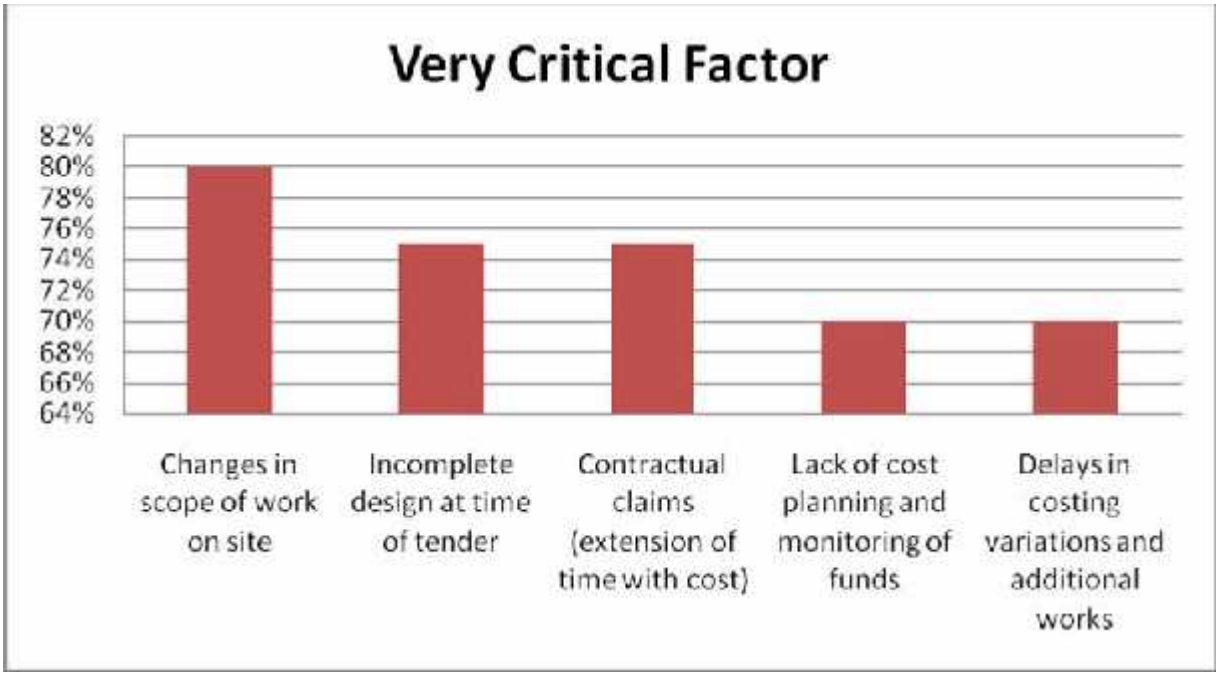


Figure 1: five very critical factors of cost overrun

Source: Ramabodu and verster (2010)

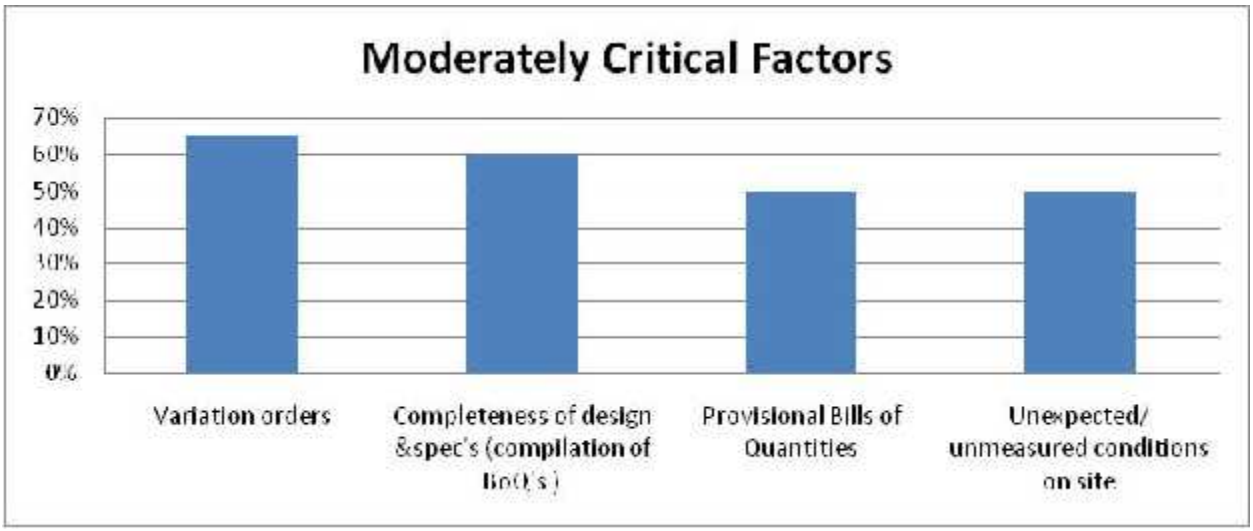


Figure 2: four moderate critical factors

Source: Ramabodu and verster (2010)

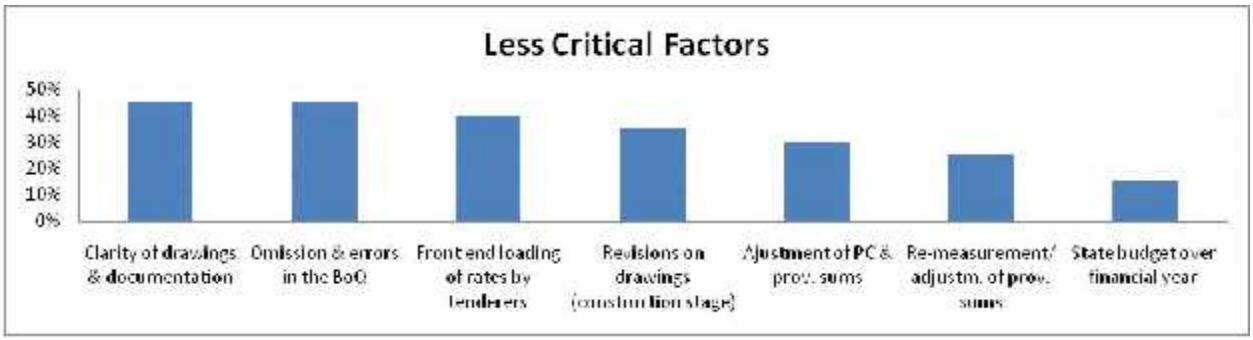


Figure 3: less critical factors of cost overrun

Source: Ramabodu and verster (2010)

Adnan et al. (2010) studied to identify factors influencing cost overrun and time in Gaza Strip. Their researches were also conducted through detailed questionnaire of 80 containing 42 factors that caused cost overrun from contractors. Their responses were analyzed to rank the causes of time and cost overrun on an important index. The most significant causes were increase in material prices due to continuous border closures, delay in construction, supply of raw materials and equipment by contractors, fluctuation in cost of building materials, project materials monopoly by suppliers, instability of local currency in relation to dollar value, low commitment of donors to compensate any negative outcomes attributable to the poor economic and political situation, and donor policy in awarding tenders to the lowest bidder.

Fetene (2008) research showed that 67 out of 70 public building construction projects in Ethiopia suffered cost overrun. It was through questionnaire and desk study that the research was conducted and 42 questionnaires was collected form the client, consultant and contractor. And about 39 factors were identified; the most important causes of cost overrun were inflation or increase in the cost of construction materials, poor planning and coordination, change order due to enhancement required by client, excess quantity during construction. The rate of cost overrun ranges from 0% to 126% of the contract amount for individual projects. Abubeker (2015) research showed that the cost overrun rate ranges from 4.11% to 135.06% of the contract amount. From 94 questionnaires 47 factors were identified and the most important cause were delay in construction, inadequate supply of raw materials and equipment by contractors, design changes and incomplete design at the time of tender.

2.3 Conceptual framework

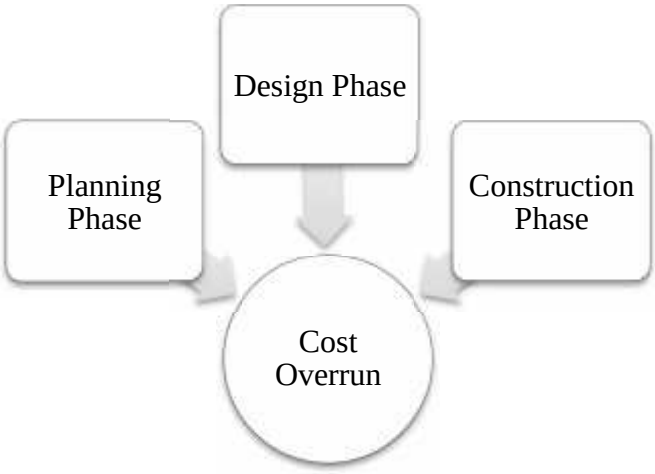


Figure 4: conceptual framework on the cost overrun

Source: self-extracted

2.4 Summary

The literature review was done through detecting previous studies, journals, books and internet of the cost overrun factors on construction projects. There are many factors identified from these resources and many of them are used to develop the research questionnaire. Cost overrun problem have become a common phenomenon in developing countries and some of the factors are similar. There are few studies conducted in Ethiopia regarding these but the literature review have found that the main causes for the overrun are inflation/increase in cost of construction material, poor planning/coordination, change order due to enhancement required by the client, design change and incomplete design at the time of tender. Cost overruns occur on many construction projects, although of course, their magnitude varies considerably from project to project. It is important to investigate the causes in order to develop an understanding of how and why arise, so that corrective action can be taken at source, to avoid or limit their negative impacts. Considering these problems this research tries to identify factors in the construction project and provides the necessary recommendation to the company.

Chapter Three

Research Methodology

3.1 Introduction

This chapter present the research methodology utilized in the study. Research methodology considers the context of the research and the results in order to achieve meaningful research outcomes. Moreover, the selection of an appropriate research design involves several steps, beginning with identifying the problem, purpose of the study and in depth literature review. This process of conducting research can either be qualitative or quantitative. Accordingly, these chapter present details of the methods employed in the study; it has different sub sections that describes and justifies the method and process that were used in order to answer the research questions.

3.2Research Design

A research design is an arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with time and money in consideration. In fact, a research design is the conceptual structure within which research is conducted; it constitutes the blue print for the collection, measurement and analysis of data (Kothari 2004:7).

This research has a descriptive nature describing the existing phenomenon as it exists.Mixed research type was found to be appropriate for this study. The data were collected from both sources, primary data were from the company and secondary sources were from reviewing books, journals and previous study. After identifying the factors, the questionnaires were distributed and some unstructured interview was conducted. Those data were analyzed by their frequency, severity and important index which later on the finding will be used to drive the conclusion and provide the necessary recommendation.

3.3 Research Type

According to McDaniel and Gate (1999), a research design is a plan for a study that provides specification of procedures to be followed by the researcher in order to achieve the research objectives. This research leans towards on descriptive research. The objective of these studies is to describe factors to the project cost overrun and to give interpretation to the findings.

Descriptive research is to portray an accurate profile of persons, events or situations (Malhotra, 2004).

3.4 Research Approach and Method

The method applied to conduct this research is mixed research since it drives the best out of the two approaches quantitative and qualitative. Hence both approaches have their own limitation its best to use them so that to fill the gap brought and to get more accurate answers.

Quantitative approach is a systematic empirical investigation of observable factors via statistical, mathematical or computational techniques. It minimizes subjectivity and arrives at more objective conclusion. However, quantitative approach is limited to the outcomes outlined only in the questionnaire. Hence, it is weak in understanding the context (Creswell, 2013).

Qualitative approach inquires deeply into specific experiences, with the intention of describing meaning through text, narrative or by developing subjects exclusive to that set of participants. in order to minimize the limitation mentioned above in the quantitative approach and to obtain additional insight more than outlined in the questionnaire, in a less structured and more flexible approach a qualitative approach was used. An interview were conducted with selected few engineers who were believed to have a better experience in the construction project. However, qualitative method has a limitation because of the difficulty in generalizing findings to a large group as limited number of participants was involved in this approach.

3.5Source of Data

This study used both primary and secondary data. Primary data were obtained from the employee of RAMA Construction PLC through the questionnaire. The secondary data were obtained from previous study, books, articles, and journals from the internet.

3.6Data collection method

The primary data was gathered through a structured questionnaire and unstructured interview which was designed from the review of related literature of various causes of cost overrun in construction projects and also through selected interview. The questionnaire was an closed ended

and open ended for those who have more factors to provide, Lykert type scale of measurement was used to determine the level of agreement. This study involved largely the use of these data for the purpose of empirical analysis and the other tool is an interview with the workers chosen which were 3 respondent, one the general manager of the company and two of them were engineers.

3.7 Population of the study

The total populations for this study are workers who have a direct contribution on Rama Construction PLC constructions projects those are project Manager, engineer, and Project team are involved. The current total number of employees in the company is around 3286, the total employees who are working in projects are about 2213 and about 1073 are nonpermanent workers; the study focused on those who are permanent and so the population of the study was 2213.

3.8 Sampling Technique

Sampling enables the researcher to study a relatively small number of units in place of the target population, and to obtain data that are representative of the whole target population.A purposive sampling is a form of nonprobability sampling in which decisions concerning the individuals to be included in the sample are taken by the researcher, based upon a variety of criteria which may include specialist knowledge of the research issue, or capacity and willingness to participate in the research. According to Carvalho (1984), the sample size were determined as the following table shows and so as this study has applied it and sample size of 50 employees were taken and the structures questionnaire were distributed.

Table 3.1 Sample size determination.

Population1	Sample Size2		
	Low	Medium	High
51-90	5	13	20
91-150	8	20	32
151-280	13	32	50
281-500	20	50	80
501-1,200	32	80	125
1,201-3,200	50	125	200
3,201-10,000	80	200	315
10,001-35,000	125	315	500
35,001-150,000	200	500	800

Source: Carvalho, 1984

3.9 Validity and Reliability

Every assessment to be sound, they must be free from bias and misrepresentation. Both validity and reliability are two important concepts which are used to define and measure bias and distortion.

Validity

Validity is the extent to which a concept, conclusion or measurement is well-founded and corresponds accurately to the real world. It's important because it can help determine what types of test to use, and help to make sure researchers are using methods that are not only ethical, and cost-effective, but also a method that truly measures the idea or construct in question. Validity cannot be measured numerically; instead it's measured by the content validity of the instrument's ability to measure what is intended to be measured and by the extent to which the instrument is correspondent to the other variables, as predicted by some rationale or theory. So these study validity was measured by the judgment of group of peoples regarding how well the instrument meets the standards.

Reliability

Reliability is the overall consistency of a measure. These measures is said to have reliability if it produces similar results under consistent conditions. It is the characteristic of a set of test scores that relates to the amount of random error from the measurement process that might be embedded in the score. Scores that are highly reliable are accurate, reproducible, and consistent from one test to another. For this study the widely used Cronbach Alpha were used to measure internal reliability for tests with multiple possible answers. Internal reliability or consistency is a measure of how well the test is actually measuring what it wants to measure. Rule of thumb for preferred levels of the coefficient is greater .80, it is said to have very good reliability; if it below .50, it would not be considered a very reliable test. This study calculated the reliability and the result for the frequency index was 0.916 for 43 numbers of items and severity index it was 0.943. There for, based on the results the items are reliable and acceptable.

Table 3.2 Reliability test result of the questionnaire

Items	Cronbach Alpha	Number of item
Frequency of Occurrences	0.916	43
Degree of Severity	0.943	43

Source: own survey 2018

3.10 Methods of data analysis

This study analyzed the data gathered from the selected respondent for the closed ended questionnaire by using the frequency of the factors/variables occurrence, degree of severity, and relative important index. This three analyzing techniques were applied by many researchers who are included in the literature reviews, those were to measure the importance of the factors based on their appearance and their impact on the project cost overrun in the company. And the SPSS version 20 was also used. According to Assaf and Hejjii, (2006), the formula to calculate the frequency of occurrence and severity index are shown below:

A. **Frequency Index**: a formula is used to rank causes of cost overrun based on frequency of occurrence as identified by the participants.

$$F.I\ \% = \sum a(n/N) * 100/4$$

Where, a= weighting given for each response (range from 1 rarely to 4 always)

n= frequency of the responses

N= total number of responses

B. **Severity Index**: a formula is used to rank causes of cost overrun based on severity as indicated by the respondent.

$$S.I\ \% = \sum a\ (n/N) * 100/4$$

Where, a= weighting given for each response (range from 1 little to 4 extreme)

n= frequency of the responses

N= total number of responses

C. **Important Index**: the important index of each cause is calculated as a function of both frequency and severity indices, as follow:

$$II == F.I\% * S.I\%$$

3.11 Ethical Consideration

The researcher has taken into account the ethical obligations to all involved in the study. The researcher first has gain consent of all respondents prior to administering the questionnaire and maintains their anonymity. In addition, the researcher ensures that findings of the study wasonly to be used for academic purposes and also findings of the research were presented without any deviation from the outcome of the research. In addition, the researcher gave fullacknowledgements to all the reference materials used in the study.

3.12Definition of variables

The goal of quantitative research is to examine the relationship between variables. A variable is a characteristic of interest in the research study that can take on different values and is not constant. There are two primary variables dependent and independent.

An independent variable is the variable manipulated or changed by the researcher. It affects the dependent or outcome variable. In this study the dependent variable is cost overrun. As mentioned in the literature review the studies in our country have identified many variables but the researcher has chosen those who are significant for the study. These factors are classified in to three phase, Planning, Design, and Construction phases and based on their source the factors are classified under these phases.

Planning phases

Poor planning, Poor project risk management, Use or wrong cost estimation tool
Inappropriate choice of site, Lack of training program, Lack of cost planning/monitoring
Inaccurate evaluation of project time duration, Poor contract management, Lowest bidding procurement policy

Design phases

Lack of coordination at design phase, incomplete design at the time of tendering
Poor design, frequent design change

Construction phases

Improvements to standard drawings during construction stage,
Additional work at owner's request, Poor financial control on site, Currency exchange
High machinery maintenance cost, Lack of adequate manpower or technical staff
Number of projects going at the same time, High interest rates by bankers
Transportation cost, Cost of labor, Economic instability, Relationship between managers and labors, Lack of experience of technical consultants, Poor site management, Change in scope/ scope creep, Poor quality management, Lack of coordination with sub-contractor, Delay in progress payment, Contractual claim such as, extension of time with cost claims,Omissions and errors in the bills of quantities

Chapter Four

Data Analysis and Interpretation

4.1 Introduction

This chapter present the result of descriptive analysis conducted through the distributed 50 questionnaires, out of which 43 were returned complete. Statistical data were entered into SPSS (Statistical Packages for Social Science) and analyzed by using descriptive statistical techniques. This chapter begun by presenting the general background of the respondent and then it shows the findings of the major factors identified which are the causes for the construction project cost to overrun in RAMA Construction PLC from the closed ended and open ended questionnaire and finally the response obtained from the interview will be presented.

4.2 General background of respondent

This study has distributed a total of 50 questionnaires and collects 43 of them. The employee who are directly involved to the projects was the respondents and their respondent rate was 0.86. The following tables show respondent age, years of experience in the company, their current position and their educational background.

Table 4.1 Age of the respondent in RAMA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<25	3	7.0	7.0	7.0
	26-46	36	83.7	83.7	90.7
	47-50	1	2.3	2.3	93.0
	>51	3	7.0	7.0	100.0
	Total	43	100.0	100.0	

Source: own survey 2018

The above table show the range in which the respondent in the company are in and the majority of them are in the range 26-46, 3 of them are below 25, 1 respondent is in between 47-50 and the rest 3 of the am above 51. The percentage calculation shows 7%, 83.7%, 2.3% and 7% respectively.

Table 4.2 Respondent years of experience in RAMA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<5	22	51.2	51.2	51.2
	6-10	12	27.9	27.9	79.1
	11-20	6	14.0	14.0	93.0
	>21	3	7.0	7.0	100.0
	Total	43	100.0	100.0	

Source: own survey 2018

As exhibited above, the majority of the respondent has served in the company less than five years which are 51.2% out of the total respondents, 27.9% of them have serve up to ten years and the rest 14% and 7% served from eleven to more than twenty one years in the company. The researcher believes that those who have worked more have more knowledge to identify what the major factors are that caused the project cost overrun.

Table 4.3 Respondent current position in RAMA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Project manager	4	9.3	9.3	9.3
	Project team member	1	2.3	2.3	11.6
	Engineer	16	37.2	37.2	48.8
	other	22	51.2	51.2	100.0
	Total	43	100.0	100.0	

Source: own survey 2018

The above table shows the current position of the respondents in the company. Out of the 43 respondents there were four project managers, 1 project team member, 16 engineers and the rest are working on other positions. These respondent are those who are directly involved in the construction project.

Table 4.4 Education background of the respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BA Degree	20	46.5	46.5	46.5
	MA Degree	17	39.5	39.5	86.0
	Other	6	14.0	14.0	100.0
	Total	43	100.0	100.0	

Source: own survey 2018

The above table shows, from the 43 respondents 20 of them are BA Degree holders, 17 of them are MA Degree holders and the rest 6 are other qualified respondents. The percentage calculation shows 46.5%, 39.5% and 14% respectively.

4.3 Analysis and interpretation

The data collected from the closed ended questionnaire were analyzed by using the formulas shown on the previous chapter. The items which are used to measure the factors are frequency index, severity index and important index. The frequency of occurrence were measured by using four indicators/categories and those are 4 (Always), 3 (Often), 2(Sometimes) and 1(Rarely) and for the degree of severity also four indicators/categories where used and those are 4(Extreme), 3(Great), 2(Moderate) and 1(Little). After calculating this two, the importance of the identified factors were calculated and ranked accordingly. The research questionnaire regarding the factors for the cost overrun was divided into three parts factors which are caused at the Planning Phase, Design Phase and Construction Phase. Their frequency and severity were calculated separately first then combined to drive their importance and to rank them. The following tables show in brief the findings.

Table 4.5 Factors identified at each phases and the abbreviation used

No	Code	Factors identified at the planning phase
1	PP01	Poor planning
2	PP02	Poor project risk management
3	PP03	Wrong cost estimation tool/techniques
4	PP04	Lack of training program
5	PP05	Lack of project cost management
6	PP06	Poor contract management
7	PP07	Lowest bidding procurement policy
8	PP08	Underestimating time requirement

No	Code	Factors identified at the designing phase
1	DP01	Poor project design
2	DP02	Frequent design change
3	DP03	Incomplete design at the time of tendering
4	DP04	Lack of co-ordination
5	DP05	Delay in designing work
6	DP06	Lack of designer experience
7	DP07	Unclear specification
8	DP08	Accepting customer request without management approval

No	Code	Factors identified at the construction phase
1	CP01	Improvement to standard drawings during construction stage
2	CP02	Additional work at owners request
3	CP03	Poor financial control on site
4	CP04	Currency exchange
5	CP05	High machinery maintenance cost
6	CP06	Lack of adequate manpower or technical staff
7	CP07	Number of projects going at the same time
8	CP08	High interest rates by bankers
9	CP09	Transportation cost

No	Code	Factors identified at the construction phase
10	CP10	Cost of labor
11	CP11	Economic instability
12	CP12	Lack of experience of technical consultants
13	CP13	Poor site management
14	CP14	Change in scope/ scope creep
15	CP15	Poor quality management
16	CP16	Lack of coordination with sub-contractor
17	CP17	Delay in progress payment
18	CP18	Contractual claim such as, extension of time with cost claims
19	CP19	Unpredicted weather condition
20	CP20	Incremental price of materials
21	CP21	Complexity of the construction project
22	CP22	Poor communication with sub-contractor
23	CP23	Inappropriate choice of site
24	CP24	Theft/ Corruption
25	CP25	Rework for correcting unsatisfactory work
26	CP26	Damage of materials
27	CP27	Lack of motivated workers

Source: own survey 2018

4.3.1 Frequency Index for factors causing cost overrun

The frequency occurrence of the factors identified was calculated using the formula mentioned in the previous chapter. After it was calculated, the factors were ranked based on their occurrence. The following tables show the computation of the factors at each phases then from the three phases the factors which are identified to be occurred frequently was ranked.

Table 4.6 Frequency Index of the factors at planning, design and construction phase of the project

Variable	Level of Agreement				Total Response	F.I%	Rank
	4 Always	3 Often	2 Sometimes	1 Rarely			
PP01	14	13	6	10	43	68.02326	2
PP02	1	22	11	9	43	58.72093	4
PP03	5	10	19	9	43	56.39535	6
PP04	3	20	15	5	43	62.2093	3
PP06	5	10	20	8	43	56.97674	5
PP07	9	7	13	14	43	56.39535	6
PP08	9	7	13	14	43	56.39535	6
PP09	12	15	9	7	43	68.60465	1
DP01	14	12	10	7	43	69.18605	2
DP02	11	20	10	2	43	73.25581	1
DP03	10	10	13	10	43	61.62791	4
DP04	0	15	20	8	43	54.06977	7
DP05	3	17	16	7	43	59.30233	5
DP06	8	10	8	17	43	55.23256	6
DP07	4	20	13	6	43	62.7907	3
DP08	7	7	13	16	43	52.90698	8
CP01	11	15	12	5	43	68.60465	2
CP02	9	13	14	7	43	63.95349	9
CP03	15	11	8	9	43	68.60465	2
CP04	17	11	10	5	43	73.25581	1
CP05	4	21	12	6	43	63.37209	10
CP06	5	22	12	4	43	66.27907	6
CP07	8	20	7	8	43	66.27907	6
CP08	6	18	14	5	43	64.53488	8
CP09	11	9	19	4	43	65.69767	7
CP10	7	19	12	5	43	66.27907	6
CP11	14	9	14	6	43	68.02326	3
CP12	15	8	11	9	43	66.86047	4
CP13	8	10	17	8	43	60.46512	14
CP14	1	21	10	11	43	56.97674	17
CP15	8	15	10	10	43	62.2093	11
CP16	4	20	14	5	43	63.37209	10
CP17	10	14	15	4	43	67.44186	5
CP18	5	16	13	9	43	59.88372	15
CP19	10	7	16	10	43	59.88372	15

CP20	11	15	8	9	43	66.27907	5
CP21	6	15	14	8	43	61.04651	13
CP22	6	14	15	8	43	60.46512	14
CP23	3	14	14	12	43	54.65116	18
CP24	7	12	18	6	43	61.62791	12
CP25	6	20	14	3	43	66.86047	4
CP26	3	14	23	3	43	59.88372	15
CP27	7	7	21	8	43	57.55814	16

Source: own survey 2018

As the table indicates the analysis for frequency of occurrence of factor are identified and ranked accordinglyat each phases. At the planning phase the first factor with the highest frequency index is underestimating time requirement 68.60%, second factors is poor planning 68.02%, third factors is lack of training program 62.2% and fourth factor is poor project risk management 58.72% and it continuous up to factor eight as shown above. At the designing phase of the project the factor with the highest frequency index are first place is frequent design change 73.25%, the second factor is poor project design 69.18%, the third factor is unclear specification 62.79% and fourth factor is incomplete design at the time of tendering 61.62%. At the construction phase of the project there are 27 factors identified and the five factors with the highest frequency index are first is currency exchange 73.25%, second factor is poor financial control on site 68.60%, third economic instability 68.02%, fourth factor is lack of experience of technical consultants 66.86% and fifth factor is delay in progress payment 67.44%.

4.3.2 Severity Index for factors causing cost overrun

The degree of severity/impact for the factors is computed applying the formula mentioned in chapter three. It shows the impact of the variables/factors on the cost overrun; it was first computed and then ranked based on the percentage it yelled. The following table shows it in detail.

Table 4.7 Severity Index of the factors at planning, design and construction phases of the project

VARIABLES	Level of Agreement				TOTAL RESPONSE	S.I%	Rank
	4 EXTREME	3 GREATE	2 MODERATE	1 LITTLE			
PP01	16	8	11	8	43	68.60465	3
PP02	4	16	13	10	43	58.13953	6
PP03	19	14	5	5	43	77.32558	2
PP04	5	11	18	9	43	56.97674	7
PP05	12	10	17	4	43	67.44186	4
PP06	13	7	13	10	43	63.37209	5
PP07	11	5	14	13	43	58.13953	6
PP08	22	10	9	2	43	80.23256	1
DP01	11	12	9	11	43	63.37209	3
DP02	11	18	6	8	43	68.60465	2
DP03	9	16	7	11	43	63.37209	3
DP04	10	6	18	9	43	59.88372	5
DP05	4	23	7	9	43	62.7907	4
DP06	10	7	13	13	43	58.13953	6
DP07	13	16	8	6	43	70.93023	1
DP08	7	4	11	21	43	48.25581	7
CP01	7	17	17	2	43	66.86047	7
CP02	8	13	11	11	43	60.46512	14
CP03	18	7	7	11	43	68.60465	4
CP04	22	9	8	4	43	78.48837	1
CP05	10	15	13	5	43	67.44186	6
CP06	6	14	14	9	43	59.88372	15
CP07	12	18	8	5	43	71.51163	2
CP08	6	22	5	10	43	63.95349	10
CP09	10	12	11	10	43	62.7907	11
CP10	12	13	13	5	43	68.60465	4
CP11	16	10	12	5	43	71.51163	2
CP12	14	6	15	8	43	65.11628	9
CP13	10	12	16	5	43	65.69767	8
CP14	7	15	10	11	43	60.46512	14
CP15	11	8	12	12	43	60.46512	14
CP16	13	15	5	10	43	68.02326	5
CP17	11	15	10	7	43	67.44186	6
CP18	9	10	12	12	43	59.30233	16
CP19	10	9	9	15	43	58.13953	17

CP20	17	6	11	9	43	68.02326	5
CP21	6	12	15	10	43	58.13953	17
CP22	3	19	8	13	43	56.97674	18
CP23	8	9	6	20	43	52.90698	19
CP24	13	8	14	8	43	65.11628	9
CP25	13	16	6	8	43	69.76744	3
CP26	5	15	17	6	43	61.04651	13
CP27	9	10	16	8	43	61.62791	12

Source: own survey 2018

The severity index analysis shows in the above table, at the planning phase of the construction project the factors with highest severity are; first is underestimating time requirement 80.23%, second factor is wrong cost estimation tool/technique 77.32%, third factor is poor planning 68.60, fourth factor is lack of project cost management 67.44% and in fifth place poor contract management 63.37% are identified. At the designing phase the factors identified are; in first place unclear specification 70.93%, second frequent design change 68.6%, third poor project design 63.37%, fourth delay in designing work 62.79% and at fifth place lack of coordination 59.88% are identified. At the construction phase of the project the factors identified are first currency exchange 78.48%, second factors are number of project going at the same time and economic instability with 71.51%, third factor is rework for correcting unsatisfactory work 69.76%, fourth place cost of labor and poor financial control on site 68.6% and the fifth factor is incremental price of materials 68.02% are identified.

4.3.3 Importance Index for factors causing cost overrun

The importance index for each factors causing cost overrun in the construction projects are computed after the frequency and severity index are computed, since it is the product of the two items.

Table 4.8 Importance Index of the factors at the planning, design and construction phase of the project

VARIABLES	F.I%	S.I%	II%	Rank
PP01	68.0232558	68.60465116	46.66711736	2
PP02	58.7209302	58.13953488	34.14007572	7
PP03	56.3953488	77.3255814	43.60803137	3

PP04	62.2093023	56.97674419	35.44483505	6
PP05	56.9767442	67.44186047	38.42617631	4
PP06	56.3953488	63.37209302	35.73891293	5
PP07	56.3953488	58.13953488	32.78799351	8
PP08	68.6046512	80.23255814	55.04326663	1
DP01	69.1860465	63.37209302	43.84464575	3
DP02	73.255814	68.60465116	50.25689562	1
DP03	61.627907	63.37209302	39.05489454	4
DP04	54.0697674	59.88372093	32.37898864	6
DP05	59.3023256	62.79069767	37.23634397	5
DP06	55.2325581	58.13953488	32.11195241	7
DP07	62.7906977	70.93023256	44.53758789	2
DP08	52.9069767	48.25581395	25.53069227	8
CP01	68.6046512	66.86046512	45.86938886	6
CP02	63.9534884	60.46511628	38.66955111	18
CP03	68.6046512	68.60465116	47.06598161	4
CP04	73.255814	78.48837209	57.49729584	1
CP05	63.372093	67.44186047	42.73931855	12
CP06	66.2790698	59.88372093	39.69037317	17
CP07	66.2790698	71.51162791	47.39724175	3
CP08	64.5348837	63.95348837	41.27230936	13
CP09	65.6976744	62.79069767	41.25202812	14
CP10	66.2790698	68.60465116	45.47052461	8
CP11	68.0232558	71.51162791	48.64453759	2
CP12	66.8604651	65.11627907	43.53704705	10
CP13	60.4651163	65.69767442	39.72417523	16
CP14	56.9767442	60.46511628	34.45105462	25
CP15	62.2093023	60.46511628	37.61492699	19
CP16	63.372093	68.02325581	43.10776095	11
CP17	67.4418605	67.44186047	45.48404543	7
CP18	59.8837209	59.30232558	35.51243916	21
CP19	59.8837209	58.13953488	34.81611682	24
CP20	66.2790698	68.02325581	45.08518118	9
CP21	61.0465116	58.13953488	35.49215792	22
CP22	60.4651163	56.97674419	34.45105462	25
CP23	54.6511628	52.90697674	28.91427799	26
CP24	61.627907	65.11627907	40.12979989	15
CP25	66.8604651	69.76744186	46.64683613	5
CP26	59.8837209	61.04651163	36.55692266	20
CP27	57.5581395	61.62790698	35.47187669	23

Source: own survey 2018

The analysis for the importance index shows in the above table, the top five factors at the planning phase of the project the first factor with highest II is underestimating time requirement 55.04%, second factors is poor planning 46.66%, third factor is wrong cost estimation too/technique 43.6%, fourth factor is lack of project cost management 38.42% and the fifth factor is poor contract management 35.73%. At the designing phase the first factor is frequent design change 50.25%, second factor is unclear specification 44.53%, the third factor is poor project design 43.84%, fourth factor is incomplete design at the time of tendering 39.05% and the fifth factor is delay in designing work 37.23%. At the construction phase of the project currency exchange is first with 57.49%, second factor is economic instability 48.64%, the third factor is number of project going at the same time 47.39%, the fourth factor is poor financial control on site 47.06% and the fifth factor is rework for correcting unsatisfactory work 46.64%.

The three analyses FI, SI and II showed the major and significant factors that are causing the construction project in RAMA. From the three phases of the construction project the next table shows on which phase is the most factors exists.

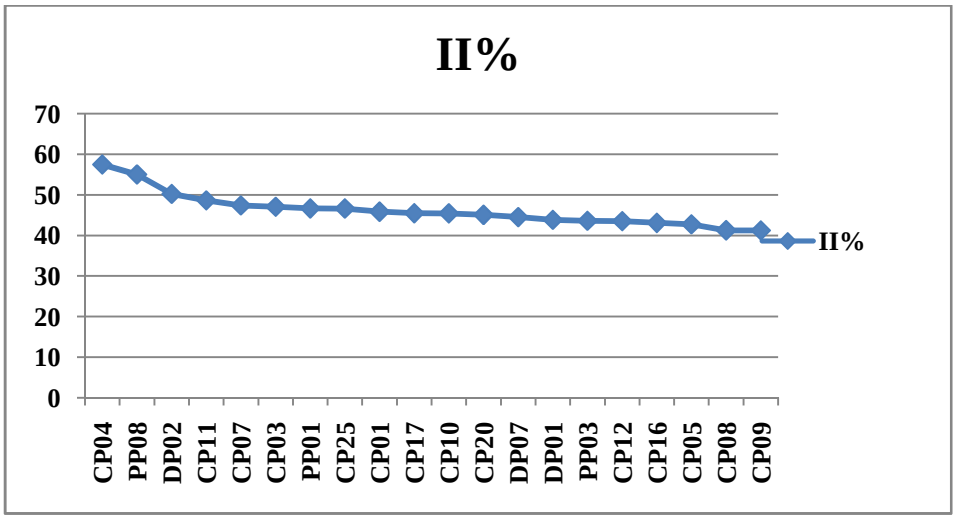
Table 4.9 Top 20 significant factors causing project cost overrun

No	Code	Factors causing project cost overrun	II%
1	CP04	Currency Exchange	57.49729584
2	PP08	Underestimating time requirement	55.04326663
3	DP02	Frequent design change	50.25689562
4	CP11	Economic Instability	48.64453759
5	CP07	Number of projects going at the same time	47.39724175
6	CP03	Poor financial control on site	47.06598161
7	PP01	Poor Planning	46.66711736
8	CP25	Rework for correcting unsatisfactory work	46.64683613
9	CP01	Improvements to standard drawings during construction stage	45.86938886
10	CP17	Delay in progress payment	45.48404543
11	CP10	Cost if labor	45.47052461
12	CP20	Incremental price of material	45.08518118
13	DP07	Unclear Specification	44.53758789
14	DP01	Poor project design	43.84464575
15	PP03	Wrong cost estimation tool/techniques	43.60803137
16	CP12	Lack of experience of technical consultants	43.53704705
17	CP16	Lack of coordination with sub-contractors	43.10776095

18	CP05	High machinery maintenance cost	42.73931855
19	CP08	High interest rates by bankers	41.27230936
20	CP09	Transportation cost	41.25202812

Source: own survey, 2018

Figure 4.1 top 20 important factors causing project cost overrun



Source: own survey 2018

The above table shows that the top 20 most important factor are ranked based on their II%, the first important factor causing project cost overrun is from the construction phase of the project which is currency exchange 57.49%, the second phase is from the planning phase of the project that is underestimating time requirement 55.04% and the third factor is from the designing phase that is frequent design change 50.25%. From the 20 factors outlined, the factors from the construction phase appeared 14 times which implies that most of the reasons or factors that are causing the project cost overrun come from it.

4.4 Interview Analysis

To make this research more reliable an interview with selected employee were conducted. The respondent contain the general manager of RAMA who have served for more than ten years and two engineers who have served more than five years in the company. The interview question was "Identify factors which are causing construction project cost overrun in RAMA"?

Much of their responses were identified in the questionnaire but here are some of the factors identified by them:

- Labor productivity
- Machinery productivity
- Site safety and employee health
- Project site and material handling
- Project manager leadership
- Lack of skilled labor
- Inadequate project planning and implementation
- Resource constraint

These were the factors identified by the few selected respondents. The above all factors identified are the causes for the project cost overrun in RAMA.

Chapter Five

Conclusion and Recommendation

5.1 Introduction

The main objective of this research was to identify factors causing construction project cost overrun in RAMA Construction PLC, hence the factors are identified these chapter will try to give conclusion and recommendation based on the finding. The study approach was descriptive survey and it used both quantitative and qualitative methods for collecting the primary data. Those data from the questionnaire was analyzed through descriptive analysis and factors were analyzed by applying SPSS. The frequency of occurrence, degree of severity and finally importance of the factor were also analyzed to rank the factors. The identified factors causing the cost overrun are 43 totally, but they were further divided in to three sub-categories of factors which exist at planning phase, design phase and construction phase. The finding showed that most of the factors are coming from the construction phase of the project.

5.2 Conclusion

Based on the finding and analysis of the research the following conclusions were drawn on the factors causing project cost overrun. The first objective of the study was to identify the factors/ variables causing the cost overrun in the company. Then their frequency, severity and importance were analyzed.

As indicated in the previous chapter the company most significant factors causing the project cost overrun comes from the construction phase. currency exchange, economic instability, number of projects going at the same time, underestimating time requirement, poor financial control on site and frequent design change are the factors with high importance. And among the three phases the highly occurred factors are currency exchange, frequent design change, poor project design, underestimating time requirements, improvements to standard drawings during construction stage and poor financial control on site are identified and the most sever factor from the three phases is currency exchange, wrong cost estimation too/techniques, underestimating time requirement, unclear specification and number of projects going at the same time are

identified. There are others parties who are responsible for the cause of cost overrun but the major is brought by the contractor since the final work of the construction project is carried.

The study were also able to get the following factors through the interview Labor productivity, Machinery productivity, Site safety and employee health, Project site and material handling, Project manager leadership, Lack of skilled labor, Inadequate project planning and implementation and Resource constraint.

Project cost overrun is inherent by nature, since it plans for future work to be done always some changes exists and affect the first outlet. But to some extent it can be minimized because cost overrun for the contractor implies loss of profit for not completing, creates a bad image, loss reputation and relationship with the owner of the project and loss the chance of winning further jobs. Cost overrun for the owner also it implies added costs over and above those initially agreed upon at the contract, it results less return on investment.

5.3 Recommendation

Even though controlling the project cost form overrun is impossible, but to some extent it can be minimized through correcting some mistakes. When project cost overrun occurs, not only the contractor who suffers from it but other stakeholders is also affected directly and indirectly. Based on the findings the researcher suggests the following recommendation to the parties concerned:

- There are factors which can be controlled and improved by the company however,there are also factors which are beyond the control of the contractor like currency exchange, economic instability, high interest rate by bankers, high machinery maintenance cost, transportation cost, labor cost, delay in progress payment, unpredicted weather condition, incremental price of materials and complexity of the construction project.
- In order to improve contractor managerial skills and leadership there is need for personnel in the industry to update their knowledge and be familiar with project management techniques and process.

- The company should practice more project risk management prior the construction projects begun since it help them to see existing and upcoming risks and problems, developing project cost management should also be considered on every work package , and activities that the project includes it will help them to manage costs and also to identify and use the appropriate estimation tool/techniques, providing the staff training program because it will help to minimize misunderstanding regarding the project cost management and generally before starting the construction project giving enough time to plan for necessary factors.
- Since frequent design change may be a result of insufficient planning, a careful study should be done and it can be minimized through focusing and using experts who have better experience in this industry, detailed and comprehensive site investigating should be done since it will led the variation during the construction phase.
- Developing effective means of communication with consultants, sub-contractor and employee in order to minimize the information gap, a good site selection and management should also be considered because
- The company should minimize the project going at the same time since this will bring the consumption of more resources and in order to complete this projects the company might acquire extra resources.

Finally the last recommendation is for future further study regarding the factors which cause the construction project cost overrun, since there are limited studies conducted in our country. Identifying the factors is the first job but the most important issue is the mechanism identifying on how to minimize those factors causing the project cost overrun.

Reference

- Abadir H. Yimam (2011). Project management maturity in the construction industry of developing countries (the case of Ethiopian contractors). M. Sc. Thesis, University of Maryland, USA.
- Abubekir,J. (2015) Factors Affecting Time and Cost Overrun in Road Construction Projects in Addis Ababa
- Al-Najjar J.M., Adnan Enshassi, Mohan Kumaraswamy, (2002), Factors Influencing Time and Cost Overruns on Construction Projects in the Gaza Strip: Master‘s Thesis: The Islamic University of Gaza.
- Akintoye, A. (2000). “Analysis of factors influencing project cost estimating practice.” Constr. Manage. Econ., 18(1), 77–89.
- AshebirShiferawBelachew, WubishetJekaleMengesha, Murad Mohammed (2017). Causes of Cost Overrun in Federal Road Projects of Ethiopia in Case of Southern District.
- Ashworth**,** A. (2004) Cost Studies of Buildings 4th Edition. Pearson, Prentice Hall – British.
- Azhar, N. and Farouqi, R. U. (2008). Cost Overrun Factors in the Construction Industry of Pakistan, In the 1st International Conference on Construction in Developing Countries: Advancing & Integrating Construction Education, Research and Practice, Karachi, Pakistan.
- Choudhury I. and PhatakO. (2004). Correlates of time overrun in commercial construction: ASC proceeding of 40th Annual Conference, provo-Utah, April 8-10, 2004. Brigham Young University.
- Creswell, J W (2003). Research design: Qualitative, Quantitative and Mixed methods approaches.
- Duncan, J.M (in Xiao, H., and Proverbs, D. (2002), the performance of contractor in Japan, UK, and USA: An Evaluation of Construction Quality. International Journal of Quality and Reliability Management, vol.19, No.6, pp 672-687.
- Dominic D Ahiaga-Dagbui, Simon D Smith, Peter E.D, Fran Ackermann, 2015. Spotlight on construction cost overrun research: Superficial, Replicative and Stagnated

- Fetene, N. (2008) Causes and effects of cost overrun on public building construction projects in Ethiopia
- Flyvbjerg, B, Holm, M K S and Buhl, S L (2002) Understanding costs in public works projects: Error or lie? Journal of the American Planning Association, 68(279-295).
- Frimpong, Y., Oluwoye, J. and Crawford, L.(2003). Causes of delay and cost overruns in construction of groundwater projects in a developing countries; Ghana as a case study. International Journal of Project Management 21(5), pp. 321-326.
- Jose Maria Delos Santos, (2017). What is Construction Project Management? Project Management Article
- J. Carvalho, (1984). Archival application of mathematical sampling techniques, records management quarterly 18:63
- Kerzner, Harold. (2009). Project management: a systems approach to planning, scheduling, and controlling/Harold Kerzner.—10th Ed.
- Love, P.E.D., Wang, X., Sing, C.-P. andTiong, R.L.K.(2012). Determining the Probability of Project Cost Overruns. Journal of Construction Engineering and Management **1**(1), pp. 438-438.
- Malhotra, N.K. (2004). Marketing Research, and Applied Orientation, Fourth Edition. Pearson Education Upper River, New Jersey.
- MattySiemiatycki, (2015). Cost Overruns on Infrastructure Projects: Pattern, Cause, and Cures.
- Memon, A.H., Rahman, I.A., Asmi, A. and Azis, A., 2010, Factors Affecting Construction Cost in Mara Large Construction Project: Perspective of Project Management Consultant: International Journal of Sustainable Construction Engineering & Technology: Vol 1, No 2, December 2010.
- M.S. Ramabodu and JJP. Vester, 2010. Factors contributing to Cost Overruns of Construction Project
- MuralidaranRamabhadran, 2018. An Investigation into Cost Overrun in Construction Projects in United Arab Emirates, 1-21.
- Nida, A., Rizwan,F., Syed, A. Cost Overrun Factors In Construction Industry of Pakistan.First International Conference on Construction in Developing Countries.August 4-5, 2008.

- Odeck, J. (2004). Cost overruns in road construction—what are their sizes and determinants? Transport Policy 11(1), page. 43-53.
- Okmen, O and Öztas, A (2010) Construction cost analysis under uncertainty with correlated cost risk analysis model. Construction Management and Economics, pp 203-12.
- Olusegun AKINSIKU, Adeyemi AKINTOLA, Oko AMEHand Ayokunle IGE, 2014. Contributions of Construction Project Team to Cost Overruns: the contractors' Perspective.
- Parviz F. Rad, (2002). Project Estimating and Cost Management, page 81-85.
- Plan Grid Construction Productivity Blog, November 1, 2017
- Project Management Body of Knowledge, PMBOK Guide 2002, page 83-90
- Roberts, A., & Wallace, W. (2004). Project Management. Edinburgh: Pearsons Education.
- Shamble GebrehiwotTadewos, (2018). Factor influencing Time and Cost Overrun in Road Construction Projects in Addis Ababa, Ethiopia.
- Skitmore, M., and Wilcock, J. (1994). "Estimating processes of smaller builders." Construction Management Economics, pp 139–154.
- Wachs, M (1990) Ethics and advocacy in forecasting for public policy. Business and Professional Ethics Journal, 9(1-2), 141–57.
- Weyessa E. 2014, cost overrun and impact assessment of Addis Ababa's light rail transit construction project.
- ZinabuTebeje, GetachewTeka (2015). Causes of Contractor Cost Overrun in Construction Projects: The Case of Ethiopian Construction Sector. International Journal of Business and Economics Research. Vol. 4, No. 4, pp. 180-191
- Zhu, K. and Lin, L.(2004). A stage by stage factor control frame work for cost estimation of construction projects, Owners Driving Innovation: International Conference.

Appendix A

Addis Ababa University

School of Commerce

MA Program in Project Management

Dear Sir/Madam I respectfully ask that you help answering this questionnaire. The information is required for academic research titled “Factors causing Project Cost Overrun in the Construction Sector in case of RAMA Construction PLC.

The main objective of this research is to identify factors which are causing the project cost overrun in the company and to provide recommendation based on the findings. The questionnaire consists two sections. Section one consists about the general background of the respondent and Section two consists about the factors contributing to the project cost overrun which are divided in to two, frequencies of occurrence and degree of severity. At the end there is space provided to write additional factors if you have any.

Your response is highly valuable and contributory to the outcome of this research. All your responses will be kept strictly confidential and it will only be used for academic study. Thank you for your time and cooperation.

Yours Sincerely,

MedhanitArega

Post graduate student, Project Management

Tel: 0912350816

Questionnaire Section 1: General Background Information

The following questions are regarding your company and yourself. Please thick on only one box from the given alternatives.

1. Age of the respondent

   Below 25 ☐ 47-50 ☐

   26-46 ☐ Above 50 ☐

2. Educational background

   Diploma ☐ Master Degree ☐

   BA Degree ☐ Other ☐

3. Years of service in the company

   Below 5 years ☐ 11-20 ☐

   6-10 years ☐ Above 21 ☐

4. Your position in the company

   Project manager ☐ Engineer ☐

   Project team member ☐ Other ☐

Questionnaire Section2: Factors contributing to the project cost overrun in the company, their frequency of occurrence and degree of severity.

A. Assessment of frequency of occurrence

The given numbers indicates the following

4- Always 3- Often 2- Sometimes 1- Rarely

No	Factors causing cost overrun	Frequency of occurrence			
		4	3	2	1
	Planning Phase				
1	Poor planning				
2	Poor project risk management				
3	Wrong cost estimation tool/techniques				
4	Lack of training program				
5	Lack of project cost management				
6	Poor contract management				
7	Lowest bidding procurement policy				
8	Underestimating time requirement				
	Design Phase				
1	Poor project design				
2	Frequent design change				
3	Incomplete design at the time of tendering				
4	Lack of coordination				
5	Delay in designing work				
6	Lack of designer experience				
7	Unclear specification				
8	Accepting customer requests without management approval				
	Construction Phase				
1	Improvements to standard drawings during construction stage				
2	Additional work at owner's request				
3	Poor financial control on site				
4	Currency exchange				
5	High machinery maintenance cost				
6	Lack of adequate manpower or technical staff				
7	Number of projects going at the same time				
8	High interest rates by bankers				
9	Transportation cost				
10	Cost of labor				
11	Economic instability				
12	Lack of experience of technical consultants				
13	Poor site management				

No	Factors causing cost overrun	Frequency of occurrence			
		4	3	2	1
14	Change in scope/ scope creep				
15	Poor quality management				
16	Lack of coordination with sub-contractor				
17	Delay in progress payment				
18	Contractual claim such as, extension of time with cost claims				
19	Unpredictable weather condition				
20	Incremental price of materials				
21	Complexity of the construction project				
22	Poor communication with sub-contractor				
23	Inappropriate choice of site				
24	Theft/ Corruption				
25	Rework for correcting unsatisfactory work				
26	Damage of materials				
27	Lack of motivated workers				

1. Is there any other factor which causes cost overrun? If so, please mention them in the space provided below.

-
-
-

B. For the degree of severity

The given number indicates the following

4- Extreme 3- Great 2- Moderate 1- Little

No	Factors causing cost overrun	Degree of Severity			
		4	3	2	1
	Planning Phase				
1	Poor planning				
2	Poor project risk management				
3	Wrong cost estimation tool/techniques				
4	Lack of training program				
5	Lack of project cost management				
6	Poor contract management				
7	Lowest bidding procurement policy				
8	Underestimating time requirement				
	Design Phase				
1	Poor project design				
2	Frequent design change				
3	Incomplete design at the time of tendering				
4	Lack of coordination				
5	Delay in designing work				
6	Lack of designer experience				
7	Unclear specification				
8	Accepting customer requests without management approval				
	Construction Phase				
1	Improvements to standard drawings during construction stage				
2	Additional work at owner's request				
3	Poor financial control on site				
4	Currency exchange				
5	High machinery maintenance cost				
6	Lack of adequate manpower or technical staff				
7	Number of projects going at the same time				
8	High interest rates by bankers				
9	Transportation cost				
10	Cost of labor				
11	Economic instability				
12	Lack of experience of technical consultants				
13	Poor site management				
14	Change in scope/ scope creep				
15	Poor quality management				

No	Factors causing cost overrun	Degree of Severity			
		4	3	2	1
16	Lack of coordination with sub-contractor				
17	Delay in progress payment				
18	Contractual claim such as, extension of time with cost claims				
19	Unpredictable weather condition				
20	Incremental price of materials				
21	Complexity of the construction project				
22	Poor communication with sub-contractor				
23	Inappropriate choice of site				
24	Theft/ Corruption				
25	Rework for correcting unsatisfactory work				
26	Damage of materials				
27	Lack of motivated workers				

2. Is there any other factor which causes cost overrun? If so, please mention them in the space provided below.

-
-
-