Addis Ababa University
College of Business and Economics
School of Commerce

CAUSES OF PROJECT DELAY AND COST OVERRUN IN

ENYI CONSTRUCTION

By
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A Project Work Submitted to the School of Commerce at Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Project Management.

Advisor
Solomon M. (PhD)

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Name and signature of members of Examining Board

Advisor:	_____	_____	_____
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(Internal)	Name	Signature	Date
Examiner:	_____	_____	_____
(External)	Name	Signature	Date

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DECLARATION

I declare that this research work entitled "CAUSES OF PROJECT DELAY AND COST OVERRUN IN ENYI CONSTRUCTION" is my original work. I have carried out the research work independently with the support of research advisor. This research work has not been presented for any other university and that all sources of material used for the work have been duly acknowledged.

Declared by:
Name: Nigussie Wendmu
Signature: _____
Date: _____
Place: Addis Ababa, Ethiopia

LETTER OF CERTIFICATION

This is to certify that **Mr. Nigussie Wendmu** has carried out this project work on the topic entitled ***"Causes of project delay and cost overrun in ENYI Construction"*** under my supervision.

This work is original in nature and is suitable for submission for the award of Master of Project Management.

Solomon Markos, (PhD)
Signature _____
Date _____

DEDICATION

This project work is dedicated with love and affection to

My parents,

My wife & Children, and

All of my friends and colleagues

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First and foremost, praises and thanks to the God, the Almighty, for His showers of blessings throughout my project work to complete the research successfully.

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LIST OF ACRONYM

BOQ	-	*Bill of Quantity*
CPM	-	*Critical Path method*
EEU	-	*Ethiopian Electric Utilities*
EOT	-	*Extension of Time*
Eth	-	*Ethiopia/n*
GDP	-	*Growth Domestic Product*
PERT	-	*Project Evaluation and Review Technique*
PMBOK	-	*Project management body of knowledge*
PMI	-	*Project management Institute*
RII	-	*Relative Importance Index*
ROW	-	*Right of Way*
SPSS	-	*Statistical Package for Social science*
Std.	-	*Standard*
WSA	-	*Water & Sewerage Authority*

ABSTRACT

Cost and time overruns are typical problems in many construction projects and there is no exception to ENYI Construction. This project work seeks to identify the major factors causing project delay and cost overrun in construction projects.

A questionnaire and interview survey along with desk study was used to carry out the study. A valid questionnaire for the survey was developed based on factors for time overruns and factors for cost overruns identified from literature review. The survey included 39 delay factors/causes which were grouped into 8 major groups. The same survey also included 27 cost overrun factors grouped in to seven groups. Fifty nine (59) responses were received from employers, consultants, and project managers, field and office engineers from ENYI Construction. The collected data in this research were analyzed using: Relative importance index and descriptive statistics according to the collective group perspective.

The results from the surveys and desk study showed that the most three factors causing project delays in construction projects from the collective group perspective of importance were: (1) "Right of Way problems", (2) "poor design", and (3) "Delay of material delivery". The result also indicates that the most three factors causing cost overrun were: (1) "Right of Way problems", (2) "Design changes", and (3) "poor inadequate project preparation, planning and implementation".

Based on these result, there is no single point of accountability by one party instead all the three parties are equally liable for time and cost overruns in construction projects. Furthermore, the local administrators are advised to initiate a viable (Working) legislation to overcome the Right of way problems in immediate possible time.

Key words: Project Management, Time Overruns, Cost Overruns, Project Delay

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Delays and cost overruns are the most common problems causing delay in the construction industry in both developed and developing countries (Enshassi, 2009). Construction industry plays an important role in contributing on national economy around the world (Takim, 2005). The construction industry also impacts the rate of GDP and employment of many countries, and for this reason, the construction industry is considered to be vital for the economic growth of a country (Olawale, Y., and Sun M., 2010).

According to (Idoko, 2008) many projects in developing countries encounter considerable time and cost overruns, fail to realize their intended benefit or even are totally terminated and abandoned before or after their completion. In Ethiopia major construction projects have a history of delay and cost overruns.

Construction project time overrun can be defined as an extension of time beyond the contractual time agreed during the tender (Al-Gahtani & Mohan, 2007). Yehen Rosen field (2002) as it was cited in (Merid, 2016) believes that Cost Overrun occurs when the final cost of the project exceeds the initial estimate or budget.

Current practice of the construction industry shows that it is a rare event that most construction projects are completed on the scheduled time, budgeted cost and desired quality. As (Frimpong, 2003, pp.321-26) describes "a successful project is one that has accomplished its technical performance, maintained its schedule and remained within budgetary costs". Therefore project may not be regarded as a successful endeavor until it satisfies the cost, time and quality limitations applied to it. However, it is not uncommon to see a construction project failing to achieve its goal within the specified cost, time and quality (Fetene, 2008).

There are many risk factors causing cost overruns in the construction industry, therefore, researchers tend to take this issue into further scrutinize with aim of identifying the factors and their ranking of importance (Shah, 2016).

Many researchers from various countries around the world and at different intervals of time conducted a research on the causes of project delay and cost overruns. These researchers have tried their main factors are consistent with the conditions and circumstances surrounding the specific location, economic level, type of projects and the like.

Ethiopian researchers ((Robel, 2015), (Shiferaw, 2016) and (Werku, 2016)) have identified delays caused by Clients, Consultants, Designers, Contractors, Suppliers and the like. The following causes of construction delay among others are identified as the critical factors that cause construction delays in the country: Site handover and right of way, finance arrangement and inadequate fund allocation; Escalation in price of materials, delay and shortage of the materials; inefficient planning and scheduling; change and variation order during construction, managerial problem or local contractor's limited capacity and ability.

Furthermore causes of delays have been identified in various parts of the world. The results disclose that there are differences and similarities as to the causes of delays.

Factors influencing cost performance based on initial estimates have been the concern of some Ethiopian researchers from the point view of contractors, consultants and clients. Their studies shows us that the primary causes of cost overrun are: inflation or increase in the cost of construction materials, poor planning and coordination, Excessive change orders, right of way problems, Fluctuations in the cost of labor, Change in foreign exchange rates(for imported goods), lack of timely decisions, frequent breakdowns of construction plants and equipments, etc ((Abubeker, 2015),(Fetene, 2008) and (Merid, 2016)). Other researchers from the different corners of the world ((Morris, 1990) (Stewart, 1991) (Frimpong, 2003)) have also reached on similar results.

Many private domestic construction projects in Ethiopia have had problems with delays and cost overruns and few investigations on the root causes of the major problems are done.

Hence the aim of this research work is to investigate the root causes of delay and cost overruns in the construction project, evaluate their relative importance in order to rank them and outline the possible recommendations for controlling project delay and cost overruns.

1.2. Statement of the problem

The inability to complete projects on time and within budget continues to be a chronic problem worldwide (Ahmed, 2003) . These two things occur in every construction project and their magnitude varies considerably from project to project.

Most of the construction projects in Ethiopia have had problems with time and cost overruns and this has caused a lot of concern (Becker and Behailu, 2006). Because of construction delays and cost overruns, less and less work is performed despite the increase in construction budgets (Abubeker, 2015).

Delay and cost overruns have become the hallmark of construction projects in Ethiopia. However, the magnitude and causes behind these time and cost overruns remain understudied.

Therefore, though the construction projects delay and cost overrun create a significant threat to the nation, research works conducted in this topic remains scanty. In the area of Delay and/or cost overrun [small number of] researches have been done in Ethiopia by (Abubeker, 2015)(Fetene, 2008)(Merid, 2016)(Shiferaw, 2016)(Robel, 2015)(Werku, 2016),(Siraw, 2014), and (Adiam, 2016).

(Werku, 2016), in his study of "Investigating causes of construction delay in Ethiopian construction industries" outlined the underlying factors that contribute to project delays. He identified that the main critical factors that cause construction delays in Ethiopia are: Difficulties in financing project by a contractor; Escalation of the materials price; Infective project planning; Scheduling or resource management and Delay in progress payments for completed works. (Merid, 2016), investigates time and cost overruns in construction project Defense Construction Enterprise. The findings revealed that the significant causes of time and cost overruns are giving less emphasis to planning, poor contract management and poor pre planning process. Studying the "cause and effects of delay on educational building projects in Addis Ababa University" (Shiferaw, 2016) explores that mistakes and discrepancies in design document, Delay in material Procurement and delivery issues, Finance related matters, unanticipated government regulation are the most significant causes of delay in construction projects. (Adiam, 2016), (Abubeker, 2015) and (Siraw, 2014) conducted a research specific to road construction projects and their finding shows somewhat similar results while Right of way problem), financial problems,

improper planning and payments delay by the owner are ranked high. (Abubeker, 2015), also identifies the most important causes of cost overrun and found that delay in construction, inadequate supply of raw materials and equipment by contractors, design changes, incomplete design at the time of tender. Ten years back (Fetene, 2008), investigates "Causes and effects of cost overrun on public building construction projects in Ethiopia" and inflation or increase in the cost of construction materials, poor planning and coordination, change orders due to enhancement required by clients are ranked as the most important causes.

Despite the fact that all the above studies, to various extents, helped with the better understanding of the problems associated with cost and time overruns in Ethiopian construction projects, all were conducted in a different study context.

Most of the research works in the area so far has mainly been devoted to identifying the causes of time overruns in Public projects. As per the knowledge of this research writer, there are limited researches geared at studying the causes of cost overrun in construction projects. Furthermore most of existing studies stopped at the identification of the influencing factors from the literature, but did not progress onto finding additional company specific causes of project delay and cost overruns.

According to the preliminary interview with the project coordinator of the company, since its establishment ENYI Construction was struggling to achieve a substantial success in regard to Time and Cost overruns. But except for the completed real estate projects almost all construction projects have faced an elevated rate of project delay and cost overruns.

Therefore, the study focuses on these important issues and believed to have a positive outcome for the owners, Project managers, Contractors, Consultants, etc in the industry and the policy makers and regulators in general.

1.3. Research Questions

The study has the following research questions to be developed to solve the problems:

- ✓ What are the major causes that influence project delay and cost overrun in construction projects?
- ✓ What is the relative degree of importance of each factor in causing delay and cost

overrun?

- ✓ What are the internal and external challenges of ENYI Construction with regard to time and cost overruns?

1.4. Objective of the Study

1.4.1. General Objectives

The general objective of this study was to assess the major causes of delays and cost overrun in the construction project and evaluate their relative importance.

1.4.2. Specific objectives

The Specific objectives of this study include the following:

- To identify the causes influencing time and cost overrun in construction projects and to evaluate their relative importance.
- To identify internal & external challenges of ENYI Construction with regard to time and cost overruns.
- To forward recommendations for improving time and cost performance in the construction industry.

1.5. Significance of the study

The principal findings of this research are expected to contribute a lot for different stakeholders and the country at large.

Therefore the outcomes of this study tries to present an ample set of information for a better understanding on the causes of delay and cost overruns by design and construction teams, consultants, clients and other stakeholders in construction industries.

Furthermore, It was the belief of the writer that the study benefits the policy makers for their effort in policy formulation and implementation and recommending possible solutions, practices and methods that can be used to minimize or avoid time and cost overruns for the concerning body.

Finally the study serve as starting point for other studies, which may focus on similar topics and issues related to delays and cost overruns. Thus, the study will help for future adjustment and improve literature on this specific issue.

1.6. Scope of the study

The study was conducted in ENYI Construction in Addis Ababa, the capital city of Ethiopia to determine the main causes of project delay and cost overruns in construction projects. Therefore, only those construction projects located in Addis Ababa are considered for this research work.

There are many factors affecting delay and cost overrun in the construction projects. For the purpose of identifying the major causes of delay in construction projects, this research work is limited to the following major groups: Project-related, Design and documentation, Materials, Execution, Labor and equipment, Contractual Relationship, Government Relations and some other External factor. Similarly the major causes of cost overruns will be confined to the main categories as follows: Contractor's site management related factors, Design and documentation related factors, Financial management related factors, Human resource (workforce) related factors, Project management and contract administration related factors, Material and Equipment Related, and external factors.

The data for this study were gathered through detailed literature review, questionnaire survey, and interview from key professionals and the relative importance index is used for analyzing the data collected from the respondents.

1.7. Organization of the paper

The research follows the logical steps of establishing the research questions, developing the methodology, gathering and analyzing data and drawing conclusions. Thus the study is presented in 5 chapters. Accordingly:

The first chapter presents the background of the study, statement of the problem, research questions, objective of the study, significance of the study, scope of the study and methodology which on account to the introduction part.

The second chapter deeply deals with review of related literature. It examines literatures and studies relevant to the study.

The third chapter incorporates brief description of methodology that is the population and sampling technique of the study; the sources of data; the data collection tools/instruments employed; the procedures of data collection; and the methods of data analysis.

The fourth chapter summarizes the results of the study and interprets the findings.

The fifth chapter devoted to conclusions and future research directions.

More over the lists of references and appendixes are attached to the research work.

CHAPTER TWO:

LITERATURE REVIEW

2.1. Overview of Literature Review

In any research it is essential to understand what has already been done (if anything) in the specific topic you have chosen and what has been done in the wider subject area of that topic (John Adams et al, 2007).

According to Kumar a literature review has the following functions: It provides a theoretical background to the study, helps establish the links between what is proposed to examine and what has already been studied and enables you the findings have contributed to the existing body of knowledge. That means it helps to integrate the research findings into the existing body of knowledge (Kumar, 2011).

One of the most important problems in the construction industry is time and cost overruns. Time and cost overruns occur in every construction project and the magnitude of these delays and cost overruns varies considerably from project to project. So it is essential to define the actual causes of time and cost overruns in order to minimize and avoid the delays and increasing cost in any construction project. This chapter reviews literature concerning the major issues of time and cost overruns in order to recognize the related information regard those issues.

Therefore, the purpose of this chapter was to identify the factors, which are the major causes of delay and cost overrun in construction projects by looking into previous studies made on the subject. This investigation was important as it provides substantial part of the inputs for the lists of factors to be considered for the research.

2.2. The concept of construction project management

In its most common context, the term management relates to the planning, organizing, directing, controlling, and staffing of a business enterprise.

Wysocki defined a project as it is a sequence of unique, complex, and connected activities that have one goal or purpose and that must be completed by a specific time, within budget, and according to specification (K.Wysocki, 2014).

The Project Management Institute (PMI) defines Project as a "temporary endeavor undertaken to create a unique product, service, or result." The temporary nature of projects indicates a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. Similarly, it formally defines project management as follows: "The application of knowledge, skills, tools and techniques to project activities to meet the project requirements." It is accomplished through the appropriate application and integration of logically grouped five project management processes groups (Initiating, planning, Executing, Monitoring and controlling, and closing). These processes have been organized into ten knowledge areas; these are Project Integration Management, Project Scope Management, Project Time Management, Project Cost Management, Project Quality Management, Project Human Resource Management, Project Communications Management, Project Risk Management, Project Procurement Management and Project, Stakeholder management (PMBOKGuide, 2013).

2.3. Defining Construction Project Management

It is impossible to define a complex operation such as construction management in a simple one sentence definition. We will have to dissect the term and define its many facets (Ritz, 1994).

What is a construction project?

Construction projects are the organized effort to construct a building or structure. In the fields of civil engineering and architecture, construction projects involve the process that consists of tangibly assembling an infrastructure or building (Laws, 2018).

According to (Ritz, 1994, pp.7-10) though there are many differences in project types, they do have at least four traits in common:

1) Each project is unique and not repetitious.
2) A project works against schedules and budgets to produce a specific result.
3) The construction team cuts across many organizational and functional lines that involve virtually every department in the company.

4) Projects come in various shapes, sizes, and complexities.

The ten knowledge areas that are previously discussed are applicable to every project management. But for a construction project management the following have been included (ConstructionExt.PMBOK, 2016).

- **Project Health, Safety, Security and Environmental management**

It presents Health, Safety, Security and Environmental considerations for managing, assuring, and controlling construction projects.

- **Project Financial Management**

Determines how the project will be financed, including the processes to acquire and manage the financial resources for the project. It is more concerned with revenue sources and monitoring net cash flows for the construction project than with managing day-to-day costs. While construction professionals are skilled in the technical side of their work, they often lack financial management knowledge and understanding. Research has shown that project managers in construction need to know financial management fundamentals in order to better understand and navigate the financial decisions that are part of every construction project. It consists of financial planning, control and administration and records.

- **Project Claim Management**

Describes the process required to eliminate or prevent construction claims from arising and expeditious handling of claims if they do occur. It consists of claim identification, quantification, prevention and resolution.

Therefore, from the above discussions one can conclude that a construction project manager uses the same models as that of the any project manager to achieve its goal other than he done it in a construction context.

Construction project management typically includes complicated tasks that can shift wildly, depending on the work at hand, and it requires strong skills in communication, deep knowledge of the building process, and the ability to problem-solve. Construction project management is a complex field, requiring knowledge in many different areas like finance, mediation, law, business, and more.

2.4. Definition of time and cost overruns

2.4.1. Time overruns/Delay

Definitions

Time overruns is defined as the extension of time beyond planned completion dates traceable to the contractors (Peter F.Kaming et al, 1997). Delays are incidents that impact a project's progress and postpone project activities; delay causing incidents may include weather delays, unavailability of resources, design delays, etc. In general, project delays occur as a result of project activities that have both external and internal cause and effect relationship (Vidalis MS & Najafi TF, 2002).

Construction project time overrun can be defined as an extension of time beyond the contractual time agreed during the tender (Al-Gahtani & Mohan, 2007).

According to (Sadi A.Assaf , Sadiq Al-Hejji, 2006) construction delay is defined as the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. It is a project slipping over its planned schedule and is considered as common problem in construction projects.

In the construction management context, the simplest definition of delay is made by (Mubarak, 2010, p.314) as "an event or a condition that results in finishing the project later than stipulated in the contract." A delay can also pertain to starting or finishing a specific activity later than planned.

.Delay in construction is a global phenomenon affecting not only the construction industry but the overall economy of countries as well (Murali Sambasivan , Yau Wen Soon, 2007). Time overrun (delay) involves multiple complex issues all of which are invariably of critical importance to the parties to the construction contract.

From above, time overruns is defined as the time increased to complete the project after planed date which caused by internal and external factors surrounded the project.

2.4.2. Cost overruns Definitions

Cost overrun is defined as excess of actual cost over budget. Cost overrun is also sometimes called "cost escalation," "cost increase," or "budget overrun."(Zhu. K. and Lin.L, 2004).

Cost overrun is defined as the change in contract amount divided by the original contract award amount .This calculation can be converted to a percentage for ease of comparison (Jackson, 1999).

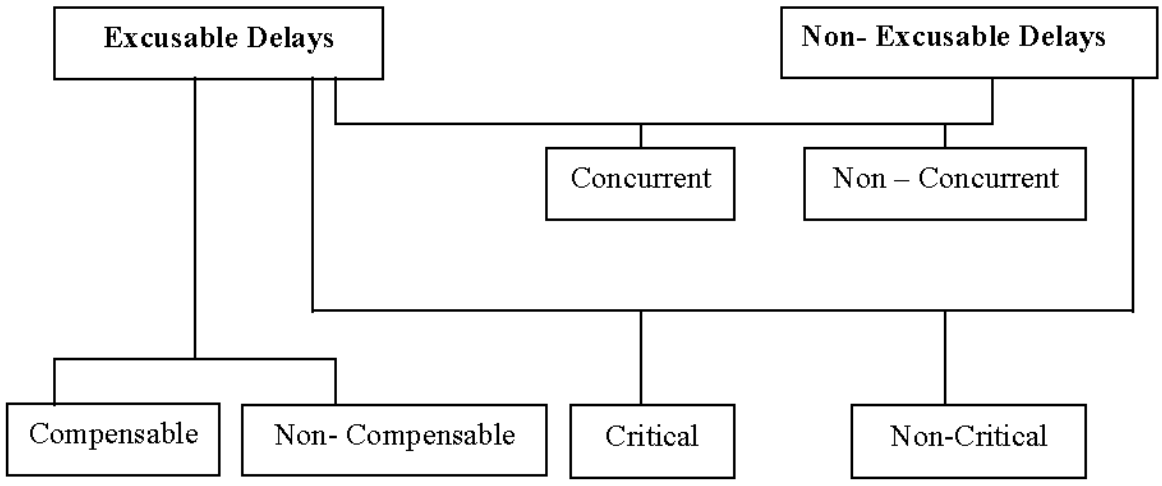
Cost overrun = $\frac{FinalcontractAmount \quad -originalContractAmount}{OriginalContractAmount}$

2.5. Types of Construction Delays

Before any discussion of delay analysis can begin, a clear understanding of the general types of delays is necessary. According to (Trauner, 2009, p.25) there are four basic ways to categorize delays:

a) Critical or noncritical
b) Excusable or non-excusable
c) Compensable or non-compensable
d) Concurrent or non-concurrent

Figure 2.1: Sequential relationships of various categories of delays (Vidalis MS & Najafi TF, 2002)



Excusable Versus Non-excusable Delays

Excusable Delays

An excusable delay, in general, is a delay that is due to an unforeseeable event beyond the Contractor's or the Subcontractor's control.

Excusable delays, also known as "force majeure" delays, and commonly called "acts of God" because they are not the responsibility or fault of any particular party. Most contracts allow for the contractor to obtain an extension of time for excusable delays, but not additional money (Alaghbari et al, 2007).

According to (Trauner, 2009) an excusable delay, in general, is owing to an unforeseeable event that are beyond the contractor's or the subcontractor's control. The authors further explain that delays resulting from the following issues are known as excusable:

- ✓ General labor strikes
- ✓ Fires
- ✓ Floods
- ✓ Acts of God
- ✓ Owner-directed changes
- ✓ Errors and omissions in the plans and specifications
- ✓ Differing site conditions or concealed conditions
- ✓ Unusually severe weather
- ✓ Intervention by outside agencies
- ✓ Lack of action by government bodies, such as building inspection

These conditions may be reasonably unforeseeable and not within the Contractor's control.

Before the analyst concludes that a delay is excusable based solely on the preceding definitions, he or she must refer to the construction Contract documents.

Non-excusable Delays

Non-excusable delays are events that are within the Contractor's control or that are foreseeable. (Mubarak, 2010), defines non-excusable delays as "delays that are either caused by the contractor or not caused by the contractor but should have been foreseen by the contractor".

(Trauner, 2009), enumerate some examples of non-excusable delays as follows:

- ✓ Late performance of Subcontractors
- ✓ Untimely performance by suppliers
- ✓ Faulty workmanship by the Contractor or Subcontractors
- ✓ A Project-specific labor strike caused by either the Contractor's unwillingness to meet with labor representatives or by unfair labor practices

Again, the Contract is the controlling document that determines if a delay would be considered non-excusable.

Compensable Versus Non-compensable Delays

Compensable Delays

A compensable delay is a delay where the Contractor is entitled to a time extension and to additional compensation. Relating back to the excusable and non-excusable delays, only excusable delays can be compensable.

Non-compensable Delays

Non-compensable delays are caused by third parties or incidents beyond the control of either the owner or the contractor and are not attributable to any of the parties. They are delays which despite being excusable do not entitle the contractor to any compensation.

Critical Versus Noncritical Delays

In any analysis of delays to a project, the primary focus is on delays that affect the progress of the entire Project (the Project end date or milestone date) or that are critical to the Project completion. However, many delays occur that do not delay the project completion date or a milestone date (Trauner, 2009).

The author state that delays that affect the project completion, or in some cases a milestone date, are considered critical delays; and delays that do not affect the Project completion, or a milestone date, are non-critical delays. The concept of "critical" delays emanates from Critical Path Method (CPM) scheduling.

Concurrent or non-concurrent delays

If only one factor is delaying construction, it is usually fairly easy to calculate both the time and cost resulting from that single issue. A more complicated but also more typical situation is one in which more than one factor delays the project at the same time or in overlapping periods of time. These are called concurrent delays (Alaghbari et al, 2007).

As (Mubarak, 2010), indicates combination of two or more independent causes of delay during the same general time period may be considered to be concurrent delays. Therefore, Concurrent delays occur when both owner and the contractor are responsible for the delay.

Concurrent delays arise when one event causes a delay simultaneously with another event.

2.6. Causes of time and cost overruns

2.6.1. Causes of time overruns (delay)

In the construction industry, the aim of project control is to ensure the projects to finish on time, within budget and achieving other project objectives. It is a complex task undertaken by project managers in practice, which involves constantly measuring progress, evaluating plans and taking corrective actions when required (Kerzner, 2009). During the last few decades, numerous project control methods, such as Gantt Bar Chart, Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM), have been developed (Nocholas, 2004).

Delays occur in every construction project and the magnitude of these delays varies considerably from project to project. Some projects are only a few days behind schedule; some are delayed by over a year. So it is essential to define the actual causes of delay in order to minimize and avoid delay in any construction project (Ahmed, 2003).

Previous research has attempted to discover reasons for the disparity between the actual completion time and the estimated completion time. Here is the right position to see some of the works for the purpose of this research work.

Werku Koshe in his study of "Causes of Construction Delay in Ethiopian Construction Industries" investigated the critical factors that cause construction delays in the country. His findings show that the main critical factors that cause construction delays in Ethiopia are: (1) Difficulties in financing project by a contractor; (2) Escalation of the materials price; (3)

Infective project planning; (4) Scheduling or resource management; (5) Delay in progress payments for completed works, (6) Lack of skilled professionals in the field of construction management in the organization, and (7) Fluctuating labor availability season to season /Seasonal labors availability (Werku, 2016).

Construction delay is considered to be one of the most recurring problems in the construction industry and it has an adverse effect on project success in terms of cost, time, quality, and safety.

There are several factors that cause delay in construction. Delay may be caused by Clients, Users, Consultants, Designers, Owners, Contractors and Suppliers. (Shiferaw, 2016) while studying causes and effects of delay in educational construction projects, he pin pointed that mistakes and discrepancies in design documents, delay in material delivery, shortage of construction materials, frequent change and variation order, unclear and inadequate details in drawings, slow response and inspection, finance arrangement and inadequate fund allocation, inaccurate site investigation, change and variation order during construction, and inefficient planning and scheduling are ranked as the top ten causes of delay.

Robel Assefa in his research studied and concluded that construction delay in Ethiopia is mostly caused due delayed site handover and right of way, lack of coordination with the stakeholders, delayed external work due to public agencies and poor economic conditions financial problem, managerial problem or local contractor's limited capacity and ability (Robel, 2015). Robel further stated that the causes of delay as;

- ✓ Delay in delivering material on site, poor site management and untimely provision of documents by the contractor.
- ✓ Slow supervision and decision by the consultant.
- ✓ Delay in site handover, right of clearance, late in approving payments and lack of proper liaison work of the employer with local authorities.

(Mansfield et al, 1994), carried out a questionnaire survey amongst 50 contractor, consultant and client organizations in Nigeria and found out that the most important variables causing construction delays are poor contract management, financing and payment of completed works, changes in site conditions, shortage of materials, imported materials and plant items, design changes, subcontractors and nominated suppliers.

(Peter F.Kaming et al, 1997), identified factors influencing construction time overrun on high rise building projects in Indonesia through a questionnaire survey administered on 31 project managers. Design changes, poor labor productivity, inadequate planning, material shortages, inaccuracy of material estimate, skilled labor shortage and etc. were identified for time overrun.

Desalegn Disasa has conducted a critical literature review on the main cause of delay on construction projects and understands that although different researchers from different area study the causes of delay in a construction project, some of the explored delay causes are similar. (Desalegn, 2018). So, based on his different literature study he identified that the main groups of delay and their sub-groups in construction projects as follows:

A. Consultant related delay factors/cause:

Lack of experience, disagreement with a design engineer, delay in approving project scope, delay in performing inspection and testing, poor site investigation, unskilled project management assistance, delay in approving and checking design documents, inadequate coordination and communication between project holders and developers, recurrent change of contractors and sub-contractors, kind of project award and bidding, variation during construction by owners, unfavorable weather condition during construction work, poor experience of consultant and contractors, delay in checking working drawing, error in design documents and discrepancies, less brief specifications in drawings, quality pledge.

B. Contractor Related Delay Factors/Cause

Dishonesty/problems in funding by contractor, ineffective site supervision, ineffective scheduling, revise due to mistakes during work, sub-contractors work related delay, poor experience of the contractor, delay in site arrangement, delay in preparation of working drawing and sample of material, delay in payment of executed work for a contractor by the owner, slow decision-making, late approving design documents ,variation by owner, delay in procurement of materials, mistakes in design documents, recurrent changing of subcontractors, poor methods of construction, unskilled project crew, poor technology, poor coordination and communication between them, ineffective contractor's policies, unskilled sub-contractors, ineffective economic control on site, inadequate procurement of construction materials, improper equipment, frequent equipment breakdowns, shortage of equipment, subcontractor turn-over, lack of labor, slow mobilization of labor, ineffective equipment, slow equipment deliver, materials damage, strike, conflict between labor and client.

C. Owner Related Delay Factors/Cause:-

Corruption, intermittent termination of variation while project is ongoing, less on-time payment for developers, variation of specifications and material type during construction work, delay in checking contract document, variation of project scope, poor coordination with other stakeholders, slow decision-making, inadequate information during project feasibility study, delay in site delivery, lack of motivations for contractor to finish ahead of schedule, ineffective representative, poor experience, interference during actual project work, joint-owners disagreement, improper feasibility study, poor coordination and communication, interruption of work, slow document approve, nature bidding and award, impractical contract duration, unrealistic delay penalties.

D. External Related Delay Factors/Cause:

Claim, unexpected natural disasters, accidents at the site, social and environmental factors, escalation of local material prices and global economic rise, price rise on the international market, Unreliable suppliers, public enemy, war, and conflict, delay in obtaining permits from local authority, geopolitical stability, variation in government regulations, late access to the site (like electricity, road , water), neighbors problems, delay by traffic restriction and control, corruption, social factors, cultures, government policy and its commitment, late certification from 3rd party, lack of communication, thieves, international economic crisis, time delay by traffic restriction at the place of work, raw materials unavailability.

E. Resource Related Factor/Cause

i. **Labors Related Factors**:-Absenteeism, Low morale, Low productivity, conflicts, Lack of labor, strikes, Poor labor experience injuries, less experience with equipment handling.

ii. **Construction Material Related Factor**:-Less qualified materials, late material supply, and Material variation during project work, Material Damage, Inflation.

iii. **Finance Related Delay Causes**:-claims due to financial, funding processes by government, slow funds release by fund raisers, International economic crisis.

iv. **Equipment Related Causes**:-Insufficient or shortage of equipment, Low efficiency and productivity of equipment lack of spare parts, lack of equipment, equipment failure, Delay in delivery of equipment, mobilizing problems of material.

F. Project Related Delay Cause

G. Unsuccessful delay punishments, too short duration of original contract, Legal disputes between various parts.

Identifying the common causes of delay (Summary)

According to the above previous studies a literature review helped to identify most of the common factors that often lead to project delay (time overruns). Some of these factors are related or overlapping each other. Furthermore some are not common or applicable to Ethiopia. Therefore after an analysis, 39 factors are shortlisted for this survey. These factors and their groups are outlined in Table 1 below.

Table 1 common causes of construction projects delay

Causes of project delay
1. Project Related Factors
Slow information flow between project team members
Inadequate experience of the project type
Low speed of decision making within each project team
Lack of follow-up for the project schedule and absence of continuous tracking
Poor provision of information to project participants
Quality assurance and control problems
2. Design and Documentation
Unclear specifications
Poor design
Incomplete drawings
Poor documentation and no detailed written procedures
Lack of designer's experience
3. Material
Delay of material delivery to site
Inappropriate/ misuse of material
Poor procurement programming of materials
Lack of materials in markets
Shortage of construction materials at site
Low quality of materials
4. Execution
Inappropriate construction methods
Poor equipment choice/infective equipment
Highly bureaucratic organization
Project construction complexity
Lack of a strong organizational culture
5. Labor and equipment
Equipment availability and failure
Shortage of site workers
Skilled labor shortage
Lack of equipment
Lack of maintenance for the equipment
Different political and factional affiliation for workers
6. Contractual relationship
Major disputes and negotiations
Inappropriate overall organizational structure linking all parties to the project
Mistakes and discrepancies in contract documents
7. Government
Building regulations
Bureaucracy in government agencies
8. External factors
Poor site conditions (location, ground, etc…)
Poor economic conditions (currency exchanges, inflation rates, etc)
Changes in laws and regulations
Bad weather conditions
Strikes, political unrest, etc
Right of way Problems

Sources (Enshassi, 2009), (Hardik, 2015) (Werku, 2016),(Abubeker, 2015),(Adiam, 2016),(Desalegn, 2018).

2.6.2. Identifying factors that influence cost overruns

Previous research has attempted discover reasons for the disparity between the tender sum and the final account (Al-Najjar, 2008). This section identifies the factors that influence cost overruns.

Fetene Nega in his study has identified 39 causes of cost overrun in Ethiopian case. The most important causes of cost overrun were found to be inflation or increase in the cost of construction materials, fluctuations in the cost of labor, Change in foreign exchange rates(for imported goods), change orders, poor planning and coordination, failure to identify problems and institute necessary and timely design and programming changes, changes in plans and drawings, insufficient geotechnical investigation, contractors bankruptcy, difficulties in obtaining construction materials in the local market and cost under estimation are among the most causes of cost overrun (Fetene, 2008).

According to (Abubeker, 2015)among the factors influencing cost overruns in the construction projects in Ethiopia from the point view of contractors, consultants and clients design changes was ranked first. Inadequate review for drawings and contact documents by consultants, fluctuations in the cost of materials, lack of cost planning/monitoring during pre and post contract stages, indecision by the supervising team in dealing with contractors queries resulting in delays…technical incompetence, poor organizational structure, additional work at owner's request, etc are also ranked higher.

Many articles and studies are conducted from the different corners of the world to identify the principal variables of cost overruns. Some of them are reviewed below for the purpose of this research.

Cost performance is the most important indicator of project success ((Frimpong, 2003); (Olawale, Y., and Sun M., 2010)). It presents not only the firm's profitability but also the productivity of organizations at any point during the construction processes

The prime variables of cost overruns have been commonly identified as: unpredictable weather, inflationary material cost, inaccurate materials estimates, complexity of project, contractor's lack

of geographical experience, contractor's lack of project type experience, and non-familiarity with local regulations (Peter F.Kaming et al, 1997).

(Mansfield et al, 1994), found that cost overrun is attributed to problems in finance and payment arrangements, poor contract management, material shortages, changes in site conditions, design changes, mistakes and discrepancies in contract documents, mistakes during constructions, price fluctuations, inaccurate estimating, delays, additional work, shortening of contract periods, and fraudulent practices and kickbacks.

(Stewart, 1991), attributes cost overruns to several factors that are either not controllable or that to a varying degree are unmanageable. They include the accuracy of original cost estimate, degree of government regulation and control, construction completion delays, number of design changes, and labor related matters such as their availability, skills, and increases in fringe benefits.

According to (User'sGuide, 2005), the following are the factors that change the cost of the construction projects through time: poor project management, design changes, unexpected ground conditions, inflation, shortages of materials, change in exchange rates, inappropriate contractors, funding problems and force majeure.

Identifying common causes of cost overruns (Summary)

According to the above previous studies the literature review helped to identify most of the common factors that often lead to project cost overruns. 27 factors are shortlisted for the survey.

These factors are outlined in Table 2 below.

Table 2 common causes of cost overruns

Causes of project cost overrun
1. Contractor's site management related factors
Poor site management and supervision
Lack of experience of the project type
Deficiencies in cost estimate
2. Design and documentation related factors
Design changes
Omissions and errors in the bills of quantity
Inadequate project preparation, planning and implementation
Mistakes and discrepancies in contract documents
3. Financial management related factors
Cash flow and financial difficulties faced by contractors
Financial difficulties of owner
4. Human resource (workforce) related factors
Fluctuations in the cost of labor
Labor unrest (labor related matters such as the availability, skills, productivity,…)
Bad allocation of workers inside the site
5. Project management and contract administration related factors
Change in scope of the project
Number of projects going at the same time
Delays in decision making
Poor project management
size or complexity of the project
Right of way problems
6. Material and Equipment Related
Fluctuations in the cost of building materials
Low quality of materials
Construction equipment shortage or failure
Delay in material delivery
7. External
Unsettlement of the local currency in relation to the dollar value (change in foreign exchange rates)
Lengthy bureaucracy in government entities
Degree of government regulations and control
Fraudulent practices and kickbacks./corruption/
Unpredictable weather conditions

Source: (Enshassi, 2009),(Mansfield et al, 1994) , (Hameed Memon et al, 2012) (Niazi, 2016),(Fetene, 2008),(Abubeker, 2015).

2.7. Construction Project Time and Cost Management

2.7.1. Project Time management

Time management is a vital part of construction project management. (Westland, 2006) gives the following definition for time management: "time management is the process of recording and controlling time spent by staff on the project."

Project Schedule Management in construction involves complex challenges mainly due to the magnitude of stakeholders involved such as the owner, prime contractor, subcontractors, vendors, material suppliers, end users, regulatory agencies, etc. Some of the factors that give rise to this complexity are:

According to PMBOK® guide 2013 edition Project Time Management includes the processes required to manage the timely completion of the project. It states that time management incorporates seven major processes;

i. **Plan Schedule Management**—The process of establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule.
ii. **Define Activities**—The process of identifying and documenting the specific actions to be performed to produce the project deliverables.
iii. **Sequence Activities**—The process of identifying and documenting relationships among the project activities.
iv. **Estimate Activity Resources**—The process of estimating the type and quantities of material, human resources, equipment, or supplies required to perform each activity.
v. **Estimate Activity Durations**—The process of estimating the number of work periods needed to complete individual activities with estimated resources.
vi. **Develop Schedule**—The process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model.
vii. **Control Schedule**—The process of monitoring the status of project activities to update project progress and manage changes to the schedule baseline to achieve the plan.

Other than the above mentioned process, the construction industry requires additional processes as it is described in the construction Extension to the PMBOK® GUIDE. These are:

i. Activity Weightage Definition

Activity weightage is the evaluation of activity characteristics and attributes for the purpose of assessing the contribution of each activity to the overall project. Activity weights can be assigned to the overall progress or to the progress of a given phase or deliverable of the project.

ii. Progress Curves Development

Progress curves development is the creation of a progress baseline. This is created in a manner similar to a cost baseline. Progress is plotted against the baseline to provide a trend line that can be helpful to forecast future progress.

iii. Monitoring Project Progress

Control Schedule is the process of monitoring the status of project activities to update project progress and manage changes to the schedule baseline in order to achieve the planned project completion date. Documentation, such as site logs and daily/weekly progress reports, are checked to verify progress. Schedule updates are produced on a predetermined frequency as outlined in the schedule management plan. These are reviewed to evaluate any deviation from the baseline.

Progress monitoring is the evaluation of the actual project progress compared to the baseline in order to take preventive or corrective action. The evaluation includes examining the activities involved and their characteristics. Schedule components that require progress monitoring are the critical path, the near-critical path, and noncritical path activities, generally considered all other work activities. If critical path activities slip, they will immediately cause project delay. If near-critical path activities slip, they could potentially become the critical path that delays project completion. If the mass work activities—noncritical path activities—slip and are not progressed appropriately, they may cause trade stacking and space/location work area conflicts, and likely cause project delay. The components can be monitored by a variety of techniques such as float dissipation (erosion of float), missed start and finish dates, actual duration analysis, and earned value management.

2.7.2. Project Cost Management

Project Cost Management includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget (PMBOKGuide, 2013).

Project Cost Management in construction includes cost estimating cost budgeting and cost monitoring and control, and further entails managing the day-to-day project costs (ConstructionExt.PMBOK, 2016).

According to the PMBOK the following are Project Cost Management processes:

- ⇨ Plan Cost Management—The process that establishes the policies, procedures, and documentation for planning, managing, expending, and controlling project costs.

- ⇨ Estimate Costs—The process of developing an approximation of the monetary resources needed to complete project activities.
- ⇨ Determine Budget—The process of aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline.
- ⇨ Control Costs—The process of monitoring the status of the project to update the project costs and managing changes to the cost baseline. Cost control provides a mechanism to monitor and control project costs in order to deliver a project within budget. Project Cost Management is critical to a successful project as it impacts, among other important aspects, organizational profitability.

More over in addition to the above the following will be considered while conducting a construction project cost management (ConstructionExt.PMBOK, 2016).

a) Bill of materials(Bill of Quantities)
b) Allowances, Contingency, and management Reserve
c) Escalation, Inflation, and Currency Exchange
d) Metrics
e) Project cost management monitoring and control

Project Cost Management in Construction

The problem of cost overrun, especially in the construction industry, is a worldwide phenomenon, and its ripples are normally a source of friction among clients, consultants and contractors on the issue of project cost variation (Garry, 2005).

Construction cost overruns have been a fact of life since Biblical times *"For which off you, intending to build a tower, sitteth not down first, and counteth the cost, whether he have sufficient to finish it*?" Luke, 14:28; quoted by (Arditi, D., et al, 1985).

Construction estimates are different from estimates in other industries. Some differences may be subtle, while others are completely different. In construction, estimates may range from a simple estimate for pouring a small concrete foundation to an estimate for building a multibillion-dollar processing plant. Construction estimates incorporate direct and indirect costs. Direct costs are those that are directly attributable to a specific scope of work, and may include equipment costs (e.g., a backhoe that is used exclusively for excavation). Indirect costs are those costs that cannot

be directly associated to a specific scope of work and are allocated equitably over multiple scopes of work on a single project (e.g., equipment and small tools). Challenges to cost management in construction include the vast number of stakeholders involved, quality and availability of skilled labor in a particular area, weather impact on productivity, transportation in remote areas, and fluctuations in material prices. Tracking and managing these costs is a complex process, which involves detailed planning, monitoring, and control. In addition, cost estimating is a function that occurs throughout the life cycle of the project to reflect scope, design, constructability, and performance changes. The cost of the project is proportional to its scope, whether that scope is based on an owner's ability to fund it or the cost efficiency and profits for contractors to build it. Cost management is fundamentally critical to all active stakeholders. Cost monitoring and control is proactive and is used to predict the final outcome of a project based on actual costs, which allows preventive or corrective actions to avoid variations in final cost. Cost control techniques may differ on some projects, depending on the type of contracting strategy used. It is imperative to the overall project planning effort that cost management integrates other Knowledge Areas to reflect not only the scope and resources, but also the cost management techniques used in different project delivery methods (ConstructionExt.PMBOK, 2016).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Research Design and Approach

Research designs are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis. It involves the intersection of philosophical assumptions, strategies of inquiry, and specific methods (Creswell, 2009).

This research work is categorized as descriptive type. It was descriptive because descriptive statistics were used to describe (analyze) the variables numerically. Frequencies, relative importance index, rankings, etc are used in this work.

In order to overcome the limitations of a single design, a Mixed Approach was used in the data collection and analysis process. Mixed methods research is "the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e. g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration." (Johnson et al., 2007, p.123). So quantitative survey backed by qualitative interviews are used in the data collection process. Similarly combination of the qualitative and quantitative approaches also used for the analysis in order to provide richer conclusion and recommendations.

3.2. Data Type, Source and Method of Data Collection

The data collection comes after the research problems and the research design or plans are completed. There are primarily two sources of information normally used for this research purpose: these are primary data and secondary data.

3.2.1. Collection of Primary Data

The primary data are those which are collected afresh and for the first time, and thus happen to be original in character (Kothari, 2004).

Therefore, in the study primary data is used. The primary data includes opinions, attitudes, perceptions and beliefs of the practitioners (clients, consultants and contractor) in the construction industry

In this research several methods of collecting the primary data are employed. The major ones are:

Interview Method

The primary data are collected using interviews. As (Shiferaw, 2016) described in his research work, the responses gathered through questionnaires are becoming less reliable as the respondents did not give due attention to the outcomes, it is essential to strengthen through interviews and face to face discussions.

The interview method of collecting data involves presentation of oral-verbal stimuli and reply in terms of oral-verbal responses. This method can be used through personal interviews and, if possible, through telephone interviews.

Collection of Data through Questionnaires

In order to investigate the causes of project delay and cost overrun in construction projects primary data are also collected using questionnaire from client, contractors and consultants.

A questionnaire of factors is carefully designed from previous preliminary investigations conducted in construction projects in Ethiopia and the world by different researchers.

The questionnaire is divided into three sections. The first section looks the background information about the respondents.

The second section of the questionnaire is made up of factors identified from the literature concerning the major causes of project delay and cost overrun in the construction industry in to two subsections. The causes for project delay are categorized into the following major groups: project-related, design and documentation, materials, execution, labor and equipment, contractual relationship, government relations and external factors.

Factors related to contractor's site management, design and documentation, financial management, human resource (workforce), project management and contract administration, Material and Equipment along with other external factors are used for identifying construction cost overruns. In this section respondents are invited to rate the levels of importance of these factors according to a five-point Likert Scale1-5 (1 = not significant, 2 = slightly significant, 3 = moderately significant, 4 = very significant, and 5 = extremely significant).

The final section is dedicated to some open ended questions for gathering some company specific causes of project delay and cost overruns, comments, recommendations and the like.

Data was collected from the target population. More specifically the data source for this study was the study population which comprises ENYI Construction employees, clients and consultants representatives.

3.2.2. Collection of Secondary Data

The secondary data, on the other hand, are those which have already been collected by someone else and which have already been passed through the statistical process (Kothari, 2004).

Secondary data may either be published data or unpublished data. In this particular study secondary data are used from different sources. More specifically this work uses: project completion reports, contract administration manuals, standard bid documents, letters, and payment request and disbursement letters, Interim Payment Certificates (IPC), journals, books.

3.3. Target Population, Sampling Technique and Sample Size

A sample design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting items for the sample. Sample design may as well lay down the number of items to be included in the sample i.e., the size of the sample. Sample design was determined before data are collected (Kothari, 2004).

The research samples are taken from the stakeholders in the construction industry which are clients (project owners like Addis Ababa City Road Authority- AACRA), ENYI Construction and consultants that are selected depending on their direct exposure to ENYI Construction and

Building activities. The questionnaire was distributed for project managers, engineers, surveyors, sub-contractors and consultants who are working under the above mentioned stakeholders.

Judgmental and convenience sampling techniques which are categorized under the non-probability sampling technique are used to collect the data. Therefore, by using a judgmental sampling technique site and office engineers, consultants, quantity surveyors, project managers, design and build engineers, Sub-contractors and architects are selected. This is due to the fact that the study wanted to obtain the views of persons who have specific expertise. From the above all, those who were easy to contact or reach are included in the study.

Convenience sampling technique is employed to select the consultants' organization. Three consultant organizations are selected attributable to their frequent work relationship with the contractor and because of their convenient accessibility and proximity to the researcher.

3.4. Data Analysis and presentation

Data analysis is the process in the form of summarizing (condensation) of meanings; categorization (grouping) of meanings; Structuring (ordering) of meanings using narrative are groups in analysis process (Mark Saunders, Philip Lewis, Andrian Thornhill, 2009).

After collecting the raw data of questionnaire, the data is entered into computer spreadsheet, SPSS program. Therefore IBM Statistical Package for Social Sciences (SPSS) computer program version 20.0.0 is used to summarize and categorize the respondents view and RII method used to rank the factors for the project delay and cost overruns separately for their importance and frequency of happening.

The procedure that is used in analyzing the results aimed at establishing the relative importance of the various factors responsible for project delay and cost overruns.

Therefore, the collected data are analyzed using a Relative Importance Index. The importance index is computed by the following formula:

Relative Importance Index (RII) $= \frac{\sum wi}{A*N} = \frac{5n5+4n4+3n3+2n2+1n1}{5N}$

Where:

- ✓ 'w' is the weighting given to each factor by the respondents, ranging from 1 to 5.
- ✓ *A* is the highest weight in the scale (in this case 5); and
- ✓ *N* is the total number of respondents.

n_1= number of respondents not significant

n_2= number of respondents slightly significant

n_3= number of respondents moderately significant

n_4= number of respondents very significant

n_5= number of respondents extremely significant

The RII values have a range of 0 to 1 (0 not inclusive). Small value of RII is discarded as they are very low (insignificant) contributors. The higher the RII, the more important the cause of delay or cost overrun it is. The RIIs is ranked, and the results are shown by using tables and/or graphs.

3.5. Pilot study

Prior to collecting the data, pilot survey was conducted with seven professionals involved in the construction industry. The main reason for conducting the survey was to test and verify whether the questions were clear and relevant to be answered in respect to the objectives of the study. The questionnaire was modified based on the results of the pilot study.

The Amharic version of questionnaire along with the English version was tested in order to make sure that the questions were easily understood .The test was made by distributing seven drafts of the questionnaire. In general, they agreed that the English version questionnaire is suitable to achieve the goals of the study. The following comments and some modifications have been done:

General notes

- The questionnaires in Amharic version are not suitable to use in such types of survey. Even they would not be understandable to use because the practitioners are related with their English or technical wordings.
- Questionnaires must be grouped differently in the way they can show the responsibilities of the different parities in the construction industry.

Notes on Section B major causes of project cost overrun in the construction industry

Group name is missed after material and equipment related factors.

- A blank row: "It seems unwanted row and must be avoided" by some of them and others urge to "insert an appropriate group name". It was left blank wrongly and corrected accordingly.

Notes on Section C Open ended questions

Most of the persons involved in the pilot study advised to add "only for contractors" phrase on the end of question number 2.

3.6. Ethical considerations

The researcher ensures the quality and integrity of this project work. The respondents pursued consent for participation with full awareness of what it is. The confidentiality and anonymity of the voluntary respondents are also guaranteed. This independent and impartial project work considered not to cause harm to respondents in what so ever way. Accordingly, the researcher optimally considers all the ethical perspectives.

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1. Introduction

This chapter of the research work presents the findings of the study in investigating the factors that cause time and cost overruns in construction projects in ENYI Construction to establish the relative importance of the identified variables. In addition to the discussion of the factors that influence time and cost overruns, this chapter also focuses on describing the respondent's characteristics. Therefore, this chapter deals with the analysis and discussion of the data gathered from the desk study and survey.

Data were analyzed using Statistical Package for Social Sciences (SPSS) in-order to determine the factors that cause time and cost overruns. The statistical tools used for the analysis were descriptive (frequencies, mean score, rankings and standard deviations, with percentages) and importance index).

4.2. Results of desk study

Desk studies were conducted at the construction company with the assistance of the key professionals. During desk study three construction projects were selected and evaluated their contract and actual completion time and cost based on their document completeness.

4.2.1. Time Overruns

As it is shown in the following table, the rate of time overrun ranges from a minimum of 117.26% to the maximum of 152.60% of the contract time.

Based on the data found in desk study; Employer name (Client), name of selected projects, contract project periods, project commencement date, project completion data, actual completed time, rate of time overrun and the reasons for the extension of time are described as shown in Table 3.

Table 3 Desk Study for Time Overruns (Project Delay)

S/N	*Employer Name*	*Name of Project*	*Project Period (Days)*	*Project Starting Date*	*project completion Date*	*Actual Completed Time (Days)*	*Rate of time overrun (%)*	*Reasons for Extension of Time*
1	Addis Ababa Road Authority /AACRA/	2nd Police Station Kidist Mariam Church Minilik Hospial Road construction	365	7-Jun-15	15-Dec-17	922	152.60%	* ROW obstructions, * Delay Caused on Earthwork activities due to adverse weather conditions Additional works Design issues and Foundation investigation delays * Delay in assignment of Engineer's representative * Late advance payment due date.
2	Addis Ababa Road Authority /AACRA/	Gurd Shola Road @ Station km Overpass Bridge Construction Project	365	30-Oct-15	9-Feb-18	833	128.22%	
3	Addis Ababa Road Authority /AACRA/	Autobis Tera Lideta Road project	365	5-Feb-14	8-Apr-16	793	117.26%	
Total			**1,095**			**2,548**	**132.69**	

Source: Project Completion Reports, Correspondence letters

It has been found from the desk study that the most common causes of project delays where by the contractor requested for additional time extension are:- Delay caused due to Right of way obstruction, partial and sometimes complete stoppages and disruption of activities due to Exceptional adverse climate conditions, additional works, design changes, delays in assignment of Engineer's representative, and late advance payments are among the causes. According to the contract agreement made between the two parties the intended completion date will be extended if a compensation event occurs or a variation of is issued which makes it impossible for completion to be achieved.

Most of the time an extension of time (EOT) was approved and determined by the Employer (Client) and the consultant by pushing the original date of the project. As it is understood from the letters from the respective documents, most of the time, the employer decided an extension of time without compensation in monetary values.

Any claims that were not entitled to be granted for an extension of time were held by the contractor. These claims are those claim that the contractors were not able to prove that the request is substantive.

4.2.2. Cost Overruns

The next table shows the rate of Cost overrun which ranges from a minimum of 11.60% to the maximum of 22.40% of the initial cost.

Based on the data found in desk study; Employer name (Client), name of selected projects, contract project amount, actual completed cost, and rate of cost overrun are described in table 4.

In most instances, the contractors were not allowed to receive any additional money but only for an extension of time. But it must be clear that all the cost overruns were not imposed on the contractors hence the employer compensates part of it according to the conditions of contract as the causes were compensable.

The writer of this research work understood that whatever the reason for the project delays, it was accompanied by an increase of the project cost.

Table 4 Desk Study for Cost Overruns

S/N	*Employer Name*	*Name of Project*	*Project Amount (Eth.Birr)*	*Actual Completed Cost (Eth. Birr)*	*Rate of cost overrun (%)*	*Remarks*
1	Addis Ababa Road Authority /AACRA/	2nd police station Kidist Mariam church Minilik Hospial Road construction	74,930,291.79	83,292,113.87	11.16%	• Time delay • Design Changes • Additional works by the request of the Society and the employer.
2	Addis Ababa Road Authority /AACRA/	Gurd Shola Road @ Station km Overpass Bridge Construction Project	171,126,862.68	209,454,784.49	22.40%	
3	Addis Ababa Road Authority /AACRA/	Autobis Tera Lideta Road project	186,488,010.45	216,878,718.68	16.30%	
Total			**432,545,164.92**	**509,625,617.04**	**17.82**	

Source:- company project completion reports

Interviewees from the different groups indicated that, though their magnitude and frequency depends upon the project type and firm, project delays and cost overruns are prevalent on construction projects due to many reasons. The interviewees from the construction firm also acknowledged that these things had unpleasant effects on the profit margin of the company.

4.3. Survey Results for causes of time and cost overrun

The structured questionnaire survey was carried out by distributing a total of 80 questionnaire sets. 65 of the 80 questionnaires distributed were returned. The distribution was to 35 clients, 35 contractors and 10 to consultant firms. It was found that 6 of returned questionnaires were not complete and considered invalid for further data analysis. As a result, 59 sets of questionnaires forming 73.75 percent of response rate were usable (complete) for further analysis as presented in Table 5. Out of the 59 questionnaires returned completed 31 were from client representing 88.57 percent of clients' response rate; 6 from consultants representing 60 percent; and 22 from contractors representing 62.86 percent of the contractors' response rate

Table 5 Summary of survey carried out.

Parameters	*Values*
Number of questionnaire distributed	*80*
Number of questionnaire received	*65*
Number of questionnaire were incomplete (invalid)	*6*
Number of responses	*59*
Percentage of responses received (%)	*81.25*
Percentage of responses were valid for analysis (%)	*73.75*

Source: Survey Result

Survey Findings

The causes of time and cost overrun from the questionnaire survey are identified based on respondents' response on each variable of time and cost overrun.

4.3.1. Respondent characteristics

This part mainly designed to provide general information about the respondents' personal characteristics and organizational information in terms of gender, age, educational qualification, the organizational type, and the experience of respondents in the field of construction.

i. Gender

In this study 45 of the respondents were Male and 14 of them were Female.

Table 6 Summary of Respondents' Gender from the Questionnaire Survey

Gender

Gender	Frequency	Percent	Cumulative Percent
Male	45	76.3	76.3
Female	14	23.7	100.0
Total	59	100.0	

In Table 6, it was observed that greater percentage of the respondents were male representing 76.3 percent and Female representing 23.7 percent.

ii. Age

From the total number of the participants in the study, 48 (81.4%)of them were from the age group 21-40 years and 11 of them were from 41-60 years of age comprising only 18.6%. No respondents were involved below 20 years and above 60 years.

Table 7 Summary of Respondents' Age from the Questionnaire Survey

Age

Age Group	Frequency	Percent	Cumulative Percent
21-40 years	48	81.4	81.4
41-60 years	11	18.6	100.0
Total	59	100.0	

Therefore, from the table above it can be concluded that majority of the respondents were found to in the young age.

iii. Qualification

Figure 4.3 shows the level of education of the respondents. It was observed that few respondents have Diploma representing 6.8 percent. First Degree holders were 44 in number representing 74.6 percent of the respondents, second degree and above were 9 in number representing 15.3 percent of the respondents. Aside these 2 (3.4%) respondents returned the questionnaire leaving empty.

Table 8 Summary of Respondents' Educational Qualification from the Questionnaire Survey

Educational qualification

Qualification	Frequency	Percent	Cumulative Percent
Diploma	4	6.8	6.8
First Degree	44	74.6	81.4
2nd Degree and Above	9	15.3	96.6
Missing	2	3.4	100.0
Total	59	100.0	

As it is presented in the above table most of the respondents (79.9) have a qualification of first Degree or above.

iv. Type of respondents' organization

In this study, 52.5 % (31) Clients, Contractors 35.6 % (21) , Consultants 10.2 % (6) and contractor 1.7% (1) were participated in the questionnaire as shown in table 9.

Table 9 Summary of Respondents' Organization from the Questionnaire Survey

Please indicate your organization type?

Organization	Frequency	Percent	Cumulative Percent
Contractor	21	35.6	35.6
Consultant	6	10.2	45.8
Client	31	52.5	98.3
Subcontractors	1	1.7	100.0
Total	59	100.0	

v. Experience

As shown in the table 10 below 26 of them have < 5 years (44.1%), 20 of the have 5-10 (33.9%), 11-15 years 4 (6.8%), 15-20 years 3(5.1%) and above 20 years 4(6.8%). Two (3.4%) respondents returned vacant.

Table 10 Summary of Respondents' Experience from the Questionnaire Survey

How many years of experience have you had in the field of construction?

	Frequency	Percent	Cumulative Percent
< 5 years	26	44.1	44.1
5-10 years	20	33.9	78.0
10-15 years	4	6.8	84.7
15-20 years	3	5.1	89.8
> 20 years	4	6.8	96.6
Missing	2	3.4	100.0
Total	59	100.0	

As far as work experience of the respondents is concerned as shown in the above table majority of them have less than 10 years work experience.

4.3.2. Major causes of project delay and cost

Major causes of project delay in the construction industry

This part consist of results and discussion of factors that influence time overruns (delay), the factors were grouped into 8 major groups, these groups are; project related factors, Design and Documentation, Material related factors, Execution, Labor and Equipment, Contractual relationship, governmental relationship and external factors.

Collective group perspectives on the relative significance of the factors were taken for ranking the causes of project delay.

i. Project related factors

Table 11 shows that the group of respondents ranked “Lack of follow-up for the project schedule and absence of continuous tracking" in the first position with Relative importance index (RII = 0.732). One of the most major management problems in Ethiopian construction industry is poor planning and monitoring of the project, particularly by the contractor. The absence of time

schedule tracking cause many problems such as; contractor's ignorance with progress rate of project, the resource needed to complete the project and the delivery date of project. These matters mentioned above lead to delay the project.

Table 11 Project Related Factors - Time Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Lack of follow-up for the project schedule and absence of continuous tracking	59	216	3.66	1.268	0.732
Quality assurance and control problems	59	213	3.61	1.682	0.722
Low speed of decision making within each project team	59	210	3.56	1.071	0.712
Inadequate experience of the project type	59	184	3.12	1.288	0.624
Poor provision of information to project participants	59	160	2.71	1.314	0.542
Slow information flow between project team members	59	160	2.71	1.403	0.542
Overall			**3.229**		**0.6458**

The second important factor ranked by the groups of the respondents was “Quality assurance and control problems” (RII=0.722). Quality control and assurance of the production factors (human, materials, machineries, Equipments …) and processes must be in place in order to avoid reworks and the risk of not fulfilling the relevant quality standards that are required in the specifications.
"Low speed of decision making within each project team" (RII= 0.712) was ranked as the third major cause in the project related group. Therefore, according to the group collective perspective low speed of decision making between the project teams acknowledged that it have some roles to play in extending the date of completion of the project.

ii. Design and documentation factors

Results from Table 12 shows that the group of respondents ranked "poor design" in the first position with importance index (RII= 0.786). The group of the respondents believes that the design that should be completed before the beginning of the construction project is becoming the major cause of difficulty and project delay at the later phases of the project. Poor design inherently leads to poor quality and possibly unsafe final product which creates reworks to the parties. Designs must be commented before they are used by the contractor.

The second important factor ranked by respondents was "incomplete drawings" with importance index (RII= 0.692). From the table it is easily understood that, the practice of tendering a project

to eligible contractors before the necessary drawings are fully completed would be the source of project delay. From the interview done to the key professionals from the construction company, they give their consent that many contracts were bid on the basis of incomplete or inconsistent drawings and information. Hence these types of drawings call for extensive changes during construction, thereby increase the completion date of the project, they should be given greater emphasis by the responsible bodies.

Table 12 Design and Documentation Factors - Time Overruns

Descriptive Statistics

Factors	N	Sum	Mean	Std. Deviation	RII
Poor Design	59	232	3.93	1.065	0.786
Incomplete Drawings	59	210	3.56	1.087	0.712
Lack of Designer's Experience	59	197	3.34	1.212	0.668
Poor documentation and no detailed written procedures	59	173	2.93	1.065	0.586
Unclear Specification	59	167	2.83	1.147	0.566
Overall			**3.318**		**0.6596**

Lack of designer's experience (RII =0.668) was ranked as the third factor to cause delay in this group. According to the collective group results the designer's should have a knowledge that is somewhat better from the contracting companies. The table shows the respondents were questioning the designer's experience. Incomplete or incorrect drawing could be the outputs of poor designer's experience and leads to a greater chance of project delay.

iii. Materials related factors

Table 13 shows that "Delay of materials delivery to site" (RII= 0.776) was ranked as the first factor to cause delay in this group. An awareness of the late supply of materials to the site due to any reason would bring the time lost by the workers and idle machineries and at large affects the performance of the project. According to the results from the interview delay of materials supply is argued to be one of the most important factors that lead to delay in construction project. Prior delivery agreements and keeping the minimum level of safety stock at the site is needed in order to avoid stoppages due to delay of material delivery to the site. Proper management of the construction materials ensures that materials are available at their point of use when needed. To

this end planning and controlling can improve the productivity and cost efficiency of a project and help ensure its timely completion. This result coincides with the result of (Shiferaw, 2016).

Table 13 Materials Related Factors - Time Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Delay of Material Delivery to site	59	229	3.88	.984	0.776
Shortage of construction materials at site	59	207	3.51	.917	0.702
Lack of materials in markets	59	193	3.27	1.080	0.664
Poor procurement programming of materials	59	195	3.31	.969	0.661
Inappropriate/ misuse of material	59	175	2.97	1.144	0.593
Low Quality of Materials	59	174	2.95	1.224	0.590
Overall			**3.315**		**0.6643**

The second important factor ranked by the respondents was "the shortage of construction materials at site" (RII = 0.702). The interpretation of this result could be the groups of respondents are aware of the importance of having materials that should be available at the project site when it is needed. If the contractors don't have their own stores in order to store the critical (highly and frequently demanded) materials at the site, the project will be delayed significantly. This result coincides with the result of (Shiferaw, 2016).

The third factor ranked by the group was the "lack of materials in markets" (RII = 0.664). From the collective group perspective this factor has got a high position due to its importance to the cause of delay (Time overruns). Now a day there are great difficulties to get materials from the local market especially due to the recent problem in getting a hard currency and unrest in the country. Major inputs for the construction are imported from outside the country.

iv. Execution related factors

Table 14 shows that respondents ranked "Lack of a strong organizational culture" in the first position with importance index (RII= 0.715). It can be concluded that the organizational cultures are not strong and vibrant in gaining better performance in reducing project delays. In this regard developing a strong organizational culture is imperative.

The second factor ranked by consultants was the "project construction complexity" (RII = 0.658). This is a strong indication that the complexity of the construction project is the major factor that caused delay hence there would be no reference for the work at hand.

Table 14 Execution related factors - Time Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Lack of a strong organizational culture	59	211	3.58	1.004	0.715
Project construction complexity	59	194	3.29	1.035	0.658
Highly bureaucratic organization	59	179	3.03	1.066	0.607
Inappropriate construction methods	59	179	3.03	1.189	0.607
Poor equipment choice/infective equipment	59	176	2.98	1.122	0.597
Overall			**3.182**		**0.6368**

"The poor equipment choice/infective equipment" (RII =0.597) was ranked as the last factor to cause delay in this group.

v. Labor and equipment factors

Table 15 shows that respondents ranked "Equipment availability and failure" in the first position with importance index (RII= 0.708), which indicates that frequent equipment failure and the availability of the equipments matter more than any factors in this group.

The second important factor that cause project delay from this group was Lack of maintenance for the equipment with RII=0.705. This indicates that a time taken for maintaining the necessary equipments may delay the project especially if rented equipment or machineries was not found in the market immediately.

Table 15 Labor and equipments factors - Time Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Equipment availability and failure	59	209	3.54	1.006	0.708
Shortage of site workers	59	160	2.71	1.115	0.542
Skilled labor shortage	59	165	2.80	.979	0.559
Lack of equipment	59	186	3.15	1.031	0.631
Lack of maintenance for the equipment	59	208	3.53	.953	0.705
Different political and factional affiliation for workers	59	141	2.39	1.300	0.478
Overall			**3.020**		**0.6038**

vi. Contractual relationship factors

Table 16 shows that respondents ranked "the major disputes and negotiations" in the first position with importance index (RII= 0.675). This indicates that the disputes between the parties were not resolved rapidly and economically as is reasonably possible. Project delay occurs because these disputes could destroy the relationship between the parties.

Table 16 Contractual relationship factors - Time Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Major disputes and negotiations	59	199	3.37	1.015	0.675
Inappropriate overall organizational structure linking all parties to the project	59	181	3.07	1.096	0.614
Mistakes and discrepancies in contract documents	59	198	3.36	1.047	0.671
Overall			**3.267**		**0.653**

The second important factor ranked by respondents was "mistakes and discrepancies in contract documents" (RII=0.671). The appropriate conclusion is that mistakes and discrepancies in contract documents are happening frequently.

Any mistakes in the contract between employer and contractor will expose the project to additional variations; and becomes the source of disputes and arguments.

vii. Government relations factors

From the two causes provided in this group the respondents ranked “Bureaucracy in government agencies” (RII = 0.719) as the major cause of project delay. From the respondents opinion it can be inferred that there are obstacles by the government agencies that lead to the delay of project. Efforts should be focused on the elimination of organizational, legal and bureaucratic bottlenecks that hinder the effective operation of the construction industry.

Table 17 Government related factors- Time Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Bureaucracy in government agencies	59	212	3.59	1.341	0.719
Building regulations	59	167	2.83	1.476	0.566
Overall			**3.210**		**0.6425**

"Building regulations" with (RII= 0.566) was ranked as the second factor to cause delay in this group. This result shows that the respondents agreed most of the regulations of government in issuing permission, or facilitate transactions have intermediate contribution to the delay of project.

viii. External factors

Table 18 shows that respondents ranked "Right of way Problems" in the first position with importance index (RII=0.888). This indicates the most important cause of delay in construction projects is the right of way issues. Successful ROW valuations and negotiations must be done some time before the contractor is awarded the contract. The experience of other countries should be sought by the concerned bodies in order to manage the Right of way obstructions.

Table 18 External factors-Time Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Right of way Problems	59	262	4.44	.749	0.888
Poor economic conditions (currency exchanges, inflation rates, etc)	59	203	3.44	.970	0.688
Bad weather conditions	59	191	3.24	1.040	0.647
Strikes, political unrest, etc	59	189	3.20	1.243	0.641
Poor site conditions (location, ground, etc…)	59	173	2.93	.828	0.586
Changes in laws and regulations	59	148	2.51	.858	0.502
Overall			**3.293**		**0.6587**

The second important factor ranked by respondents was "poor economic conditions (currency inflation rate, etc)" (RII = 0.688). This indicates that the devaluation of Birr in relation to Dollar, and the high rates of inflation are considered as the major factors that affect the construction process.

The above table 18 shows that respondents contractors ranked the "Bad weather conditions" (RII= 0.647) as the third factor that cause delay. The Most appropriate interpretation of this rank is that the weather condition becomes unexpected due to the climatic change. Unexpected occurrence of rain outside the normal rainy seasons becomes the major causes of delay in construction projects because the project will suffer a partial and sometimes a complete stoppage and disruption of activities.

Ranking of top 10 Individual factors influencing time overruns (delay)

In this section ranking of the major factors that influence time overruns (project delay) from the collective group perspective on the relative significance of factors are presented. (Full list of individual factors can be found on Annex. 1)

Table 19 shows the rank of the first 10 factors of time overruns that have been investigated in this research from collective group perspective.

The rank was based on importance index values.

Table 19 Factors influencing time overruns due to the point view of all respondents

Factors/ Causes	N	Sum	Mean	Std. Deviation	RII
Right of way Problems	59	262	4.44	.749	0.888
Poor Design	59	232	3.93	1.065	0.786
Delay of Material Delivery to site	59	229	3.88	.984	0.776
Lack of follow-up for the project schedule and absence of continuous tracking	59	216	3.66	1.268	0.732
Quality assurance and control problems	59	213	3.61	1.682	0.722
Bureaucracy in government agencies	59	212	3.59	1.341	0.719
Lack of a strong organizational culture	59	211	3.58	1.004	0.715
Incomplete Drawings	59	210	3.56	1.087	0.712
Low speed of decision making within each project team	59	210	3.56	1.071	0.712
Equipment availability and failure	59	209	3.54	1.006	0.708

As it is presented in the above table the "Right of Way" (RII= 0.888) stood to be the giant causes of delay in this study. Integration has to go a long way, between the providers of utilities (Ethio-telecom, the city's Water & Sewerage Authority (WSA), and the Ethiopian Electric Utilities (EEU)) and other *Wereda* level officials to solve problems that surround the issue of project delay. If the number of days the project stalled reduced by way of government regulations and integrations between the parties, the right of way as the major cause of project delay will end up as it is not the major cause in the developed countries. This result coincides with the result of (Abubeker, 2015).

From the collective group perspective on the relative significance of factors “Poor Design” (RII= 0.786) placed in the second positions. The design that should be completed before the beginning of the construction project is becoming the major cause of difficulty and project delay at the later phases of the project. This Poor design from the consultant or the employer inherently leads to much rework between the parties, poor quality and possibly unsafe final product.

"Delay of materials delivery to site" (RII= 0.776) was ranked as the third factor to cause delay from overall group perspective. Therefore delay of material delivery is one of the most important factors that cause delay in construction projects. The major causes of delay in delivering the materials should have to be studied and besides these problems in estimation of materials quantity, quality and availability should be resolved by using a proper material handling and procurement system.

Standard deviations along some factors seem to be high. This may be due to some differences in point of view of contractors, owners, and consultants regarding the importance of some factors affecting the delay. The best interpretation for such differences is that the nature of work for each party is different. Each party feel that he exerted his almost efforts to avoid project delay.

The major groups of factors influencing project delay are found to be: External factors, Design and documentation related factors, material related factors, and Project management related factors.

From the interview session a relatively similar result was found. Right of Way problems, design changes, financial problems, poor quantity estimations, procurement and delivery of construction materials, adverse weather conditions, and lack of prompt decision makings are among the prominent factors that attribute to the time overruns.

Groups influencing time overruns at construction projects

Table 20 shows the rank of 8 groups that influencing time overruns (delay) at construction projects in Ethiopia, according to the collective group perspective.

Table 20 Groups influencing time overruns at construction projects

S/N	Groups	RII
1	Design & Documentation Factors	0.6637
2	Material Related factors	0.6627
3	External Factors	0.6588
4	Contractual Relationship Factors	0.6531
5	Project Related factors	0.6458
6	Government Related Factors	0.6424
7	Execution Related Factors	0.6366
8	Labor & Equipment Factors	0.6039

From the collective group perspective, the design and documentation group of delay factors was ranked highest. This result shows that design issues (as group) are the most critical factors for causing project delay in Ethiopian construction. It is worth mention that the respondents ranked "Poor Design" and "Incomplete Drawings" among the top ten causes of delay in this survey. So the highest ranking of this group reflects that designs that must be completed before the beginning of the project is becoming the problem for the parties, the practice of tendering of the drawings before they are fully completed and lack of sufficient experience in designing projects and preparing the documentation of project.

The materials group of delays was ranked very high by all parties (contractors, consultants and owners). This result is due to the lack of required resources in Ethiopia. Most of construction materials are imported from other countries. It is worth mention that the respondents ranked "Delay of material delivery to site", as the most significant cause of project delay in this group.

The "external factors" group of delay was ranked also high by all parties. From this group Right of Way (ROW) was ranked as the most critical cause of factor influencing time overruns (project delay). So the highest ranking of this group reflects that the most important cause of delay in construction projects is the right of way issues. Poor ROW valuations and negotiations before the contractor is awarded is the major profile of the Ethiopian construction industry.

Major causes of project cost overruns in the construction industry

The causes of cost overrun from the questionnaire survey are identified based on the collective group perspective on the relative significance of the factors. Questionnaire for the survey was developed based on 27 factors of cost overruns which were grouped in to 7 major groups. These groups are: *Contractor's site management related factors, Design and documentation related factors, Financial management related factors, Human resource (workforce) related factors, Project management and contract administration related factors, Material and Equipment Related, and External*. In a similar fashion to the causes of project delay, the respondents were requested to rate using five point scale of 1 to 5 (not significant, slightly significant, moderately significant, very significant and extremely significant).

It was assessed by the rank which was based on importance index values.

i. Contractor's site management related factors

Table 21 shows that the group of respondents ranked "Deficiencies in cost estimate" in the first position with Relative importance index of (RII = 0.739). These revealed that an accurate estimate of project costs is an essential part for the proper basis of management decisions and control if project objectives have to be met.

Table 21 Contractor's site management related factors - Cost Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Deficiencies in cost estimate	59	218	3.69	1.087	0.739
Poor Site Management and Supervision	59	193	3.27	1.014	0.654
Lack of experience of the project type	59	178	3.02	.938	0.603
Overall			**3.3267**		**0.6653**

The second important factor ranked by the groups of the respondents was "Poor Site Management and Supervision" (RII=0.654). Poor site management and supervision factor is focusing more towards contractor group. A paramount weakness and incompetence in this area will damage the cost areas of the Construction Company and leads to cost overrun.

"Lack of Experience of the project type" (RII= 0.603) was ranked as the third cause in the *Contractor's site management related factors.* This indicates that the profit from the construction

work cannot be realized without overcoming obstacles raised from the increased level of uncertainty due to lack of experience in the project type.

ii. Design and documentation related factors

Results from Table 22 shows that the group of respondents ranked "Design Changes" in the first position with importance index (RII= 0.776) in this group. This indicates that design changes are considered as one of the major factor for increasing the cost of project. Any modification in the design will affect the project scope, inputs and process. This result coincides with the result of (Abubeker, 2015).

Table 22 Design and Documentation related factors- Cost overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Design Changes	59	229	3.88	1.035	0.776
Inadequate project preparation, planning & implementation	59	227	3.85	.867	0.769
Omissions and errors in the bills of quantity	59	199	3.37	.945	0.675
Mistakes and discrepancies in contract documents	59	188	3.19	1.074	0.637
Overall			**3.5725**		**0.7143**

The second important factor ranked by respondents was “Inadequate project preparation, planning and implementation" with importance index (RII= 0.769). From the table it is easily understood that, a good deal of preparation, planning and implementation is required by the parties involved in the construction project in order to reduce the cost overruns connected with this factor. Careful planning and preparation minimize uncertainties and problems before they actually come into existence.

“Omissions and errors in the bills of quantity” (RII =0.675) was ranked as the third factor to cause delay in this group. According to the collective group results projects becomes susceptible to cost overruns resulting from omissions and errors in the bills of quantity. Thus, the discovery of error or omission might ultimately result in an expensive process to rectify and may result in change orders.

iii. Financial management related factors

From the two factors grouped in the Financial Management Related factors from table 23 Cash flow and financial difficulties faced by contractors (RII=0.746) was ranked as the first factor to

cause cost overrun in this group than Financial difficulties of owner. (RII=0.647). This shows that the financial difficulties of contractors would have a higher impact on cost overruns than the financial problems of the employers.

Table 23 Financial Management related factors- Cost Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Cash flow and financial difficulties faced by contractors	59	220	3.73	.944	0.746
Financial difficulties of owner(employers)	59	191	3.24	1.278	0.647
Overall			**3.485**		**0.6965**

iv. Human resource (workforce) related factors

Table 24 shows that "Labor unrest (labor related matters such as the availability, skills, productivity,…) " (RII=0.556) was ranked as the first factor to cause delay in this group. The second important factor ranked by the respondents was "Fluctuations in the cost of labor " (RII =0.529).

Table 24 Human Resource (Work Force) Related factors - Cost Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Labor unrest	59	164	2.78	1.001	0.556
Fluctuations in the cost of labor	59	156	2.64	.924	0.529
Bad allocation of workers inside the site	59	146	2.47	1.040	0.495
Overall			**2.63**		**0.5267**

The last factor ranked by the group was the "Bad allocation of workers inside the site" (RII =0.495).

Generally, the factors from this group have less overall impact on the cost overruns.

v. Project management and contract administration related factors

Results from Table 25 shows that the group of respondents ranked " Right of way problems" in the first position with importance index (RII= 0.905). This indicates the most important cause of project cost overrun in construction projects is the right of way obstructions. More specifically, failure by the urban administrators to clear conflicts of possession rights, existing infrastructures and residents from the construction site has imposed additional cost on the project.

Table 25 Project management and contract administration related factors- Cost Overrun

Factors	N	Sum	Mean	Std. Deviation	RII
Right of way problems	59	267	4.53	1.040	0.905
Poor project management	59	224	3.80	.805	0.759
Delays in decision making	59	213	3.61	.910	0.722
Change in scope of the project	59	203	3.44	1.134	0.688
size or complexity of the project	59	196	3.32	.937	0.664
Number of projects going at the same time	59	174	2.95	1.057	0.590
Overall			**3.6083**		**0.7213**

The second important factor ranked by respondents was “Poor project management" with importance index (RII= 0.759). From the table it is easily understood that, poor project management practices remains an unsolved problem and needs improvement in the Ethiopian construction industries. Passive and immature project management practices in managing the people, resources, processes and quality could lead to a higher cost of construction.

“Delays in decision making” (RII =0.722) was ranked as the third factor to cause cost overrun in this group.

“Change in scope of the project” (RII = 0.688) was ranked as the fourth factor to cause cost overrun in this group. According to the collective group perspective cost overruns are the normal results of scope changes and should be held to a minimum.

vi. Material and Equipment Related

As can be seen from table 26 the first major factor ranked by respondents was “fluctuations in the cost of building materials” (RII = 0.702). Fluctuation in prices of the major construction inputs like Mild Steel has a significant impact on cost increase. This is prevalent in the projects that were awarded before the major adjustments of the Birr value in relation to the Dollar value. The contractors’ estimate prices of the tender according to the prices of the materials at the local market in the previous times. In case of high fluctuations in the prices, the contractor would face the problem of cost overruns. Price fluctuation is also contributed from instability and inflationary rate of a country.

Table 26 Material and Equipment Related - Cost Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Fluctuations in the cost of building materials	59	207	3.51	.972	0.702
Delay in material delivery	59	206	3.49	.989	0.698
Construction equipment shortage or failure	59	186	3.15	1.031	0.631
Low quality of materials	59	167	2.83	.931	0.566
Overall			**3.245**		**0.6493**

Delay in material delivery with RII = 0.698 was ranked as the second most important factor of cost overrun in this group. The respondents acknowledged that delay of construction inputs adversely affect project cost. To this end the use of multiple sourcing and identifying long lead items in the planning stage can be seen as a response to the uncertainties or risks arises due to late delivery of supplies.

vii. External

Table 27 shows that "Unsettlement of the local currency in relation to the dollar value" (RII=0.756) was ranked as the first factor to cause cost overrun in this group. Present price escalations of building materials and labor were due to the devaluation of the Birr in relation to the Dollar value was a recent story in the construction industry and may have impacted the result of the study in this category. Hence it has a great impact on the general market of the materials and the economy.

Table 27 External Factors - Cost Overruns

Factors	N	Sum	Mean	Std. Deviation	RII
Unsettlement of the local currency in relation to the $value	59	223	3.78	.911	0.756
Fraudulent practices and kickbacks./corruption/	59	211	3.58	1.177	0.715
Unpredictable weather conditions	59	203	3.44	1.005	0.688
Lengthy bureaucracy in government entities	59	200	3.39	1.326	0.678
Degree of government regulations and control	59	169	2.86	1.008	0.573
Overall			**3.41**		**0.682**

The second most important factor ranked by the respondent was "Fraudulent practices and kickbacks./corruption/" (RII= 0.715). The respondents agreed that all the parties involved in the

process were observed in such practices in the execution of the contract. Highest standard of ethics is required during the phases of the project.

“Unpredictable weather conditions” (RII=0.688) was ranked as the third important factor in this group. As it is shown in table 26 respondents ranked unpredictable weather condition as one of the intermediate factor that cause cost overruns. To the contrary, the professionals involved in the interview had seen it differently.

Ranking of top 10 Individual factors influencing Cost overruns

In this section ranking of the major factors that influence cost overruns from the collective group perspective on the relative significance of factors are presented. (Full list of individual factors can be found on Annex. 2)

Table 28 shows the rank of the first 10 factors of cost overruns that have been investigated in this research from collective group perspective. The rank was based on importance index values.

As can be seen from the Results of Table 28 the collective group perspective respondents ranked " Right of way problems" in the first position with importance index (RII= 0.905). It is recalled that the respondents also ranked it as first the most important cause of project delay .This indicates the major problems that surrounds the cost and time overruns is the Right of Way (Row) issues. This result coincides with what (Abubeker, 2015). Research results from outside Ethiopia contravenes with this result, since ROW are not the major causes of cost overruns in the developed countries.

Table 28 indicates that from the collective group perspective respondents ranked "Design Changes" in the 2nd position with importance index (RII= 0.776) as the major cost of overrun in the construction projects. This indicates that any modification in the design will affect the project scope, inputs and process. In (Abubeker, 2015) work this appears to be in the first position to cause cost overruns in the construction projects.

Table 28 Factors influencing cost overrun due to the collective group perspective

Factors	N	Sum	Mean	Std. Deviation	RII	Rank
Right of way problems	59	267	4.53	1.040	0.905	1st
Design Changes	59	229	3.88	1.035	0.776	2nd
Inadequate project preparation, planning and implementation	59	227	3.85	.867	0.769	3rd
Poor project management	59	224	3.80	.805	0.759	4th
Unsettlement of the local currency in relation to the dollar value	59	223	3.78	.911	0.756	5th
Cash flow and financial difficulties faced by contractors	59	220	3.73	.944	0.746	6th
Deficiencies in cost estimate	59	218	3.69	1.087	0.739	7th
Delays in decision making	59	213	3.61	.910	0.722	8th
Fraudulent practices and kickbacks./corruption/	59	211	3.58	1.177	0.715	9th
Fluctuations in the cost of building materials	59	207	3.51	.972	0.702	10th

The third important factor ranked by all the respondents was “Inadequate project preparation, planning and implementation" with importance index (RII= 0.769). From the table it is easily understood that, a good deal of preparation, planning and implementation is required by the parties involved in the construction project in order to bring a paramount improvements in time and cost performance.

Project management & contract administration related factors, External factors, and design & documentations related factors dominates the top most causing factors. This indicates that factors related to these groups would bring a cost increase and there should be given much attention by all the parties involved in the constructions.

To the contrary Human Resource (Work Force) related factors rated by the group of respondents as the least influencing factors.

Groups influencing cost overruns at construction projects

Table 29 shows the rank of 7 groups that influences Cost overruns at construction projects in Ethiopia, according to the collective group perspective.

Table 29 Groups influencing Cost overruns at construction projects

S/N	Groups	RII
1	Project Management & Contract administration related factors	0.7213
2	Design & Documentation related factors	0.7143
3	Financial management related factors	0.6965
4	External Factors	0.6820
5	contractors site management related factors	0.6653
6	Materials and Equipment related factors	0.6493
7	Human Resource(Work force) related factors	0.5267

From the collective group perspective, the Project Management & Contract administration related factors group of cost overrun factors was ranked highest. This result shows that poor construction management creates a high risk of cost overruns in Ethiopian construction. It is worth mention that the respondents ranked "Right of Way", and "Poor Project Management" are among the top ten causes of cost overruns in this survey.

From the collective group perspective, the design and documentation group of delay factors was ranked high. This result shows that design issues (as group) are among the critical factors for causing cost overruns in Ethiopian construction. It is worth mentioning that the respondents ranked "Design Changes", first in this group of four causes. This indicates that any modification in the design is affecting the project scope, inputs and process at large and making increments on the cost of the project.

The interviewees highlighted a number of factors that would cause cost overruns. The common causes of cost overruns in construction projects were identified to include: inflation or instability prices of construction materials, poor planning, scope changes, corruption, and quantity estimation problems.

4.3.3. Company Specific Causes

Respondents from ENYI Construction Company were requested to mention and rank factors that contribute to project delay and cost overruns in the projects they were involved in. This part therefore consists of discussions and results of company specific factors as it is rated by the contractors. Accordingly, Table 30 below indicates the top five (5) causes according to frequency scores.

Table 30 Top Five company specific factors

S/N	Causes of Time overruns (Project delay)	Rank		Causes of Cost Overruns	Rank
1	Right of Way (ROW)	1st		Design Changes /Low Quality Designs	1st
2	Adverse Weather Condition/ Climatic Changes	2nd		variations/ Change in scope	2nd
3	Design Issues	3rd		Right of Way (ROW)	3rd
4	Poor Project Management	4th		Employers late payment	4th
5	Additional Works/ Supplementary Works	5th		Delay of the project (time overruns)	5th

This shows that somewhat similar results to the results found from the collective group perspective. Therefore it can be concluded that these factors are the major causes of cost overruns and project delays in the country.

4.3.4. Internal and External Challenges of ENYI Construction

Participants were asked to bring up the internal and external challenges with regard to project delay and cost overruns. They pointed out that the following are the major challenges:

Internal

- Financial Management Problems
- Managing different projects at the same time
- Site Inspection
- Cost of labor fluctuation
- Delay of Managerial Decision

Somewhat similar result was found from the interview. The interviewees highlighted that the following are the main internal challenges: Financial management, unrealistic schedules, Delay

in materials delivery, running many number of projects at the same periods, equipment or machineries maintenances problems.

External

- ✶ Right of way obstructions
- ✶ Adverse Weather conditions
- ✶ Design related issues
- ✶ Hard currency problems/ Shortage of foreign currency
- ✶ Supplier Problems
- ✶ Delay in material delivery
- ✶ Market fluctuations
- ✶ Bureaucracy in government offices
- ✶ Quantity variation and scope changes by the employer.
- ✶ Relation with consultant's & Employer's personnel

In support to these findings, interviewees indicated that Supplier related issues, the relationship with the consultant, communication with the employer, unethical issues (problems), delays in decision making by the employer and the consultant, inadequate technical knowledge of the consulting firms, making a design based on conceptual thinking only. (Preparing a design before deeply evaluating the physical topography of the site), variation orders, foreign exchange fluctuations.

In addition to these the interviewees had also raised the construction industry is spoiled by unethical practices and corruption in executing their work.

4.3.5. Opinion on minimizing or avoiding time and cost overruns

Respondents were requested for the opinion on how could time and cost overruns can be avoided or minimized in the construction projects. A wide range of responses were given from the different perspective but most of them agreed on that time and cost overruns cannot be avoided instead they can only be minimized significantly.

Some of the minimization techniques or mechanisms are listed below:

Integrity and better communication with utility organizations before final tender document preparation , Solve ROW problems on time (Early Removal of ROW), careful preparation of project design documents, drawings and cost estimates, Implementing proper construction methods, Proper Planning for the different phases of the project, Frequent progress meetings, by monitoring activities of project according to the plan and schedule, Preparation of better designs by consultants, Good quantity estimation, identification of the stakeholders and participation of these stakeholders from the beginning(common understanding between all stakeholders) Establishing Accountability, Local Administration consultation before commencement of works, by Minimizing fraudulent practices and corruptions from all the parties, Minimizing the bureaucracy in the government entities creating good management system and early decision on the project related issues, choosing the best contractual method for the intended project, subcontracting the work to share the management of the project, working on the quality of design, Timely financing the project payments, (timely payments to contractors), early communication of the parties involved in the project and etc are among the mechanisms to solve project delay and cost overruns in the construction projects.

Similarly the interviewees were asked if there are any contractual methods that can best avoid or minimize the prevalence of time and cost overrun in construction projects.

They indicated that there are contractual methods that best address the issue of time and cost overruns. The Standard Bid Document (SBD- Works) from public procurement agency and most of the contractual methods available in the country would be useful in addressing these problems provided competent personnel were assigned the responsibility of managing construction projects.

Liquidity of damages in the contract document may discourage a controllable overruns hence it imposes a 0.01% penalty from the total project amount daily. The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Special Conditions of Contract for each day that the Completion Date is later than the Intended Completion Date.

More over the construction industry is guided by the 'Conditions of Contract for Works of Civil Engineering Construction Federation' from Internationale Des Ingenieurs Conseils (FIDIC). It

contains regulation on the preparation of Particular Conditions and provides guidance on project specific sub-clauses where particular Conditions might be used.

Whenever the selection procedures for contractors and consultants are primarily based on an in-depth analysis of objective methods, the interviewees believe that it avoids the subjectivity and the tendency of selecting a bidder based on the price which may not guarantee performance in time and cost.

Furthermore, the practice of documenting lessons learned for minimizing the risk of project delay can be used as the mechanism along with the above methods.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter focuses on forwarding conclusions and recommendations of the study that would help in solving the setbacks in time and cost performance of construction projects.

5.2. Summary

The study was guided by three objectives. The first objective of this study was to identify variables influencing project delay & cost overruns and evaluate their relative importance. The second objective was to identify internal and external challenges of ENYI Construction with regard to time and cost overruns, and the last one was to forward recommendations to improve performance.

To answer the general and all specific objectives of the research, a desk study and descriptive survey was done by involving Fifty nine (59) personnel drawn from contractors, consultant and clients to establish factors that were significantly contributing to time and cost overruns.

The study focused on 39 and 27 variables that were deemed to have had significant contribution to time and cost overruns respectively. Respondents are invited to rate the levels of importance of these factors according to a five-point Likert Scale1-5 (1 = not significant, 2 = slightly significant, 3 = moderately significant, 4 = very significant, and 5 = extremely significant). Almost all of the variables in the project delay and cost overruns have got more than a "moderately significant" to "extremely significant". The study sought to elicit those factors that were considered to have high significance. To this regard the results from the surveys and desk study showed that the most three important factors causing project delays in construction projects from the collective group perspective of importance were: (1) "Right of Way problems", (2) "poor design", and (3) "Delay of material delivery". Similarly the result also indicates that the most three factors causing cost overrun were: (1) "Right of Way problems", (2) "Design changes", and (3) "poor inadequate project preparation, planning and implementation".

The second objective of the study was to identify the internal and external challenges of ENYI Construction with regard to time and cost overruns. Financial management, running many numbers of projects at the same periods, unrealistic schedules, and delay in materials delivery are found among the internal challenges. Moreover, the study established that right of way obstructions, adverse weather conditions, Design related issues (making a design based on conceptual thinking only.), Hard currency availability, Supplier related issues, the relationship with the consultant, communication with the employer, unethical issues (problems), delays in decision making by the employer and the consultant, inadequate technical knowledge of the consulting firms), variation orders, etc are the most important external challenges.

5.3. Conclusions

Based on the results of questionnaire responses, interviews and desk study the following conclusions are drawn.

With regard to project delay in Ethiopian construction projects, a total of 59 samples were found as valid and analyzed statistically using relative importance index method on 39 causative factors of project delay (Time overrun). Although several factors have contributed to project delay (Time overrun) in construction projects, the most significant of them found right of way problems, designs changes, Delay of material delivery, Inadequate project preparation, planning and implementation, poor project management, unpredictable weather, foreign exchange rate fluctuations, Additional instructions(Supplementary works), incomplete drawings, Late Decision making made by the employer(client) are having the significant impact on causing time overruns (Project delay) in construction projects.

From this study, the right of way problems smashes all the other variables and stood to be the giant causes of delay.

The findings of this work supports past empirical studies on the major causes of project delay and time overruns associated with construction projects as outlined in the literature review. But right of way (ROW) problem is a major problem in Ethiopia especially in project that were undertaken in Addis Ababa. Literatures that were done outside Ethiopia didn't include right of way problem as a major factor for time overrun. Results of the study indicated that the factor "poor design" has been ranked in the second position from the collective group perspective. This

result indicates that the design that should be completed before the beginning of the project phase is becoming the major cause of difficulty and causes of project delay at the later phases of the project. From the collective group perspective "Delay of materials delivery to site" was ranked as the third factor to cause delay. From this work it was found that the top three causes of project delay are under the responsibilities of the employer (client), the consultant and the contractor. All have their aggregate contribution in the delay of the construction projects.

Many contracts were bid on the basis of incomplete or inconsistent drawings and information. Hence these types of drawings call for extensive changes during construction thereby increase the completion date of the project.

Therefore, the groups that affect the project delay more are found to be Design & Documentation Factors, Material Related factors and External Factors.

With regard to the potential causes of cost overrun in Ethiopian construction projects, a total of 59 samples were found as valid and analyzed statistically using relative importance index method on 27 causative factors of cost overrun. It was found that the top five factors causing cost overrun in construction projects was discovered as Right of Way problems, Design Changes, Inadequate project preparation, planning and implementation, Poor project management and Unsettlement of the local currency in relation to the dollar value.

It can be concluded that the most important causes of cost overruns are inherent to the three groups namely employer (client), consultant and contractor. Every one of them has their share.

Right of Way problems was found to be the single most important factor considered by practitioners as the major cause of project delay but also cost overruns.

The weather condition in Ethiopia becomes unexpected due to the global climate change. Unexpected occurrence of rain outside the normal rainy seasons becomes the major causes of cost overruns in construction projects because the project will suffer a partial and sometimes a complete stoppage and disruption of activities.

Passive and immature project management practices in managing the people, resources, processes and quality could lead to a higher cost of construction.

From this work, the financial management problems, unrealistic work schedules and plans, and the number of projects going at the same time are the main internal challenges that face the construction company.

Delay in materials delivery, Supplier related issues, the relationship with the consultant, communication with the employer, unethical issues (problems), delays in decision making by the employer and the consultant, inadequate technical knowledge of the consulting firms, making a design merely based on conceptual thinking. (Preparing a design before deeply evaluating the physical topography of the site), variation orders, foreign exchange fluctuations are considered the key external challenges that face the construction company.

Therefore, groups that influences Cost overruns at construction projects in Ethiopia, according to the collective group perspective are Project Management & Contract administration related factors, Design & Documentation related factors, and financial management related factors

5.4. Recommendations

The following points can be recommended to all the parties involved in the construction projects so as to control or minimize time and cost overruns

- ☞ Actions to be taken by Contractors
  - ∗ Contractors are recommended to be aware about construction materials, so they are advised to make Prior delivery agreements and keeping the minimum level of safety stock at the site. The use of multiple sourcing and identifying long lead construction items in the planning stage can be seen as other mechanisms to respond to uncertainties that arise due to late delivery of materials.
  - ∗ Contractors are recommended to manage their cash flows effectively to avoid the financial problems. Also it is advised to monitor financial spending of the project and payments because any problem in financial aspect will lead to time and cost overruns.
  - ∗ Contractors are recommended to have a time schedule that clarifies their needs for equipments in the site, so it would be ready where needed without delay.
  - ∗ Contractors are recommended to monitor the quality of activities continuously and to set the required quality system in the different activities of the project so as to avoid any mistakes that may lead to rework of activities, and finally time and cost overruns.
  - ∗ Contractors are recommended to have qualified and quantified technical staff with appropriate experience of the project in order to be able to follow the different technical and managerial aspects of the project.
- ☞ Actions to be taken by Employers
  - ∗ Since Right of Way (ROW) continues to be the most significant causes of delay and cost overrun in the construction projects, employers are recommended to engage in successful ROW valuations and negotiations before the contractor is awarded the contract. So integration has a long way to go, between the providers of utilities, ethio-telecom, the city's Water & Sewerage Authority (WSA), the Ethiopian Electric Utilities (EEU) and other *wereda* level officials to solve problems that surround these issues
  - ∗ Employers are recommended to restrain from the practice of tendering a project to eligible contractors before a major revision is done on the tender documents (such as technical specifications, drawings, bill of quantities and the design of the project). This is

because any discrepancy in bid documents will lead to disputes between projects parts and so delay and cost overruns may occur.

- Employers are recommended to employ the use of the Liquidity Damages as penalty to discourage project delays by contractors and rewarding those who completes their work on time.
- The employers are advised to make the progress payments to the contractor on time because it impairs the contractor's ability to finance the work.
- Employers are recommended to minimize red-tape; that is, minimize unnecessary and excessive bureaucratic procedures in the clients' organization.
- Designs must be commented before they are used by the contractor.

☞ Actions to be taken by Consultants

- The consultants are advised to give enough time and attention for project studies (concept design stage of the project) since many unpredictable conditions can be avoided during the construction stage
- Consultants should prepare good quantity estimation; they should have also prepare the design ethically and professionally as per the design standards & manuals.
- Designs must be commented before they are used by the contractor.
- Sufficient data collection and survey, and detail site investigation and design should be done before tender to avoid future variations.
- Approve the requested payments, additional works, variation orders etc. on time, as per the rule and regulation of contract, to successful completion of the construction of the proposed projects on time.

5.5. Suggestions for Further Research

This study investigated the major causes of project delay and cost overrun of construction projects by taking ENYI Construction as a case.

So further study may gear to study:-

- The correlation or the interrelationship that may exists among the identified causes of project delay and cost overruns.
- The extent / impact of these variables using a wider scope.
- To identify the responsible bodies that contributes more to time and cost overruns.

Moreover, similar study could be carried out on the contributions of these variables to claims and disputes between the client and contractors.

This work identifies ROW as the most important cause of project delay and cost overrun. So any interested researcher may do a confirmatory investigation in country level.

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APPENDIX

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(Annex 1) Factors influencing time overruns due to the point view of all respondents

Factors	N	Sum	Mean	Std. Deviation	RII	Rank
Right of way Problems	59	262	4.44	.749	0.888	1st
Poor Design	59	232	3.93	1.065	0.786	2nd
Delay of Material Delivery to site	59	229	3.88	.984	0.776	3rd
Lack of follow-up for the project schedule and absence of continuous tracking	59	216	3.66	1.268	0.732	4th
Quality assurance and control problems	59	213	3.61	1.682	0.722	5th
Bureaucracy in government agencies	59	212	3.59	1.341	0.719	6th
Lack of a strong organizational culture	59	211	3.58	1.004	0.715	7th
Incomplete Drawings	59	210	3.56	1.087	0.712	8th
Low speed of decision making within each project team	59	210	3.56	1.071	0.712	9th
Equipment availability and failure	59	209	3.54	1.006	0.708	10th
Lack of maintenance for the equipment	59	208	3.53	.953	0.705	11th
Shortage of construction materials at site	59	207	3.51	.917	0.702	12th
Poor economic conditions (currency exchanges, inflation rates, etc)	59	203	3.44	.970	0.688	13th
Major disputes and negotiations	59	199	3.37	1.015	0.675	14th
Mistakes and discrepancies in contract documents	59	198	3.36	1.047	0.671	15th
Lack of Designer's Experience	59	197	3.34	1.212	0.668	16th
Poor procurement programming of materials	59	195	3.31	.969	0.661	17th
Project construction complexity	59	194	3.29	1.035	0.658	18th
Lack of materials in markets	59	193	3.27	1.080	0.654	19th
Bad weather conditions	59	191	3.24	1.040	0.647	20th
Strikes, political unrest, etc	59	189	3.20	1.243	0.641	21st
Lack of equipment	59	186	3.15	1.031	0.631	22nd
Inadequate experience of the project type	59	184	3.12	1.288	0.624	23rd
Inappropriate overall organizational structure linking all parties to the project	59	181	3.07	1.096	0.614	24th
Highly bureaucratic organization	59	179	3.03	1.066	0.607	25th
Inappropriate construction methods	59	179	3.03	1.189	0.607	26th
Poor equipment choice/infective equipment	59	176	2.98	1.122	0.597	27th
Inappropriate/ misuse of material	59	175	2.97	1.144	0.593	28th
Low Quality of Materials	59	174	2.95	1.224	0.590	29th
Poor site conditions (location, ground, etc…)	59	173	2.93	.828	0.586	30th
Poor documentation and no detailed written procedures	59	173	2.93	1.065	0.586	31st
Unclear Specification	59	167	2.83	1.147	0.566	32nd
Building regulations	59	167	2.83	1.476	0.566	33rd
Skilled labor shortage	59	165	2.80	.979	0.559	34th
Shortage of site workers	59	160	2.71	1.115	0.542	35th
Poor provision of information to project participants	59	160	2.71	1.314	0.542	36th
Slow information flow between project team members	59	160	2.71	1.403	0.542	37th
Changes in laws and regulations	59	148	2.51	.858	0.502	38th
Different political and factional affiliation for workers	59	141	2.39	1.300	0.478	39th

(Annex 2) Factors influencing cost overrun due to the collective group perspective

	N	Sum	Mean	Std. Deviation	RII	Rank
Right of way problems	59	267	4.53	1.040	0.905	1st
Design Changes	59	229	3.88	1.035	0.776	2nd
Inadequate project preparation, planning and implementation	59	227	3.85	.867	0.769	3rd
Poor project management	59	224	3.80	.805	0.759	4th
Unsettlement of the local currency in relation to the dollar value	59	223	3.78	.911	0.756	5th
Cash flow and financial difficulties faced by contractors	59	220	3.73	.944	0.746	6th
Deficiencies in cost estimate	59	218	3.69	1.087	0.739	7th
Delays in decision making	59	213	3.61	.910	0.722	8th
Fraudulent practices and kickbacks./corruption/	59	211	3.58	1.177	0.715	9th
Fluctuations in the cost of building materials	59	207	3.51	.972	0.702	10th
Delay in material delivery	59	206	3.49	.989	0.698	11th
Unpredictable weather conditions	59	203	3.44	1.005	0.688	12th
Change in scope of the project	59	203	3.44	1.134	0.688	13th
Lengthy bureaucracy in government entities	59	200	3.39	1.326	0.678	14th
Omissions and errors in the bills of quantity	59	199	3.37	.945	0.675	15th
size or complexity of the project	59	196	3.32	.937	0.664	16th
Poor Site Management and Supervision	59	193	3.27	1.014	0.654	17th
Financial difficulties of owner	59	191	3.24	1.278	0.647	18th
Mistakes and discrepancies in contract documents	59	188	3.19	1.074	0.637	19th
Construction equipment shortage or failure	59	186	3.15	1.031	0.631	20th
Lack of experience of the project type	59	178	3.02	.938	0.603	21st
Number of projects going at the same time	59	174	2.95	1.057	0.590	22nd
Degree of government regulations and control	59	169	2.86	1.008	0.573	23rd
Low quality of materials	59	167	2.83	.931	0.566	24th
Labor unrest (labor related matters such as the availability, skills, productivity,…)	59	164	2.78	1.001	0.556	25th
Fluctuations in the cost of labor	59	156	2.64	.924	0.529	26th
Bad allocation of workers inside the site	59	146	2.47	1.040	0.495	27th

Addis Ababa University

College of Business and Economics

Department of BAIS: Project Management Program Unit

Objective of the survey:

Dear respondents this questionnaire has been prepared in the view of assessing information required for the academic research entitled " Cause of Project Delay and Cost Overrun in ENYI Construction" which is being conducted as partial fulfillment of MA in Project Management from Addis Ababa University School of Commerce.

The main objective of the research is to identify the main factors that lead to time and cost overruns, and make recommendations based on the findings.

The questionnaire consists of three sections. Section A includes the background information relating your experience. Section B contains the major causes of project delay and cost overrun in the construction industry in to two subsections. Section C is dedicated to some open ended questions for gathering some company specific causes of project delay and cost overruns, comments, recommendations and the like.

Your valuable responses would be a great help for the researcher to address the major causes and make recommendations based on the findings.

The researcher assures you that your response and opinions are highly valuable to the outcome of the research, and would not be used other than intended objectives and is highly confidential.

Thank you,

Nigussie Wendmu

Post graduate student, Project Management

A.A.U, College of Business & Economics, School of Commerce, BAIS Department

Tel: 0911 31 43 07

Addis Ababa

About filling the questionnaire:

- *Don't write your name.*
- *Mark " ✓"in the appropriate box to indicate your answer(s)*
- *Write a short and precise answer for open-ended questions.*

Section A. General Information

1. *Gender*
    a. *Male* ☐
    b. *Female* ☐
2. *Age*
    a. *Below 20 years* ☐
    b. *21-40 years* ☐
    c. *41-60 years* ☐
    d. *Above 60 years* ☐
3. *Educational qualification*
    a. *High School Graduate* ☐
    b. *Certificate* ☐
    c. *Diploma* ☐
    d. *First Degree* ☐
    e. *2nd Degree and Above* ☐
4. *Please indicate your organization type:*
    a. *Contractor* ☐
    b. *Consultant* ☐
    c. *Client* ☐
    d. *Subcontractors* ☐
    e. *Other (please specify) ……*
5. *How many years of experience have you had in the field of construction?*
    a. *< 5 years* ☐
    b. *5-10 years* ☐
    c. *10-15 years* ☐
    d. *15- 20 years* ☐
    e. *> 20 years* ☐

Section B. Major causes of project delay and cost overrun in the construction industry

B1. Major causes of project delay in the construction industry

Rating Scale	*not significant*	*slightly significant*	*moderately significant*	*very significant*	*extremely significant*
	1	*2*	*3*	*4*	*5*

Causes of Construction Project Delay	***1***	***2***	***3***	***4***	***5***
1. *Project Related Factors*					
Slow information flow between project team members					
Inadequate experience of the project type					
Low speed of decision making within each project team					
Lack of follow-up for the project schedule and absence of continuous tracking					
Poor provision of information to project participants					
Quality assurance and control problems					
2. *Design and Documentation*					
Unclear specifications					
Poor design					
Incomplete drawings					
Poor documentation and no detailed written procedures					
Lack of designer's experience					
3. *Material*					
Delay of material delivery to site					
Inappropriate/ misuse of material					
Poor procurement programming of materials					
Lack of materials in markets					
Shortage of construction materials at site					
Low quality of materials					
4. *Execution*					
Inappropriate construction methods					
Poor equipment choice/infective equipment					
Highly bureaucratic organization					
Project construction complexity					
Lack of a strong organizational culture					
5. *Labor and equipment*					
Equipment availability and failure					
Shortage of site workers					
Skilled labor shortage					
Lack of equipment					
Lack of maintenance for the equipment					
Different political and factional affiliation for workers					
6. *Contractual relationship*					
Major disputes and negotiations					
Inappropriate overall organizational structure linking all parties to the project					
Mistakes and discrepancies in contract documents					
7. *Government*					
Building regulations					
Bureaucracy in government agencies					

8. *External factors*					
Poor site conditions (location, ground, etc…)					
Poor economic conditions (currency exchanges, inflation rates, etc)					
Changes in laws and regulations					
Bad weather conditions					
Strikes, political unrest, etc					
Right of way Problems					

B2. Major causes of project cost overrun in the construction industry

Causes of construction projects cost overrun	***1***	***2***	***3***	***4***	***5***
1. Contractor's site management related factors					
Poor site management and supervision					
Lack of experience of the project type					
Deficiencies in cost estimate					
2. Design and documentation related factors					
Design changes					
Omissions and errors in the bills of quantity					
Inadequate project preparation, planning and implementation					
Mistakes and discrepancies in contract documents					
3. Financial management related factors					
Cash flow and financial difficulties faced by contractors					
Financial difficulties of owner					
4. Human resource (workforce) related factors					
Fluctuations in the cost of labor					
Labor unrest (labor related matters such as the availability, skills, productivity,…)					
Bad allocation of workers inside the site					
5. Project management and contract administration related factors					
Change in scope of the project					
Number of projects going at the same time					
Delays in decision making					
Poor project management					
size or complexity of the project					
Right of way problems					
6. Material and Equipment Related					
Fluctuations in the cost of building materials					
Low quality of materials					
Construction equipment shortage or failure					
Delay in material delivery					
7. External					
Unsettlement of the local currency in relation to the dollar value (change in foreign exchange rates)					
Lengthy bureaucracy in government entities					
Degree of government regulations and control					
Fraudulent practices and kickbacks./corruption/					
Unpredictable weather conditions					

Section C. open ended questions

1. What other factors might have contributed to time and cost overruns in the project/s you were involved in? Please you are kindly requested to write here in the order of their importance.

Causes of project delay	**cause of cost overrun**
a. _____	a. _____
b. _____	b. _____
c. _____	c. _____
d. _____	d. _____
e. _____	e. _____

2. What are the internal and external challenges of ENYI Construction with regard to time and cost overruns?

_____
_____
_____
_____
_____.

3. In your opinion how could the time and cost overruns can be avoided or minimized?

_____
_____
_____
_____.

4. Do you have any comments or recommendations to solve the factors causing
   4.1. Time overrun(Project Delay)

   _____
   _____
   _____
   _____.

   4.2. Cost overrun

   _____
   _____
   _____
   _____.

Thank you for your cooperation!