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FACTORS AFFECTING TIME DELAY AND COST OVERRUN IN CONSTRUCTION OF CONDOMINIUM IN ADDIS ABABA: PROJECT 6 HOUSING DEVELOPMENT

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ADDIS ABEBA, ETHIOPIA

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APPROVED BY BOARD OF EXAMINERS

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DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Dr. Temesgen Belayneh. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

Yeshi Habte _____

Student's Name Signature

St. Mary's University, Addis Ababa **JUNE, 2021**

ENDORSEMENT

This thesis has been submitted to St. Mary's university, school of graduate studies for Examination with my approval as a university advisor

Dr. Temesgen Belayneh _____

Advisor's Name Signature

St. Mary's University, Addis Ababa **JUNE, 2021**

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ACRONYMS

AAHDPO	Addis Ababa Housing Development Project Office
AAP6HD	Addis Ababa project6 Housing Development
CCM	Critical Chain Method
CPM	Critical Path Method
E.C	Ethiopian calendar
G.C	Gregory calendar
UN-HABITAT	United Nations Human Settlements Programme
PMI	Project Management Institute
RII	Relative Important Index
MWUD	Ministry of Work and Urban Development
SPSS	Statistical Package for the social sciences
PMBOK	Project Management Body of Knowledge
GTP	Growth and Transformation Plan
WBS	Work Breakdown Structures
PERT	Program Evaluation Review Technique
ITB	Instructions to Bidders

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ABSTRACT

The main objective of this study was to identify the factors affecting time delay and cost overrun in the construction of condominium house Project 6. Project 6 housing development construction was chosen for this study out of 18 condominium house projects in Addis Ababa because it was the closest project to my living area and researcher witnessed work stoppage for a long period of time, motivating me to conduct research on the factors that cause delays and cost overruns . It is a delayed project relative to its baseline schedule time and cost, planned time 7/1/2015 G.C for only one years to 8 month, which was expected to be completed G+7 in 24 months, G+4 in 18 months, with works running concurrently, but it has now taken 48 months with an 89.24 % performance .To collect both qualitative and quantitative data for the analysis, a mixed method research approach was used. The major factors of delay were identified using a questionnaire and an interview. A total of 39 questionnaires were distributed to the project's three key groups of participants, namely the owner, consultant, and contractors, and three of them participated in the interview. Explanatory (causal) research method was used to analyze the results. The data from the survey was statistically analyzed. The most significant factors influencing time delay and cost overruns were identified using the relative important index process. The respondents' level of agreement/disagreement on the causes of time delays and cost overruns was also calculated using Spearman's correlation coefficient analysis. The study's findings showed that the main factors affecting of construction delays and cost overruns in condominium house projects were Fluctuation of material price, Poor planning and scheduling, Poor inspection, Less responsibility for the work, Lack of government control, Inadequate time estimation , Poor monitoring and evaluation, Scarcity utility, Less follow up of progress and improper site management for time overrun and Less productivity and inefficiency of equipment, Inflationary increase of materials price, Un periodic maintenance cost of machineries, Change of consultants for design, supervision and contract management, Late delivery of material on site, Unskilled personnel , Inefficient material management, Suspension of work, Low experience of project managers and Low experience of consultants for cost overruns.

Keywords: condominium project delay, client, contractor and consultant, time overrun, cost overrun

CHAPTER ONE: INTRODUCTION

This chapter deals with background of the study, significance of the study, scope of the study, limitation of the study, limitation of the study, objective of the study and organization of the study.

1.1 Background of the study

The construction industry is critical to a country's physical growth in order to promote other social and economic developments. This industry is regarded as a national economic locomotive (Naveenkumar and Prabhu, 2016). It is important for economic development not only because of its high jobs and income generation potential for a large number of people, but also because it makes major construction materials available locally, improving the economy of industry, trade, social services, and agriculture. The greater the degree of self-reliance, the more energy, engineering, labor, materials, equipment, and market trade are given from within the national economy (Rathi and Khandve, 2013). Since the construction industry buys goods and services from other businesses in other industries, it has grown into a large market (Arcila, 2012). This means that the construction industry will help to promote a more balanced distribution of the benefits of economic development, thus alleviating some of the issues associated with income inequality. As a result, not only does the construction industry contribute to national economic development, but it also has a huge impact on the performance and competitiveness of other industries.

Since 1991, Ethiopia's government has liberalized the economy, shifting from a state-controlled to a more market-oriented economy. In line with this agenda, the government devised a number of policies and initiatives aimed at transforming the country into a middle-income nation by 2025. GTP, one of the country's plans, is aimed at bringing rapid economic growth and assisting in the nation's transition to the desired higher level of economy (Construction contractors association of Ethiopia, 2013). Ethiopia is undergoing large-scale development efforts. Housing, roads, railways, lakes, airports, colleges, schools, and hospitals, as well as water supply and sewerage, power, and telephone lines, are all examples. The Ethiopian government now recognizes the construction industry's contribution to jobs, growth, and long-term development. Its promotion and growth has a huge impact on other industries' production and productivity.

UN-HABITAT (2011) specified, Addis Ababa is mostly categorized by low provision of inadequate housing development, overloaded housing that lacks basic services such as

potable water, electricity, sanitation and do not meet minimum standards of living. To overcome the severe housing shortage of Addis Ababa, constructing cost efficient condominium houses, establishing fair housing transfer system and timely delivery of houses to enable residents was an option put in place.

The government of Ethiopia has, therefore, planned and started facilitation of condominium housing program in the city since 2003 and financial source of those condominium house projects includes bank loan, city budget and down payments from beneficiaries of the project. The independent source of finance is Commercial Bank of Ethiopia (CBE) which provides funding directly to housing development program and loan service to the beneficiaries (Integrated Housing Development Program [IHDP], 2008).

Finally, the aim of this study is to assess and establish the applicability of previous studies on the factors that affect time delays and cost overruns in current projects. As a result, attempts are being made to identify the primary causes of time delays and cost overruns. In the housing construction practice of the Addis Ababa Housing Development Project Office (AAHDPO) in general and in Addis Ababa: project 6 Housing Development Project Office (AAP6HDPO) in particular; and forward reliable and timely possible solutions as a set of recommendations for future activities.

1.2. Statement of the Problem

Ethiopia is one of the fastest rising developing countries spending house construction program as an effort for development, work opportunity and infrastructure development (UN-HABITAT, 2011). Construction industry is very big, difficult, and needs huge funds' investments. Public construction projects in Ethiopia are parts of the country's development initiative. It shares considerable amount of the country's scarce financial resources. Mahamid (2013)

In Ethiopia, the construction industry is the highest recipient of government capital budget in terms of government development and investment program. Consequently, public construction projects consume an average annual rate of nearly 60% of the government's capital budget (Ministry of Works and Urban Development [MoWUD], 2006). Worku and Jha (2016) also noted that construction delays are common problems within projects in Ethiopia. According to Tekalign (2014), 79.06% of public construction projects failed to meet their objective in Ethiopia and resulted in average of 26.2% delay. Abdo (2006) states

94% of the public building projects have encountered delays. Moreover, the delays extended three times than actual plan and the average delay is found to be 89.9%. Similarly, Worku and Jha (2016) show that, in Ethiopia, only 8.25% construction projects have been finished in the original targeted completion date. The remaining 91.75% delayed three times than targeted contractual time.

From 18 projects in AAIHDP (2018) Project 6 housing development construction is one and it was started in June 2015. This project was to construct G+4 in 18 months and G+7 in 24 months. Although they were planned to be completed in 1 years to 8 months, 48 months elapsed with 89.24% performance. This delay is three times than schedule baseline. From 18 housing construction projects in Addis Ababa, Project 6 was chosen purposively for this study because it is the most delayed project when compared to its baseline plan and near to the researchers (AAIHPO, 2018).

From this, one can reason that project delay has negative implication on economy since they share significant amount of scarce resource of the country. Project 6 housing development construction shares considerable amount of the project's scarce resources. According to AAIHDP (2018) capital budget of project is Birr 881,529,529.05. But with this specified budget construction of this condominium house project is delayed three times than baseline plan. If the causes for the delay of such a project are not identified and the corrective project management decisions are not taken in time, the project may incur extra cost and extension of project time, which gives rise to dissatisfaction to all the parties, involved which nowadays is becoming a serious problem. Project 6 housing development construction cannot be an exception.

Although the cause of delay varies from project to project, since every project has its own unique characteristics; the multiple effects seem to be time overrun, budget overrun, poor quality, bad public relation, arbitration, litigation, disputes and claims and total abandonment. Therefore, this research intended to identify the real causes and effects of delay in Project 6 housing development construction.

Many studies have been done in this respect with a tool of Relative Importance Index (RII). However, relationship or correlation of causes and effects on delay of construction of condominium projects were uncovered.

A methodology that requires sound engineering judgment is needed for the effective implementation of construction projects and holding them within projected costs and schedules (Al-Najjar, 2008). Despite the extensive project management experience, delays

and cost overruns are an unavoidable part of most projects. The project's efficiency and progress are measured in terms of cost, time, and quality.

The Ethiopian housing initiative, like other construction projects, is plagued by time and cost overruns. Housing construction in Addis Ababa was not completed on time and budget due to a variety of reasons, as detailed in table 9 and table 12. Improving construction quality by cost-effectiveness and timeliness will almost certainly result in project cost savings. However, delays and cost overruns in housing developments continue to be a bottleneck to project completion. As a result, the aim of this research is to identify factors that contribute to time delay and cost overruns, as well as their impact on housing construction projects, and to make recommendations for reducing delays and overspending in Addis Ababa: project 6 Housing Development.

1.3. Research questions

The following are the basic research questions:

- What does the existing performance of project 6 housing development in terms of time and cost
- What are the Factors affecting time delay and cost overrun in construction of condominium projects in Addis Ababa: project 6 Housing developments?

1.4. Objectives of the Study

This study has the following general and specific objectives:

1.4.1. General Objective:-

The general objective of this study is to assess the main factors affecting time delay and budget over run in construction of condominium in Addis Ababa; project 6 housing development and possible mitigation strategies in project 6 housing developments.

1.4.2 Specific Objectives

The specific objectives of the research are to:

1. To assess the current status of construction condominium in Addis Ababa: project 6 housing developments.

2. To determine important factors affecting time delay and cost overrun in the construction of condominium in Addis Ababa: project 6 housing development.
3. To examine the extent the causes and effects had on the delay of condominium house of project 6.

1.5 Significance of the Study

In the Addis Ababa Condominium Housing Project 6, there are few records regarding the housing project. Previously, there were no well-documented research on factors influencing time delays and cost overruns in housing project construction. As a result, the aim of this study was to fill a knowledge gap in the literature about the factors that influence time delays and cost overruns in condominium housing construction.

The study is felt to be significant for the following reason:

- It is of the utmost importance for the company in question.
- It describes causes and solutions that contribute to construction time and cost overruns in condominium housing developments.
- Another important aspect of the analysis was that it enabled researchers to do more in-depth studies on condominium housing developments, and they were able to use this study as a source of knowledge as well as understand the potential causes of delay and come up with a solution by recognizing which causes needed more attention.

1.6 Scope of the Study

This research was conducted in Addis Ababa, Ethiopia, with a focus on the Project 6 housing construction. The factors influencing time delays and budget increases in condominium housing project development were the focus of this report.

- The research makes use of cross-sectional data from the study year.
- The analysis focused only on the client, contractor, consultant, and external factors that cause time delays and cost overruns in condominium projects.
- In Addis Ababa; project 6 housing development projects specifically from 2015 to 2020 G.C

1.7 Limitations of the Study

This research had some limitations that prevented it from successfully achieving its goals. The following were the study's main flaws:

• At the project office level, there is a lack of a well-organized and well-developed data system.

• Inadequate time to perform a large-scale analysis

• The respondents' working days have been shifted due to Covid 19 mitigation.

1.8 Terms and Definition

The definitions of terms given below are defined in the sense in which they are used in this paper.

A project: is a one-of-a-kind, short-term undertaking to accomplish a specific goal.

Housing: buildings or other shelters in which people live.

Condominium Housing: A style of living in multi-story buildings that accommodates several families in a single structure.

Condominium Housing unit: A single-family residence with a condominium building Construction Delay: The time it takes to finish a project after it was originally scheduled to be completed.

Consultants: The supervision operation is carried out by private architectural and engineering companies.

Contractors: Firms that are hired by the government to undertake the construction works of the housing units.

Stake holders: A person, group, organizations that has interest or concern in an organization include Client, Contractor and Consultant.

1.9 organization of the paper

This paper is divided into five parts. History of the study, statement of the issue, basic research problems, general and specific goals, the importance of the study, definition main words, scope and limitation of the study are all covered in the first chapter. The second chapter contains a literature review on time delays and cost overruns on the subject matter, which was compiled from technical articles, books, and internet searches, among other sources. It also includes an analysis that is philosophical, theoretical, and analytical in nature. The research design and methods are discussed in the third chapter. It covers the study design, methodology, target population, sample procedure, data sources and types, data collection methods, data processing methods, ethical considerations, and the validity and reliability of data collection instruments. The fourth chapter delves into data interpretation

and survey results discussion. The fifth chapter is divided into three sections: overview of results, study conclusion and recommendations to project main stakeholders.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

This chapter will focus on theoretical, empirical studies and conceptual framework to study the meaning, delay and overrun causing factors on construction projects. It presents the most important factors which cause delay in construction projects.

2.1 Theoretical literature review

2.1.1 Construction

The construction industry is critical to any country's growth. Buildings, highways, and bridges can be used to calculate a country's economic development (Fugar & Agyakwah-Baah (2010)). Various parties, procedures, different phases and steps of work, and a great deal of feedback from both the public and private sectors are all involved in the implementation of a construction project, with the main goal of getting the project to a successful conclusion Wang (1994). The success in carrying out construction project creation is measured by the quality of the respective parties' managerial, financial, technological, and organizational efficiency, while taking into account the related risk management, the market climate, and economic and political stability (Duncan 1990). As construction becomes more complex, Wang (1994) claims that a more sophisticated approach is needed to deal with initiating, preparing, funding, designing, authorizing, implementing, and completing a project.

According to (Duncan 1990) Contractors play a critical role in the completion of construction projects. Their key responsibilities begin when the project hits the implementation point, which is when the project's actual work is completed. When it comes to the building sector, project success is crucial. Client satisfaction and on-time completion are often used as performance indicators. The effectiveness of construction projects is determined by the ability of the construction project manager to fulfill his job functions with the expected efficacy.

According to Azeb (2016) a stakeholder is a person or community who has a stake in, or can affect, the construction project's success, whether they are within or outside the project. Construction projects may have a variety of stakeholders, but for the purposes of this article, the stakeholders are limited to contractors.

2.1.2 What is Project?

A project is a temporary endeavor undertaken to create a unique product, service, or result. Projects are temporary, but their deliverables may exist beyond the end of the project. Temporary means that every project has a definite start and a definite end. Moreover, once it includes the main constraints of the project, we determine time along with cost and scope which requires careful attention throughout the total project life cycle, throughout the planning phase, executing and monitoring and control before closing the project. Unique means that the product or service is different in some distinguishing way from all other products or services. For many organizations, projects are a means to respond those requests that cannot be addressed within the organization's normal operational limits.

In the words of Turner (1999), "a project is an endeavor in which human, monetary and fabric assets are organized in a novel way to embrace different scope of work, of given specification, inside limitations of cost and time, so as to realize advantageous alert characterized by quantitative and qualitative objectives."

As defined in A Guide to the Project Management Body of Knowledge (PMBOK® Guide, 2000), a project is a temporary endeavor embraced to form a different product or service. Temporary implies that every project has a definite starting and a definite ending. Unique means that the item or service is divers in few recognizing way from all other items or services.

Projects are attempted to fulfill targets by creating deliverables. An objective is defined as result toward which work is to be coordinated, a key position to be achieved, a purpose to be accomplished, a result to be gotten, an item to be produced, or a service to be performed. A deliverable is defined as any unique and verifiable product, result, or capability to perform a service that is needed to be produced to complete a process, phase, or project. Deliverables may be tangible or intangible.

Projects are attempted at all organizational levels. A project can contain a single individual or a group. A project can contain a single organizational unit or different organizational units from numerous organizations and their time ranges from a few weeks to more than five years. Projects are basic to the realization of the performing organization's commerce procedure since projects are a means by which plane is implemented.

A project has unique characteristics. The primary characteristic is project is one-time-activity which the core objective is to solve problem or to grasp an opportunity. Moreover, have

starting and ending point. The success of a project is highly affected by the involvement of a stakeholder. So, project need to be managed carefully. It is the roll and responsibility of a project manager to manage the project (PMBOK 2000)

2.1.3 Project Life Cycle

There are several different meanings that represent various industry practices. Pre-feasibility validation of concepts; feasibility (detailed investigation of viability); design; contract (procurement); implementation; commissioning; handover and service are the widely agreed steps.

The four broad, generic project phases (common alternative terms are shown in parentheses), as advocated by Archibald & Voropaev (2003), are widely accepted:

- Concept (Beginning, finding, and choosing.)
- Definition (feasibility, manufacturing, demonstrating, prototyping, and quantification.)
- Execution (As well as design/build/commission, installation, and testing, implementation, realization, production, and deployment.)
- End of the line (Finishing, including post-completion assessment.)

Dividing a large project into manageable chunks simplifies the difficult task of project management. These chunks are referred to as project phases, which can be further divided into sub-phases, and a compilation of these phases is referred to as a project life cycle. The completion of one or more deliverables marks the end of each project process. Despite the fact that many project life cycles have similar step names and need similar deliverables, few are identical. The majority of them have four or five stages, but some have as many as nine. Project life cycles can differ for sub-projects within larger projects.

Importantly, these phases are not always consecutive in nature but are more simultaneous. Though some representative project life cycles have been proposed by researchers, such as the waterfall model and Muench et al. al's spiral model for the software development life cycle, Morris' (1994) building project life cycle, and Murphy's (1989) representative life cycle for a pharmaceutical project.

According to Kulkarni et al. (2004), projects with a longer lifecycle are more likely to be successful. Depending on the functions, it is divided into several stages. The three well-known phases are used for ease and simplicity:

- Procurement phase: From inception to the financial closure and beginning of works (tendering; dealing with governments, lenders, insurers, pressure groups, experts)
- Execution phase: Execution of the Project (site installation till routine processes are reached, significant completion)
- Operation and handover phase: From the start of major construction to the end of the defect liability span and handover.

In each phases of a project life cycle needs proper way of management because to say project is successful each phases of the cycle must be monitor and control properly. To do this the project manager need to have a skill and knowledge of management and use different tools and techniques.

2.1.4 Project Management

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the suitable application and integration of the project management processes identified for the project. Project management empowers organizations to execute projects successfully and efficiently. PMBOK Guide (2017)

According to Kerzner (2009), project management is the organizing, arranging, directing, and managing of company resources for a relatively short-term mission with clearly defined goals and objectives. Project management criteria are influenced by the project's size, scope, urgency, importance, and novelty. Independent businesses, particularly those vying for the same resource, have more stringent requirements. [José R. San Cristóbal1, Luis Carral2, Emma Diaz3, José A. Fraguela3, and Gregorio Iglesias4] [Year 2018]

According to the project management handbook, a project has four processes: are initiations to planning, planning to controlling, controlling to closing as show in the figure below.

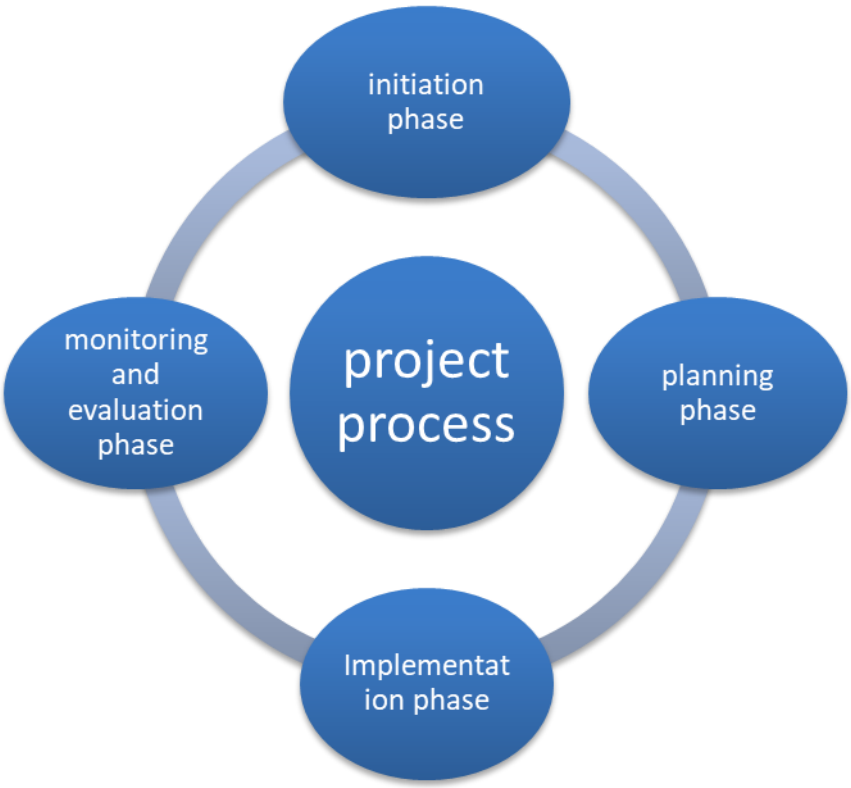

Figure 2.1, project process. Source (Yeshi y., 2021)

2.1.5 Project management knowledge areas

According to A Guide to the Project Management Body of Knowledge (PMI, PMBOK® Guide, 2000), a project is a temporary undertaking undertaken to create a new product or service. The term "temporary" means that each project has a start and finish date. A product or service that is "special" is one that stands out from all other projects or services in some way. According to PMI (2013), each project discusses ten project management expertise areas, which represent a range of competency skills and processes that the PM must properly utilize during the life cycle (Richardson, 2015). The following are some examples:

- **Project cost management: -** To ensure that the project stays within the approved budget, processes such as planning, cost estimating, budgeting, financing, funding, managing, implementing, and tracking costs must all be followed.
- **Project time management:**-The time management process includes the procedures for monitoring the project's timely completion.

- **Project scope management**: - It refers to the processes that must be followed to ensure that the project includes all of the work required to be completed successfully, and only the work required.
- **Project quality management**: - The product and project quality processes are described in detail.
- **Project human resource management:**-Project human resource management focuses on tasks related to the project's human aspect (Richardson, 2015), so it offers strategies for coordinating, managing, and guiding the project team (PMI, 2013).
- **Project procurement management**: - It refers to the processes for receiving products, services, or outcomes from outside the project.
- **Project stakeholder management**: - Determine which individuals, groups, or organizations may have a positive or negative impact on the project; evaluate stakeholder priorities and their impact on the project; and develop acceptable management strategies for effectively involving stakeholders in: The quality assurance processes for both the product and the project are outlined in detail.
- **Project Communication Management**: - Ensure that project data is produced, collected, disseminated, processed, and disposed of in a timely and acceptable manner. This method includes contact planning, knowledge sharing, performance monitoring, and administrative closure.
- **Project Risk Management**: - is in charge of identifying, evaluating, and reducing project risk. Risk evaluation, qualitative and quantitative risk analysis, risk response preparation, and risk monitoring and control are all covered.
- **Project integration management**: The processes and activities for recognizing, describing, integrating, unifying, and organizing the various processes and project management activities are included in the Project Management Process Groups (PMI, 2013). As a result, project management knowledge is becoming more valuable across the project life cycle.

The paper focuses on and seeks to discuss project time management and project cost management, which are more closely related to the paper's target, from these information fields.

2.1.6 Project time

The time it takes to complete a project from start to finish, from site handover to completion, according to Sunny and K. Baker's 2003 definitions. The word "duration" refers to the time it takes to complete a project from start to finish, which is usually expressed in days. The most important aspect of the procedure is calculating the length of duties. Clough describes it as the project's duration on the contract's due date, or the provisional completion dates required for phases of the work, according to Clough, 2000. A housing project's failure to finish on time can be caused by a number of causes, both predictable and unpredictable.

To complete a project on time and on budget, each phase of the design and implementation process, from the feasibility assessment to the contractor handing over the finished project to the client, must be meticulously planned to avoid delays, disagreements, and unexpected additional costs. FIDIC is an acronym for the International Federation of Insurance Companies (FIDIC, 2005).

2.1.7 Project Time management

Project time management is the effective and efficient use of time to allow project execution, which starts with project planning, scheduling, and deadline monitoring. The processes that must be followed to ensure that the project is finished on time are referred to as project time management (Jemal, 2015).

The following are brief summaries of the major project time management processes as described by the PMBOK.

- Activity definition; determining the precise tasks that must be completed in order to achieve the various project deliverables.
- Activity sequencing; Interactivity dependencies must be identified and recorded.
- Activity duration estimating; calculating the number of work periods required to complete individual activities.
- Schedule development; analyzing activity sequences, activity durations, and resources requirements to create the project schedule.
- Schedule control; controlling changes to the project schedule.

2.1.8 Project management tools and techniques

Project management methods are mainly intended to apply experience, knowledge, resources, and techniques to organize projects in order to meet project goals (PMI, 2013). In the literature, the importance of project management techniques and tools in achieving project

objectives and expectations has been well established (Milosevic, 2003, Murphy and Ledwith, 2007). Project management principles, for example, have been shown to be extremely useful in managing and controlling project operations (Murphy and Ledwith, 2007) some of the tools and techniques described and discussed are listed below.

Bar Chart: - It's the most straightforward way to plan, organize, and manage a project. It graphically or tabulated displays the regular and cumulative costs over a specified time period. The general contractor creates a bar map when a project with routine completion or consistent results is awarded. Each bar represents the beginning, duration, and completion of a particular project section. When the bars are added together, they form a project timeline.

Line-of-balance (LOB):- the LOB technique was originated by the Goodyear Company in the early 1940's and was developed by the U.S. Navy in the early 1950's. The technique is widely used for repetitive unit projects such as railroad tracks, roads and tunnels.

Critical Path Method (CPM):- is a tool for determining the amount of scheduling flexibility on the logical network paths within the schedule model and estimating the minimum project time. By conducting a forward and backward pass analysis via the schedule network, this schedule network analysis methodology measures the early start, early end, late start, and late finish dates for all operations without consideration for any resource limitations. (PMBOK, 2004)

Critical Chain Method (CCM):- is a scheduling approach that requires the project team to add buffers to any project schedule path in order to account for limited resources and project risks. It is based on the critical path method and takes into account the effects of resource allocation, resource optimization, resource scaling, and operation period variability on the critical path. (PMBOK, 2004)

Precedence diagram method (PDM :-In addition to the conventional Finish-to-Start relationship, the activities on nodes (AON) or boxes network mechanism goes beyond the critical path approach by including other interactivity relationships such as Start-to-Start (SS), Start-to-Finish (SF), and Finish-to-Finish (FS). It also allows "lags" or "leads" (negative "lags") to be added between tasks.

2.1.9 Definitions of Time Overruns

One of the most serious problems in the construction industry is time overrun. Time overruns occur with any construction project, and the magnitude of these delays varies widely from

one project to the next. It is important to determine the exact causes of time overruns in order to minimize and avoid delays in any construction project. Construction projects that are not completed on time are known as time-overrun projects. According to (Naveenkumar and Prabhu) (2016) Time overrun is described as a delay in the completion of a project that can be traced back to the contractors.

According to Scott (1991), time is the amount of time it takes to complete a project according to the timeline. The length of a project is determined by its design, form, and size. Quality is often related to time, and it is impossible to obtain high quality in a short period of time. In this thesis, delay is defined as the time taken to complete the project beyond what was originally planned.

$$\text{Time Overrun (\%)} = \frac{\text{Actual time Spent} - \text{Estimated planed time}}{\text{Estimated planed time}} * 100 \text{----------Eq.1}$$

2.1.10 Definitions of Cost Overruns

Cost overruns are common in the construction industry. Only a small portion of projects are completed on schedule and within budget. Cost overrun refers to the amount by which actual costs exceed the baseline or agreed-upon costs. According to (Memon, March 2013) "Cost escalation," "cost increase," and "budget overrun" are all terms used to describe cost overrun. Cost overrun is also described by Memon as a percentage of actual costs over the project's projected costs, as shown below.

$$\text{Cost Overrun} = \frac{\text{Actual Cost} - \text{Estimated Cost}}{\text{Estimated Cost}} * 100 \text{ ----------Eq.2}$$

Actual costs are those that are both actual and paid for.

2.1.11 project Cost management

Project cost refers to the financial effort required to manufacture a construction product, such as a house. To summarize, the total amount of money required to complete all project activities is known as the project cost (Jemal, 2015).

Estimating, scheduling, gathering and analyzing cost data, and finally implementing measures to resolve construction cost problems are all part of the construction cost management process (Nega, 2008). Cost control is used to align the scope, quality specifications, and budget during the planning, design, and construction phases of a project.

The following three steps can be summarized as part of the approach:

- Define the scope, the required level of quality, the completion time, and the budget.
- Ensure that the scope, quality, time and budget are aligned,
- Throughout the life of the construction project, keep an eye on the balance of these elements.

The process of project cost control starts with the selection of the owner's goals and ends when those goals are reached. In Ethiopia, a similar study revealed significant delays in construction projects (Zinabu, 2016). Different factors make it difficult to maintain effective time management. According to Olawale and Sun (2010), the following are the top five factors that obstruct successful project time management, in order: Changes in design, inaccurate project time/duration estimates, job difficulty, project risk and uncertainty, and poor performance by subcontractors and nominated suppliers are all factors to consider.

Kasimu and Abubakar (2012) discussed a delay study they conducted in the Nigerian construction industry, identifying the top five factors that affect delay in ascending order as improper preparation, lack of effective communication, design errors, steel and concrete shortages, and slow decision making. Mengistu (2010) argues that project controlling supporting techniques and software are not well implemented in the Ethiopian construction sector for the management of real and planned operations, and emphasizes the importance of project personnel training. Similarly, Abadir (2011) discovered that project time management is the most important of the project information areas in Ethiopia, with just 24% of projects handled well.

2.1.12 Definition of Delay

The term "delay" has been described in a variety of ways by numerous academics. Delays are defined as events or occurrences that affect the time required to complete a particular task. Assaf and Al-Hejji (2006) defined construction delay as the time over run either beyond completion date specified in a contract or beyond the date that parties agree upon for delivery of a project . It is slipping over its planned schedule and is considered as common problem in construction projects. Delay was also defined as an “act event which extends required time to perform or complete works of the contract manifests itself as additional days of work” by Zack (2003).

Construction delays can be described as the late completion of work relative to the scheduled or contract schedule (Kang sikwei (2010). Pickavance Keith (2005) describes the term

‘delay‘ as anything occurring at a later time than anticipated, intended, defined in a contract or beyond the deadline that the parties decided upon for the completion of a project. Construction delay is defined as the times overrun either ahead of end date specific in a contract.

A project is said to be delayed if it takes longer than expected and lags behind schedule. Owing to the delay in building, the owner will lose money due to lower efficiency, a rentable void, or dependence on existing facilities. Longer work periods cause construction delays, which affect contractors by increasing overhead costs, material costs, and labor costs through price increases. Delay is described as causing things to happen later than planned or failing to act in a timely manner (Assaf and Al-hejii, 2006). In another report, Mohammed (2012) described construction project delay as the difference between the baseline construction plan or contract schedule and the actual progress or completion of work.

In general, the above definitions of delay can be summarized as time extension, work slowing down, project slipping, beyond completion date, beyond date of agreement, and late in progress over the baseline schedule.

2.1.13 Type of delay

Delays are almost always unavoidable in construction projects that must be finished according to a schedule. Delays can be classified into two groups in terms of responsibility: excusable and non-excusable delays (Raykar and Ghadge, 2016). These two main categories of delays can be further classified into six types of delays: compensable, non-compensable, concurrent, non-concurrent, essential, and non-critical. Delays can take many forms (Vidalis et al, 2002 as cited in Al-Najjar, 2008). On the project phase, the types of delays may come from both internal and external sources. The owner's internal causes of delay are among the internal causes of delay. External causes of delays are originated from outside of construction projects.

2.1.13.1 Excusable and non-excusable delays

There are two types of delays: excusable and non-excusable. An excusable delay is one caused by an unforeseen incident outside the control of the contractor or subcontractor. There are two types of delays: compensable and non-compensable. If the delay is considered compensable, the contractor may be entitled to additional financial compensation as well as additional project time. When non-compensated excusable delays arise, the contractor is given additional time but not additional money for the additional work done. Excusable

delays are referred to as "force majeure" delays and are often referred to as "acts of God" because they are not the fault or liability of any one person. Most contracts enable the contractor to request an extension of time, but not additional money, in the event of unavoidable delays. General labor strikes, explosions, floods, and Acts of God, according to Mustafa (2008), are all examples of excusable delays. Non-excusable delays are those that occur due to circumstances outside the contractor's control or that are predictable. There are only a few instances of unforgivable delays. Unfair labor practices may also cause construction projects to be delayed.

2.1.13.2 Compensable and non-compensable delays

Excusable delay can be divided into compensable and non-compensable delay. Delays that are compensable are unforeseeable and beyond the contractor's influence. Both time extensions and extra payments are available to the contractor. The administration, direct modifications, job suspension, and critical criticism are all possible causes (Raykar and Ghadge, 2016). In non-compensable delay, neither the owner nor the contractor is responsible for delay.

2.1.13.3 Concurrent and non-concurrent delays

Multiple factors may cause a construction project to be delayed at the same time or for a period of time are called concurrent delays (Alaghabari et al, 2007). When two or more delays occur at the same time or coincide, this is known as concurrent delay. If both the owner and the contractor are to blame for the delay, this occurs. When one occurrence induces a delay at the same time as another, this is known as concurrent delays. For example, if a project owner refuses access to a project site for two weeks, and a major storm stops a contractor from working on the project for either or more of those two weeks, there is a breach of contract (Mustafa, 2015).

2.1.13.4 Critical and non-critical delays

Delay claims that have a significant impact on growth, time, and payments are known as critical delays. Non-critical delays have little bearing on the project's completion date. They have an effect on subsequent events that are not on the schedule's vital course. When there isn't a float in the calendar, this will cause events to be pushed back. (Abdul-Rahman et al, 2006)

2.2 Empirical literature review

Delay factors in construction projects

Failure to finish a building project on time can be caused by a number of causes. There are four different types of roots for these factors.

2.2.1. Contractor related factors

Contractor-related considerations, according to Abdella and Hussien (2002), include site management, poor preparation, and insufficient contractor expertise, as well as mistakes during design, improper methods, and delays caused by subcontractors .Subcontractor delays are included in the contractor's reasons since the latter is entirely responsible for the delays incurred by his subcontractors. Ahmed et al. (2003) and Alaghbari (2005) listed the following reasons that could trigger delays in construction projects involving contractors. These include delays in equipment supply to the job site, a scarcity of supplies on the job site, construction errors and faulty jobs, inadequate labor qualifications and experience, a labor shortage, low labor quality, financial issues, communication issues with others, and a lack of subcontractor expertise. lack of site contractor‘s staff, poor site management, equipment and tool shortage on site.

Contractor-related factors include the contractor's technical staff's lack of qualification, skills, and experience, the contractor's poor control of subcontractors (relationships, payments...), the contractor's cash flow issues, the contractor's slow preparation of change order requests, the contractor's poor project planning and scheduling, and poor site management and supervision, inadequate building methods used by the contractor, material quality issues, delays in site procurement, shortages of construction materials, machinery availability and failure, delays in preparing shop drawings, delays in inventory delivery, difficulties receiving work permits from the relevant authority, and low manpower productivity. One of the contractor's contract obligations is to complete the work by the deadline stated in the contract documents; however, if he fails to do so by default, he must pay the owner as liquidated loss. (Frics, 1995)

2.2.2 Consultant related factor

A consultant is a business that integrates the services of a designer/architect and a supervisor engineer. An architect is an individual who plans and designs buildings as well as, the landscaping that surround them. Engineer is a term used to describe a person who works on

the architecture or other aspects of the design or construction. The consultant engaged in a building project can affect the progress of construction programming through various monitoring measures such as issuing certificates, and endorsing the satisfaction of certain activities in the construction process. Progress delay can happen if these monitoring measures are not implemented properly. Until construction programming will move forward, consultants are given the authority to certify that certain processes, such as planning, piling, steel fixing, and key material consistency, have been met .As a result, the reasons that are linked to the consultant's obligation are the absence of the consultant's site staff, the consultant's lack of experience, the consultant's site staff's lack of experience (managerial and supervisory personnel), delayed and slow monitoring in making decisions, missing records, The slowness at which orders are given, as well as the lack of or inaccurate design details, are major factors in project delays. (Al- Najjar, 2008).

According to Odeh & Battaineh, 2002, consultant related factors of delay are poor qualification of consultant engineer‘s staff assigned to the project, delay in the preparation of drawings, delay in the approval of contractor submissions by the consultant, poor communication between the consultant engineer and other parties involved, poor planning and coordination by the consultant engineer with other parties involved, delays in performing inspection and testing by the consultant engineer, slow response from the consultant engineer to contractor inquiries, Inadequate design specifications and poor contract management.

2.2.3 Client related factor

Odeh & Battaineh, (2002), stated some factors that are related to client, and these are delay in furnishing and delivering the site to the contractor, unrealistic contract duration, delay in the settlement of contractor claims by the owner, suspension of work by the owner‘s organization, delay in issuing of change orders by the owner, slow decision-making by the owner‘s organization, interference by the owner in the construction operations, uncooperative owner with the contractor complicating contract administration, delay in progress payments by the owner, owner‘s poor communication with the construction parties and government authorities, owner‘s failure to coordinate with government authorities during planning, poor coordination by the owner with the various parties during construction and excessive bureaucracy in the owner‘s administration.

The client may be influenced by the following factors, according to Ahmed et al. (2003) and Alaghbari (2005). Contract modifications (replacement and inclusion of new work to the

project, as well as improvements in specifications) and financial difficulties due to a lack of working experience, inefficient decision-making, inadequate communication with vendors, and contract modifications (replacement and addition of new work to the project, as well as adjustments in specifications) (delayed payments, financial difficulties, and economic problems)

2.2.4 External related factors

A construction project may be postponed for a variety of reasons. Some researchers have identified the following factors as leading to construction project delays. Lack of resources on the market, lack of equipment and facilities on the market, poor weather conditions, poor site conditions (location, land, etc.), and poor econometric conditions are some of the conditions that contributed to external factors. Changes in laws and legislation, delays in transit, and the work of state bodies such as airports, infrastructure, and public facilities on the outside are also factors to consider (Alghbari et al, 2007).

Lack of supplies on the market, facilities and personnel on the market, inclement weather, bad site conditions (location, property, etc.), changes in legislation and regulations, shipping delays, and additional work relating to government agencies (roads, infrastructure, and public services) are all listed as external factors by Ahmed et al. (2003) and Alaghbari (2005).

Construction delays are caused by a variety of causes, including unforeseen ground hazards, unexpected geographical conditions, problems with neighbors, suddenly bad weather, war, campaign, and general enemy, poor weather conditions on the job site, traffic control and restrictions on the job site, and fluctuations in the price of materials. According to Odeh & Battaineh. (2002). I will summaries causes of delay by the context of Addis Ababa building construction in the table below.

Table 2.1 Summarized causes of delay

No	**Related to**	**Causes of delay**
1	Client	Interference of owner during construction time Improper feasibility study Poor communication with government authorities Financial problem Delay in preparation of the site Unrealistic contract duration Slow decision making Delay payment
2	*Consultant*	Poor communication with the design engineer Delay in approval for progress Poor site investigation Delay in performing inspection and testing Lack of experience Preparation and approval of drawing Mistake in design document
3	*contractor*	mistake during construction Subcontractor delay Poor skill and experience of labor Financial problem Poor site management Ineffective scheduling Poor method of construction Conflict between contactor and labor Turnover of subcontractors
4	External	Lack of material, tool, Equipment Poor weather condition Change in law and regulation Socio political and economic factor delay in obtaining permits from local authority poor site location Unreliable suppliers External work due to public agencies (road, utility, public service)

2.3 Conceptual frame work

The aim of this section is to include a summary of the major causes of delay. The researcher conceptualized the potential causes of delays at a reasonably broad level, based on theoretical and empirical investigation, and is depicted Figure 2.2

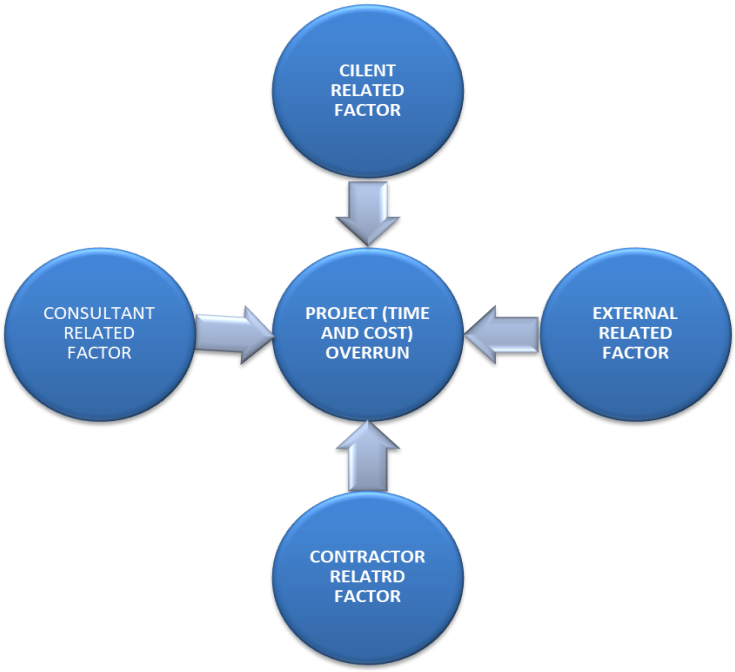

Figure 2.2, Conceptual frame work.

CHAPTER THRE: RESEARCH METHODOLOGY

This chapter explains the analytical approach that was used, as well as how the analysis was carried out based on the study's goal. It is important to have a well-designed research methodology because the methodology has a direct impact on the quality and usefulness of a study. It covers the study design, methodology, target population, sample procedure, data sources and types, data collection methods, data processing methods, ethical considerations, and the validity and reliability of data collection instruments.

3.1 Research Approach and Design

In this study, mixed method research approach was used to capture both qualitative and quantitative data. The qualitative method was used to support the quantitative data. This method was used for triangulation of qualitative with quantitative methods and to increase the perceived quality of the research.

According to Cooper (2014) any researcher can use diverse strategies in his/her research or more than one design at a time. This means different research designs can employ at a time, in single study. This research employed one types of designs such as explanatory design. And the type of delay for this study was critical and non-critical delays.

3.2 Sampling selection procedure

Stratified sampling procedure was applied to separate the experts and management of client, consultants and contractors in the project team. From those strata of experts and management sampling frame of the study was selected by using simple random sampling. This means, each member of the strata has an equal chance of being included in a sample by using probability proportionate that have worked directly in the project construction. Stratified sampling was selected because there were different characteristics among teams of client, contractors and consultant. However, there were similarities between each team members in the strata.

3.3. Sources and Types of Data

By conducting cross-sectional questionnaire studies, interviewing technical expert's staffs working in project 6 housing developments as key information, and personally visiting condominium housing sites, the analysis used both primary and secondary sources of data, as well as both qualitative and quantitative data. Questionnaires as well as receiving the strategic

plan from construction of condominium project 6 housing developments and its current implementation.

Questionnaire, interview, and observations are used as primary data sources to determine factors that influence time and cost overruns in the construction of housing. Secondary data gathered from both released and unpublished documents, including: study papers, journal articles, related books, project reports that have been completed, different thesis, and website.

3.4 Target population

The participants were project office staff, project managers, client, contractors, consultant, supervisors, and Forman from the construction of condominiums in Addis Ababa: project 6 housing development (Bereket site, wetader sefer site, Jemo Gara site and Fanuel site). The study's participants are clients, contractors, and consultants who are currently working on the construction of a condominium in Addis Ababa's Project 6 housing development, with a total of 131 project team members.

3.5 Determining the sample size

Project 6 housing development projects three time delay from baseline plan was the delayed of the 18 housing construction projects in Addis Ababa. The sample size was calculated using the statistical formula given below. This was done to predict the number of questionnaires that will be provided to respondents based on the study's population and response rate.

When the population is less than 1000, we can test 30 percent of the total population. In the case that the population is greater than 1000, a sample size of 10-20% can be used as a population agent (Gay and Airasian, 2003). As previously mentioned, this considers had a total population of 131 people. As a result, the test measure was determined by the equation below.

$$n = N*0.3 \text{ ---------- } (3.1)$$

Where

- n is the sample size of the study
- N is the population size and team members who were working as consultant, contractor and client in Project 6 housing development construction and
- 0.3 represent 30% of population size .When this is applied to equation (3.1)

  n= 131*0.3= 39

Table3.1 Sample size summary of each team

No	Stakeholders responding in project 6	Total employees	Sample size of the study
1	Client	75	22
2	Consultant	12	4
3	Contractor	44	13
Total		*131*	*39*

This study's sample size is 39 project team members, as calculated by a simple formula (Gay and Airasian, 2003). Data collection, questionnaires, interviews, and observation were used to assess the sample size.

3.6 Methods of data collection

The essential data were calm by using a questionnaire. A questionnaire was established to assess the factors affecting time delay and cost overrun in construction of condominium houses in Project 6. 56 structured questionnaires was prepared in English and translated to Amharic to collect the required information. The questionnaire was divided into three parts. The first part contained of questions about the overall profile, information and background of the respondents. The second part included of questions about the major and important factors affecting construction of condominium project 6 delays. The third part concentrated on the most important and major effects of construction delay. The questionnaire was designed to be close ended questions. These types of questions had a number of choices of possible answers and the respondents to select whatever they feel was most appropriate.

The purpose for selecting a questionnaire in this research was because it has a merit of giving adequate time for informants to respond. It also allowed easily approaching respondents and reaching them conveniently and it is economical. Similarly, the closed ended questions were also selected because they were easier to assess and help them answer considering how busy the respondents were.

In addition, unstructured one-to-one interview was conducted with five purposely selected participants from sample size of the study. The respondents of interview were major contracting parties from consultant, contractor sand client who participated at different

responsibility levels in the construction of Projects 6. Interview participants were drawn from those who filled in the questionnaire for the reason of triangulating the data and to collect reliable and firsthand information. They assumed management positions. The interview was done after the questionnaire. Since the interview was face to face it helped the researcher to get more information about Project 6. The researcher had enough time to work on the questionnaire until the members of management confirmed their availability.

3.7 Methods of data analysis

Specifically, to analyze the qualitative one, thematic analysis (i.e., summarizing and categorizing comments or opinions of the respondents on the basis of their majority of similarities and to analyze them thematically) was applied to analyze and explain the results of the interviews and discussion.

And the quantitative one has been analyzed based on all collective response of groups of respondents (contractors, consultants and owners) in order to obtain significant results. The data were analyzed by calculating the relative important index model to rank the hypothesized factors based on their importance and frequency which is derived from the views of the respondents of the three groups.

The data gathered through the questionnaire's closed-ended questions was analyzed using explanatory statistics. Calculating the Relative Importance Index (RII) and ranking factors in each group based on the Relative Importance Index.

$$RII = \frac{\Sigma Wi}{A*N} = \frac{5\,n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{5*N} \quad \text{.....equation 3.3}$$

Where

W = Respondents' weighting of each factor, which ranges from 1 to 5, with 1 indicating 'strongly disagree' and 5 indicating strongly agree.'

i = Index of answer categories (frequency of response given for each cause)

A = the highest weight (in this case, 5)

N= the total number of people who responded.

3.8 Reliability test and validity

The reliability test is used to verify the accuracy and stability of documents using the Cornbrash alpha process, which is widely used. The Cronbach's alpha coefficients indicate the degree of inner or internal reliability, or how closely a group of items are associated.

Cronbach's alpha is a coefficient of reliability or accuracy, not a statistical test, according to the official definition. According to the correlations between the objects, Cronbach's alpha values ranged from 0 to 1. In most social science research contexts, values above 0.70 are considered "rational" or “acceptable”. Cronbach alpha was calculated using the statistical program SPSS version 20 in this report. Cronbach's alpha is a function of the number of test items and the average inter-correlation between them. Cronbach's coefficient alpha values for both time and cost overruns variables, as well as the entire data, are greater than 0.70. As a result, a higher value indicates a higher level of internal consistency.

Cronbach’s alpha is calculated using the following equation 3.2 (Boermans & Kattenberg, 2011.

$$\alpha = \frac{I}{I-1}\left(1 - \frac{\sum_{i=1}^{I}\sigma_i^2}{\sigma_X^2}\right)$$ ---------- [Eq.3.2]

Where I = the number of items in the scale.

σi2 = the variance of item i, and

σ2X = the variance of the observed total test scores

Table 3.2: Reliability test for time delay factors

Category of time overruns Factors	Cronbach’s alpha value
Client related factor	0.822
Contractor related factors	0.743
Consultant related factors	0.862
Project related factor	0.713
External factors	0.732
Overall Cronbach’s alpha value	0.890

Table 3.3: Reliability test for cost overruns factors

Category of time overruns Factors	Cronbach's alpha value
Material related factor	0.707
Equipment related factors	0.781
Labor related factors	0.945
Contract management related factors	0.745
Overall Cronbach's alpha value	0.830

3.9 Correlation test

Spearman's Coefficient of Correlation

The Spearman rank correlation coefficient was calculated to investigate the strength of the relationship between two sets of rankings. The Spearman rank correlation coefficient is used to compare the rankings of two classes of respondents who scored different factors (i.e. clients versus consultants, clients versus contractors, and consultants versus contractors). Equation 3.4 is used to measure the Spearman rank correlation coefficient. Spearman's coefficient of correlation (or rank correlation) is analyzed using the give formula (Kothari, 2004).

$$\text{Spearman's coefficient of correlation (or } r_s) = 1 - \left[\frac{6\sum d_i^2}{n\left(n^2 - 1\right)}\right] \quad \text{---------- [Eq.3.4]}$$

Where, di = difference between ranks of i_{th} pair of the two variables;

n = number of pairs of observations.

rs = Spearman rank correlation coefficient; (-1 < rs > 1)

3.10 variable measurements

Ordinal scales were used in this study. Ordinal scale is a ranking or rating system that uses integers in ascending or descending order to rank or rate data. The numerical value assigned to the degree of influence did not imply that the intervals between scales are equal, nor did it imply absolute quantities. They're all stickers with numbers on them. The factors were rated on a scale of 1 to 5, with higher scores indicating strong agreement and lower scores indicating strong disagreement. On a 5-point Likert scale, respondents demonstrated their

degree of agreement with each evaluative argument regarding construction project time and cost overruns. The researcher did this analysis by using criterion validity measurement method to check validity of the instrument before distrusting the questionnaires. This analysis used the following format, as shown in table 5, based on the Likert scale. Although the item scores are discrete, a Likert scale is considered to be an interval scale.

Table 3.4: variable measurement using Likert's scale

Item	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Scale	5	4	3	2	1

3.11 Research Ethical Consideration

When performing research, it is important to follow ethical guidelines. St. Mary's University wrote a letter of cooperation to the researcher. The researcher was able to conduct the research and approach the informants thanks to this text. The study's objectives were explained to the participants, with the emphasis that the data would only be used for the study's intended academic purpose. Respect for the study subjects' rights, wishes, and values, as well as data confidentiality and acknowledgment of sources of information, were all carefully considered.

CHAPTER FOUR: DATA PRESENTATIONS, ANALYSIS AND INTERPRETTATIONS

This chapter explains how data is collected, including how the questionnaire is distributed, how responses are collected, and how the data is analyzed using responses from practitioners working for the client, consultants, and contractors who are interested in the development of condominium housing projects. A questionnaire survey was conducted to collect the necessary data from professionals involved in the construction of condominiums in Addis Ababa: project 6 housing developments. Working was behalf of a client, consultant and contractor to address a fundamental research question.

4.1 Questionnaire Response Rate

The questionnaire was prepared and circulated to three contracting groups, namely contractors, clients, and consultants, who are currently working on the project's 6 housing construction sites, both in person and through technical means. The project owners, consultants, and contractors involved in the construction of condominium project 6 housing developments have unique responsibilities and assignments, all of which are critical to the project's success. As a result, the study focused on the three major parties. By considering the respondents' role in the project, thirty-nine (39) questionnaires were distributed to the parties

Client: - A total of 22 questionnaires were sent out to customers, and 22 were returned and estimated valid for review. This accounts for 56.41% of the total number of questionnaires submitted to the Client.

Consultants: - A total of 4 questionnaires were sent out to the consultants, and 4 of them were obtained. This accounts for 10.26% of the total number of questionnaires sent to consultants.

Contractors: - Architects, engineers, and contractors Out of a total of 13 surveys sent out, 33.33 percent were returned and found to be important. It was possible to achieve a reaction rate of 100% in general. The response rate is shown in the following table.

Table 4.1: Number and percentage of questionnaires distributed, returned and response rate

Contractual Parties	Questionnaire distributed	Questionnaire responded	Response Rate
Client	22	22	56.4%
Contractor	13	13	33.3%
Consultant	4	4	10.3%
Total	39	39	100%

4.2 characteristics of respondents

Table 4.2: characteristics of respondents

characteristics of respondents	frequency	**percent**
respondent's sex		
male	22	56.41
female	17	43.59
Respondent's educational level		
diploma	2	5.13
BSC	25	64.1
MSC	12	30.77
Work experience of respondents		
<4	8	20.51
4-8	23	58.9
9-12	7	17.59
>12	1	2.56
Respondent title in the company		
Project managers	6	15.38
Site engineer	14	35.9

Office engineer	17	43.59
Forman	2	5.13
Usage of software packages in the organization.		
yes	29	74.36
no	10	25.64

The study discovered that there were more males than females among the 39 respondents working on the condominium project 6.

Table 4.2 indicates that (25) 64.10 percent of those who responded to the survey had a bachelor's degree and (12)30.77 percent had a master's degree. The rest of the respondents had credential certificates, with (2) 5.13 percent holding a diploma. As a result, the survey shows that more trained experts, who are expected to have more in-depth knowledge of the problem, were well-represented.

The findings indicate that of the 39 questionnaires returned, 8 (20.5 percent) had less than 4-years of work experience, 23 (59) percent had 4-8 years of work experience, 7 (17.9) percent had 9-12 years of work experience, and 1 (2.6) percent had more than 12 years of work experience. This demonstrates that the outcomes will be reliable. The overall profile suggests that the majority of respondents have sufficient experience working in construction firms. This means that the respondents were able to provide all of the relevant details for all of the questionnaire's questions.

In terms of project respondent titles, 6 (15.38 percent) project managers, 14 (35.9 percent) site engineers, 17 (43.59%) office engineers, and 2 (5.13 percent) Forman participated in the survey. According to the percentage distribution of the different professionals, the majority of the questionnaires were filled out by professionals directly involved in the condominium construction project. The majority of the respondents are office engineers and site engineers, who are responsible for the majority of the legally binding issues and venture consulting and have a lot more experience with the research subject. Construction workers in practice understand the importance of time and cost management. According to the results of this study's questionnaire survey, only 74.4 percent (29) of respondents often apply time and cost

controls in their programs controls, while 25.64 percent (10) do not used. In the project 6 housing development, the majority of the respondents used software packages in the construction of condominiums.

4.3 Discussion section

4.3.1 Information of interview

A qualitative standardized interview was used to perform the interview. The aim is to investigate further into the hot topics that emerged from the questionnaire survey and practitioners' experiences. The same demographic was used as in the quantitative stage of the study. Three professionals interested in the construction of housing were available for interviews. The first question sought to determine if construction time and cost overruns are considered an issue in housing construction in Addis Ababa's housing development projects. Time and cost overruns in housing construction projects are big issues that need to be resolved quickly, according to 100% of respondents.

More detail on each of the interviewees can be found in Table 4.3. The interviewees were a combination of contractors, clients, and consultants with common housing project backgrounds, as seen in the table.

Table 4.3: Information of interviewees

Organization Type	Roles	Experience (years)	Interview time (in Min.)
Client	Project manager	10	15
Contractor	Site engineer	6	20
Consultant	Office engineer	4	30

Table 4.3 shows that the interviewed respondents have 4 to 10 years of experience managing housing construction projects. Housing construction projects took a long time to complete, according to all respondents; they took more time and cost used more money.

Financial, commodity price fluctuation, scarcities of material, hard copy sign (office to office, managers to managers) and low expertise manpower issues are the most pressing issues listed by respondents. And if there are project overruns at this time, there are no special measures or programs in place to quantify the overruns factors and reduce their effect on the projects.

The covid 19 outbreak, the project was delay special from 2011 to 2013 EC half. These overrun issues are overwhelming the entire project's operations, resulting in additional project costs. This overruns have long-term consequences on both the Project 6 housing development and the city as a whole. The bellows are some of the issues that the respondents decided on: social, economic, and political issues that need to be addressed: When a project's duration increases, the cost of the project rises as well. As a consequence, the project budget limitation has been found in practice. Delays in transferring houses to beneficiaries cause a loss of confidence and faith in the city government, which is a social issue. Political issue: As a result of project overruns, rent seeking and poor governance take the lead, resulting in civil instability such as strikes and other issues.

According to the participants' comments, the Addis Ababa Housing Development Project 6 Office (AAHDP6O) has intervened in housing construction programs to try to minimize project overruns. AAHDP6O has made a number of efforts, which are described below.

- ✓ Effective contact among all members of the team.
- ✓ On construction sites, using a direct access management system.
- ✓ Obtain and distribute funds to the sub-cities or project 6.
- ✓ Purchasing and delivering construction goods to project locations
- ✓ Organizing and delivering instruction to all partners at all stages, as well as regular project follow-up
- ✓ Skilled employees are recruited and assigned to various housing construction programs.
- ✓ Develop month to month controlling system

4.3.2 Observation at the job site and in the workplace

One of the data collection techniques used in this study was observation. During the survey and interviews, the researcher observed construction operations at the project sites (Bereket site, Wetader Sefer site, Jemo Gara site, and Fanuel site).The below are some of the issues that were discovered during the site and office visits.

- Poor handling of construction materials on the site and wastage of materials for example sand, aggregate, cement etc.
- Less responsibility of the work
- Poor documentation system
- Lack of preventing system – due to project completion time and cost increases

- No required number of staffs to administer and manage the construction works
- Unreasonable absences of staffs from the work place.
- No organized offices and facility in project site.
- less follow up of progress and week quality control systems
- Poor coordination system and lack of communication
- Poor recording system
- Covid 19 was the main delay factors in this year.

4.4. Relative Important Index (RII)

The results and discussion of factors that affect time and cost overruns are presented in this section. The questionnaires were obtained and analyzed using the SPSS version 20 statistical software kit. The ranking of factors was determined using the Relative Importance Index (equation3. 3).

4.4.1. Ranking of causes of time overrun (RII)

The factors were ranked using a hierarchical evaluation method based on their degree of significance. It was possible to determine the most significant factors that affected project time overruns based on the ranking of the factors by the different classes.

It was determined for each category of respondents, i.e. contractor, consultant, and owner, as well as the total respondents, using the RII value. An explanatory of all the factors that trigger time overruns in construction condominiums in Addis Ababa project 6 housing development in terms of relative importance index, community ranking, and overall ranking as found by all groups are presented in table 4.5. The findings show that there are many significant factors that contribute to time overruns in construction of condominium projects 6 housing development.

Table 4.4 contains the total and group-level RII of the variables that practitioners believe influence their ability to manage construction project time. The factors were given a ranking based on their overall RII. In total, 37 variables were investigated, with the top eleven accounting for more than 74 percent of the delays. Table 4.5 shows the eleven most significant causes of time overruns, as ranked by total respondents or decided upon by owners, contractors, and consultants.

Table 4.4: factors causing of time delay on housing construction projects in overall and group level RII.

Factors of time overruns	Client		Contractor		Consultant		Overall	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Client related factor								
Increase in project volume	0.76	9	0.55	8	0.74	12	0.73	13
Repeated design change	0.75	10	0.75	4	0.80	8	0.76	10
Disagreement with subcontractor	0.63	20	0.70	5	0.77	10	0.68	18
Unplanned funding of project	0.65	19	0.65	6	0.83	6	0.71	15
Scares supply of material	0.72	13	0.95	1	0.80	8	0.77	9
Poor decision making process	0.70	15	0.60	7	0.83	6	0.73	13
Lack communication and coordination	0.65	18	0.65	6	0.86	4	0.72	14
Poor monitoring and evaluation	0.76	9	0.60	7	0.88	3	0.79	7
Less follow up of progress	0.76	9	0.45	10	0.89	2	0.77	9
unexperienced management	0.73	12	0.50	9	0.78	9	0.72	14
Interference owner	0.68	16	0.50	9	0.78	9	0.70	16
Contractor related factors								
improper site condition	0.72	13	0.75	4	0.88	3	0.76	10
Financial problem between contractor and sub-contractors	0.75	10	0.70	5	0.77	10	0.75	11
Poor planning and scheduling	0.88	1	0.75	4	0.86	4	0.86	2
Fluctuation of material price	0.87	2	0.70	5	0.94	1	0.88	1
Lack of communication and misunderstanding	0.74	11	.075	4	0.80	8	0.76	10
Technical mistake during construction	0.70	15	0.60	7	0.77	10	0.71	15
Low performance of sub -contractors	0.73	12	0.75	4	0.72	13	0.73	13
Unreasonable delay	0.65	18	0.70	5	0.78	9	0.70	16
Less responsibility for the work	0.82	6	0.70	5	0.85	5	0.82	4
Unethical behavior	.058	21	0.65	6	0.60	18	0.59	28
Consultant related factors								
Inadequate cost estimation	0.84	4	0.65	6	0.78	9	0.80	6
Slowness in giving work orders	0.79	7	0.55	8	0.75	11	0.75	11
Less performance of consultant	0.79	7	0.50	9	0.80	8	0.76	10
Poor design	0.77	8	0.50	9	0.69	14	0.72	14
Inadequate project time estimation	0.83	5	0.60	7	0.74	12	0.77	9
Poor inspection	0.85	3	0.65	6	0.89	2	0.85	3

Slowness in payment preparation	0.74	11	0.50	9	0.83	6	0.74	12
Low communication	0.71	14	0.60	7	0.72	13	0.70	16
Delay in material approval	0.75	10	0.60	7	0.62	17	0.69	17
Project related factor								
Project place	0.72	13	0.70	5	0.72	13	0.72	14
Definition of Project boundary	0.67	17	0.65	6	0.58	19	0.64	20
Scarcity of manpower and equipment	0.65	19	0,70	5	0.60	18	0.64	20
External Factors								
Scarcity utilities (water and electricity)	0.75	10	0.85	2	0.82	7	0.78	8
Unpredictable weather conditions	0.77	8	0.65	6	0.63	16	0.71	15
Lack government control	0.83	5	0.80	3	0.80	8	0.81	5
Unsuitable site conditions (location soil, etc.)	0.65	19	0.80	3	0.68	15	0.67	19

Clients view

Table 4.4 shows clients were ranked the first factor that contributed to time the RII 0.88 delay was “poor planning and scheduling”. For the project to be completed successfully, proper planning and scheduling are essential. Construction delays are also caused by poor planning and scheduling. It can be built from the beginning of a project to its completion. This finding is consistent with the results of many studies undertaken in various countries to determine the most important causes of project delays. (Frimpong, Oluwoye, & Crawford, 2003). A. M. Odeh and H. T. Battaineh, (2000) found in their research work Ineffective planning and scheduling by contractors is the significant causes of delay in construction project. The second significant aspect was “material price fluctuation”, which had a RII of 0.87, indicating that the client was facing new problems in finance while the consultant was dealing with fires. This result emphasizes the importance of meticulous preparation in order to complete the project on time. When operations are carried out without regard for mission goals, the project will inevitably be delayed. The third great element was "poor inspection" (RII=0.85). This conclusion is shared by both the client and the contractor, but the consultant's RII rating is greater and the project is also under his oversight. Client time to time inspects the project then decease the delay of time.

With a RII of 0.83, the fourth element rated by the client was "inadequate cost estimation." This is a clear indicator of the value of inaccurate project cost estimation. Since project costs are often estimated haphazardly or roughly, the project can be postponed due to a lack of

funds. One of the most significant responsibilities of a consultant is to estimate the cost of a project based on the number of activities the same as contractors, But client was the first cost estimators relative to his money. So before start the project properly estimate the cost of the project. Otherwise the project was delayed. The contractor is one of the main parties in any construction industry. The amount of money that is released to the project by the client should be managed properly by the contractor in order to accomplish the project successfully. With a RII of 0.83, the filthy significant factor rated by the client was "inadequate time estimation." This is a clear indicator of the value of inaccurate project time estimation is the most time delay factors for client. Since project length is always estimated haphazardly, the project can be delayed. Estimating the duration of a project depending on the size of the operations is one of the most important duties of a contractor over a client because once a time estimates the schedules.

Contractors view

Table 4.4 reveals that "scares of material supply" are rated first by the contractors, with a RII of 0.95. This means that material supply shortages have an effect on project timelines. If there is a scarcity of materials in a construction building project, it can cause the project to be delayed significantly. According to the report's conclusions, commodity supply shortages cause some programs to be postponed for years, less motivation of supply from the government and supply. This arrangement is best summarized as follows: material delivery delays have a major impact on condominium project development.

With a RII of 0.85, contractors ranked "scarcity utility" as the second most important factor. This is a strong indication that the utility shortage problem would trigger a delay. This contract is better represented as utility. It is critical for the contractor to conclude the job within the agreed-upon time period .Due to a lack of utility in the work place; concrete works are rendered useless because the concrete is mixed with water. As a result, utility is more essential to contractors. Any lack of utility for the contractor would result in a slew of issues, including slow progress and a drop in productivity.

Contractors rated “lack of government control” and “unsuitable site condition” third and third, respectively, with RII=0.80. Project delays are caused by a lack of government control, but the project's success is often controlled by the government the project is rough control, if the government have tight control of the project, it will be completed on schedule. Unsuitable

site conditions: The project's construction site is very hot, making it difficult for staff to function efficiently and efficiently. This would have a major impact on the project's schedule.

With RII = 0.75, the fourth most significant factor that can trigger time overrun is "repeated design changes," "inadequate site management," " poor planning and scheduling," "lack of communication and misunderstanding," and "low performance of sub-contractors ". repeated design changes was one of time killer factors In the project, Inadequate site management leads to a number of project limitations, such as ineffective progress monitoring, inconsistent mission allocation, a lack of staff involvement on the job site, and poor project coordination, to name a few. Poor planning and scheduling the plan and schedule were not correct need other time to correct plane and timelines .five of these aspects add to the project's lateness. One of the filth variables that causes time delay was "disagreement with subcontractor" (RII =0.70). Subcontractors are causing a gap between owners and contractors. The disagreement factors from sub-contractors; projects scale the issue of cash payment, the lack of materials on site all clash and new design. Every activity needs cooperation among project members, sun contractors and the majority of tasks necessitate a thorough understanding of the needs of others. There are times when the project's timetable fails due to a lack of proper interaction among the participants. Under such circumstances, the project manager's willingness to coordinate with his or her team mates and subcontractors is invaluable. The achievement of the required project completion period is aided by short and informal lines of communication among project team members.

Consultants view

Table 4.4 shows that the consultants rated "material price fluctuations" as the first factor, with a RII of 0.94 .This addresses the main reasons that contribute to project delays. Since there is no set price for goods on the market, the price of materials fluctuates from time to time. As a result, the consultant has a tough time estimating, payment preparation and cost estimation of the project. The second factor that causes delay was "less follow up of progress" and "poor inspection" with RII =0.89. One of the consultant's responsibilities was to keep track of the project's progress and inspect it. Due to the consultant's failure to submit accountability on timetable, the plan was postponed. The third important factor ranked by consultants was "poor monitoring and evaluation problem" and "improper site management" with RII=0, 89. Poor project management leads to a slew of issues, including incorrect work distribution, a lack of staff commitment on the job site, and poor project monitoring and evaluation, to name a few these factors all contribute to the project's delay.

The consultants ranked "lack of coordination and misunderstanding" and "poor planning and scheduling" fourth and fourth, with a RII of 0.86. The findings revealed that a lack of communication and coordination among project parties has a significant impact on construction scheduling, implying that it is one of the primary causes of project delays. This is a critical factor in improving construction performance and preventing misunderstandings among project stakeholders like client, contractors, consultants and subcontractors. When there is a lack of cooperation and teamwork, it could have a huge impact on the construction process and timeline. This finding is consistent with the results of many studies undertaken in various countries to determine the most important causes of project delays efficient communication and rapid knowledge transfer between project members and stakeholders, according to Chan and Kumaraswamy (2002), help to accelerate project success, but lack communication and coordination and poor planning and scheduling this would have a major impact on the project's schedule.

Table 4.5: Top eleven factors causing time overruns on housing construction projects

Factors of time overruns	Client		Contractor		Consultant		Overall	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Fluctuation of material price	0.87	2	0.70	5	0.94	1	0.88	1
Poor planning and scheduling	0.88	1	0.75	4	0.86	4	0.86	2
Poor inspection	0.85	3	0.65	6	0.89	2	0.85	3
Less responsibility for the work	0.82	6	0.70	5	0.85	5	0.82	4
Lack of government control	0.83	5	0.80	3	0.80	8	0.81	5
Inadequate project cost estimation	0.84	4	0.65	6	0.78	9	0.80	6
Poor monitoring and evaluation	0.76	9	0.60	7	0.88	3	0.79	7
Scarcity of utility(water and electricity)	0.75	10	0.85	2	0.82	7	0.78	8
Scares supply of material	0.72	13	0.95	1	0.80	8	0.77	9
Less follow up of progress	0.76	9	0.45	10	0.89	2	0.77	9
Inadequate project time estimation	0.83	5	0.60	7	0.74	12	0.77	9

Table 4.5 above illustrates the top 11 significant factors affecting time overruns of housing construction projects. It can be inferred from this table that 3 most important factors affecting time Delay according to the perception of owner, consultant, and contractor were: "fluctuation of materials price", "Poor planning and scheduling" and "poor inspection". The first most significant factors was ranked "fluctuation of material price" (RII =0.88), indicating that the client was facing new problems in finance while the consultant was dealing with fires the main reasons that contribute to project delays. Since there is no set price for goods on the market, the price of materials fluctuates from time to time. As a result, the client has waited the market price to decease; the consultant has a tough time planning payment and project plan. Fluctuation of materials price has a significant impact on construction delays.

"Poor planning and scheduling" (RII=0.86) and poor inspection (RII=0.85) were ranked second and third respectively. In the planning and scheduling time properly plan the project otherwise requires additional time to complete the project. The third most significant factors were poor inspection. Strong inspection was to reduce time delay and remove rework occurrence in the project. This result agrees with the findings of several researches conducted in different countries to evaluate the most significant causes of project delays (Frimpong, Oluwoye, & Crawford, 2003). A. M. Odeh and H. T. Battaineh, (2000) found in their research work Ineffective planning and scheduling by contractors is the significant causes of delay in construction project Ineffective planning and scheduling has a significant impact on construction delays. It should be developed from the start of the project until completion of a project. According to the information from personal interview, reasons why contractors are not able to follow the planning and scheduling effectively is due to shortage of inexperience staff.

The fourth factor was ranked "less responsibility for the work" RII=0.82. The filthy factor was ranked "lack of government control" (RII=0.81). The project's progress was managed by the government; if the government had tight control over the project and all project participants followed the rules and regulations, it would be completed on time. Failure to follow the rules and regulations would result in severe penalties for the participants. Sixth factor was "inadequate project cost estimation" with RII =0.80. Inadequate cost estimation this is a direct indication of unpredictable project cost estimation as the leading cause of time delays. The project can be postponed because project cost is still measured haphazardly. One

of the most significant roles of client over contractor is to predict the amount of money spent a project based on the scale of the activities. Inadequate cost estimation cause project time delay because require additional budget for the project.

The seventh factor ranked was “poor monitoring and evaluation” RII =0.79. The eighth factor ranked was “Utility scarcity” (water and electricity) RII=0.78. Utility was more important for contractors. Water is used for mixing concrete, drinking labor, washing labor, and electricity used to operating computers, machines, both water and electricity are used in the construction site. This is a strong indication that the utility shortage problem would trigger a delay. This contract is best described as a utility contract. It is important for the contractor to do the job within the agreed-upon time frame. Concrete jobs are made worthless due to a lack of utility in the workplace when the concrete was mixed with water. As a consequence, contractors place a higher value on utility .Any loss of utility for the contractor would result in a slew of problems, including inactive improvement and lower productivity.

The ninth factors ranked were “Less follow up of progress”, “inadequate time estimation” and “scares supply of material” with RII=0.77. Monitoring and evaluation is a continual assessment that seeks to provide all stakeholders with timely updated updates on the success or delays of the measured activities. It's a check on how well the operation is being implemented. Its purpose is to determine if the outputs, deliveries and schedules planned have been reached so that action can be taken to correct the deficiencies as quickly as possible, whereas poor Monitoring and evaluation were the significant causes of delay in construction project. According to the information the researcher obtained during personal interview from the project consultants, there is no continuous project work monitoring and evaluation activities in order to evaluate the performance of the project by comparing with the given time frame, the approved budget and also to make corrective action for the dalliance of project, therefore less follow up of progress was the significant impact in the time delay. Inadequate time estimation this is a direct indication of unpredictable project time estimation as the leading cause of time delays. The project can be postponed because project time is still measured haphazardly. One of the most significant roles of a contractor over a client is to predict the span of a project based on the scale of the activities. Unproper time estimation causes project time delay.

Scares supply of material among the thirty-seven causes was the most influential source of project delay .The most time-consuming factors in the design of Project 6 housing

development was a lack of material supplies. This outcome substantiates the findings of Fugar and Agyakwah-Baah (2010), which ranked the aforementioned factors as one of the most influencing causes of construction project delay in Ghana. This is not surprising given that the Addis Ababa construction industry is reliant on export materials (cement, reinforcement) primarily from China, Turkey, and other countries, which may result in supply shortages on the market and, as a result, on-site availability. Furthermore, timely delivery of construction materials is dependent on resource availability.

4.4.2. Ranking of causes of cost overrun (RII)

Table 14 illustrates the relative importance of all cost overrun variables studied in this study. It was possible to classify the most important factors that affected project cost overruns from the viewpoints of the contractor, consultant, and client based on the ranking of the factors by the different classes. A total of 19 variables found in the literature that have a significant impact on cost overruns in the construction industry have been investigated and addressed. The study participants were asked to rate these 19 factors in order of their effect on construction project cost overruns.

As a result, the respondents' perceptions were used to rate the companies, which were divided into three categories: owner, consultant, and contractors. It was determined for each group of respondents and the overall respondents using the RII value. Table 12 summarizes the RII and rank of cost factors by category as well as overall.

Table 4.6 provides the total and group-level RII of the variables that practitioners consider to be impacting their ability to monitor and handle construction project costs. The factors were given a ranking based on their overall RII. 19 variables were examined in total, with the top eleven accounting for more than 76 percent of cost overruns. Table 4.7 shows the eleven most significant cost overrun factors as ranked by total respondents or decided upon by owners, contractors, and consultants.

Table 4.6 Factors causing of cost overruns on housing construction projects in overall and group level of RII and rank.

Factors of cost overruns	Client		Contractor		Consultant		Overall	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Material related factor								
Unstable materials specification	0.75	8	0.65	5	0.60	11	0.69	10
Inflationary increase materials price	0.80	3	0.70	4	0.88	1	0.82	2
Scarcity of materials	0.76	7	0.85	1	0.85	2	0.80	4
Inadequate material estimation	0.80	3	0.50	6	0.80	5	0.77	6
Dependency on imported construction materials	0.79	4	0.50	6	0.72	8	0.74	8
Late delivery of material on site	0.80	3	0.70	4	0.83	3	0.80	4
Inefficient material management	0.78	5	0.75	3	0.75	7	0.77	6
Equipment related factors								
Poor schedule and equipment needed	0.75	9	0.75	3	0.71	9	0.73	9
Low equipment supply	0.77	6	0.80	2	0.65	10	0.73	9
Unskilled equipment operators	0.66	12	0.75	3	0.60	11	0.65	11
Less productive and inefficiency of equipment	0.73	10	0.80	2	0.60	11	0.69	10
Unperiodic maintenance cost of machineries	0.84	1	0.80	2	0.75	7	0.81	3
Labor related factors								
Less productivity	0.81	2	0.85	1	0.85	2	0.83	1
Unskilled personnel	0.78	5	0.80	2	0.80	5	0.79	5
Contract management related factors								
Change in size of work on site	0.71	11	0.75	3	0.77	6	0.73	9
Suspension of works	0.77	6	0.70	4	0.77	6	0.76	7
Low experience of project managers	0.78	5	0.70	4	0.75	7	0.76	7
Low experience of consultants	0.80	3	0.70	4	0.72	8	0.76	7
Change of consultants for design, supervision and contract management	0.80	3	0.80	2	0.82	4	0.81	3

Table 4.7: Top eleven factors causing cost overruns on housing construction projects

Factors of cost overruns	Client		Contractor		Consultant		Overall	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Less productivity	0.81	2	0.85	1	0.85	2	0.83	1
Inflationary increase of materials price	0.80	3	0.70	4	0.88	1	0.82	2
Unperiodic maintenance cost of machineries	0.84	1	0.80	2	0.75	7	0.81	3
Change of consultants for design ,supervision and contract management	0.80	3	0.80	2	0.82	4	0.81	3
Late delivery of material management	0.80	3	0.70	4	0.83	3	0.80	4
Scarcity of materials	0.76	7	0.85	1	0.85	2	0.80	4
unskilled personnel	0.78	5	0.80	2	0.80	5	0.79	5
Inefficient material management	0.78	5	0.75	3	0.75	7	0.77	6
Suspension of work	0.77	6	0.70	4	0.77	6	0.76	7
Low experience of project managers	0.78	5	0.70	4	0.75	7	0.76	7
Low experience of consultants	0.80	3	0.70	4	0.72	8	0.76	7

Table 4.7 shows that the most significant factor responsible for project cost overrun in construction of condominium in Addis Ababa: projects 6 housing developments on this study are 11 from this table that 3 most relevant factors impacting cost overrun according to client, consultant, and contractor perceptions were: “less productivity”, “Inflationary increase of materials price” and “unperiodic maintenance cost of machineries” and “change of consultants for design, supervision and contract management. The first most significant factors were “less productivity of labor” with RII value of 0.83. The project's production was reliant on labor. Since less producers sell a smaller quantity of goods, but contractors pay their workers' salaries out of the contract volume, the constant rise in labor costs has a large impact on them`. As a result, vendors have been demanding contract adjustments to accommodate the increase. The contractor's first benefit was overhead expense, but due to lower labor efficiency, the project was hit by cost overrun. The second most significant factor was “Inflationary increase of materials price” with RII value of 0.82, indicating that this factor was clients more impacted than others. As we studied in the analysis part, Inflationary increase was one of the key factors affecting cost of construction of condominium houses. As a result, during the cost calculation period, the client took into account a sufficient inflation rate. Since the cost of construction materials, tools, workers, and equipment can fluctuate from time to time during the construction process. To avoid time and cost problems, stores

for necessary construction materials, especially those that are scarce or in short supply in the markets, should be established Cost impacts can be mitigated by proactive value engineering for replacement materials, creating an on-time order culture and stockpiling of standard goods, making early orders of materials that are susceptible to escalation risk, and identifying essential materials whose manufacture and procurement take a long time and acting on supply commitments early.

Material and equipment costs are one of the project expense components that has an effect on the viability and project expenditure of the owners. AAHDPO supplied all of the main building materials needed for the project, according to the information form interview. Since products including steel and finishing materials are manufactured from other nations, the project's cost overrun was exacerbated by the country's current foreign currency shortage. Third factors of cost overrun were ranked "unperiodic maintenance cost of machineries" and "change of consultants for design, supervision and contract management" with RII =0.81. Unprecedented machinery maintenance costs were one of the cost overrun factors. Machinery maintenance costs are very high. Machinery maintenance costs are estimated in project cost forecasts, but unprecedented machinery maintenance costs were cost overrun factors. Change of consultant for design, supervision and contract management also one of the factors affecting cost overrun. Constant consultants were familiar with the project and hence were able to fully comprehend it. As a result, constant consultants were able to avoid redesigning and correcting errors before starting work on the project during supervision period. Changing contractors from time to time causes a gap between consultants, resulting in project expense delays.

The fourth most significant factors were ranked "late delivery of material management" and "scarcity of materials "with RII =0.80. This consideration has a strong impact on the project cost in terms of time. If services are not available as expected during the project's lifetime, the project will be delayed and cost overrun. Late handover of construction sites is a possibility that may significantly raise the cost of construction projects. Late site handover is a typical source of compensation for contractors in most foreign projects in Ethiopia [Girmay, 2003]. However, the issue of site handover remains a major cause of time delays and cost overrun and the majority of employers pay a set monthly wage, but even though they are not working, they still pay that salary the same as machinery. The big cost rise goods were one of the late distribution reasons caused by shortages of supplies.

The filth factor was “unskilled personnel” with RII =0.79. The availability of staff with extensive expertise and qualifications in project planning and execution helps to maintain cost, time, and quality control, but unskilled personnel contributes to project cost overruns. “Inefficient material management” was ranked the sixth factors the value of RII 0.77.the availability of material was inefficient management, the project cost over .disorganized material the some labor was out of work and occurs waste of material at this time needs additional material. “Suspension of work”, “low experience of project managers” and “low experience of consultants” were ranked the seven factors with RII =0.77. Suspension of work, do not terminate work which denotes the critical importance of maintaining work continuity in order to complete the project on time and on budget. Suspension of work causes disagreements between project parties, raises costs, and puts stakeholders out of work. The order of project activities will be disrupted, causing delays.

“Low experience of project managers” and “low experience of consultants”, in the construction industry, has been a long-term problem that will continue to drive up project timelines and prices. According to an interview with some of the consultants and administrators, they agree that while numerous higher education institutions produce a large number of graduates each year, the standard of education and training is insufficient to satisfy the need for a large number of qualified jobs .The cost overrun variables in Project 6 housing construction were low project manager experience and low consultants experience, since low project manager experience includes: Poor progress of monitoring, incorrect work distribution, poor communication with others, lack of commitment of employees on the job site, misunderstanding of plan, unimportant equipment used, improper distribution of finance these considerations all add to the project's cost overrun. Consultants with no expertise were hired. Inadequate estimation cost was the major delay of cost, incorrect supervision and uncompleted design.

The survey finding also agrees with similar studies in other developing countries. For example, Enshassi, Mohamed and Abushaban (2009), study observed that most important factors affecting the cost performance of construction projects in the Gaza Strip were materials shortage, availability of personnel with a high experience and qualifications, and leadership skills for project managers.

According to study conducted by Baloyi and Bekker (2011), the most significant factors that caused cost overruns at the various 2010 FIFA World Cup stadia construction in South Africa

were inaccuracy of material estimates and shortage of skilled labor. Tejale, Khandekar and Patil (2015) study identified and analyzed causes of cost overrun in construction industry in Pune region, India. It was observed the factors for cost overrun were the material shortage, shortage of labor, late delivery of materials, and unavailability of competent staff. In another study carried out in Czech by Ahmed, Dlask and Hasan (2014) the main factors caused deviations in the cost of project were identified. These factors include rising prices, shortage important materials, inaccurate estimates and poor management.

4.5. Correlation tests on factors of time and cost overruns

One of the goals of this thesis is to see whether there is consensus among stakeholders about the causes of time and cost overruns on housing construction projects in Addis Ababa's Project 6 housing developments. Later in this segment, the responses of respondents will be checked for correlation using Spearman rank correlation coefficients to see whether there is a difference in ranking between two classes of respondents on the variables of time and cost overruns and their rate of incidence, namely Owner versus Contractors, Contractors versus Consultant, and Owner versus Consultant. The aim of a hypothesis test is to avoid being deceived by random events. The tests also assisted in determining whether respondents agree on those points of view.

4.5.1.. Correlation tests on factors of time overrun

- The Null Hypothesis (H0): There is no agreement in the ranking of causes of time overrun between two groups of respondents,
- The Alternative Hypothesis (Ha): There is an agreement in the ranking of causes of time overrun between two groups of respondents
- Spearman rank correlation coefficient: is used to see if there's proof of a linear relationship between two ordinal variables, or if both variables are intervals and the normality condition isn't met.

For time overruns, the spearman correlation coefficient ‘rs' is estimated using Equation 3.3 and tabulated as shown in Table 4.8. The degree of significance 95 percent (P = 0.05) is used to determine whether to accept or reject the null hypothesis. This helps you to say whether or not the responses of the respondents "agree."

If p value >α, Ho is a statistically relevant agreement between the groups and proof of reject.

If p value < α, H0 is accepted**,** and i.e. there is no evidence of a statistically significant agreement between the two groups (owner Vs contractor, Owner Vs consultant or Contractor Vs consultant). Correlate Factors with time delay.

Table 4.8: Correlation test on causes of time delay among client, contractor and consultant

Respondents	Spearman's rho	P-value	Decision on the null hypothesis
Client Vs Contractor	0.353	0.032	Reject
Contractor Vs Consultant	0.068	0.690	Do not reject
Client Vs Consultant	-0.092	0.587	Do not reject

From this finding:

- Strong association or correlation between the attitudes of respondents in the two groups of client and contractor.
- A moderate association or correlation between the attitudes of contractor and consultant.
- The degree of association or correlation between the attitudes of client and consultant is low.
- P value > α , with a significance level of 95% (α = 0.05), rejecting the Ho that means no significant agreement between the respondents.(Client Vs contractor)
- P value < α (contractor Vs consultant and client VS consultant) respondents, with a significance level of 95% (α = 0.05), so the Ho that there is no significant agreement between the respondents is accepted. There is no evidence that the two parties have statistically meaningful agreement.
- This means no significant consensus between respondents' perceptions of (client and consultant), (contractor and consultant), in terms of how they rate the variables.
- This indicates that some of the respondents do not share the same views on the causes of time overruns.

4.5.2. Correlation tests on factors of cost overrun

For cost overrun, the same correlation test is used, as seen in the following section. The cost overrun hypothesis test also assisted us in determining whether there is consensus among respondents.

- The Null Hypothesis (H0): Between two groups of respondents, there is no consensus about how to rate the causes of cost overruns.
- The Alternative Hypothesis (Ha): There is an agreement in the ranking of causes of cost overrun between two groups of respondents

The spearman correlation coefficient 'rs' is calculated using Equation 3.3 and tabulated as shown below in Table 4.9 , correlate factor with cost overruns.

Table 4.9 Correlation test on causes of cost overrun among client, contractor and consultant

Respondents	Spearman's rho	P-value	Decision on the null hypothesis
Client Vs Contractor	0.555	0.014	Reject
Contractor Vs Consultant	0.175	0.474	Do not reject
Client Vs Consultant	-0.054	0.828	Do not reject

The findings revealed that there is a strong or clear interaction between the attitudes of respondents in the two groups of client and contractor, while the degree of association or correlation between the attitudes of respondents in the two groups of contractor and consultant is moderate. The degree of association or correlation between the attitudes of the respondents in the two groups' client and consultant is low as indicated table 4.9. The p value for the two group cases Client Vs Contractor is greater than the alpha value so the hypothesis that there is no substantial agreement between the respondents is rejected, i.e. the null hypothesis is rejected, with a significance level of 95% ($\alpha = 0.05$).

The p value is smaller than the alpha values of α in the other case of (Client Vs Consultant and Contractor Vs Consultant) respondents, with a significance level of 95% ($\alpha = 0.05$), so the null hypothesis that there is no substantial agreement between the respondents is acknowledged or accepted.

There is no proof that the two parties have statistically meaningful agreement. As a result, it was determined that there is no substantial degree of consensus between respondents' perceptions of client and consultant, as well as contractor and consultant, in terms of how they rate the variables. As a consequence of this finding, some respondents do not share the same views on the causes of cost overruns.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary of Major Findings

The construction industry is regarded as a competitive industry that is continually confronted with uncertainties that make time and cost management difficult, resulting in time and cost overruns.

Construction projects often experience time and cost overruns. It is the product of a number of factors found in this report. A total of 39 samples were found to be accurate and statistically evaluated using the relative importance index method on 37 and 19 variables, respectively, for time and cost overruns. The attitude of owners, consultants, and contractors toward factors influencing project overrun of construction projects in Addis Ababa: project 6 housing development was obtained through a questionnaire-based survey. The following numbers of questionnaires were distributed: 22 to owners, 4 to consultants, and 13 to contractors. A total of 56 questionnaires (100%) were returned. The respondents were asked to rank each of the 56 factors that contribute to project overruns (time and cost overruns) in Addis Ababa: project 6 housing developments as strongly disagree, disagree, neutral, agree, and strongly agree. In addition, interview and observation data collection approaches are used to obtain important and accurate information from respondents.

The findings of this study listed the top eleven factors that cause time and cost overruns in housing construction projects respectively. Fluctuation of material price, Poor planning and scheduling ,Poor inspection ,Less responsibility for the work ,Lack government control ,Inadequate project cost estimation ,Poor monitoring and evaluation ,Scarcity utility, Scares supply of material ,Less follow up and Inadequate project time estimation for time overrun and Less productivity ,Inflationary increase materials price ,un periodic maintenance cost of machineries ,Change of consultant design ,Late delivery material management, Scarcity of materials ,unskilled personnel ,Inefficient material management ,Suspension of work ,Low experience of project manager and Low experience of consultant for cost overruns. As a result, serious attention must be paid to these factors in order to eliminate time and cost overruns, as well as the impact of these overruns on the construction of condominiums in Addis Ababa: project 6 housing projects and the construction industry in general.

The degree of agreement among overrun factors for the owner, consultant, and contractors is determined using Spearman's correlation coefficient. The findings revealed that there is

strongly association or correlation between the attitudes of respondents in the two groups of client and contractor, but a moderate association or correlation between the attitudes of respondents in the two groups of contractor and consultant. In time and cost overruns, the degree of association or connection between the attitudes of respondents in the two categories, client and consultant, is poor or low.

The measured value of ‘rs' for the two group cases Client Vs Contractor is greater than the essential values of ‘r' in this analysis, with a significance level of 95% (P = 0.05), rejecting the hypothesis that there is no substantial agreement between the respondents, i.e. the null hypothesis is rejected in both time and cost overruns. The measured value of ‘rs' is less than the essential values of ‘r' in the case of (client vs consultant and contractor vs consultant) respondents, with a significance level of 95 percent (P = 0.05), so the null hypothesis that there is no substantial agreement between the respondents is acknowledged. In terms of time and cost overruns, there is no statistically significant agreement between the two parties. As a result, it was concluded that there is no significant agreement between respondents' perceptions of how they rate the factors in (client and consultants and contractor and consultant).

This indicates that some respondents do not share the same views on the causes of time and cost overruns in this situation. The severity of the consequences of construction delays differs from one stakeholder to the next in a housing construction project. Time claim – needs additional time to complete the project, Budget claim – requires additional budget for the project, Disagreement among stakeholders, Project closures, loss of profit and decrease in country economy are some of the major effects of project overruns in order of severity.

5.2. Conclusion of the study

A construction project is considered satisfactory when the project's target is met in terms of predetermined goals, such as completing the project on time, on budget, and to the satisfaction of all stakeholders. The number of housing construction projects in Ethiopia is steadily growing. However, completing tasks within the allotted budget and time frame becomes difficult. Many projects have encountered time and cost overruns, causing the contract time and amount to be exceeded. Wide construction industries in Ethiopia face serious problems with time and cost overruns. It is the product of a number of factors found in this report. As a result, serious consideration must be given to these variables in order to prevent time and budget overruns, as well as their impact on projects.

The focus of this paper's survey of contractors, owners, and consultants is on the construction of condominiums in Addis Ababa: project 6 housing development. The survey focused on identifying the key causes of project delays and cost overruns, as well as rating these factors in order of relative importance. The aim of identifying the causes of time and cost overruns in the construction industry, and especially in housing construction projects, is to prevent time and cost overruns.

A thorough literature review was conducted in order to identify a number of variables that are thought to influence project overruns. Three core classes of project participants, namely the client, consultant, and contractors, completed and returned 56 questionnaires in total.

The findings of the study revealed that Fluctuation of material price and less productivity are the primary causes of delays and cost overruns in the construction of condominiums in Addis Ababa: Project 6 housing developments. As a result, serious attention must be paid to these variables in order to avoid time and cost overruns. In addition, the study identified the most common consequences of project overruns in the housing construction industry. In reality, this phenomenon is likely to persist unless steps are taken to address these causes as soon as possible, from forecasting to activity and management. As a consequence, best practices in process preparation, coordination, control, and following must be remembered.

5.3 Recommendations

Based on the survey results and literature review, the researcher recommended the following key points from the study findings that could help with problem solving and suggested ways to reduce and manage time and cost overruns in the construction of condominiums in Addis Ababa: project 6 Housing developments.

5.3.1. Recommendations for the project owner

AAP6HDPO, the project owner, is one of the most influential stakeholders involved in the financing of housing development projects, as well as a central role player during the project's lifecycle. To reduce or eliminate project overruns and their impact on projects, the project owner should take the following points.

- Make sure that the project's critical budget is presented on time to avoid scarcity of fund for the project. Before beginning a project, owner should ensure that they have sufficient financial capital.
- Examine the bid documents content carefully such as instructions to bidders (ITB) reference and specification.
- Progress payment must be paid to the contractors on time in order to accelerate work progress and to prevent any delays that may result in project cost overruns.
- Choose appropriate contractors based on their experience, financial status, ability, and skills, as well as their price and time offering to enable the project handover on time.
- Owners should Work with project consultants and contractors who are both competitive and experienced.
- Client showed report monthly activity to AAHDPO. Used to identify the problems timely and to take the action.
- Managerial levels should participate in decision – making. To solve disagreement, conflict and to solve challenges between different employees.
- Put cost-cutting incentive plans into action-when material price decrease extra material purchase based on project material schedules and increase productive employees.
- Client must improve communication and coordination between stakeholders throughout the project life cycle
- To avoid project delays, clients are advised to set up stores for essential construction materials, particularly those that are scarce or in insufficient supply

in the markets .Cost effects can be mitigated by vigorous value engineering for replacement products, increasing on-time order culture and stockpiling of standard materials, prompt purchasing of materials prone to escalation risk, and classifying essential materials whose manufacture and procurement take a long time and acting on supply commitments early.

- Covid 19 is one of the reasons that have been postponed over the last two years, so the client, contractor, and consultant have come up with ways to alleviate the delay caused by Covid 19. For both employers, the first approach used a time shifting system to develop labor allocation and used Covid 19 reduction instruments (mask, sanitizer, and social distance).

5.3.2 Recommendations for Contractors

Contractors among other stakeholders' play a major role for an efficient and effective completion of construction works. Hence the following recommendations are forwarded based on the research findings.

- Motivate workers to speed up construction activities and improve productivity by giving incentive and rein forcers.
- Contractor should avoids and prevent occurrence of rework on construction by using qualified or experienced workers.
- Contractors should apply plan and schedule in day today activity and evaluate the executed work as the planned one by hiring experienced professionals.
- Maintain the equipment before beginning construction - to ensure that it is in good working order and that replacement equipment is available in case of a project interruption.
- Contractors need a good Forman to increase production, coordinate all operations, specify late delivery inventory, and reduce contractor loads to a minimum.
- Applying good project management technique and proper resource planning to proactively solve challenges and suggest solutions to construction sites.
- By Using Proper fund allocation Contractors should have enough money based on the cash flow to start the project in order to run the project smoothly.
- Continuous coordination and direct contact with consultants and clients should be established and follow up the projects activity day to day.
- Hiring qualified architects and experienced technical staff to prepare and oversee the construction site. Develop the skills of construction laborers by providing enough

training for employees to avoid rework on the job. To close the skills gap and increase building quality, either the contractors or the clients should receive the requisite training.

- Use project management methods and strategies in a structured manner to schedule and control project activities efficiently. (CPM), (WBS), (CCM), (PDM), Gantt maps, and (PERT) is a few examples (PMI, 2013). Ensure adequate project management and tracking during the project lifecycle as well. These may help to solve these problems in Addis Ababa's project 6 housing construction.
- A requirement Strong site management and resource planning are important. The site manager is responsible for coordinating all activities, maintaining a positive relationship with stakeholders and employees, and ensuring effective communication. Check the site's resource availability before beginning the work.

5.3.3 Recommendations for Consultant

Consultants are one of the most important players in housing construction projects, as they translate the wants, interest and plans of clients into plans and drawings, as well as oversee the transformation of these plans and drawings into real physical structures. As a result of the results of this study, the researcher makes the following recommendations for potential service improvements.

- Consultant should pay serious attention to designing, planning and scheduling of the work.
- Before starting construction activities, drawings and other contract documents should be thoroughly detailed and accepted.
- Prepare and encourage prompt contractor payments to prevent any delays that may result in project cost overruns.
- Short training programs cover project planning, scheduling and cost control.
- To prevent variations and late adjustments during the construction process, a detailed and thorough site investigation should be conducted during the design phase.
- Apply project management tools and strategies to the fullest extent possible in order to take the required steps to reduce construction costs, since this is one way to avoid cost overruns.
- Create a detailed and practical project plan and budget. The main stages, activities, and milestones must all be included in this plan.

- Consultants should Continuous follow up of progress and program that includes collaboration and direct contact with contractors and clients to ensure that design inconsistencies, mistakes, and omissions are corrected as soon as possible. This also gives you the chance to carefully review the contract documents in order to avoid change orders or variations caused by discrepancies in the contract documents
- Consultants should avoid ambiguous and inadequate sketches during the design process. Until implementing the drawings, consultants should create simple and complete drawings and revise them on a regular basis. Standard reporting systems are needed to enhance coordination between both parties.
- Constant consultants apply for planning, supervision and contract management – constant consultants is family with the project, to learn the project detail, therefor constant consultants used to minimize redesigning, to correct the error before work at supervision period.

5.4 Suggestions for future research

- Analyzing The financial impact of time and cost overruns in Addis Ababa : project 6 housing development
- Identifying the parties responsible for the time and cost overrun in the construction of a condominium in Addis Ababa: project 6 housing developments.

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APPENDIX A: RESEARCH QUESTIONNAIRES

St Mary University

School of Graduate Studies

Faculty of Business

Masters of Art in Project Management

Factors Affecting Time Delay and Cost overrun In Construction of Condominium Houses in Addis Ababa: Project 6 Housing Development Construction In focus

Dear Participants:-

My name is Yeshi Habte; I am MA student in Project Management at St Mary University School of Business. At this moment am conducting a research for completion of the requirements for the Master's Degree in Project Management (MPM). The title of my research is "**Factors Affecting Time Delay and Cost Overrun in Construction of Condominium Houses in Addis Ababa; Project 6 Housing Development projects In focus"**

I thoughtfully request you to participate in this research study by responding the attached Questionnaire.to be more confidential please do not include your name. As well I kindly request you to respond to the questions as truthfully as possible and return back the completed questionnaires. Since your time is valuable I politely ask you to take few minutes of your time to complete the questionnaire. I apologize you in advance for giving me your time and assistance. Please do not hesitate to contact me, should you require further clarification.

Sincerely,

Yeshi Habte

QUESTTIONNAIRE

FACTORS AFFECTING TIME AND COST OVERRUNS

SECTION A: DEMOGRAPHIC CHARACTERSTICS AND ORGANIZATION INFORMATION

1. Mention respondent organization / company type.

   Client ☐ contractor ☐ consultant ☐

2. Respondent's Gender; Male ☐ Female ☐

3. Respondent's educational level

   Certificate ☐ Diploma ☐ BSC ☐ MSc

4. Respondent's title in the company

   Project manager ☐ site engineer ☐ Office Engineer ☐

   Forman ☐

5. Relevant work experience (years)

   <4 ☐ 4-8 ☐ 9-12 ☐ >12 ☐ -

6. Do you use software packages for project cost and time control? (Like MS project)

   Yes ☐ No ☐

SECTION B: FACTORS INFLUENCING TIME DELAY OF CONSTRUCTION OF CONDOMINIUM HOUSES IN ADDIS ABABA: PROJECT 6 HOUSING DEVELOPMENT PROJECTS. Pleas tick the box with proper box or fill the proper number the following questions based on your experience in your project office.

5.Strongly Agree	*3.Neutral*	*1.Strongly Disagree*
4.Agree	*2.Disagree*	

No	Cause Of Time Delay Factors	S.A (5)	A (4)	N (3)	D (2)	S.A (1)
	Owners Related Factors					
1	Increase in project volume/scope					
2	Repeated Design Change					
3.	Disagreement with Subcontractor					
4.	Unplanned funding of project					
5	Scares supply of material					
6	Poor decision making process					
7	Lack of communication and coordination					
8	Poor monitoring and evaluation					
9	Less follow up of progress					
10	unexperienced management					
11	Interference of owner					
	Contractor related factors					
12	improper site management					
13	Financial problem between contractor and sub-contractor					
14	Poor planning and scheduling					
15	Fluctuations of material price					
16	Lack of communication and misunderstanding					
17	Technical mistake during construction					
18	Low performance of sub-contractors					
19	Unreasonable delay					
20	Less responsibility for the work					

21	Unethical behavior					
	Consultant Related Factors					
22	Inadequate project time and cost estimation					
23	Slowness in giving work orders					
24	Less performance					
25	Poor design					
26	Under-estimation of costs					
27	Poor inspection					
28	Slowness in payment preparation					
29	Low communication					
30	Delay in material approval					
	Project Related Factors					
31	Project place					
32	Project boundary definition					
33	Scarcity of Manpower and equipment					
	External Factors					
34	Scarcity of utilities(water and electricity)					
35	Unpredictable weather conditions					
36	Lack of Government control					
37	Unsuitable site conditions (location, soil, etc.)					

For addition comments _____

SECTION C: **FACTORS INFLUENCING COST OVERRUNS OF CONSTRUCTION of Condominium Houses in Addis Ababa: Project 6 Housing Developments.**

Material related factors						
38	Unstable materials specification					
39	Inflationary increase of materials price					
40	Scarcity of materials					
41	Inadequate material estimation					
42	dependency on imported construction materials					
43	Late delivery of material on site					
44	Inefficient material management					
Equipment Related Factors						
45	Poor Schedule of Equipment					
46	Low equipment supply					
47	Unskilled equipment operators					
48	Less productivity & Inefficiency of equipment					
49	unperiodic Maintenance cost of machineries					
Labor related factors						
50	Less productivity					
51	Unskilled personnel					
Contract management Related Factors						
52	Change in size of work on site					
53	Suspension of works					
54	Low experience of project managers					
55	Low experience of consultants					
56	Change of consultants for design, supervision and contract management					

For additional comments _____

APENDIX B:

STRUCTURED INTERVIEW

Dear interviewee

Currently, I am working on a research titled "Factors Affecting Time Delay and Cost Overrun in construction of Condominium Houses in Addis Ababa; Project 6 Housing Development Construction" to meet the requirements for the Degree of Master of Art (MA) in St. Mary University School of Business. This project is to address Factors Affecting Time Delay and Cost Overrun in construction of Condominium Houses in Addis Ababa: Project 6 Housing Development in focus. To meet the requirement of this research objective, it is necessary to have the response of contractors, client and consultants at this time working on this project and since you are one of the members engaged to respond this interview. In fact I conducted questionnaire on this project and came up with findings. Now I need to collect detailed information about these causes and effects of delay to enhance the research finding through interview. I confirm that your response will be kept confidential and will be used only to this research.

With best regards,
Yeshi Habte

Advisor Dr. Temesgen Belagnh
Thank you very much for your cooperation!

Interview guidelines to collect data from construction of condominium houses at Addis Ababa; Project 6 Housing Development Construction

1. What is your educational level?
2. In what organization you are working?
3. What is your position in the organization?
4. Are there time delay and cost increase in housing construction in project 6 housing developments?

Yes ☐ No ☐

If yes, please answer the following questions.

5. What is the reason for occurrence of time delay in this project?
6. How do you measure and evaluate the planning, scheduling and controlling process of this project?
7. What are the major reasons for delay of construction in this project?
8. What are the major consequences of delay in this construction project?
9. What are the reasons contributing for major cause of delay in this project?
10. What are the reasons contributing for major effect of delay in this project?
11. Do you think that project delays have an effect on the development of one county?