

**ST. MARY'S UNIVERSITY  
SCHOOL OF GRADUATE STUDIES**

**ASSESSMENT OF THE RELATIVE IMPORTANCE OF  
FACTORS OF TIME OVERRUN IN BOLE ARABSA  
PROJECT 7, ADDIS ABABA**

**BY  
HELEN LAKEW**

**June, 2021  
ADDIS ABABA, ETHIOPIA.**

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**ST. MARY'S UNIVERSITY  
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DEPARTMENT – PROJECT MANAGEMENT**

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**HELEN LAKEW YIFRU**

***A THESIS SUBMITTED TO ST. MARY'S UNIVERSITY, SCHOOL OF GRADUATE  
STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE  
OF MASTERS OF PROJECT MANAGEMENT.***

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**DECLARATION**

I, Helen Lakew, declare that this thesis is my original work, prepared under the guidance of Temesgen Belayneh (PhD). All sources of materials used in preparing these papers have been duly acknowledged.

Name

Helen Lakew Yifru

Signature

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**ENDORSEMENT**

This thesis has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a university advisor.

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Advisor

St. Mary's University, Addis Ababa

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Signature

June,2021

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## **ABBREVIATIONS**

<b>AAIHDP:</b>	Addis Ababa Integrated Housing Development Program
<b>UN-HABITAT:</b>	United Nation Human Settlement Program
<b>POBOK:</b>	Project Management Body of Knowledge
<b>PMI:</b>	Project Management Institute
<b>PMCD:</b>	Project Manager's Competency Development
<b>TOR:</b>	Time overrun
<b>RII:</b>	Relative Important Index

## ABSTRACT

*Building construction is one of the largest industries in Ethiopia and plays an important role in overall economy of the country. However, time overrun is the major challenge to the building construction industry in Ethiopia. The objective of this study is to assess the relative importance of factors of time overrun in bole arabsa project 7 and identifying the responsible parties. The project is constructed by Addis Ababa Housing Development and Administration Bureau. To achieve this objective this study used structured questionnaires for survey. A reliability test was conducted to test the questionnaires. The respondents selected using stratified sampling technique. The survey was conducted with 125 participants of building construction project team as a sampling of population from client (from two departments namely infrastructure and building construction), contractors (owners, Engineers and foreman's) and consultant side in bole arabsa project 7. After collecting the questionnaires the data was analyzed using MS excel and relative important index (RII) and mean value was applied to prioritize the delay factors. The result discovered and showed that among the six grouped factors of time overrun consultant related factors ranked in the 1<sup>st</sup> level with (RII=0.7699) followed by external related factors with (RII=0.768), the 3<sup>rd</sup> most influential factors are related to material and equipment with (RII=0.726), in the 4<sup>th</sup> contractor related factors are ranked with (RII=0.724), followed by client related factors as the 5<sup>th</sup> ranked effect with (RII=0.717) and finally labor related factors are ranked as the 6<sup>th</sup> influential effects of time overrun with (RII=0.703). Among those groups the top 15 factors of time overrun were identified as escalation of material price, delays in material supply, changes in exchange rate, delays in progress payments, changes in drawing, long waiting time for approval of drawings, inadequate early planning and scheduling of the project, economic condition, inexperience sub-contracts, design change and modification by client, delay in decision making by consultants, poor labor productivity and shortage of skills, changes in selected material price, delays in making decision by client and poor site management and supervision by contractors. Recommendation is given to minimize project time overrun.*

**Keywords:** *Project, project management, time overrun, cause, Bole Arabsa, Addis Ababa*

## **CHAPTER ONE: INTRODUCTION**

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

### **1.1 Background of the study**

PMBOK (2000) defines a project as a temporary endeavor undertaken to create a unique product or service. Temporary means that every project has a definite beginning and ending and Unique means that the product or service is in some way different from other similar products or services. Bridge field Group defines a project as a related set of activities and milestones with a preset goal and time frame that is designed as a specific event and not an ongoing process. The project can also be defined as a single-use plan to achieve a certain goal of introducing something unique or a change and ensure that progress is maintained in line with the goal, generally in terms of time, cost, and various technical and quality performance parameters.). Projects differ from other types of work (e.g. process, task, procedure). Meanwhile, in the broadest sense a project is defined as a specific, finite activity that produces an observable and measurable result under certain preset requirements. So, it is better to manage it properly.

The Project Management Institute (Institute 2000) provides a simplified definition of project management as the application of knowledge, skills, tools and techniques to meet project requirements. It is accomplished through the applying and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing. In keeping with the national commonplace competence of project management (Pitas et al.,2010), project management is the planning, organizing, monitoring and controlling of all aspect of a project and the management and leadership of all involved to achieve the project objectives safely and within agreed criteria for time, cost, scope and performance/quality.

Kerzner (2003) defines project management as the planning, organizing, directing, and controlling of organization resources for a short-term objective that has been established to complete specific goals and objectives.

Project management is a difficult duty with several complicated responsibilities and it offers a systematic approach to all stages of a project by certifying that every step is wisely planned, monitored and measured. The construction industry is one of the major rising industries which play an important role in the growth of once country economy. Ismail (2007) explain that construction industry is catalyst for economic growth as it stimulates development in other industries.

Construction projects offer the basic infrastructure requirements of housing, water supply and power. It is important that this infrastructure is continually developed and upgraded to meet with the ever-increasing population and demand. However, the industries are highly affected by one of the most common phenomena called time overrun. According to Sambasivan and Soon, (2007) delay in construction projects is a worldwide phenomenon. The effects of delays in construction projects are not limited to the construction industry but it also has an impact in the overall economy of the country (Arditi et al, 1985). Completing projects on time is a sign of

efficiency, but the construction process is subject to many variables and unpredictable factors which come from many sources.

Currently many projects are constructed in Ethiopia however, when we see the practices of the construction industry most of the project completed by taking much longer time than the schedule. The population of Addis Ababa highly increased from time to time and the need for housing also increased. Due to the increasing of population growth and immigration from different side of the country Addis Ababa city government plans to solve this housing problem by constructing condominium houses. In 2012 Addis Ababa Integrated Development Program (AAIHDP) was launched. The program comprises of three different schemes based on the advanced payment modalities such as 10/90, 20/80, 40/60 housing projects. However, it became difficult to complete a project on a stipulated time. Time overrun is the most common phenomenon in almost all construction projects.

According to AASGDE progress report almost all 20/80 project face time overrun and cost overrun. Different researcher gave different reasons for causes of time overrun like late design change, shortage of materials, ineffective planning and scheduling financial difficulties faced by contractors, delay in payment, poor site management and so on. However, the problem cannot be solved and still happening in other similar projects that means there is still gaps. This study also assesses the causes of time overrun in one of the project sites located around bole arabsa namely Bole Arabsa Project 7.

Ethiopia is one of the developing countries with high population growth. The combination of high population and urban growth rates coupled with a high prevalence of urban poverty has placed enormous strain on Ethiopian cities. 80 percent of the population lives in sub-standard slum housing that needs either complete replacement or significant upgrading. Ethiopian cities suffer from a high degree of environmental degradation, urban decay, a shortage of infrastructure and basic services, and high unemployment (Un-Habitat 2010).

Based on the above initiatives Addis Ababa city government launched the housing program in 2004 and still the program is continued. The initial goal of the program was to construct 400,000 condominium units, create 200,000 jobs, promote the development of 10,000 micro - and small - enterprises, enhance the capacity of the construction sector, regenerate intercity slum areas and promote homeownership for low-income households. As the five-year program nears completion, documentation of the program is timely (Un-Habitat 2010). The program classifies as 20/80, 10/90, and later 40/60 projects were added. But this program continues because it is unable to address the need of the people due to the rapid growth of the population in Addis Ababa.

Addis Ababa condominium projects face many difficulties one of the difficulties is time overrun. Bole Arabsa project 7 is one example of housing projects which is not completed on the planned schedule. In this project there are around fifty contractors, two consulting offices and a client. The contractors are appointed by the government based on their performance in the previous work in related projects and some based on tendering processes. And also consulting offices

appointed by tendering. The project started on June 2015 G.C having a budget and schedule for G+4 6.1 million and 1.6 year and for G+7 was 7.6 million and 2 years. However, until now the project is not completed and about 90% of the work is done. There are different causes for the delay this paper will find out the main causes in which the project faces time overrun.

## **1.2 Statement of problem**

A project goal to be achieved the three constraints which are time, cost, scope and quality must be achieved and the project manager is expected to control all these constraints carefully. Projects are needed to be completed within the time frame, budgeted cost, and required quality. If the project takes a longer time than anticipated, it requires additional resources and budgets. This consequently increases labor, material, machinery, and equipment cost. This affects the budget of other projects and in general, it affects the economy of the country.

Many projects in developing countries and developed country faces considerable time and cost overruns, fail to realize their intended advantage, or even totally terminated and neglected before or after their completion (Oawale,2010). Addis Ababa housing project is one of the projects in Ethiopia which are currently implemented by the Government of Ethiopia and it is also affected by the delay and cost overrun. Studies were conducted regarding to the field and find out different reasons for the cause. According to Arditi et al, (1985) the effects of delay in construction project are not confined to the construction industry but also the overall economy of the country. According to Friming (2003) in studying ground water project and illustrated that owners, contractors and consultant ranked poor contract management, monthly payment difficulties from the agencies, material procurement, poor technical performance and escalation of material price as a major factor that can cause time overrun.

Delay is a common problem of projects in Ethiopia. Werku and Jha (2016) on his studies indicated that, in Ethiopia about 91.75% of projects delayed 352% of its contractual time. Abdissa (2003) in his studies conducted on 15 completed projects in different regions of the country (Ethiopia), has shown that projects were delayed from 20.66% to 500% of original contract duration. According to Siraw Y. (2014), the most common and frequent factors contributing to time overrun includes slow site clearance, supply of materials, Inflation, and exchange rate fluctuation, progress payments delay by owner, unforeseen site condition, slow equipment movement and quality of materials, contractor's financial problems and inaccurate cost estimation.

Bole Arabsa project 7 is one of the projects constructed by Addis Ababa city administration which is affected by time overrun. This study is conducted in order to know the main factors of time overrun and to take lesson for the remaining work and for other similar projects aiming at limiting the root causes and improve the project delivery timelines. Different studies in different country including in our country Ethiopia were conducted related to this topic and found out

many reasons however, the previous study conducted in our country does not fully address all possible delay attributed to project delay especially in condominium housing projects. Because of the unique features of projects, the causes of project delay may vary for specific project from country to country, region to region, and even project to project. Therefore, further study can be also undertaken to investigate major causes of time overrun and this study tried to identify the most important and frequent causes of schedule delay in condominium housing projects in bole arabsa project 7.

As it presented in the introduction like other projects constructed by the government Bole Arabsa project 7 also face time overrun. This can be proved by calculating using one of the techniques called Earned Value Analysis.

The project started in June 2015 and still in progress (70 months)

For G+4 Building the schedule was 1 year and 6 months (18 months)

Time overrun (%) =  $\frac{\text{Actual time spend} - \text{Estimated planned time}}{\text{Estimated planned time}} * 100$

Estimated planned time

$$\text{TOR} = \frac{70 - 18}{18} * 100\% = 288.88\%$$

This shows that FOR G+4 the project delayed by 288.88%

For G+7 Building the schedule was 2 years (24 months)

Time overrun (%) =  $\frac{\text{Actual time spend} - \text{Estimated planned time}}{\text{Estimated planned time}} * 100$

Estimated planned time

$$\text{TOR} = \frac{70 - 24}{24} * 100\% = 191.66\%$$

This shows that for G+7 the project delayed by 191.66%

### 1.3 Objective of the study

#### 1.3.1 General objective

Assessment of the relative importance of factors of time overrun in bole arabsa project 7.

#### 1.3.2 Specific objective

To describe the current status of schedule management in Bole Arabsa project 7

To identify client-related factors that causes time overrun in bole arabsa project 7

To identify contractor- related factors that causes time overrun in bole arabsa project 7  
To identify consultant- related factors that causes time overrun in bole arabsa project 7  
To identify external-related factors that causes time overrun in bole arabsa project 7  
To identify labor- related factors that causes time overrun in bole arabsa project 7  
To identify material and equipment-related factors that causes time overrun in bole arabsa project 7  
To analyze and rank the time overrun factors in their order of severity

### **1.3.3 Research questions**

What are the major factors (related to client, consultant, contractor, labor, material/equipment and external factors) that affect this project not to complete on the schedule?  
How much of each factor of time overrun contribute in delaying Bole Arabsa project 7?  
What are the most significant factors that cause time overrun in Bole Arabsa project 7?

### **1.4 Definition of basic terms**

**Project:** - PMBOK (2000) defines a project as a temporary endeavor undertaken to create a unique product or service

**Project management:** the application of knowledge, skills, tools and techniques to meet project requirements.' It is accomplished through the applying and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing.'" (Project Management Institute 2000).

**Time overrun:** According to Kaming et. al. (1997), time overrun is the addition of time beyond planned completion dates usually visible to contractors.

### **1.5 Scope and Limitation of the study**

#### **1.5.1 Scope of the study**

20/80 Condominium housing projects constructed in all sub city of Addis Ababa however due to the similarity of the nature of the project and to easily manage the study focuses only one of the project sites found in bole sub city namely in Bole Arabsa projects 7. This sub city is selected because currently there is ongoing project. When construction projects are performed the issue of time overrun arises due to different reason this needs properly planned project time management plans. Therefore, this study will find out the main causes of time overrun in related to client, contractor, consultant, labor material/equipment and external factors in Bole Arabsa project 7, measure how much different causes affect the implementation process and give a recommended solution.



### **1.5.2 Limitations of the study**

The limitation of this study is that it is conducted only on 20/80 condominium housing projects specifically in Bole Arabsa project 7 because currently almost all projects are completed and unable to get needed information and also respondents. However, due to the similarity of the nature of the project the finding of this study can be applied to other similar projects.

### **1.6 Significance of the study**

The study is very important in finding out the unseen root causes of time overrun which in turn affects the budget of the project and also the overall economy of the country, find out different parties who are responsible for this, to review and improve currently used policy by providing an inputs for policy makers in order to limit and avoid this kind of problems , and show how properly planned time management plan plays an important role in managing project schedule by comparing the current trends used in the project, it helps in facilitating the tasks of different stakeholders, it would also give idea for the top management attention to ensure housing construction effectiveness and efficiency on timely completion of projects and also in reducing additional costs associated with project delays. The finding of this result serves as an input for those who are interested to conduct further researches related to this area.

### **1.7 Organization of the study**

The paper contains five chapters. The first chapter contains a brief description of background of the study, background of the study setting, statement of the problem, objectives, research questions, scope and limitation the study, and the significances of the study. The second chapter contains discussions of relevant related literature and prior studies that supports the study. Chapter three contains the research methodology, data collection techniques, data analysis process. Chapter four is the analysis and result part which deals with the questionnaire response rate, questionnaire response analysis and summary. The last chapter which is chapter five contains the conclusion and recommendation of the study plus recommendation for further studies.

## **CHAPTER TWO: LITRATURE REVIEW**

### **2.1 Theoretical literature**

#### **2.1.1 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 beginning and a definite end. Moreover, once it involves the main constraints of the project, we discover 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 ways 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.

According to PMBOK (2000), a project has distinctive characteristics. The primary characteristic is project is one-time-activity which the main objective is to solve problem or to grasp an opportunity. Moreover, have beginning and ending point. The success of a project is highly affected by the participation of a stakeholder. So, project need to be managed carefully. It is the roll and responsibility of a project manager to manage the project.

## Characteristics of a project

Typically, most projects share most if not all of the five characteristics listed below.

1. Projects are unique
2. Projects are temporary in nature and have a definite beginning and ending date.
3. An involvement of several people on an ad-hoc basis
4. A limited set of resources
5. A sequencing of activities and phases

Knowing those characteristics of a project helps the project manager or any other concerned body to manage the project properly and proactively in each phases of the project life cycle.

### 2.1.2 Project life cycle

According to POBOK Guide, (2000) Project life cycle is the arrangement of stages that a project passes through from its beginning to its completion. It gives the essential framework for managing the project. This essential framework applies in any case of the specific project work included. The phases may be sequential, iterative, or overlapping.

Project life cycles can be predictive or adaptive. Inside a project life cycle, there are by and large one or more phases that are related with the improvement of the product, service, or result. These are called a development life cycle. Development life cycles can be predictive, iterative, incremental, adaptive, or a hybrid model:

**In a predictive life cycle**, the project scope, time, and cost are determined in the early stages of the life cycle. Any changes to the scope are properly managed. Predictive life cycles may also be referred to as waterfall life cycles.

**In an iterative life cycle**, the project scope is generally determined early in the project life cycle, but time and cost estimates are routinely modified as the project group's understanding of the item increments. Iterations develop the product through arrangement of repeated cycles, while increments successively add to the usefulness of the item.

**In an incremental life cycle**, the deliverable is made through a stage of iterations that progressively add usefulness within a predetermined time frame. The deliverable encompasses the fundamental and sufficient capability to be considered total as it were after the final iteration.

**Adaptive life cycles** are agile, iterative, or incremental. The point by which scope is defined and endorsed before the beginning of iteration. Adaptive life cycles are moreover mentioned to as agile or change-driven life cycles.

**A hybrid life cycle** is a mixture of a predictive and an adaptive life cycle. Those components of the project that are well known or have constant requirements follow a predictive development life cycle, and those components that are still advancing take after an adaptive development life cycle.

It is up to the project management group to decide the best life cycle for each project. The project life cycle ought to be sufficiently flexible to bargain with the different factors included in the project. Life cycle flexibility may be accomplished by the following: the first one is by identifying the different processes or processes needed to perform in each phase. The second is by performing the process or processes identified in the appropriate phase and also by adjusting

the various attributes of a phase (e.g. name, duration, exit, criteria, and entrance criteria). Project life cycle generally defines the assignment to be accomplished in each stages or sub-phases and the responsibility of the project group in each of the stages characterized.

According to Archibald & Voropaev (2003), there is a common understanding that the four wide, generic project phases are (common alternative terms are shown in parentheses): the first phase is Concept (initiation, identification, selection.) or developing a concept is the first step in every project then after proceed to the second phase which is Definition (feasibility, development, demonstration, design prototype, quantification.). Execution (implementation, realization, production and deployment, design/construct/ commission, installation and test.) is the third phases in this phase the concept or idea changed in to practice and the last phase is Closeout (termination, including post-completion evaluation.)

The number of phases in a project life cycle depends on assortment of components like nature of industry, type of output, size of project etc. Kerzner (2003) has formulated a theoretical arrangement of phases that may be distinguished with most of the projects as is laid out below:

- Conceptual
- Planning
- Testing
- Implementation or Execution
- Closure

It is by and Large way better in planning projects to analyze progressive increase or particular stages of activity; in this way the return to each relatively small increment can be judged independently. Like items take after item life cycle, projects follow a project life cycle that has certain stages of advancement.

To manage big and complex projects easily, it is better to separate the projects in to manageable chunks. These chunks in a successive frame can be named as project phases which can further be divided into sub-phases and assemblage of these phases makes what is called as a project life cycle. Each project phase is checked by completion of one or more deliverables. In spite of the fact that numerous project life cycles have comparable phase names with somewhat comparative deliverables required, few are indistinguishable. Most have four or five phases, but a few have nine or more. Sub-projects within projects may also have different project life cycles. Importantly, these phases are not continuously sequential in nature but are more simultaneous.

As per Kulkarni et al. (2004), the projects, particularly the ones having a longer lifecycle, might be categorized into numerous phases depending on the purposes. For suitability and ease points of view, the three commonly known phases is utilized, namely: **Procurement phase**: this phase covers starting from inception to the financial closure and beginning of works (tendering; dealing with governments, lenders, insurers, pressure groups, experts). **Execution phase**: Project execution (site installation till routine processes are reached, significant completion). **Operation and handover phase**: From significant completion till the end of defect liability period and handover.

Generally, there are four project life cycle phases these are

- A) Initiation phase
- B) Planning phase
- C) Implementation phase
- D) Monitoring and Evaluation phase

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.

### **2.1.3 Project management**

According to PMBOK Guide (2017), 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.

According to Seymour et al. (1992) project management is a central methodology within the changes that numerous organizations are experiencing as they adjust from a steady, machine like model to a more dynamic one in confront of natural turbulence and change. Project managers confront difficult assignment of both fostering flexibility, adaptability and the acceptance of change as a changeless state and giving support for group members to empower them to live with a process they may experience as stressful and disorientating.

Kerzner (2003) defines project management as the planning, organizing, coordinating, and controlling of company assets for a relatively short-term goals that has been built up to complete specific goal and objectives. Project Management is the application of knowledge, abilities, tools and methods to project activities to meet project necessity. Project management is accomplished through the utilization of the processes such as: initiating, planning, executing, controlling, and closing. The term project management is sometimes used to label an organizational approach to the management of ongoing operations also referred to as management by projects. Within the same numerous viewpoints of ongoing operations are treated as projects so as to apply the project management practices easily to them.

The project life cycle is overseen by executing an arrangement of project management activities known as project management processes. Each project management process produces one or more outputs from one or more inputs by using appropriate project management tools and methods. The output can be a deliverable or an outcome. Outcomes are an end result of a process. Project management processes apply worldwide across industries.

According to Joseph J. Heagney (2012) Project management processes are consistently connected by the outputs they produce. Processes may contain overlapping actions that occur throughout the project. The output of one process generally comes about in either: An input to another process, or a deliverable of the project or project stages.

### Project management process group

Project Management Process Group is a logical grouping of project management processes to attain specific project goals. Process Groups are independent of project stages. There are around five Project management processes groups: Initiating Process Group. Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.

**Planning Process Group:** - Those processes required to form the scope of the project, refine the goals, and define the course of activity needed to achieve the goals that the project was attempt to achieve.

**Executing Process Group:** - Those processes executed to complete the work defined in the project management plan to meet the project requirements.

**Monitoring and Controlling Process Group:** - Those processes required to track, audit, and direct the progress and execution of the project; recognize any areas in which changes to the plan are needed; and initiate the corresponding changes.

**Closing Process Group:** - Those processes executed to formally complete or close the project, phase, or contract.

Process flow diagrams are utilized throughout this direct. The project management processes are connected by a particular inputs and outputs where the outcome or outcome of one process may become the input to another process that is not essentially with in the same Process Group. Note that Process Groups are not the same as project phases.

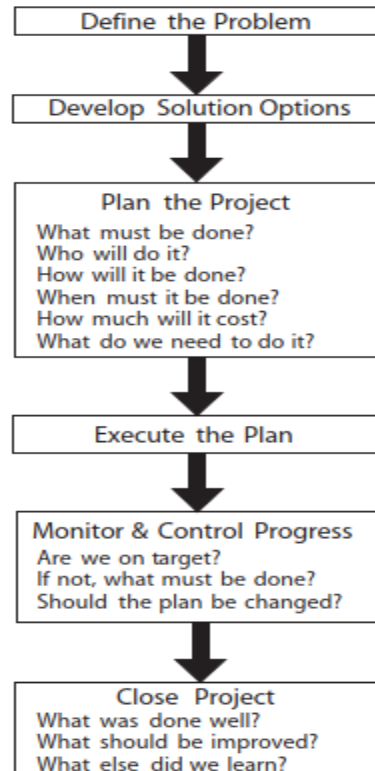


Figure 2.1 the steps in managing a project

## **Project management knowledge area**

The PMBOK® (2017) Guide identifies around ten knowledge areas that project managers should know in order to be considered as experts. A Knowledge Area is an identified area of project management defined by its knowledge necessities and depicted in terms of its component form, practices, inputs, outputs, tools, and techniques.

In spite of the fact that the Knowledge Areas are interrelated, they are defined independently from the project management viewpoint. The ten Knowledge Areas identified in this guide are utilized in most projects most of the time. The ten Knowledge Areas described in this guide are:

**Project Integration Management:** - Includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups.

**Project Scope Management:** - Includes the processes required to ensure the project includes all the work required and only the work required, to complete the project successfully.

**Project Schedule Management:** - Includes the processes required to manage the timely completion of the project.

**Project Cost Management:** - Includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so the project can be completed within the approved budget.

**Project Quality Management:** - Includes the processes for incorporating the organization's quality policy regarding planning, managing, and controlling project and product quality requirements, in order to meet stakeholders' expectations.

**Project Resource Management:** - Includes the processes to identify, acquire, and manage the resources needed for the successful completion of the project.

**Project Communications Management:** - Includes the processes required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and ultimate disposition of project information.

**Project Risk Management:** - Includes the processes of conducting risk management planning, identification, analysis, response planning, response implementation, and monitoring risk on a project.

**Project Procurement Management:** - Includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.

**Project Stakeholder Management:** - Includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution. The needs of a specific project may require one or more additional Knowledge Areas, for example, construction may require financial management or safety and health management.

To perform all the above activities the engagements of different experts is needed. Among those project managers is one of the experts who is responsible in managing all above-mentioned

activities. Therefore the project manager is the one who manages the overall activities of the project and needs to have basic knowledge of project management.

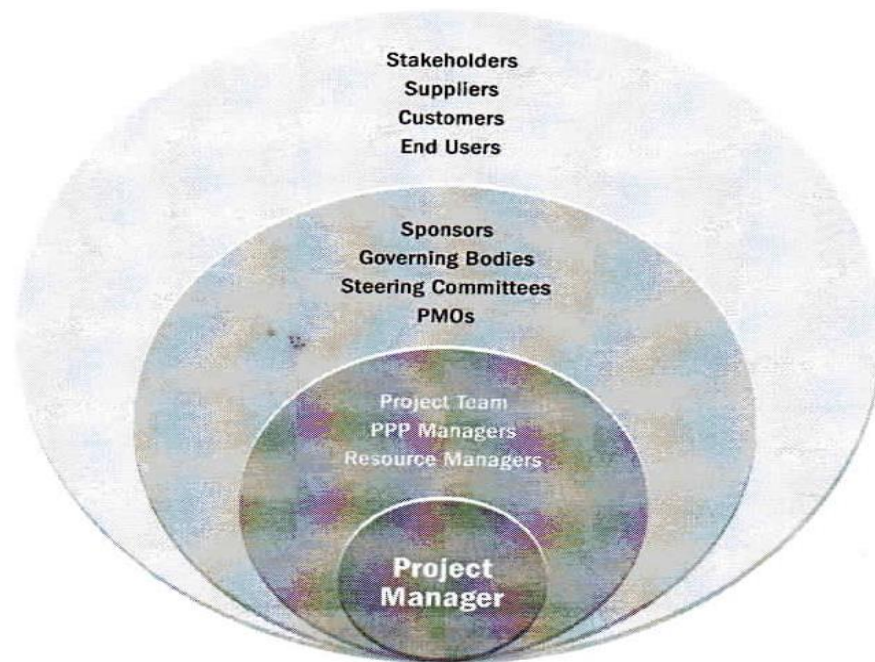
#### **2.1.4 Project manager**

According to POBOK (2017), a project manager is an individual appointed by the performing organization to lead the group that is responsible for meeting the project goals. The project manager plays a critical role within the leadership of a project group in order to accomplish the project's goals. This role is visible throughout the project. Many project managers become involved in a project from its starting up to the ending of the project. Be that as it may, in some organizations, before the initiation of a project, a project manager may be engaged in evaluation and analysis activities. The activities may include consulting with executive and business unit managers on ideas for advancing strategic goals, increasing organizational performance, or achieving the need of a customer. In a few organizational settings, the project manager may also be called upon to oversee or help in business investigation, business case improvement, and perspective of portfolio management for a project. A project manager is moreover involved in follow-on exercises realizing business benefits from the project. The role of a project manager may differ from organization to organization. Eventually, the project management role is custom made to fit the organization in the same way that the project management processes are custom made to fit the project.

The project manager is not anticipated to perform each part on the project, but ought to have project management knowledge, technical knowledge, understanding, and involvement. The project manager provides the project group with administration, planning, and coordination through communications. The project manager gives a composed communication (e.g., documented plans and schedules) and communicates in genuine time with the project group using meetings and verbal or nonverbal signals. Project managers fulfill various parts inside their sphere of influence.

These parts reflect the project manager's capabilities and are agents of the esteem and contributions of the project management profession.





**Figure 2.2 Examples of project manager's sphere of influence**

The project manager leads the project group to meet the project's goals and stakeholders' desires. The project manager works to adjust the competing limitations on the project with the asset available.

The project manager too performs communication parts among the project sponsor, group members, and other stakeholders. This incorporates giving direction and presenting the vision of success for the project. The project manager utilizes soft skills (e.g., interpersonal skills and the ability to manage people) to adjust the conflicting and competing objective of the project stakeholders in arranging to realize agreement. In this context, agreement implies that the relevant stakeholders support the project decisions and actions even when there is not 100% agreement (POBOK 2017).

Research shows that successful project managers reliably and viably utilize certain basic abilities. Investigate show that the top 2% of project managers as assigned by their bosses and group members recognize themselves by illustrating predominant relationship and communication abilities whereas showing a positive attitude.

The capacity to communicate with project owners, including the team and sponsors applies over numerous angles of the project including, but not limited to, the following:

- Developing finely tuned skills using multiple methods (e.g., verbal, written, and nonverbal);
- Creating, maintaining, and adhering to communications plans and schedules;
- Communicating predictably and consistently;
- Seeking to understand the project stakeholders' communication needs (communication may be the only deliverable that some stakeholders received until the project's end product or service is completed);

- Making communications concise, clear, complete, simple, relevant, and tailored;
- Including important positive and negative news;
- Incorporating feedback channels;

Relationship aptitudes including the advancement of broad system of individuals throughout the project manager's spheres of influence. These systems incorporate formal system such as organizational reporting structures. However, the formal systems that project managers create, keep up, and sustain are more vital. Formal system incorporates the utilization of built up connections with people such as subject matter specialists and influential pioneers. Utilizes of these formal and informal system permits the project manager to engage in different individual in solving problems and exploring the bureaucracies experienced in a project.

**Skills needed by project managers**

Recent PMI studies connected the Project Manager Competency Development (PMCD) Framework to the ability required by project managers through the utilization of The PMI Talent Triangle. The talent triangle concentrates on three key skill sets:

**Technical project management:** - The knowledge, skills, and behaviors related to specific domains of project, program, and portfolio management. The technical aspects of performing one's role.

**Leadership:** - The knowledge, skills, and behaviors needed to guide, motivate, and direct a team, to help an organization achieve its business goals.

**Strategic and business management:** - The knowledge of and expertise in the industry and organization that enhanced performance and better delivers business outcomes.



**Figure 2.2 The PMI Talent Triangle**

While technical project management skills are core to project management, PMI research indicates that they are not enough in today's increasingly complicated and competitive global market place. Organizations are seeking added skills in leadership and business intelligence. Members of various organizations state their belief that these competencies can support longer-range strategic objectives that contribute to the bottom line. To be the most effective, project managers need to have a balance of these three skill sets (POBOK 2017).

### **2.1.5 Project time overrun**

According to Kaming et. al. (1997), time overrun is the extension of time beyond planned completion dates usually traceable to contractors.

Lo, Fung & Tung (2006) and Assaf & Al-Hejji (2006), mentioned that time overrun is either beyond the contract date or beyond the date that the parties have agreed upon for the delivery of the project.

Time overrun is one of the most serious issues in construction industry worldwide. Construction time overrun is the variation between a project's definite contract period at the time of tender and its final contract period on which construction project completed. Time overrun can affect bring many negative impacts on the construction project like cost overrun, productivity will be less, contract expiration, quality of work will decrease due to work acceleration, and arguments among construction stakeholders. It is observed that many construction projects face the issue of time overrun worldwide both in developing and developed countries. Like other countries, time overrun is one of the most severe problems in the construction industry of Ethiopia.

### **2.1.6 Project schedule management**

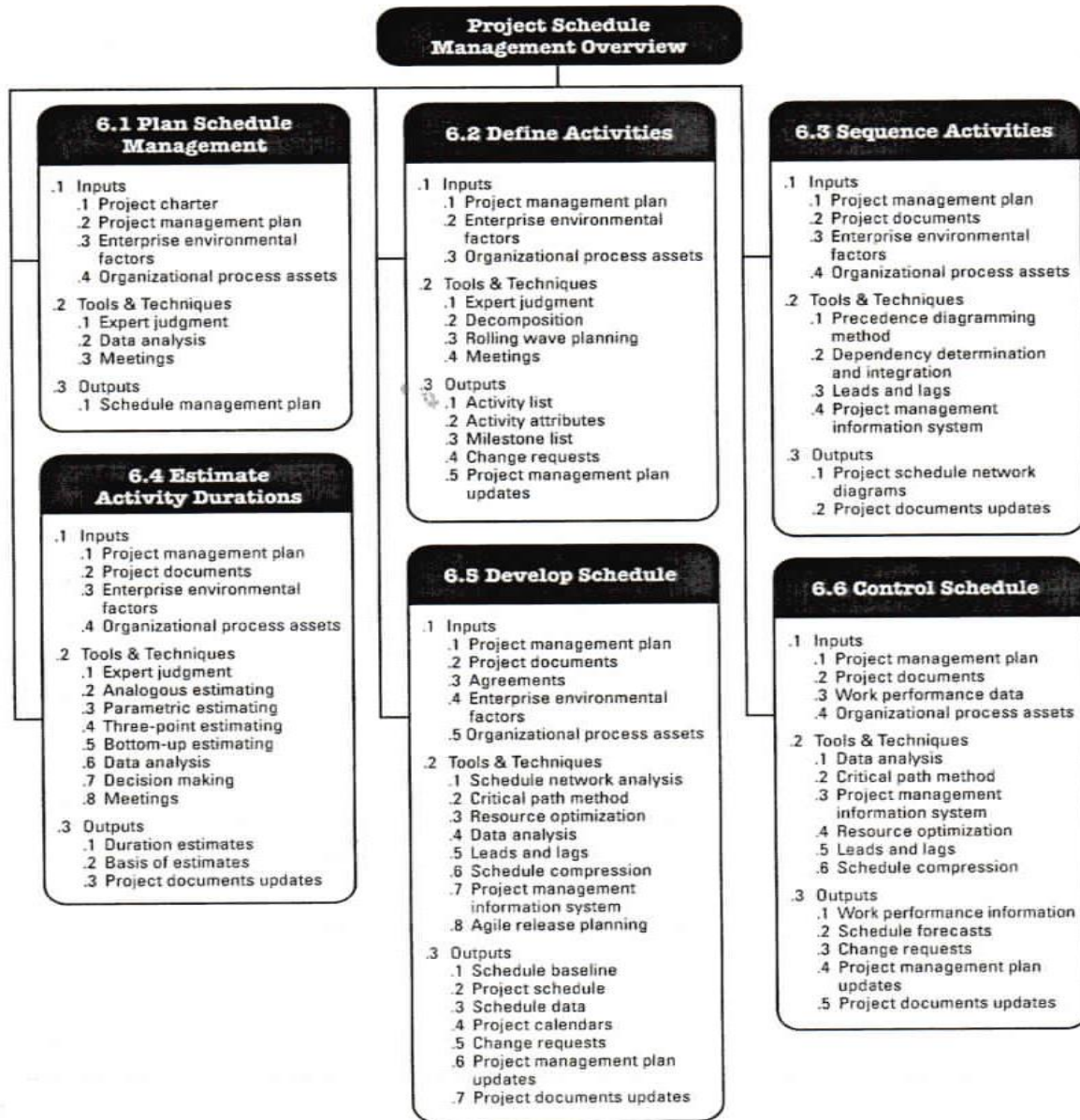
According to POBOK (2017), Project Schedule Management includes the processes required to manage the timely completion of the project. Project scheduling provides a detailed plan that represents how and when the project will deliver the products, services, and results defined in the project scope and serves as a tool for communication, managing stakeholders' expectations, and as a basis for performance reporting. The project management team selects a scheduling method, such as critical path or an agile approach. Then, the project-specific data, such as the activities, planned dates, durations, resources, dependencies, and constraints, are entered into a scheduling tool to create a schedule model for the project. The result is a project schedule.

#### **Project Schedule Management processes**

1. Plan Schedule Management: the process of establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule.
- 2 Define Activities: the process of identifying and documenting the specific actions to be performed to produce the project deliverables.
- 3 Sequence Activities: the process of identifying and documenting relationships among the project activities.
- 4 Estimate Activity Durations: the process of estimating the number of work periods needed to complete individual activities with the estimated resources.

5 Develop Schedule: the process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model for project execution and monitoring and controlling.

6 Control Schedule: the process of monitoring the status of the project to update the project schedule and manage changes to the schedule baseline.



**Figure 2.3 Project schedule management overview**

According to POBOK 2017 shown in the figure in each stage there are input, tools and techniques and outputs. However, since this study focused on time overrun it only focused on schedule controlling tools and techniques.

**Data analysis**

There are different data analysis techniques which used for this process among those the following are the major one.

**Earned value analysis:** schedule performance measurements such as schedule variance (SV) and schedule performance index (SPI) are used to assess the magnitude of variation to the original schedule baseline. **Iteration burns down chart:** this chart tracks the work that remains to be completed in the iteration backlog. It is used to analyze the variance with respect to an ideal burn down based on the work committed from iteration planning and a forecast trend line can be used to predict the likely variance at iteration completion and take appropriate actions during the course of the iteration. A diagonal line representing the ideal burn down and daily actual remaining work is then plotted. A trend line is then calculated to forecast completion based on remaining work. **Performance reviews:** performance reviews measure, compare, and analyze schedule performance against the schedule baseline such as actual start and finish dates, percent complete, and remaining duration for work in progress. **Trend analysis:** trend analysis examines project performance over time to determine whether performance is improving or deteriorating. Graphical analysis techniques are valuable for understanding performance to date and for comparing to future performance goals in the form of completion dates. **Variance analysis:** variance analysis looks at variances in planned versus actual start and finish dates, planned versus actual durations, and variances in float. Part of variance analysis is determining the cause and degree of variance relative to the schedule baseline estimating the implications of those variances for future work to completion, and deciding whether corrective or preventive action is required. **What-if scenario analysis:** what-if scenario analysis is used to assess the various scenarios guided by the output from the Project Risk Management processes to bring the schedule model into alignment with the project management plan and approved baseline.

### **Critical path method**

Comparing the progress along the critical path can help determine schedule status. The variance on the critical path will have a direct impact on the project end date. Evaluating the progress of activities on near critical paths can identify schedule risk.

### **Project management information system**

Project management information systems include scheduling software that provides the ability to track planned dates versus actual dates, to report variances to and progress made against the schedule baseline, and to forecast the effects of changes to the project schedule model.

### **Resource optimization**

Resource optimization techniques involve the scheduling of activities and the resources required by those activities while taking into consideration both the resource availability and the project time

### **Leads and lags**

Adjusting leads and lags is applied during network analysis to find ways to bring project activities that are behind into alignment with the plan. For example, on a project to construct a new office building, the landscaping can be adjusted to start before the exterior work of the building is completed by increasing the lead time in the relationship, or a technical writing team

can adjust the start of editing the draft of a large document immediately after the document is written by eliminating or decreasing lag time.

### **Schedule compression**

Schedule compression techniques are used to find ways to bring project activities that are behind into alignment with the plan by fast tracking or crashing the schedule for the remaining work POBOK (2017).

## **2.2 Empirical study**

### **2.2.1 Causes of time overrun**

Many researchers conducted studies on the causes of time overrun in different kinds of construction projects to find the factors and causes of time overrun. Kumaraswamy and Chan (1998), conducted a more extensive study in Hong Kong using 400 questionnaires after which follow up interviews were held. The study exposed the top causes of construction time overrun from the contractors' point of view are delays in design information, long waiting time for approval of drawings, poor site management and supervision, mistakes and discrepancies in design documents, etc. Al-Momani (2000), studied 130 public projects in Jordan and concluded that the main causes of delays include changes initiated by designers, client requirement, weather, site conditions, late deliveries, economic conditions and etc. Yogeswaran et. al. (1998), scrutinized 67 civil engineering projects in Hong Kong and suggested that at least 15-20% time overrun was due to inclement weather. Walker (1995), surveyed Australian project representatives and found that the most important factors that affect time delays are the ability of the organization to manage risk, planning capabilities and ineffective resource coordination.

According to Fugar (2010), conducted survey on 130 randomly selected engineers. Identified causes of time overrun were delayed payments, material shortage, changes in selected material prices, poor site management, and problems in bank credit. Kumaraswamy and Chan (1996), identified 83 common factors of time overrun and arranged these factors in 8 groups. By using relative importance index five causes of time overrun were identified which were poor supervision at site and site management, delay in making decisions, owner interference in the project, ground conditions, and necessary changes from the owner. Mansfield (1994), identified 16 causes of time overrun, the top 5 being: financial problems faced by the contractor, poor contract management, site supervision, lack of planning, and delay in material supply. Ogeno (2016), carried out a survey through questionnaire distribution to selected experts of construction industry in Nigeria. Identified causes of time overrun were inexperienced sub-contractors, shortage of labor, poor site management, shortage of selected materials and mistakes during works.

According to Frimpong (2003), in studied groundwater project and illustrated that owners, contractors and consultants ranked poor contractor management, monthly payment difficulties from agencies, material procurement, poor technical performances and escalation of material prices as major factors that can cause time overrun. According to (Assaf and Al-Hejji 2006) 70% of projects experienced time overrun. The average time delay ranges from 10% to 30% of the

original duration of the project. The study identified 6 main causes including change order, delay in progress payment, ineffective planning and scheduling of project by contractor, poor site management and supervision by contractor, Shortage of labors and Difficulties in financing project by contractor as most critical factors responsible for this time overrun. Delayed payment was found to be the number one cause of schedule delays in the Zambian road construction industry followed by protracted financial processes in client organizations, financial difficulties that accompany the delayed release of funds by client organizations, contract modification, material procurement and changes in drawings, staffing problems, equipment unavailability, poor supervision, construction mistakes, poor coordination on site and changes in specifications (kaliba et. al. 2009).

According to Khatib et al (2018), in studied delay factors in reconstruction projects different causes of delay are identified from the owner, contractor and consultant sides among those financial problems and difficulties, change orders, delays and shortages of materials, poor site management and supervision, in accurate time estimation poor communication and coordination among construction parties, lowest bid awards, slow decisions, the contract type, delays in performing inspections and tests, and lack of clarity of the project’s scope and also design changes and modifications, errors, delays, shop drawings’ slow preparation and approval, and erroneous sources of information are the major causes of delay. According to Alsuliman (2019) in investigating the causes of delay in public construction project. The results showed that the most significant owner and consultant related causes are the factors associated with awarding tenders. In particular, the bid and award process, financial problems, approval delay, owner’s poor management capability, variations in orders that occur during the project period and failure to determine quantities, specifications, and drawings accurately were the most frequent causes of delays in public construction projects.

According to Zidane (2018), in studying the top ten universal delay factors in construction projects the main factors for the delays are design changes during construction/ change orders, delays in payment of contractors, poor planning and scheduling, poor site management and supervision, incomplete or improper design, inadequate contractor experience/building methods and approaches, contractor’s financial difficulties, owner/client/sponsor financial difficulties, resource shortage (human, material, equipment), and poor labor productivity and shortage of skills.

Based on the literature the different causes of time overrun in construction projects are identified and to make it simple and clear this paper presented it in table form. The causes are related to owners, contractors, consultants, external factors, labors, material and equipment.

**Table 2.1 Main Causes of Time Overrun in Construction Projects**

S/no	Overall identified causes
1	Delays in design information
2	Long waiting time for approval of drawings
3	Poor site managements and supervision
4	Mistakes and discrepancies in design documents

5	Design changes and modification
6	Weather
7	Site condition
8	Economic condition
9	Ineffective resource coordination
10	Material shortage
11	Changes in selected material price
12	Problems in bank credit
13	Poor supervision at site
14	Delay in making decision
15	Owner interference in the project
16	Ground condition
17	Necessary change from the owner
18	Financial problems faced by the contractors
19	Poor contract management
20	Inexperience sub-contracts
21	Lack of planning
22	Delay in material supply
23	Shortage of labor
24	Shortage of selected material
25	Mistakes during works
26	Poor technical performances of the staffs
27	Escalation of material price
28	In accurate time estimation
29	Delay in progress payment
30	Ineffective planning and scheduling of project by contractors
31	Poor site management and supervision by contractors
32	Difficulties' in financing the project by contractors
33	Shortage of contract period
34	Changes in drawing
35	Equipment unavailability
36	Changes in material and specification
37	Poor communication and coordination among construction parties
38	Lowest bid award and contract type
39	Delays in performing inspection and tests
40	Change orders
41	Incomplete or improper design
42	Inadequate contractors experience/building methods and approaches



43	Resource shortage (human, material and equipment)
44	Owner/client/sponsor financial difficulties
45	Lack of clarity of the project scope
46	Poor labor productivity and shortage of skills

Source: from the literature

As it described in the above table different researchers identifies different reasons for the causes of time overrun in construction projects and most of the causes mentioned above are raised by different researcher as a major cause and most of the causes identified are similar. Ethiopia is one of the countries which are highly affected by time overrun in construction projects especially in government housing projects. However, studies related to this issue are not satisfactory and not sufficiently found that mean even if our country is highly affected by this problem, only limited number of researches were done related to the topic. Therefore, this study will identify the main causes which affect project 7 not to complete on the planned schedule.

### 2.2.2 Responsible parties for the cause of time overrun

In construction industry there are different parties who participate in project activities and responsible in achieving project objectives. These parties also responsible for the causes of different problems that occur in that project. Among the different problem time overrun, cost overrun, quality problem, scope creep, financial problem and the like. Time overrun is one of the most common problem in construction industry all over the world especially in developing country this kind of problem is commonly known. These parties include contractors, consultants and clients.

### 2.3 Conceptual framework

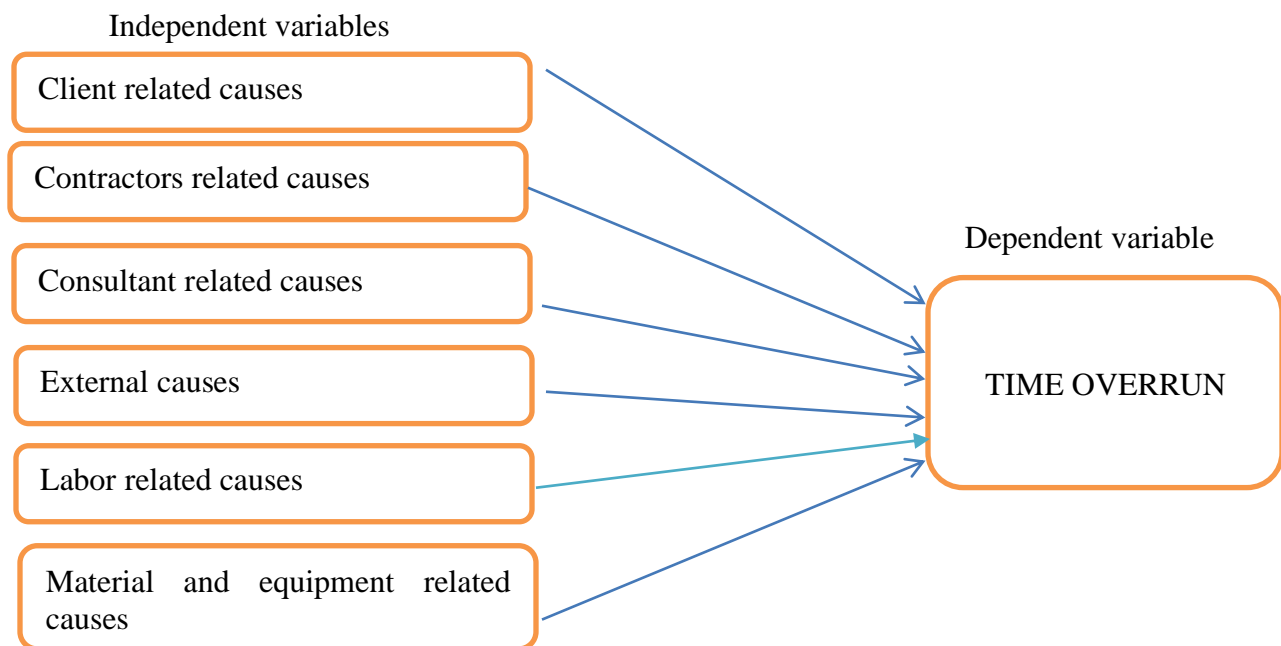


Figure 2.4 Conceptual frame work

## **CHAPTER THREE: RESEARCH METHODOLOGY**

In this chapter the main contribution is describing the research methodology used in the assessments of the factors of time overrun in Bole Arabsa project 7 20/80 condominium houses followed by discussion of data collection method, research design, sample and sampling technique, and also data analysis.

### **3.1 Research design and Research approach**

Research design is advanced planning of the methods to be implemented for collecting the relevant data and techniques used in the analysis of the collected data, keeping the objective of the study (McNabb, 2010). It refers to the overall strategy that we choose and utilized to carry out research and address the research problem. There are different research design methods but for this study, descriptive and explanatory research design method adopted. Descriptive studies are designed primarily to describe what is going on or what exists. Explanatory research also known as Causal research, it's a kind of research design which is used to obtain the evidence of cause-and-effect relationship between two or more than two variables, where one or some variables would be the dependent and another/rest of the variable would be independent. Causal research, also known as explanatory research is conducted in order to identify the extent and nature of cause-and-effect relationships. Causal studies focus on an analysis of a situation or a specific problem to explain the patterns of relationships between variables.

Based on the discussions made above the research design used in this research was descriptive and explanatory research design. The methods were preferred to be fit to describe the situation about time overrun in the project and explain the main factors causing time overrun.

### **3.2 Sample size and Sampling technique**

#### **3.2.1 Research Population**

When conducting a research in a given population it is difficult to collect data from every individual in that population especially if the population is large. Instead selecting a sample is the best way. Sample is the group of people who participate in the study. Among the different 20/80 housing projects in bole Arabsa site, this study focused on project 7. On the site there are around 51 contractors, two consulting office and client. The population of the study will be taken from the three parties which is directly related to the title therefore the total population is 125 from the contractor side 51, from the client 53 and from the consultant 21. The sample size is calculated using the sample size formula. This formula used to get results that reflect the target population as precisely as needed. The researcher proposes to use the following sample size estimation formula to assess the sample size of the population in Bole Arabsa project 7. The formula is established by (Yemane, 1967) It estimates the sample size as follows:

$$n = \frac{N}{1 + N(e)^2} \dots\dots\dots \text{Eqn.1}$$

where

n is the sample size

N is the total population = 125

E is the level of precision or sampling error = 0.05

Then the calculated sample size,  $n=125/1+125(0.05)$ , **n=95**

### **3.2.2. Sampling Technique**

Select the sample may be using probability sampling; random or non-probability sampling; non-random selection bases. For this study the participants who will fill the questionnaires' is select based on stratified sampling technique.

### **3.3 Data Source**

There are different types of data source primary data source and secondary data source. For this study to identify the root causes of time overrun in bole arabsa project 7 both types of data source are used. The Primary data is collected using questionnaires and interview from the contractors and consultants and secondary data is collected from client from the report.

### **3.4 Data Gathering Instrument**

Questionnaires will be prepared for the stakeholders (client contractor and consultant). The questionnaires conducted by direct contact. There are variables namely dependent and independent variables. A variable that causes time overrun in that project grouped in to six groups according to the source of time overrun.; client related, consultant related contractor related, external related, labor related and material and equipment related causes are the independent variables and the dependent variable is the results that comes due to the different causes which is called time overrun.

#### **3.4.1 Designing the questionnaires**

The questionnaire is divided in to two main parts which consist of general information of the respondents (profile and experience) and also other questions related to the main causes of time overrun identified from the literature. For each cause a question was asked: What is the degree of severity of this cause on project time overrun? The severity was categorized on a five-point scale as follows: strongly disagree, disagree, neutral, agree, and strongly agree. The questionnaire will be prepared in English. The questionnaire comprises a 5-point Likert scale of 1 - 5 where 1 shows a high level of disagreement and 5 shows a high level of agreement. Instruction will be given to the respondents during the administration of the questions by the researcher.

### 3.5 Method of data analysis

This deals with the analysis of the information gathered from the respondents. Therefore, in this case out of 95 distributed questionnaires for survey 83 are responded. The feedback from the respondent had been analyzed using Micro soft Excel and Mean value and relative important index are used to prioritize the factors. According to Aibinu and Jagobro (2002) relative important index (RII) approach used to describe the specific cause and effects based on the likelihood of occurrence and effect on the project using Likert scale of five scale. The higher the value of the RII, is the critical cause or impact component and is determined by equation 2. According to Akidar (2011), five important levels are transformed from RI values: high(H) ( $0.8 \leq RII < 1$ ), high to medium(H-M) ( $0.6 \leq RII \leq 0.8$ ), medium (M) ( $0.4 \leq RII \leq 0.6$ ), medium to low (M-L) ( $0.2 \leq RII \leq 0.4$ ) and low (L) ( $0 \leq RII \leq 0.2$ ).

$$RII = \frac{\sum W * F}{A * N} \quad (0 \leq RII \leq 1) \dots \dots \dots \text{Eqn.2}$$

Where

W is the weight given to each factor by the respondents and ranges from 1 to 5

F frequency of each

A is the highest weight (in this case 5) and

N is the total number of respondents

### 3.6 Ethical consideration

The right of the individual respondent to give information that he/she only wants to tell about was respected. So, there was no influence on the respondents. Personal information obtained from the respondents was kept secret. Generally, necessary precautions were taken to eliminate or to minimize any possible harm to the respondents and the study community

### 3.7 Validity and reliability

Reliability and validity tests will conduct to ensure the accuracy of the methods and data collected and the questionnaires will also be reviewed by the research supervisor; corrections were made to some questions to ensure clarity and relevance (Kothari, 2014).

#### 3.7.1 Validity

According to Roberta Heale and Twycross (2015) define validity as the extent in which a concept is accurately measured in a quantitative study. Validity is used to define the range to which a concept is precisely measured. There are different types of validity; Content validity, Face validity, Criterion validity and Construct validity. Providing accurate and honest information by the participants contribute to achieve research validity this can be achieved by

providing a clear and understandable questionnaire for the respondents. To make the study more valid I will use more than one instrument therefore both questionnaire and unstructured interview will be used. In addition to this I ensure research validity by avoiding bias of data collection and findings or by avoiding pre-assumed beliefs.

### 3.7.2 Reliability

Roberta Heale and Twycross (2015) also define reliability as the consistency of a measure. Reliability concerns the extent to which a measurement of a phenomenon provides stable and consistent results (Taherdoost, 2016). This is used to see whether each respondent’s answer has consistency or not. Cronbach Alpha approaches will be used if the alpha value is 0.7 and above indicates an acceptable level of reliability. And also, by using unstructured interviews, collecting and reviewing documents and archive records and also by conducting appropriate research method and design I ensure reliability of the research.

#### Pilot study

Pilot study is very important in making a research valid and reliable. Therefore, before distributing the final questionnaires pilot study were conducted by randomly choosing some respondents from the sample size and distribute the questionnaires to them then based on the result, the final questionnaires distributed for the sample.

**Table 3.1 Analysis of alpha value for reliability test**

Item	Alpha Value
Client related causes	0.680
Contractors related causes	0.674
Consultant related causes	0.666
External causes	0.773
Labor related causes	0.730
Material and equipment related causes	0.695
<b>Average Alpha Value</b>	<b>0.703</b>

Source: own survey, 2021

## CHAPTER FOUR: DATA ANALYSIS AND INTERPRETIATION

### 4.1 Introductions

The overall purpose of this paper is to assess the main causes of time overrun in bole arabsa project 7 building projects. In this chapter the issue related to the distribution of the questionnaires, data collected from the respondent from the three parties namely client, contractors and consultants were analyzed and interpret deeply. As I described in chapter three out of the total population 95 sample size was selected and distributed the questionnaires for the respondents.

**Table 1.1 Summary of survey response level**

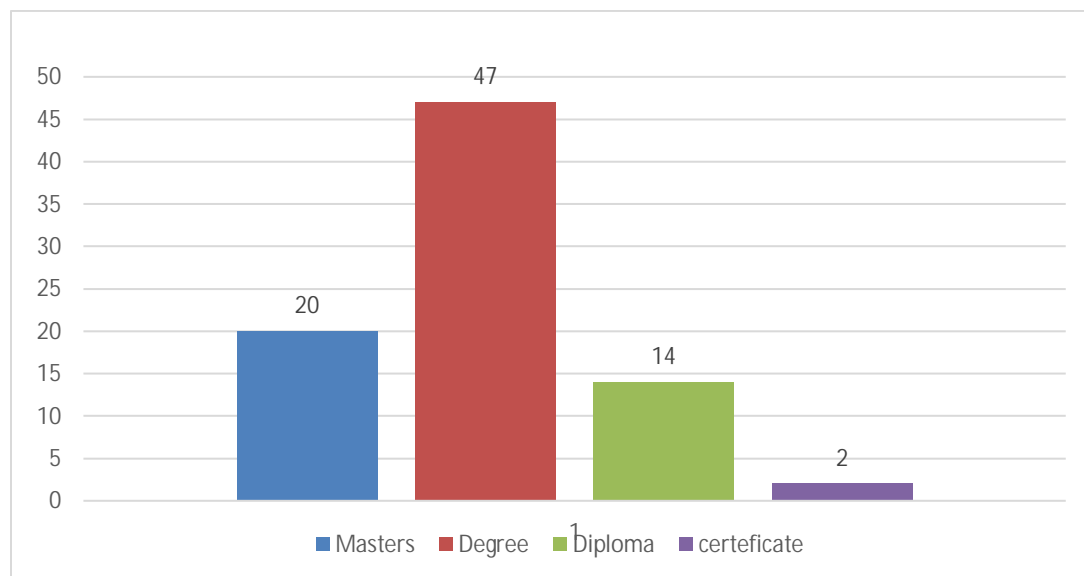
Group	Questionnaire Distributed	Questionnaire Returned	Response Rate
Client	24	22	91%
Contractor	56	49	88%
Consultant	15	12	80%
Total	95	83	87%

Source: own survey, 2021

Table 4.1 shows that general response rate for the respondents 87% and the total number of respondents is 83 out of 95 respondents. The response rate in the client side is 91%, in the contractor side is 88% and that of consultant side is 80%.

### 4.2 General information

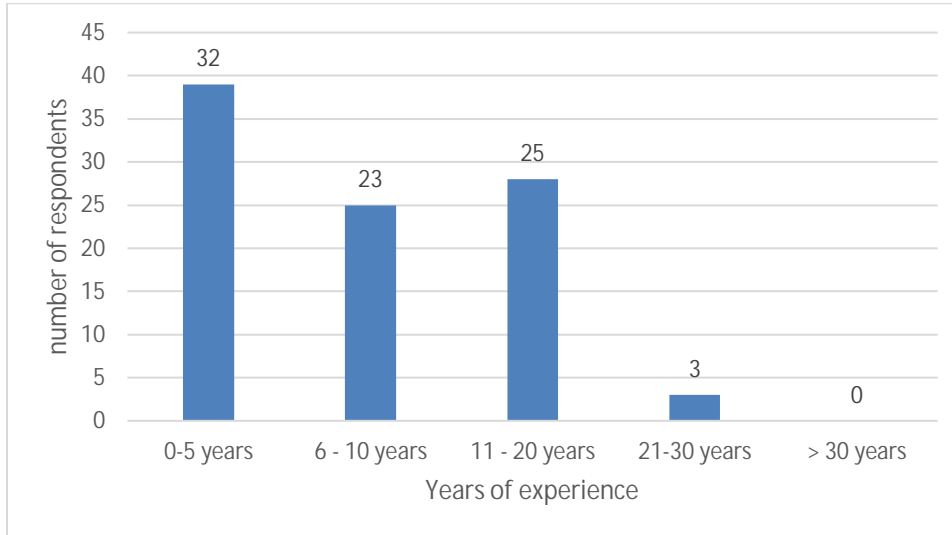
#### 4.2.1 Level of Education



**Figure 4.1 summary of respondents' educational qualification ion from the questionnaire**

Figure 4.1 shows that 20 (24.1%) of the respondents have masters, 47 (56.6%) of the respondents educational qualification is first degree, 14 (16.9%) of respondents have diploma and the rest 2 (2.4%) respondents have a certificate.

#### 4.2.2 Description about years of experience



#### Figure 4.2 summary of respondents' work experience

Figure 4.2 shows that among the total respondents 32 (38.5%) of the respondents have experienced up to up to 5 years, 23 (27.7%) of the respondent experience is from 6 to 10 years, 25 (30.1%) of respondents have an experience from 11 to 20 years and only 3 (2.6%) of respondents have an experience from 21 to 30 years.

#### 4.2.3 Description about grade of contractors

Table 4.2 summary of grade of contractors

S.no	Grade of contractors	Number of contractors
1	Grade 1-2	5
2	Grade 3-4	18
3	Grade 5-6	29
4	Grade 7-8	0

Source: own survey, 2021

Table 4.2 shows that among 52 contractors only 5 (9.61%) contractors are from grade 1 to 2 contractors, 18 (34.61%) contractors are grade 3 to 4 and the other 29 (55.76%) contractors are

from grade 5 to 6. These show that most of the contractors in bole arabsa project 7 is from grade 5 to 6.

### 4.3 The extent of time overrun

**Table 4.3 The extent of time overrun**

Extent of time overrun for	N	Very High	High	Moderate	Low	Very Low
G+4	83	74	9	–	–	–
G+7	83	67	16	–	–	–

Source: own survey, 2021

Table 4.3 shows that the respondents were asked about the performance of the project in terms of the extent of time overrun for the project. in this project the time frame for G+4 and G+7 was different therefore for G+4 building among 83 respondents 74 (89.2%) of respondents give the rate of time overrun as very high and the rest 9 (10.8%) respondents give high. For G+7 building among 83 respondents 67 (80.7%) of respondents give a very high rate and the remaining 16 (19.3%) respondents give a high rate.

### 4.4 Analysis of most important factors of time overrun

This part describes those identified elements of causes of project time overrun in bole arabsa project 7 and level of significance on the implementation process. These determinants are classified as a variable that is independent in our case, is presented with their relative tables of detailed data presentation. The main purpose of using this statistical parameter is to interpret the average response rate of respondents for each subject. The study used judgment to classify the range of scores obtained of the five-point Likert scale as follows: A variable with a mean score of 4.5 to 5.0 have taken as ‘strongly agree on the five-point Likert scale, a score of 3.5 to 4.49 as ‘Agree’ on the five-point Likert scale, a score of 2.5 to 3.49 ‘Neutral’ on the Likert scale, a score of 1.5 to 2.49 have taken as ‘Disagree’ and a score of 1.0 to 1.4 ‘strongly disagree’ on the Likert scale.

**Table 4.4 Visual Interpretation**

Scale	Visual interpretation	classification
Strongly Agree	4.5 – 5.0	3.5 – 5
Agree	3.5 - 4.49	
Neutral or Moderate	2.5 - 3.49	2.5 - 3.49
Disagree	1.5 - 2.49	1 – 2.49
Strongly Disagree	1.0 - 1.4	

Prepared by the researcher, 2021



#### 4.4.1 Client related factors

**Table 4.5 mean and RII value of client related factors**

Client related causes	N	Mean	RII	Rank
Design change and modification by client	83	4.024	0.804	2
Delays in making decision by client	83	3.939	0.787	3
Poor communication and coordination by client with other parties	83	3.722	0.744	7
Change orders	83	3.674	0.734	8
Delays in progress payments	83	4.180	0.836	1
Inaccurate time estimation	83	3.915	0.783	4
Problems in bank credit	83	3.204	0.640	10
Owner's interference in the project	83	2.795	0.559	11
Lack of early planning of the project	83	3.891	0.778	5
Lack of clarity of the project scope	83	3.216	0.643	9
Lowest bid award and award process	83	2.698	0.539	12
Poor technical performance of the staffs	83	3.759	0.751	6

Source: own survey, 2021

Table 4.5 shows the analysis shows that the results of causes of delay from the client perspective respondents ranked 'Delays in progress payments' as the most influential causes that contributing time overrun in bole arabsa project 7 with relative important index (RII) of 0.836. delaying of progress payment become a common problem. As (Assaf and Al-Hejji 2006) said in the literature among the 6 identified main causes of delays, progress payment is one of the most critical factors responsible for this time overrun. It is obvious that delayed payment will affect the work progress. This result agrees with Mansfield (1994), who identified 16 causes of time overrun and found that the financial problems faced by the contractor included in the top 5 causes of time overrun. 'Design change and modification by client' were ranked second with relative important index (RII) of 0.804. Khatib et al (2018) also supports this idea in studied delay factors in reconstruction projects different causes of delay are identified from the owner,

contractor and consultant sides among those design changes and modifications is one of the major causes of delay and also Zidane (2018), in studying the top ten universal delay factors in construction projects the main factors for the delays are design changes during construction was among major causes of time overrun. The third most crucial factors causing time overrun from the client side were ‘Delays in making decision by client’ with relative important index (RII) of 0.787. Kumaraswamy and Chan (1996), identified 83 common factors of time overrun and arranged these factors in 8 groups. By using relative importance index five causes of time overrun were identified one of the causes were delay in making decisions and ‘Inaccurate time estimation’ ranked in the fourth level with relative important index (RII) of 0.783. This factor also has been identified in other studies in the literature Khatib et al (2018) in accurate time estimation were one of the major causes of delay. Next to these factors Lack of early planning of the project, Poor technical performance of the staffs, Poor communication and coordination by client with other parties, change orders, Lack of clarity of the project scope, Problems in bank credit, Owner’s interference in the project and Lowest bid award and award process are ranked.

#### 4.4.2 Contractor related factors

**Table 4.6 mean and RII value of contractor related factors**

Contractors related causes	N	Mean	RII	Rank
Poor communication and coordination by contractor with other parties	83	3.493	0.698	8
Poor site management and supervision by contractors	83	3.903	0.780	2
Inadequate contractors experience/building methods and approaches	83	3.493	0.698	8
Ineffective resource coordination	83	3.566	0.713	7
Inadequate early planning and scheduling of the project	83	4.096	0.819	1
Delayed payment	83	3.831	0.766	4
Constructions mistakes and defective Works	83	2.831	0.566	11
Poor schedule management	83	3.843	0.768	3
Poor technical performances of the staffs	83	3.819	0.763	6
Financial problems faced by the contractors	83	3.831	0.766	4

Changes in material and specification	83	3.156	0.631	10
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Source: own survey, 2021

Table 4.6 show that the results of causes of time overrun in related to contractors. Among 11 contractor related causes ‘Inadequate early planning and scheduling of the project by contractors’ were ranked the first most influential causes contributing to time overrun in bole arabsa project 7 with relative important index (RII) of 0.819. This result supports the findings by Assaf and Al-Hejji 2006 for a similar study as most critical factors for time overrun. The second ranked cause were ‘Poor site management and supervision by contractors’ with relative important index (RII) of 0.780. based on the literature Kumaraswamy and Chan (1998), conducted a more extensive study in Hong Kong which supports this idea using 400 questionnaires after which follow up interviews were held. The study exposed poor site management and supervision as one of the top causes of construction time overrun from the contractors’ point of view. ‘Poor schedule management’ this effect was ranked the third effect with a relative important index (RII) of 0.768. ‘Financial problems faced by the contractors’ ranked in the fourth level with the RII value of 0.766, this finding is related to the findings of Mansfield (1994), who identified 16 causes of time overrun and financial problems faced by the contractor ranked in the first among top five. Following the above factors Delayed payment, Constructions mistakes and defective Works, Poor technical performances of the staffs, Ineffective resource coordination, Inadequate contractors experience/building methods and approaches, Poor communication and coordination by contractor with other parties and Changes in material and specification are ranked.

#### 4.4.3 Consultant related factors

**Table 4.7 mean and RII value of consultant related factors**

Consultant related causes	N	Mean	RII	Rank
Poor site management and supervision	83	3.566	0.713	10
Delays in design information	83	3.939	0.787	5
Long waiting time for approval of drawings	83	4.120	0.824	2
Changes in drawing	83	4.132	0.826	1
Poor communication and coordination by consultant with other parties	83	3.843	0.768	6
incomplete or improper design	83	3.795	0.759	8
Mistake and discrepancies in design documents	83	3.783	0.756	9

Delay in decision making by consultants	83	4	0.8	3
Delays in performing inspection and tests	83	3.397	0.679	11
Poor technical performances of the staffs	83	3.807	0.761	7
Poor contract management	83	3.963	0.792	4

Source: own survey, 2021

From Table 4.7 it can be observed that the key factors that contributed most from the summary of the above table among 11 consultant related causes ‘Changes in drawing’ is the first ranked most important causes in bole arabsa project 7 with a relative important index (RII) of 0.826. This result supports the findings by (kaliba et. al. 2009) who studied the Zambian road construction industry and found that changes in drawing as one of the major factors in causing time overrun. The second most important causes for time overrun in this project was ‘Long waiting time for approval of drawings’ with relative important index (RII) of 0.824. ‘Delay in decision making by consultants’ ranked the third most influential effects causing time overrun with relative important index (RII) of 0.80. Kumaraswamy and Chan (1998) conducted similar study carried out in Hong Kong and the study exposed the top causes of construction time overrun among those causes long waiting time for approval of drawings and also delay in decision making by consultant is the major causes. The fourth most crucial factors causing time overrun in this project related to the consultants were ‘Poor contract management’ with relative important index (RII) of 0.792. Mansfield (1994) studies also revealed that poor contract management as one of the major factors causing time overrun. Following the above factors Delays in design information, Poor communication and coordination by consultant with other parties, Poor technical performances of the staffs, incomplete or improper design, Mistake and discrepancies in design documents, Poor site management and supervision and Delays in performing inspection and tests are ranked.

#### 4.4.4 External factors

**Table 4.8 mean and RII value of external related factors**

External related causes	N	Mean	RII	Rank
Changes in exchange rate	83	4.265	0.853	2
Economic condition	83	4.096	0.819	3
Escalation of material price	83	4.506	0.901	1

Site condition	83	3.349	0.669	4
Weather condition	83	2.987	0.597	5

Source: own survey, 2021

Table 4.8 shows that the first most critical factors causing time overrun in bole arabsa project 7 in related to external cause was ‘Escalation of material price’ with relative important index (RII) of 0.901. This idea supported by Frimpong (2003), in studied groundwater project illustrated that escalation of material prices as one of the major factors that can cause time overrun. ‘Changes in exchange rate’ is the second most important cause with relative important index (RII) of 0.853. A project is initiated with the estimated budget by considering some amount of variation but sometimes due to various reason exchange rate might be changed and the price of different materials, equipment and other which is important to the implementation of the project will increase in other way the overall work progress of the project will be affected. ‘Economic condition’ is ranked in the third level with relative important index (RII) of 0.819 and in the fourth level ‘Site condition’ is ranked with relative important index (RII) of 0.669, according to Al-Momani (2000), studied 130 public projects in Jordan and concluded that the main causes of delays include site conditions and economic conditions. weather condition ranked in the 5<sup>th</sup> with a relative important index of 0.597.

#### 4.4.5 Labor related factors

**Table 4.9 mean and RII value of labor related factors**

Labor related causes	N	Mean	RII	Rank
Shortage of labor	83	2.493	0.498	3
Inexperience sub-contracts	83	4.072	0.814	1
Poor labor productivity and shortage of skills	83	3.987	0.797	2

Source: own survey, 2021

Table 4.9 shows that among the three labor related causes the first most crucial factors causing time overrun in bole arabsa project 7 was ‘Inexperience sub-contracts’ with relative important index (RII) of 0.814. This finding supports the findings of Ogeno (2016), carried out a survey through questionnaire distribution to selected experts of construction industry in Nigeria. Identified causes of time overrun were inexperienced sub-contractors. ‘Poor labor productivity and shortage of skills’ is the second most influential cause with relative important index (RII) of 0.797. According to Zidane (2018), in studying the top ten universal delay factors in construction projects one of the main factors for the delays was poor labor productivity and shortage of skills.

Among the three labor related causes ‘Shortage of labor’ ranked in the third level with relative important index of 0.498.

#### 4.4.6 Material and equipment related factors

**Table 4.10 mean and RII value of material & equipment related factors**

Material and equipment related causes	N	Mean	RII	Rank
Shortage of materials	83	3.29	0.657	3
Changes in selected material price	83	3.95	0.790	2
Delays in material supply	83	4.37	0.874	1
Equipment unavailability	83	2.91	0.583	4

Source: own survey, 2021

Table 4.10 shows that ‘Delays in material supply’ ranked in the first stage in related to material and equipment related causes with relative important index (RII) of 0.874. this result supports the finding carried out by Mansfield (1994) in identified 16 causes of time overrun, among the top 5 delay in material supply was included. The second most influential cause of time overrun in this category was ‘Changes in selected material price’ with relative important index (RII) of 0.790. The third ranked cause was ‘Shortage of materials’ with relative index (RII) of 0.657 and among the four material and equipment related causes. According to Khatib et al (2018), in studied delay factors in reconstruction projects different causes of delay are identified shortages of materials was among those identified causes. ‘Equipment unavailability’ ranked in the fourth level with relative important index (RII) of 0.583.

#### 4.5 Ranking the factors

**Table 4.11 Top 15 overall factors of time overrun in Bole Arabsa Project 7**

Group	Causes of time overrun	Mean	RII	Rank
External	Escalation of material price	4.506	0.901	1
Material & Equipment	Delays in material supply	4.373	0.874	2
External	Changes in exchange rate	4.265	0.853	3

Client	Delays in progress payments	4.180	0.836	4
Consultant	Changes in drawing	4.132	0.826	5
Consultant	Long waiting time for approval of drawings	4.120	0.824	6
Contractor	Inadequate early planning and scheduling of the project	4.096	0.819	7
External	Economic condition	4.096	0.819	7
Labor	Inexperience sub-contracts	4.072	0.814	9
Client	Design change and modification by client	4.024	0.804	10
Consultant	Delay in decision making by consultants	4	0.8	11
Labor	Poor labor productivity and shortage of skills	3.987	0.797	12
Material & Equipment	Changes in selected material price	3.951	0.790	13
Client	Delays in making decision by client	3.939	0.787	14
Contractor	Poor site management and supervision by contractors	3.903	0.780	15

Source: own survey, 2021

#### 4.6 Discussion of Research Findings

As it described in the above in this study the factors are grouped in to client, contractor, consultant, external, labor and material and equipment related causes. The objective of this study is to identify the main factors of time overrun in bole arabsa project 7 and also the extent to which each factor affects the implementation process. The mean score of each independent variable presented in this section to generalize about the findings. And for better explanation visual interpretation used and based on this interpretation most of the results relies on agreed and neutral however it does not mean that all of the respondents are agreed in all listed factors there are also respondents who disagrees with some factors but the frequency was less. This research has come up with the following discussion.

Based on the participants response rate and recorded data shown in the table 4.6, delays in progress payment, design change and modification by client, delays in making decision by client,

Inaccurate time estimation, Lack of early planning of the project, Poor technical performance of the staffs, Poor communication and coordination by client with other parties and Change orders as the most significant factors causing time overrun in Bole Arabsa Project 7 and need to have a very high attention and focus on those factors to improve the implementation process. The finding of this study supported by other studies; Assaf and Al-Hejji (2006) in his research shows that among the six most significant factors of delay identified in construction projects delays in progress payment and change orders are the major factors contributing time overrun. Kaliba et. al. (2009) also supports the findings in his studies in the Zambian road construction industry; delayed payment was found to be the number one cause of schedule delays followed by protracted financial processes in client organizations. This implies that financial problems are very significant factors in affecting the implementation process of a project and not to complete the project in the intended schedule. Khatib et al (2018), in studied delay factors in reconstruction projects different causes of delay are identified from the owner, contractor and consultant sides among those financial problems and difficulties, change orders, in accurate time estimation, poor communication and coordination among construction parties and design changes and modifications are the major one. finding of Kumaraswamy and Chan (1996), also supports this result in identified 83 common factors of time overrun and arranged these factors in 8 groups. By using relative importance index five factors of time overrun were identified delays in making decision is among the five factors.

In the other side in bole arabsa project 7 factors like lack of clarity of the project scope, problems in bank credit, owner's interference in the project and lowest bid award and award process have less mean comparing to the other factors and it implies that the factors has less impact in causing time overrun in this project so that respondents are disagree and neutral on those factors. These findings contradict with other researchers finding in the literature like the finding of Fugar (2010), conducted survey on 130 randomly selected engineers Identified problems in bank credit as one of the major factors causing time overrun and also Kumaraswamy and Chan (1996), find out owner interference in the project as one of the most significance factors. Khatib et al (2018), in studied delay factors in reconstruction projects different causes of delay are identified from the owner, contractor and consultant sides among those lowest bid awards and lack of clarity of the project's scope is the most significant factors. According to Alsuliman (2019) in investigating the causes of delay in public construction project. The results showed that the most significant owner and consultant related causes are the factors associated with awarding tenders.

In the perspective of the contractor's different factors are identified and listed including the mean value of each factor in table 4.7. The findings revealed that among those listed variables most of the respondents were agreed with the following factors as the major factors causing time overrun in bole arabsa project 7. These factors are Inadequate early planning and scheduling of the project by contractors, Poor site management and supervision by contractors, Poor schedule management and financial problems faced by the contractors listed as the first four significance



factors causing time overrun. Based on the literature reviewed these factors also mentioned by Assaf and Al-Hejji (2006) in their studies as the major factors contributing time overrun in construction projects. Following the above four factors Delayed payment, Poor technical performances of the staffs and Ineffective resource coordination are also the next three significant factors in related to contractors related causes. Delayed payment was found to be the number one cause of schedule delays in the Zambian road construction industry (Kaliba et. al. 2009). The other studies which supports this finding done by Walker (1995), surveyed Australian project representatives and found that the most important factors that affect time delays are ineffective resource coordination, the ability of the organization to manage risk and planning capabilities.

Inadequate contractors experience/building methods and approaches, Poor communication and coordination by contractor with other parties, Changes in material and specification, Constructions mistakes and defective Works ranked as the least factors causing time overrun in this project. Therefore, most of the respondents are disagree and some of them are neutral regarding to these factors that means the level of impact of those factors comparing to the other are less in this project. But from the literature these findings oppose the finding of Khatib et al (2018), in which finding revealed that poor communication and coordination among construction parties as significant factors, kaliba et. al. (2009). also found changes in specifications as a major factor causing time overrun in construction projects. Zidane (2018), in studying the top ten universal delay factors in construction projects on of the main factors for the delays was inadequate contractor experience/building methods and approaches which is opposite to the fining of this study.

Based on the respondents' response rate the 5 top most influential factors causing time overrun as in related to consultants are; Changes in drawing, Long waiting time for approval of drawings, Delay in decision making by consultants, Poor contract management and Delays in design information. The study by Kumaraswamy and Chan (1998), supports this finding related to the design in conducted a more extensive study in Hong Kong using the study exposed the top causes of construction time overrun as delays in design information, long waiting time for approval of drawings, mistakes and discrepancies in design documents, poor site management and supervision. Kumaraswamy and Chan (1996), identified 83 common factors of time overrun and arranged these factors in 8 groups. By using relative importance index delay in making decisions was among the five causes of time overrun. The next factors which have a significant effect on the project not to complete on the schedule relies on Poor communication and coordination by consultant with other parties, Poor technical performances of the staffs, incomplete or improper design, Mistake and discrepancies in design documents and Poor site management and supervision. According to Frimpong (2003), in studied groundwater project and illustrated that owners, contractors and consultants related causes; poor contractor management and poor technical performance as among the major factors. From the literature the

study of Zidane (2018) also supports the findings in studying the top ten universal delay factors in construction projects the main factors for the delays, poor site management and supervision and incomplete or improper design are among the major one. Delays in performing inspection and tests was the least factors comparing to the other factors based on the visual interpretation it relies on neutral. this finding contradicts with the finding of from the literature Khatib et al (2018), in studied delay factors in reconstruction projects different causes of delay are identified from the owner, contractor and consultant sides among those delays in performing inspections and tests was found.

External related causes also one of the major factors contributing to time overrun in bole arabsa project 7. Based on the respondents' response level the factors causing time overrun listed in this group are ranked as follows; Escalation of material price and Changes in exchange rate ranked as the first and second most significant factors causing time overrun respectively. It is obvious that in government housing project most of the materials supplied by the client however due to the change in exchange rate and escalation of building materials the client could not supply on time this affects the implementation process and the overall completion time of the project. Frimpong (2003), findings also agreed with the study of this finding in studied groundwater project and illustrated that owners, contractors and consultants related causes one of the major factors was escalation of material prices. Following the above two factors most of the respondents also show their agreement for economic condition and site condition as the next two significant factors causing time overrun. Some of the respondents are neutral and disagree with weather condition as a factor in bole arabsa project 7 which contradicts Al-Momani (2000) findings in studied 130 public projects in Jordan and concluded that weather as a main cause of delay.

The research undertaken established that the last group of factors to cause of time overrun in bole arabsa project 7 was labor related factors which is the last influential factors among the other groups. Based on the findings Inexperience sub-contracts and Poor labor productivity and shortage of skills ranked the first two most significant factors in this category. To implement a project successfully the combination of different expertise is mandatory and expertise need to have a good skill and knowledge otherwise difficult to achieve its intended purpose. The study of this findings supports this idea. The study of Ogeno (2016), supports this finding carried out a survey through questionnaire distribution to selected experts of construction industry in Nigeria. among the Identified causes of time overrun were inexperienced sub-contractors one of the major causes. In the other side some of the respondents are neutral and disagree with Shortage of labor as a factor causing time overrun in this project however from the literature the finding of Ogeno (2016), shows that shortage of labor as among the major one.

According to the respondents' response and finding the factors related to material and equipment causing time overrun are ranked as follows; Delays in material supply and Changes in selected material price ranked as the first two most significant factors. Finding of Fugar (2010), agrees

with this finding in conducted survey on 130 randomly selected engineers. Identified causes of time overrun were material shortage and changes in selected material prices are among the major one. In the other side some of respondents are neutral and disagree with equipment unavailability as a major factor causing time overrun in bole arbsa project 7. This result also opposes the finding of kaliba et. al (2009) which mentioned equipment unavailability as among the significant factors.

## CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

### 5.1 Summary of findings

Generally, the main objective of this study is to assess the main causes of time overrun in Bole Arabsa project 7, the responsible parties and identifying the extent of each factor contributing for time overrun and the detail presented in interpretation and discussion part. As it showed in the table the overall findings show that among the six categorized factors causing time overrun the most significant factors are found in consultant related factors with relative important index of. In this category design related factors like changes in drawing, long waiting time for approval of drawing, delay in decision making by consultant ranked the first top three and this highly affect the implementation process of the project. The second most influential factors are related to external factors like Escalation of material price, Changes in exchange rate and Economic condition ranks in the first top three which are very critical factors in overall progress of the project. In other word the economy of the country or exchange rate plays an important role. Material and equipment related factors ranked in the 3<sup>rd</sup> most influential factors causing time overrun. In this category delays in material supply, changes in selected material price, and shortage of materials are the most significant. In the 4<sup>th</sup> rank contractor related causes are found which are; Inadequate early planning and scheduling of the project by contractors, poor site management and supervision by contractors, poor schedule management and financial problems faced by the contractors are among the first top factors. Client related factors; delays in progress payments, design change and modification by client, delays in making decision by client and inaccurate time estimation ranked as the 5<sup>th</sup> influential factors causing time overrun. The least aggregated relative important index is scored by labor related factors which includes inexperience sub-contracts, poor labor productivity and shortage of skills and shortage of labor.

**Table 5.1 Summary of finding**

CAUSES	Average RII	Ranke
Client related causes	0.717	5
Contractor related causes	0.724	4
Consultant related causes	0.769	1
External causes	0.768	2
Labor related causes	0.703	6
Material and equipment related causes	0.726	3

Source: own survey, 2021

### 5.2 Conclusion

Delays are expected however it can be minimized or avoided if their causes are properly identified and analyzed. The purpose of this paper is to identify the main causes of time overrun from different perspective and the give a recommended solution. Since 2006 our country Ethiopia start constructing condominium house in order to solve the housing problems however,

none of the projects were completed on the planned schedule Bole Arabssa project 7 also one of the projects which affected by time overrun.

The first objective of this study was identifying the main causes contributing for time overrun. Based on the literature reviewed different causes are identified and grouped as client, contractor, consultant, external, labor and material and equipment related factors. In each category different causes were identified and distributed for the respondents in a questionnaire form in order to find out the most influential causes of time overrun and rate the extent of each factors affecting the implementation process. For this study the three parties were participated; client, contractors and consultants to identify the most influential factors that contribute to time overrun in Bole Arabssa Project 7.

Based on the discussion in chapter four the top 15 factors causing time overrun were identified and based on that the following conclusion are drawn.

Escalation of material price from the perspective of external related factors are ranked 1<sup>st</sup>. This can be because of increment of exchange rate or other factors however this affects the overall implementation process of the project so that it is unable to complete the project in the planned schedule. Following this delay in supply of material raked the 2<sup>nd</sup> most influential factors causing time overrun in related to material and equipment related causes because a project to be implemented the combination of different resources (human, material and equipment) must be fulfil. But as the respondents said in this project the project was highly affected by late delivery of materials which was unable to proceed the project activities in the intended time. From external related factors Changes in exchange rate were ranked in the 3<sup>rd</sup> level. Changes in selected material price also grouped in this category with ranked position of 13<sup>th</sup>.

The findings also revealed that from the client perspective delays in progress payment which is ranked in the 4<sup>th</sup> level from the overall factors affects the implementation process and lead to the project to face time overrun. If owners cannot pay the progress payment as per the agreement, it is difficult to perform the different activities in the project which leads the project to completed beyond the schedule. And also design change and modification by client and delays in making decision by client ranked 10<sup>th</sup> and 14<sup>th</sup> position respectively.

The study also revealed that factors which is directly related to design are changes in drawing, long waiting time for approval of drawing and delay in decision making by consultants ranked in the 5<sup>th</sup>, 6<sup>th</sup> and 11<sup>th</sup> position respectively from the perspective of consultants and has high effects in delaying the project completion.

From the contractor side Inadequate early planning and scheduling of the project and Poor site management and supervision by contractors ranked in the 7<sup>th</sup> and 15<sup>th</sup> influential factors causing time overrun. Without adequate planning it is difficult to meet the project objectives as needed because planning shows weather the project is on the track or not, the sequences of activities, allocation of different resources and so on therefore to achieve the objective of the project preparing a plan before the implementation of the project is very important. And also, to manage a project properly there needs to be knowledge of project management skills however due to contractors' poor management and supervision the project faced time overrun.

Economic condition of the country also another factor causing time overrun in related to external factors and ranked in the 7<sup>th</sup> position. From the perspective of labor inexperience sub contracts and poor labor productivity and shortage of skills ranked in the 9<sup>th</sup> and 12<sup>th</sup> position. Man power is a very essential resource for day to day project activities but their skills, knowledge and experience should fit with the intended activities and the project goals.

### **5.3 Recommendation**

Clients should ensure that progress payment should paid on time and with the planned time frame in order to facilitate the implementation of the project and completion of the project in the intended time frame. Client also must ensure that their need in design change have no adverse effect in the implementation of the project to avoid delay. The other one is regarding to the decision by client shouldn't be delayed or it should quick decision it can be by different means it may be by representing someone in the site or other way to ensure that works are not stopped in waiting the decision of the client and it should provide timely strategic decision. In order to improve the overall performance of the project the management should know proper time management in exciting projects and control delay by formulating a good strategy to give timely strategic decision and meet the project objectives. Well planned and accurate time estimation for the project also very important point regarding to completing the project in the intended time frame and also in regarding to quality issue. Clients should plan regarding to the project before the implementation stage of the project or during pre-contract period.

The top three factors in the contractor perspective were related to planning and management therefore contractors should ensure proper planning and scheduling of the project. Very important in manage the schedule properly by focusing on critical activities and struggle to complete the project with in the planned schedule while in meeting quality and budget. In addition, contractors should use modern project management tools and technique in managing time, scope, budget and the like. Contractors should have enough cash flow on their hands to execute the work and should prohibit from using the payment to other purpose or non-project activities to avoid shortage of cash during execution period.

Consultants should ensure that design related changes should not take longer time for approval especially if the change is made during the execution stage, all necessary information (dimension or scale) in the design should be presented and also complete drawing should be submitted for the concerned body because the final desire outcome should not be affected due to this problem. The other one is decision making process should not be delayed and on time response of requests should be made.

In minimizing the external factors in this project all the concerned body and stakeholders in the project should have to be responsible in doing their task on time and also government also should support the project by regulating the economic condition of the country.

In labor related factors the concerned body in this project should give the subcontract works for those who are well qualified for the intended purpose or jobs and also man powers in each party; client, contractors and consultants should be selected and hired based on good and qualified criteria.

Among the major resource in implementing a project material and equipment are the major one therefore the concerned body should deliver the needed material on time. Late delivery of material will affect the implementation process in other way it leads to delay of the project completion therefore, the concerned body should secure adequate resources on time. Also, since it is a government project government should support the project by balancing the market price.

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## **APPENDIX 1**

### **QUATIONNAIRE FOR SURVEY**

#### **TITLE: ASSESSMENT OF THE RELATIVE IMPORTANCE OF FACTORS OF TIME OVERRUN IN BOLE ARABSA PROJECT 7, ADDIS ABABA**

Dear respondent,

This questionnaire has been designed to collect data for the study of “Assessment the causes of time overrun in bole arabsa project 7”. The purpose of this study is to assess the main factors of time overrun in bole arabsa project 7 and how much different causes of time overrun affects the implementation process and then to recommend research base solution for similar future projects. The study is conducted to achieve a master's degree in St. Mary’s university. Your response to each question is vital for the effectiveness of this study. So please respond to the questions honestly by ticking the most appropriate response.

As a researcher I would like to assure you that your response to the questionnaire would be kept confidential and it has no intention except for academic purposes. Please don't write your name or any personal identifier on the questionnaire. For any clarification needed, please contact me on the below telephone number and email.

I would like to thank you in advance, for completing this questionnaire and assisting me in my project work.

Yours Sincerely

Helen Lakew.

Mobile: - 0913 54 24 78

Email: - helenlakew272@yahoo.com

**Instructions:** Please answer the following questions based on your experience in building construction in Addis Ababa. Please tick[X] in the provided space the most suitable answer using the given scale. Please also answer all the questions considering the projects you are participated in to enhance the objectivity of the project work.

**SECTIONA: PERSONAL DETAILS OF THE RESPONDENT**

**Q.1**Age: 20-30  31-40  41-50  50 and above

**Q.2** Sex: Female  Male

**Q.3** What is your level of education?

Certificate  Diploma  1<sup>ST</sup> Degree  Master's Degree

Others(specify).....

**Q.4.** How long have you been working with the organization?

0-5 years  6-10 years  11-20 years  21-30 years  30 years and above

**Q.5.** Your organization is?

Contractor  consultant  client

**Q.6.** If it is a contractor, what is your organization grade?

Grade 1-2  Grade 3-4  Grade 5-6  Grade 7-8

**Q.7.** What is your position in the company?

.....  
 .....

The project started in June 2015 and still in progress (70 months). The time overrun calculated as

**For G+4 Building the schedule was 1 year and 6 months (18 months)**

Time overrun (%) =  $\frac{\text{Actual time spend} - \text{Estimated planned time}}{\text{Estimated planned time}} * 100$

$$\text{TOR} = \frac{70 - 18}{18} * 100\% = 288.88\%$$

This shows that for G+4 the project delayed by 288.88%

**For G+7 Building the schedule was 2 years (24 months)**

Time overrun (%) =  $\frac{\text{Actual time spend} - \text{Estimated planned time}}{\text{Estimated planned time}} * 100$

$$\text{TOR} = \frac{70 - 24}{24} * 100\% = 191.66\%$$

This shows that for G+7 the project delayed by 191.66%

How did you rate this this delay? please tick (x) in the provided space.

	Very high	high	Average	Low	Very low
For G+4					
For G+7					

For section B please indicate the rate of each factors by thicking x the appropriate box. Add any remark relating to each factor on the last column.

S. D= strongly disagree (1)

D=Disagree (2)

N= Neutral (3)

A= Agree (4)

S.A =strongly agree (5)

**SECTION B: Q.8 CAUSES OF TIME OVERRUN IN BOLE ARABSA PROJECT 7**

**Instructions:** Please answer the following questions based on your experience in bole arabsa project 7 condominium housing projects. Please tick[x] in the provided space the most suitable answer using the given scale. Please also answer all the questions considering the projects you are participated in to enhance the objectivity of the project work.

**1. Clients related causes**

	S.D	D	N	A	S.A	REMARK
Design change and modification by client						
Delays in making decision by client						
Poor communication and coordination by client with other parties						
Change orders						

Delays in progress payments						
Inaccurate time estimation						
Problems in bank credit						
Owner's interference in the project						
Lack of early planning of the project						
Lack of clarity of the project scope						
Lowest bid award and award process						
Poor technical performance of the staffs						

## 2. Contractors related causes

	S.D	D	N	A	S.A	REMARK
Poor communication and coordination by contractor with other parties						
Poor site management and supervision by contractors						
Inadequate contractors experience/building methods and approaches						
Ineffective resource coordination						
Inadequate early planning and scheduling of the project by contractors						
Delayed payment						
Constructions mistakes and defective Works						
Poor schedule management						
Poor technical performances of the staffs						
Financial problems faced by the contractors						

Changes in material and specification						
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### 3. Consultants related causes

	S. D	D	N	A	S. A	REMARK
Poor site management and supervision						
Delays in design information						
Long waiting time for approval of drawings						
Changes in drawing						
Poor communication and coordination by consultant with other parties						
incomplete or improper design						
Mistake and discrepancies in design documents						
Delay in decision making by consultants						
Delays in performing inspection and tests						
Poor technical performances of the staffs						
Poor contract management						

### 4. External causes

	S.D	D	N	A	S.A	REMARK
Changes in exchange rate						
Economic condition						
Escalation of material price						
Site condition						
Weather condition						

**5. Labor related causes**

	S.D	D	N	A	S.A	REMARK
Shortage of labor						
Inexperience sub-contracts						
Poor labor productivity and shortage of skills						

**6. Material and equipment related causes**

	S.D	D	N	A	S.A	REMARK
Shortage of materials						
Changes in selected material price						
Delays in material supply						
Equipment unavailability						

If any other causes are facing during your project implementation, please specify below

.....

.....

.....

.....

.....

**Thank you for your time**