ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

Causes of Delay in Construction Project of Private Real Estate

A project submitted to School of Commerce of Addis Ababa University in partial fulfilment of the requirements of for the award of Master of Science in Project Management

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Addis Ababa

Declaration

I, Adem Hussien, declare that this project paper is my own original work and that it has not been presented and will not be presented to other university for a similar or any other degree award.

……..

Adem Hussien

Certification

The undersigned certify that he has read and herby recommends for acceptance by Addis Ababa University School of commerce entitled: Causes of delay in construction project of real estate, in fulfilment of the requirements for the degree of Master of Science in Project Management

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This is to certify that the thesis prepared by ADEM HUSSIEN, ''Causes of Delay in Construction Project of Private Real Estate 'and submitted in partial fulfillment of the requirement for the Degree of Master of Project Management complies with the regulations of the university and meets the accepted standard with respect to originality and quality.

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Abstract

Current practice of the real estate industry shows that it is a rare event that the projects are completed on the scheduled time, budgeted cost, and desired quality because the construction projects experience a tremendous amount of delays. Timely completion of construction project is a major criterion of project success. The need to control the causes of delays during the construction process comes out when the number of delay project has been increasing from time to time. Hence, it is essential to identify the causes of this problem from the early stage of construction project. The objectives of this study are to study the causes of delay in term of frequency occurrence and severity effect. A total of 70 contractors and consultants with an experience in construction of private real estate project are involved in the study. A questionnaire survey was conducted to identify the significant causes of delay in order to avoid or minimize their impact on construction project. The perspective of contractors, consultants and client has been analysed and ranked based on Relative Important Index (RII). The study indicate that the top major causes of delay were ´Owner interference´, ´Frequent change orders´, ´Long waiting time for approval of tests and inspection´, ´Shortage of construction material´, ´Mistakes in design documents´, ´Inappropriate organizational structure linking all parties involved in the project´, ´Mistakes and discrepancies in design documents´, ´Discrepancies in contract document´ and ´Delays caused by subcontractors´. In addition, the top major effects of delay were; time overrun, cost overrun, dispute, arbitration, litigation and abandonment.

Keywords: *Real estate, building, construction, delay, contract,*

Contents

List of Tables

List of Figure

Abbreviations

E.I.A. ……Ethiopian Investment Authority

A.A. …… Addis Ababa

P.P.A. ……Public Procurement Authority

CHAPTER ONE

INTRODUCTION

1.1 Research background

Housing plays a very important role in human life and human society, and has tremendous social and economic impact on the living environment of the world. It has direct and immediate influence on health, education, economy, environment, and political and social life of any society.

Despite claims of rise in the standard of living of the people in the developing countries like Ethiopia, in recent years housing to masses at affordable cost has remained a distant dream. There are several factors contributing to these phenomena like unavailability of adequate land for undertaking mass housing program, shortage of fund for large scale housing program, high cost of construction, scarcity of construction materials, lack of knowledge in construction techniques and construction delays, etc.

Delays in construction projects are considered one of the most common problems causing a multitude of negative effects on the project and its participating parties. Along with delay, the frequently faced consequences are project failure, reduction of profit margin, and loss of belief of citizen in government funded projects, etc. When delays do occur, they are either accelerated or have their duration extended beyond the scheduled completion date. These are not without some cost consequences. Delays also give rise to disruption of work and loss of productivity, late completion of project increased time related costs, third party claims, abandonment and termination of contract (Abdul-Rahman 2006)

Previous researches similar to this show that the main causes of delay and cost overrun in building construction is improper project management and claim administration. Due to unforeseen incidences and contract management problems, construction projects experience delays which directly impacts all

parties involved. Home buyer who give their trust on the real estate companies are the one who are suffering most and have no control on the matter.

Trauner *et al*. (2009) defines that construction delays make something happen later than expected, to cause something to be performed later than planned, or to not act timely.

Construction delays result in claim by contractors. Claims related to construction projects are inevitable and there is no way of eliminating all project risks, as some are unforeseeable. However, if scope of the project is well thought and transferred in the design, duties of all parties clearly defined and played, most uncertainties will be eliminated.

This thesis examines causes of delay in an integrated manner and determines how critical delay causes are most influential in project performance. This will provide owners, consultants and construction companies involved in construction projects with the foundation on which such strategies – on how to avoid delays - can be developed in the future. This thesis focuses on private operated real estate construction projects in Addis Ababa, which were assessed for delay causes and examines the corresponding effects identified and provide recommendation based on the findings to improve project performance within the real estate development projects as well as the general public construction projects.

1.2. Problem statement

The property market of the country is full of complains and uncertainty. Failing to complete the project on time is of course not the single most serious problem in real estate sector in Ethiopia, though, it's a common feature in the multibillion birr industry.

Private real estate development is one of the booming industries of the country in recent years. According to EIA data there are about 100 private real estate companies that are actively involved in the business. Although the number of

developers is increasing recently, the gap between demand and supply of property market remain the same with all its negative images and complaints

In Ethiopian construction practice, it is very rare that construction projects are completed on the time specified or agreed upon. Ismeal (1996) reported that delays are endemic to construction projects in Ethiopian. His study indicates, most of the projects experience delay from 100% to 460% of the original contract time. The study show how important it is to investigate and study on delay causing factors in construction projects of Ethiopia and find solutions to reduce the effect.

Shewaferahu (2016), in his study on construction of educational projects found that none of the case study projects completed within the contract period and consultant and contractor caused delay factors are the two most responsible factors for most delays. The total delay ranges from 200% to 329% of the initial contract times excluding the time required to complete the projects. This study is conducted on educational building of Addis Ababa University which is government run. The method of contractor and consultant selection in government project is conducted by the rules and regulation of PPA. Whereas, in case of the private projects contractor and consultant selection procedures are different and the client conduct selected companies on closed bid. Apart from this, in education projects certain construction material like cement and reinforcement bar are provided by the government at certain fixed unit rate which makes it completely different from the private run projects. Hence, it is important to research the delay causing factors and effects in the private run construction because the modalities of contractor selection and procurement are quite different. Therefore, this research duly investigates delay causing factors in private real estate projects in Addis Ababa to forward visible and scientific solution to improve project performance.

1.3. Research questions

On the basis of the above stated facts, the following would be the research questions.

1. What are the real causes of project delays in the private real estate projects?
2. What are the effects of construction delays in the private real estate projects?
3. How can delays be minimized?

1.4. Research objectives

1.4.1. General objectives

Broadly, this study examined the causes of delay in construction in Ethiopia. And, hence, draw a significant and feasible suggestion based on the findings.

1.4.2. Specific Objectives

1. To identify the delay causing factors that currently exist in private real estate construction.
2. To identify the most significant delay causing factors that affect the sector.
3. To identify the effects of delay in private real estate construction projects.

1.5 Significance of the research

There are several valuable benefits expected by implementing this study. The significance of establishing the issues related to the real estate construction project delays was to provide a greater insight and understanding on the causes of delays particularly among the main project players: contractors, client and consultants. This can be achieved by applying theoretical concepts discussed in many literatures into practice in real projects. It is hoped that these findings will guide efforts to improve the performance of the construction industry and will be useful to the construction players. Therefore, these findings might encourage the practitioner to focus on delay problem that might have existed in their present or future projects. Other than that, this study is expected to provide a better ways and methods in delivering construction projects by minimize the major causes of delays.

1.6 Scope and limitation of the research

The research will be focused on the following matter:

i. This research was comprised in A.A city.
ii. The group of respondents for this research involves client, consultant and contractor companies that are involved in real estate development and building construction projects.
iii. We consider real estate projects which involve independent external consultant and contractors. It is a common practice among real estate companies to form sister companies involved in construction and consultancy in which this research doesn't incorporate.

1.7Organization of the research

- This research contains five chapters as described below;
- Chapter One is an introductory part containing discussions on background, research problems, aim and objective of the research, significance of the research, scope and limitation of the research and organization or layout of the research.
- Chapter Two presents literature review with general descriptions by different researchers on construction, contract, planning, control and delay.
- Chapter Three discusses about research design and methodology
- Chapter Four presents results and discussion of the research findings.
- Chapter Five contains conclusions and recommendations based on what is discussed in the previous chapters.

CHAPTER TWO

LITERATURE REVIERW

This part of the thesis focuses on theoretical approaches to examine the meaning, cause and effect of delay in construction projects. Furthermore, related studies in Ethiopia and other developing countries and their experience related construction delay causes will be viewed.

2.1Definition of delay

Delays of a construction project can be defined as the late in progress or actual completion of works compared to the baseline construction schedule or contract schedule. Vast majority of project delays occur during the construction phase, where many unforeseen factors are always involved. Previous researchers defined construction delays by their own sentence, however it brings similar meaning.

In the context of building contracts, the term 'delay' is used to indicate that the works are not progressing as quickly as intended and, specifically, that as a result completion may not be achieved by the completion date specified in the contract documents. (Chappel *et al* 2005)

Delay could be defined as the time overrun either beyond completion date specified in a contract or beyond the date that the parties agree upon for delivery of a project. (Divya & Ramya2015)

According to A. Dinakar, 2014, Delay is the slowing down of work without stopping construction entirely and that can lead to time overrun either beyond the contract date or beyond the date that the parties have agreed upon for the delivery of the project.

Aibinu and Jagboro (2002) described delay as a situation when the contractor and the project owner jointly or severally contribute to the non-completion of the project within the original or the stipulated or agreed contract period.

In the study of Assaf *et al.* (1995) construction delay was defined as the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. Abd Majid (1997) defined delays as the time overrun beyond the contract date or beyond the date that the critical activities have been delayed.

Delay was also defined as an act or event which extends required time to perform or complete work of the contract manifests itself as additional days of work (Zack, 2003). Majid (2006) interprets delay as a loss of time. 'Time' refers to the duration for completing the construction project. When the project period is delayed, it means the project cannot be completed within original schedule.

2.2 Classification of delay

Most importantly, delays can be seen in these four major categories as

1. Critical or Non-Critical.
2. Excusable or Non-Excusable,
3. Compensable or Non-Compensable
4. Concurrent or Non-Concurrent. (Trauner 2009)

2.2.1 Critical or Non-Critical Delays

Delays that affect the project completion or in some cases a milestone date are considered as critical delays and delays that do not affect the project completion or a milestone date are considered as noncritical delays. If these activities are delayed, the project completion date or a milestone later will be delayed. The determining which activities truly control the project completion date depends on the following:

1. The project itself
2. The contractor`s plan and schedule (particularly the critical path)
3. The requirement of the contract for sequence and phasing
4. The physical constraint of the project, i.e. how to build the job from a practical perspective. (Dinakar 2014)

2.2.2 Excusable or Non-Excusable Delays

Non-excusable delays are events that are within the contractor's control or that are foreseeable.

These are some example of non-excusable delays:

• Late performance of subcontractors.

• Untimely performance by suppliers.

• Faulty workmanship by the contractor and subcontractors.

• A project specific labor strike caused by either the contractor's unwillingness to meet with labor representatives or by unfair labor practices. (Ahmed2017)

Excusable delays are occurrences over which neither the owner nor the contractor have any control, e.g. extreme weather conditions, acts of God and other unforeseen future events. (Srdić & Šelih 2015)

2.2.3 Compensable or Non-Compensable

A compensable delay is one where a contractor is entitled to financial recovery in the form of direct and indirect time related costs arising from an employer risk event. (Keane & Caletka 2008)

2.2.4 Concurrent or Non-concurrent parallel delay

Concurrent or parallel delays occur when there are two or more independent delays during the same time period. Concurrent delays are significant when one is an employer risk event and the other a contractor risk event, the effects of which are felt at the same time. When two or more delay events arise at different times, but the effects of the mare felt (in whole or in part) at the same time, this is more correctly termed 'concurrent effect' of sequential delay events. (Keane *et al* 2008)

2.3 Causes of delays.

Traditional contractual approach is still dominant in Ethiopia construction sector and this may likely continue to be a trend. Ethiopian construction sector

comprises the clients or project owners, contractors, subcontractors, suppliers, and others key professional actors responsible for design and supervision of projects. These professionals include architects, engineers and quantity surveyors. Due to this mixed variety of parties involves in projects, they often encounter difficult situations and some degree of pressures.

Delays occur in every construction project and the significant of these delays varies considerably from project to project. Many researchers have studied the causes of project delays in public construction industry. The findings of such studies have been reviewed for this research.

According to Abdella and Hussien (2002) causes of delay can be categorized in to the following eight major groups

1. Client related factors including finance and payment of completed work, owner interference, slow decision making and unrealistic contract duration imposed by owners.
2. Contractor related factors including site management, improper planning inadequate contractor experience, mistake during construction, improper method and delays caused by subcontractors. Delays caused by sub-contractors are included among the contractor's factors because the latter is fully responsible for the delays caused by his sub-contractors.
3. Consultant related factors include contract management, preparation and approval of drawings, quality assurance/control and long waiting time for approval of tests and inspection.
4. Material factor including quality and shortage.
5. Labor and equipment factor include labour supply labour productivity, and equipment availability and failure.
6. Contract factors include change orders and mistake s and discrepancies in contract document
7. Contractual relationships factors include major disputes and negotiations during construction, inappropriate organizational structure

linking all parties involved in the project, and lack of communication between these parties.

8. External factors include weather conditions, changes in regulations, problems with neighbours and site conditions.

While traditional delay analysis approaches tend to focus on the design and construction phase, delays and inefficiencies can often result due to circumstances which occur long before the first drawing is produced. Although these early factors are more difficult to identify as delay 'events', typical factors which can result in programmes containing inherent delays before the first delay event culminates on-site include:

- poor project definition;
- use of an inappropriate form of contract;
- inappropriate contract packaging strategy;
- ambiguities present in specifications, contract drawings, bills, employer's requirements;
- the appointment of inexperienced managers and supervisors;
- insufficient budget allowances or contingencies (e.g. cost and time) for unforeseen events and design development;
- poor plant selection;
- failure to communicate plans/intentions to local authorities;
- ineffective site logistics planning; and/or
- incorrect assumptions regarding neighbouring sites, land-owners or other interested stakeholders. (Keane *et al*2008)

In a study of delay analysis in construction project (Dinakar 2014), classified delay causing factors into seven major groups, these are owner contributed factors, contractor contributed factors, consultant contributed factors, material contributed factors, equipment contributed factors, labor contributed factors and external factors. The contribution of Contractor in delay of the construction project is more than the client and consultant side. And the external factors contribute the least in delay of construction project. Improper

communication between the involved parties is found as the major problem while external reasons like lack of qualified labor, equipment and material when needed comes next in row.

Samarah & Abu Bekr (2016) studied causes and effects of delay in public construction in Jordan. They identified 55 delay causing factors and grouped them in to four categories: clients group, contractors group, consultants group and external circumstances. They conclude the research by identifying the top 10 most significant causes of construction delays for public sector project:

1. Inadequate management and supervision by the contractor,
2. Client's changes of the design,
3. Inadequate planning and control by the contractor,
4. Using lowest bid that lead to low performance,
5. Changes in the extent of the project,
6. Errors in design and contract documents,
7. Progress payments are not made in time by the client,
8. Rework due to mistakes during construction,
9. Changes in the original design and
10. Low level productivity.

Srdić *et al* (2015) studied causes of delay in construction industry of Slovenia. They categorized the causes in to 11 groups and conducted a research. The results show that the causes of the majority of delays can be attributed to the legal issues, slow decisions of the owner or his representative, and to design that lacks details important for the contractor. Many of the issues within these categories appear in the very beginning of the project, and can be mitigated (partially or fully) by the owner; while their costs are far away from being excessive.

Sambasiva and Soon (2007) conducted a study to identify the causes and effects of the project delays in Malaysian construction industry. They have initially identified 28 causes for delay of construction industry. They are divided in to eight categories as fallows

a) Client related causes
   i. Finance and payment s of completed work
   ii. Owner interference
   iii. Slow decision making
   iv. Unrealistic contract duration and requirements imposed
b) Contractor related factors
   i. Subcontractors
   ii. Site management improper planning,
   iii. Construction methods
   iv. Improper planning
   v. Mistake during construction stage,
   vi. Inadequate contractor experience
c) Consultant related causes
   i. Contract management
   ii. Preparation and approval of drawings
   iii. Quality assurance /control
   iv. Waiting time for approval and inspection
d) Material related causes
   i. Quality of material
   ii. Shortage of material
e) Labour and equipment category causes
   i. Labour supply
   ii. Labour productivity
   iii. Equipment availability and failure
f) Contract related causes
   i. Change order
   ii. Mistakes and discrepancies in contract document
g) Contract relationships related causes
   i. Major disputes and negotiations
   ii. Inappropriate overall organizational structure linking to the project

iii. Lack of communication

h) External causes

i. Weather condition

ii. regulatory changes

iii. Problem with neighbours

iv. Unforeseen site condition

Accordingly, major causes of project delay in Malaysia construction industry are identified as fallows, contractors improper planning, contractors poor site management, inadequate contractors experience, inadequate clients finance and payment for completed work, problems with subcontractors, shortage of material, labour supply, equipment availability and failure, lack of communication between parties and mistakes during the construction stage (Sambasiva *et al* 2007)

Same kind of study was carried out by Alagbari *et al* (2007) to identify the main causes of delays in building construction projects in Malaysia. Four major categories are identified: client related causes, consultant's responsibility, owner's responsibility and external causes. Client related causes include delay in delivery of material to site, shortage of material on site, construction mistakes and defective work, poor skills and experience of labour, shortage of site labour, low productivity of labour, financial problem, coordination problems with others, lack of sub-contractor's skills, Lack of site coordinator's staff, poor site management and Equipment and tool shortage on site. Consultants responsibility include finance and payment s of completed work, absence of consultant s site staff, lack of experience on the part of the consultant, lack of experience on the part of the consultants site staff (managerial and supervisory personnel), delayed and slow supervision in making decisions, incomplete documents and Slowness in giving instructions. Owners responsibility include lack of working knowledge, slowness in giving decision, lack of coordination with contractor, contract modifications (replacement and addition of new works to the project and change in specifications), financial problems (delayed payments, financial difficulties and economic problems. External causes

include lack of material on the market, lack of equipment and tools on the market, poor weather condition, poor site condition (location, ground, etc.), poor economic condition (currency, inflation, etc.) and changes in laws and regulatory.

The main causes of project delays in Malaysia building construction projects were identified as follows: financial difficulties and economic problems, supervision too late and slowness in making decisions, slow to dive instructions, lack of material on market, poor site management, construction mistakes and defective work, delay in delivery of materials to site, slowness in making decisions, lack of consultant experience and incomplete document (Algabari *et al*, 2007).

The findings of Algabari *et al.* (2007) was different from that of Sabasivam *et al* (2007), although both researches were carried out in Malaysia at the same time period. This shows that the causes of project delays can be vary from project to project with in the country based on the type of construction procurement system, location within the country and type of construction.

Koshe & Jha (2016) studied causes of delay in construction of Ethiopia. They have identified 88 delay causing factors under eight broad categories namely: client related, consultant/supervisor related, contractor related, designer related, labor related material related equipment, and external related.

Accordingly, major causes of project delay in Ethiopian construction industry are identified as fallows (Koshe *et al* 2016)

1) Difficulties in financing project by contractor,
2) Escalation of materials price,
3) Infective project planning, scheduling or resource management
4) Delay in progress payments for completed works,
5) Lack of skilled professional in construction PM (project management) in the organization
6) Fluctuating labours availability season to season/Seasonal labours availability

7) Late delivery and shortage of materials,
8) Low productivity of labour,
9) Unqualified/inadequate experienced labour,
10) Insufficient data collection and survey before design

Assaf et al. (1995) identified 56 main causes of delay in Saudi large building construction projects and their relative importance. Based on the contractors surveyed the most important delay factors were: preparation and approval of shop drawings, delays in contractor's progress, payment by owners and design changes.

Koushki et al. (2005) carried out a research in Kuwait and identified estimates of time delays and cost increases and their causes. The three main causes of delays are changing orders, owners' financial constraints, and owners' lack of experience. And three first causes of cost overruns are contractor- related problems, material-related problems and owners' financial constraints.

According Ashraf and Ghanim (2016)the top ten factors causing delays for public sector projects in Jordan are: (1) inadequate management and supervision by the contractor, (2) client's changes of the design, (3) inadequate planning and control by the contractor, (4) using lowest bid that lead to low performance, (5) changes in the extent of the project, (6) errors in design and contract documents , (7) progress payments are not made in time by the client, (8) Rework due to mistakes during construction, (9) Changes in the original design and (10)Low level productivity.

2.4 Effects of delay

Delays in construction project completion seem to be a perennial problem. When projects are delayed, they are either accelerated or have their duration extended beyond the scheduled completion date. Delays are usually accompanied by cost increases. The subject of delay has been addressed by several researchers and they found that delay always led to the negative effects.

The desire to finish a project on time, under the planned budget, and with the highest quality is common goals for all contracting parties, including the owner, contractor and consultant. Delay usually result in losses of one form or another for everyone. Sambasivam *et al* (2007) studied the effects of construction delays on project construction industry. The six effects of delay identified were:

1. Cost overrun
2. Time overrun
3. Dispute
4. Arbitration
5. Litigation and
6. Abandonment

B.P. Sunjka and U. Jacob, 2013 studied the effects of construction delay on projects in the Niger delta region of Nigeria. Seven effects of delay were identified which includes: time overrun, budget overrun, poor quality completed project, bad public relations, arbitration, total abandonment and litigation dispute and claims.

The consequences of delay are different for different parties. The general consequences are the loss of wealth, time and capacity. For owner, delay means the loss of income and unavailability of facilities.
For contractor, delay means the loss of money for extra spending on equipment and materials and hiring the labor and loss of time. (Haseeb, Xinhai-Lu, Bibi & Maloof-ud-Dyian2011)

Divya *et al (*2015) in their study about causes, effects and minimization of delays in construction projects concluded that time overrun and cost overrun are the most top effects of delay. Abdul-Rahman *et al.* (2006) in their study found that delays effect to the disruption of work, loss of productivity, late completion of project, increased time related costs, third party claims and termination of contract.

2.5 Methods in Minimizing Construction Project Delays

Several researchers have recommended the methods of minimizing delay in construction project. Chan and Kumarasamy (1997) suggested that the minimization of time overrun would require: strong management teams; thorough investigation of site conditions, together with the design of groundwork and foundations. They added that developing communication systems linking all project teams was the significant way to mitigate this matter.

Aibinu and Jagboro (2002) conducted a study on the effect of delays on project delivery in Nigeria. They identified two methods to minimize or if possible eliminate time overrun. There were acceleration of site activities and contingency allowance.

Odeh and Battaineh (2002) recommended the following to improve the delays situation in Jordan: enforcing liquidated damage clauses; offering incentives for early completion; developing human resources through proper training and classifying of craftsmen; adopting a new approach to contract award procedure by giving less weight to prices and more weight to the capabilities and past performance of contractors; and adopting new approaches to contracting, such as design-build and construction management types of contracts.

Ahmed *et al.* (2002) in their study of delays in Florida have recommended streamlining the Buildings Permit Approval Process as much as possible. The issues such as changes in drawings, incomplete and faulty specifications and change orders must be controlled with proper design process management and timely decision making.

Abdul-Rahman *et al* (2006) identified the procedures taken by contractor as to recover delays. From their survey, recommended procedures were increasing the productivity by working overtime hours or working by shifts, followed by asking for extension of time. If the problem was shortage of resources, they suggested rescheduling the activities within the available resources, using skilled labours and by using subcontractors. The respondent also agreed that

site meetings are essential in solving the problems with the condition that it should not be too frequent.

2.7 Conceptual Frame Work

The aim of this section is to summarize the idea about past literature and to bring out the contributions for this study area. Thus, this part starts with the idea generated and the contribution follows.

The general idea from the past literature shows that there is a relationship between delay causing factors and construction delay; and also, the are delay effects consequently.

The relationship between construction delay and delay causing factors can be conceptualized at a fairly general level, depicted in Figure 1, as two stage relationships where a set of casual factors are categorized based by the responsible body which in turn determine the outcome in terms of effects of delay in construction.

The framework is developed from works of two different authors. Abdella *et al* (2002) who categorised delay causing factors in eight groups and Sambasivam *et al* (2007) who identified six effects of delay.

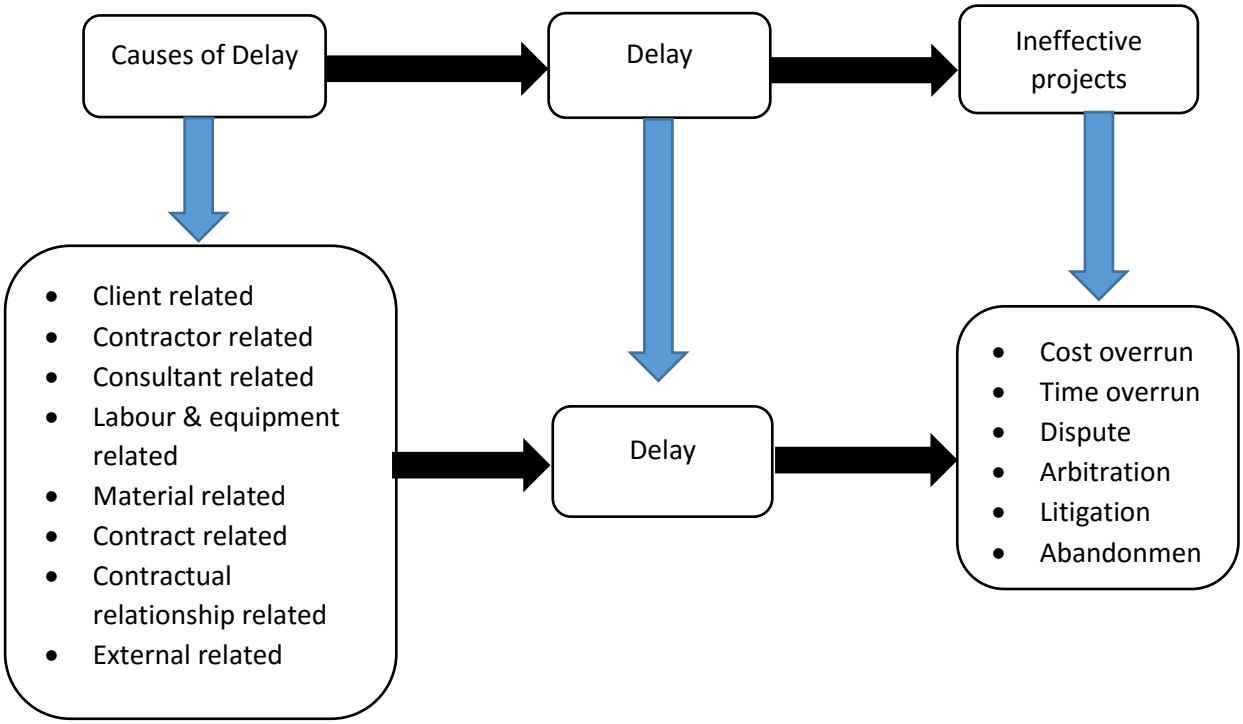

Figure 1 Analytical framework for linking causes of delay to effects of delay

CHAERTER THREE

RESEARCH METHODOLOGY

3.1 Research design

The research was designed to get opinion from consultants and construction companies in regard to the factor causing delays and effects of delays. The possible causes and effects of delays were identified from the literature reviews. A total of 29 delay causing factors and six effects of projects were identified after thoroughly reviewing the literatures and questions were designed according to these factors to get the opinion from stake holders of real estate construction.

3.2 Population and sample size

The population was made of consultants and contractors with an experience in the construction industry and currently involved in real estate construction projects. More over all respondents had high position, lengthy year of experience and educational background attended higher level education implies the respondents have enough knowledge of the construction industry with issues relating to causes and effects of delay.

According to the Ministry of urban development and housing construction website, the current registered grade one to five general, building and road contractors in the country are 1029. And also, there are 97 consulting architects and contractors registered and involved the construction industry of the country. A level of confidence of 80% and a margin of error of 0.06 were used in selecting a sample size of 112 for a population size of 1200.

A total of 112 questionnaires were sent to contractors and consultants in the Ethiopian building construction industry. 71 responses were obtained, out of which 1 were rejected. This means an effective response rate of 64%. This was believed to be acceptable for the research. The sample size consists of 70respondents, which include 60 contractors and10 consultants.

3.3 Sampling Techniques

In this study, respondents were selected based on their experience in real estate construction experience, knowledge and involvement. Cluster sampling was used first to select representative samples from contractors and consultants, and then Snow ball sampling was used for selecting samples within the group of consultants and contractors. Since there is no data available that lists contractors and consultants particularly involved in construction of real estate construction projects, respondents were selected using convenient or the snowball sampling technique. Snow ball sampling is a non-probability sampling technique where elements are selected based on the researcher's convenience that is from friends, colleagues professional contacts and referral networks.

3.4 Data collection

The primary data refers to the first-hand information gathered by the researcher. The information was collecting in the survey by making use of questionnaires. The questionnaires were hand delivered to respondents and collected same wise after being filled.

The secondary data used in this research are information's gathered through a literature review regarding delays in construction project. Literature reviews was carried out to enhance the understanding of theory regarding the research problem. The materials for literature reviews are such as books, articles, magazines, internet, journals, documents and other's research papers. The information, which is relevant, was used as a benchmark against primary data collected to support the research.

3.5 Questionnaire Methodology

The questions were designed related to the research objectives especially on the causes and effects of construction delays. The Survey is designed based to use Likert Scale on the objective of the study to find out the causes of delays in construction projects and effect of the delays on overall project. The Survey is

framed in such a way that the personal view of different people involved in different projects is collected and analysed. The questionnaire basically consists of three sections as detailed below.

1. Respondent Background - This is to collect the basic information of the respondent.
2. Causes of Delays - This is used to collect the data on different causes of the delays happened in that particular project.
3. Effects of Delays - Using these questions the effects of the delays on the project are identified.

The questionnaire is based on Likert Scale of five ordinal measures from one (1) to five (5) according to level contributing. According to John F. (2001), Likert Scale is easier to use for respondent to express their level of opinion. For the frequency of cause's occurrence, each scale represents the rating as shown in Table 3.1. In a meanwhile, Table 3.2 shows the rating for the most influential effects of delay.

Table 3-1Likert scale for frequency of occurrence of related delay causes.

Category	Never	Rarely	Sometimes	often	Greatly often
Rating	1	2	3	4	5

Table 3-2 Likert scale for most influential effects of delay

Category	Strongly Disagree	Disagree	Slightly Disagree	Agree	Strongly Agree
Rating	1	2	3	4	5

3.6 Data analysis

The data analysis is determined to establish the relative importance of various factors that contribute to causes and effects of construction delays. Analysis of data consists of calculating the Relative Importance Index (RII) and Ranking of factors in each category based on the Relative Importance Index (RII).

$$RII = \frac{1\,n_1 + 2n_2 + 3n_3 + 4n_4 + 5n_5}{A*N} \quad \text{.....Equation 3.1.}$$

Where,

RII = Relative Importance Index,

n_1, n_2, n_3, n_4, n_5 = Number of respondents answer each factor

1, 2, 3, 4, 5 = weight given for each factor (ranging from 1 to 5),

A = highest weight (i.e. 5 in our case),

N = total number of respondents.

The importance indices were calculated for all delay causes and the delay causes were ranked accordingly. In order to identify how project delay can be mitigated, it is important to identify the responsible party. Therefore, the responsibility of the delay causes is illustrated in the factor or category column.

3.7. Survey Distribution and Response Statistics

3.7.1. Survey Response

A total of 112 questionnaires were distributed among the respondents of different backgrounds working on real estate construction projects and71 responded fully to the questionnaire, giving 64 percent responds rate. One is rejected making only 70 respondents usable in the analysis.

Table 3-3Respondents designation and rate of response

Group of respondents	Frequency	Percentage of total	Percentage of usable
Contractor	60	53.57	85.71
Consultant	10	8.93	14.29
Not returned	41	36.61	------
Rejected	1	0.89	------
Total	112	100	100

The result indicates that out of 50questionnaires that were distributed 45 were successfully completed and returned. Of the 70questionnaires returned,60 (85.71%) were answered by contractors and10(14.29%) were responded by consultant.

3.7.2. Survey Respondents Experience in Construction Industry

The experience possess by the respondents may help in providing a better understanding of this matter and in better position in giving much precise answer required to the questionnaires form.

Table 3-4Respondents experience in construction

Construction party	Frequency	Percentage
Less than 5 years	11	15.7
5-15 years	19	27.1
More than 15 years	40	57.2
Total	70	100

Regarding number of years involved in construction, 15.7percent of respondents have less than 5 years, 27.1 percent of those have between 5 to 15 years and 57.2 percent of those have 15 years or more.

CHAPTER FOUR

FINDINGS AND DISCUSSION

4.1 Introduction

The results and discussion below is devised in three parts corresponding to the research questions and also the sections of the questionnaire. These divisions can help tackle one question at a time. The first part of the results and discussion contains the findings of the questions directed towards identifying the importance of delay causes and raking in the level of their severity. A total of 29 potential delay causes were selected from previous studies and grouped in eight categories: client related factors, contractor related factors, consultant related factors, material related factors, labour and equipment factors, contract related factors, contractual relationship factor and external factors.

Thus, respondents were asked to rank delay causes factors in a five-point scale range from 1 to 5 based on frequency of occurrence from rarely to greatly often. In the second part respondents were asked to identify the most important and frequent effect of construction delay. Similar to delay causes, six potential effects were selected from previous studies. These effects of delay had also a five-point scale ranged from 1 to 5 and the results of both questions are presented and discussed accordingly.

4.2. The importance and ranking of delay causes by respondents

The construction delay is universally evident reality and is counted as a common problem in construction projects. Delays in construction projects happen because of various factors and causes. A total of 29 delay causing factors were identified and classified in to eight factor groups: client related factors, contractor related factors, consultant related factors, material factor, labor and equipment factor, contract factors, contractual relationships factors and external factors

In this respect the respondents were asked to rank the importance of delay causes using five points' scales. The importance and ranking of delay causes

resulted by the research methodology of questionnaire survey and evaluated by statistical formula for each factor group are shown below.

From Table 4.1 the results show that the respondent ranked the most important client related delay causes in the construction of real estate projects were owner interference (RII=0.81), slow decision making (RII=0.629), finance and payment of completed (RII=0.600)and unrealistic contract duration (RII=0.443).

Table 4-1Importance and ranking of Client related delay causes

Importance and ranking of Client related delay causes by RII value		
Delay causes	**RII**	**Rank**
Finance and payment of completed work	0.600	3
Slow decision making	0.629	2
Owner interference	0.814	1
Unrealistic contract duration imposed by owners	0.443	4

Importance and ranking of Client related delay causes by RII value		
Delay causes	**RII**	**Rank**
Finance and payment of completed work	0.600	
Slow decision making	0.629	
Owner interference	0.814	
Unrealistic contract duration imposed by owners	0.443	

As shown on the table 4.2 below, the most important and highly ranked contractor related delay causes in the construction of real estate projects, are delay caused by sub-contractors (RII=0.700), poor site management (RII=0.543), improper planning (RII=0.457), Inadequate contractor experience (RII=0.443), mistake during construction (RII=0.381) and improper method (RII=0.381).

Table 4-2Importance and ranking of Contractor related delay causes

Importance and ranking of contractor related delay causes by RII value		
Delay causes	**RII**	**Rank**
Poor site management,	0.543	2
Improper planning	0.457	3
Inadequate contractor experience,	0.443	4
Mistake during construction	0.386	5
Improper method	0.386	6
Delays caused by subcontractors.	0.700	1

According to table 4.3, the most important and highly ranked Consultant related delay causes in the construction of real estate projects, are Long waiting time for approval of tests and inspection(RII=0.786), Mistakes and discrepancies in design documents (RII=0.743), Poor contract management (RII=0.782) and inadequate experience of consultant (RII=0.629).

Table 4-3Importance and ranking of Consultant related delay causes

Importance and ranking of consultant related delay causes by RII value		
Delay causes	**RII**	**Rank**
Poor contract management	0.629	3
Inadequate experience of consultant	0.486	4
Mistakes and discrepancies in design documents	0.714	2
Long waiting time for approval of tests and inspection	0.786	1

According to table 4.4 the most important and highly ranked material related delay causes in the construction of real estate projects, are Shortage of construction material (RII=0.771) and Poor-quality material supply (RII=0.586).

Table 4-4Importance and ranking of Material related delay causes

Importance and ranking of Material related delay causes by RII value		
Delay causes	**RII**	**Rank**
Poor quality material supply	0.586	2
Shortage of construction material	0.771	1

According to table 4.5, the most important and highly ranked labour and equipment related delay causes in the construction of real estate projects, are labour supply and labour productivity (RII=0.657) and equipment availability and failure. (RII=0.600).

Table 4-5 Importance and ranking of Labour & equipment related delay causes

Importance and ranking of Labor &Equipment related delay causes by RII value		
Delay causes	**RII**	**Rank**
Labour supply labour productivity,	0.657	1
Equipment availability and failure.	0.600	2

According to table 4.6, the most important and highly ranked contract related delay causes in the construction of real estate projects, are frequent change order (RII=0.814), mistakes in design documents (RII=0.771), and discrepancy in contract documents (RII=0.714).

Table 4-6Importance and ranking of Contract related delay causes

Importance and ranking of Contract related delay causes by RII value		
Delay causes	**RII**	**Rank**
Frequent change orders	0.800	1
Mistakes in design documents	0.771	2
Discrepancies in contract document	0.714	3

According to table 4.7, the most important and highly ranked contract related delay causes in the construction of real estate projects, are Inappropriate organizational structure linking all parties involved in the project (RII=0.743), Lack of communication between these parties(RII=0.686), Major disputes(RII=0.557), and Negotiations during construction (RII=0.514).

Table 4-7Importance and ranking of Contractual related delay causes

Importance and ranking of contractual relationship related delay causes by RII value		
Delay causes	**RII**	**Rank**
Major disputes	0.557	3
Negotiations during construction	0.514	4
Inappropriate organizational structure linking all parties involved in the project,	0.743	1
Lack of communication between these parties	0.686	2

According to table 4.8, the most important and highly ranked external related delay causes in the construction of real estate projects, are problems with neighbours (RII=0.486), unfavourable site conditions. (RII=0.471), poor weather conditions, (RII=0.443), and changes in regulations, (RII=0.400).

Table 4-8Importance and ranking of Client related delay causes

Importance and ranking of External related delay causes by RII value		
Delay causes	**RII**	**Rank**
Poor weather conditions,	0.443	3
Changes in regulations,	0.400	4
Problems with neighbours	0.486	1
Unfavourable Site conditions.	0.471	2

Table 4-9Top ten delay causing factors

Top 10 importance and ranking delay causes factors by RII value		
Delay causes	**RII**	**Rank**
Owner interference	0.814	1
Frequent change orders	0.800	2
Long waiting time for approval of tests and inspection	0.786	3
Shortage of construction material	0.771	4
Mistakes in design documents	0.771	5
Inappropriate organizational structure linking all parties involved in the project,	0.743	6
Mistakes and discrepancies in design documents	0.714	7
Discrepancies in contract document	0.714	8
Delays caused by subcontractors.	0.700	9
Lack of communication between these parties	0.686	10

4.3 Top Delay Causes

In Table 4.9 above, as ranked by the respondent, 10 most important factors causing delay in construction project are summarized and presented. Owner interference with RII=0.814 is suggested as the most important factor causing delay on building construction projects. This is closely followed by frequent change orders with RII=0.800. Long waiting time for approval of tests and inspection with RII=0.786 comes third followed by Shortage of construction material and Mistakes in design documents with equal RII values of RII=0.771. Inappropriate organizational structure linking all parties involved in the project with RII=0.743 ranked 6th. Mistakes and discrepancies in design documents and Discrepancies in contract document ranked 7th and 8th with equal value of RII=0.714. Delays caused by subcontractors ranked 9th with RII=0.700 followed by Lack of communication between these parties with RII=0.686

4.4 The Importance and Ranking of effects of Delay by respondents

The desire to finish a project on time, under the planned budget, and with the highest quality is common goals for all contracting parties, including the Owner,

Contractor and Consultant. Delay usually result in losses of one form or another for everyone. The causes lead to the effects of delay on construction projects. The six effects of delay identified were:

1. Time overrun
2. Cost overrun
3. Dispute
4. Arbitration
5. Litigation
6. Abandonment of the project

Table 4.10 shows that Time overrun ranked the highest with RII of 0.964, while cost overrun ranked second with RII of 0.891. Time overrun and cost overrun affect the two components of project namely budget and schedule. Dispute among parties involved ranked third with RII value of 0.768. Arbitration and litigation were ranked fourth and fifth RII values of 0.636 and 0.568 respectively. Abandonment of the project was ranked sixth with RII value of 0.577.

Table 4-10Importance and ranking of effects of delay

Importance and ranking of effects of delay by RII value		
Effects	**RII**	**Ranking**
Time overrun	0.964	1
Cost overrun	0.891	2
Dispute	0.768	3
Arbitration	0.636	4
Litigation	0.568	5
Abandonment	0.577	6

4.5 Methods of Minimizing Delays

Mitigation efforts are necessary to minimize losses due to major problems. Previous analysis on the causes of delay is crucial as to recommend the appropriate action or method to mitigate delay and minimize the effect that might be raised. Project delays have been a topic of concern in the

construction industry. Delays can be minimized only when their causes are identified. Knowing the cause of any particular delay in a construction project would help avoiding the effects. Previous researches suggest that Strong management team, thorough investigation of site conditions, together with the design of groundwork and foundations, developing communication systems linking all project teams, offering incentives for early completion; developing human resources through proper training and classifying of craftsmen and adopting a new approach to contract award procedure by giving less weight to prices and more weight to the capabilities and past performance of contractors will help in mitigating delays.

4.6. Summary of Findings

The outcome of analysis from this study can be said to be of great relevance to the construction industry. Just like any other construction industries, the Ethiopian construction is also prone and liable to delay. The factors that cause delay in construction industry varies across different countries based on the political and socio economical condition of a particular country. In addition, the environment condition of a country significantly influences the extent to which construction projects are delayed and the effects are pronounced.

There are many factors that induce delay on construction projects, however in this study the factors are limited to 29 factors. These delays causing factors are grouped in eight categories and they were ranked according to the Relative Importance Index. The factors: owner interference, delay caused by subcontractors, long waiting for approval of test and inspection, shortage of construction materials, labour supply and productivity, frequent change order inappropriate organizational structure linking all parties involved and problems with neighbours are found to be the most important from each category.

The result shows that the real estate industry of the country has a different character in its construction stage than other constructions. The involvement of the client is highly pronounced to extent that it is ranked 1st in being a delay

causing factor. Thus, showing importance level of delay causing factors may vary from based on the construction nature like real estate development.

Analysis was also carried out on the effect of delay on the project work. Time overrun, cost overrun and dispute among parties involved were ranked highest. Time is factor that is very essential in all activities that has to be carried out, in the contract document. A specific time phase is given for delivery of project and if the time is being exceeded more money is often spent which could lead to increase in final cost of project leading to cost overrun and finally to dispute.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

This chapter includes the conclusions and recommendations that would help in solving the occurrence of delay and its effects in the construction of real estate projects in Ethiopia. The first question of this study was to determine the real delay causing factor in real estate construction projects. The second question was to identify the effects of construction delays in the projects. The final and third question was discussing how can delays be minimized in construction.

5.1 Conclusions

One of the most important problems that may arise in the construction project is delays and the magnitude of these delays varies considerably from project to project. Some projects are only a few days behind the schedule: some are delayed over a year. So, it is essential to define the actual causes of delays in order to minimize and avoid the delays in any construction projects.

Based on the literature reviews and the results of questionnaire responses the following conclusions are drawn.

a) The following causes are identified as a potential delay causes on real estate construction projects.
    i) Owner interference which results in design change, material change is the most influential delay causing factor in real estate construction.
    ii) Frequent change orders, Long waiting time for approval of tests and inspections, mistakes in design documents, mistakes and discrepancies in design documents and discrepancies in contract documents are found as real causes of delay in the real estate construction projects.
    iii) Shortage of construction material, inappropriate structure linking all parties involved in the project, delay by sub contracts and lack of

communication between these parties are also found as delay causing factors.

b) Time overrun, cost overrun, dispute, arbitration, litigation and, abandonment are the effects of the delay encountered so far.
c) Besides all, other non-quantifiable delay damages that cannot be stated in terms of money such as inferior quality end product, inability to provide service and/or loss of client opportunities.

5.2 Recommendations

The purpose of the following recommendation is not to deeply address areas that need improvement. The intention is only to point out some major issues that need consideration to enhance the current project management of real estate construction projects. The analysis of the questionnaires has suggested the client, the contractors and the consultants have contributed their own share in causing delay to the project. Hence the following recommendations are focused towards improvements to be made on these causes.

1. **Reducing Owner interference**

- Owners should be informed about their role and the effect scope changes. The culture of thinking to change while the construction is on process must be avoided by effectively utilizing the design stage to eliminate future changes. Preparation of 3D models must be encouraged to clearly see the design out puts and to accommodate change if necessary.

2. **Eliminating mistakes and discrepancies in contract design and documents by**

- Conducting proper investigation and giving adequate time in the design and preparation of documents.
- Conducting design reviews by highly qualified and experienced group of professionals. Constructability reviews and value engineering studies on the final design must be conducted before going to tendering. These

review tasks can also be given to the design review consultant if there is lack of qualified in-house staffs.

- Making sure that the contract documentation is free of ambiguous terms of contract; errors and omissions; plans and specifications are adequately referenced and coincide with the terms of references before entering in to contract. Design consultants' liability has to include fitness for the purpose of the design work.

3. Improving the performance of consultant

- A standard checklist has to be prepared with all necessary details for reviewing the completeness of designs, plans, specifications and tender documentations. Accordingly, documentations have to be checked before floating the tender. The contract documentation problem areas encountered or design deficiencies on projects undertaken previously can be used to develop the checklist;
- Design consultants have to cover (indemnity) the additional costs that the client incurs due to incorrect designs or insufficient data supplied by them and this has to be clearly included in the service contract agreement.
- Consultants, although they are directly hired by the client, their specific position is to hand the contract in neutral position. For the sake of granting their business with the client. They shouldn't lose their neutrality and professionalism in administering the contract.

4. Improving the communication between all parties

- Standard reporting systems must be followed in reporting progress report
- Periodical meetings must be organized to facilitate the communication between all parties involved.

5. Improving the performance and capacity of contractor.

- Contractors should prepare proper plan and achievable schedule using the appropriate scheduling techniques and revise as appropriate.

- Contractors should apply effective site management system for different activities of the project so as to avoid rework of activities and low labor productivity that will result time and cost overruns.
- Contractors should involve qualified and responsible subcontractors. The subcontractors must be involved with a proper contractual agreement with a contractor that can transfer risk from contractor to sub-contractors.

Recommendations for future studies

More research on construction delays should be done in order to develop guidelines, or methods of minimizing the effects of construction delays in Ethiopia. Furthermore, similar research should be performed in various provinces or cities. In order to providing more reliable data, it is required to carry out studies for each specific type of construction projects, including highways, dam construction projects, utilities and etc.

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Appendix A

Questionnaire

Dear Sir/Madam

My name is Adem Hussien. I am currently doing my MSc. in Project Management at Addis Ababa University, school of Commerce. I have finished my course work and now I am doing my MSc. Project entitled: **Causes of Delays in Construction Projects of Private Real Estates**

I believe your experience and educational background will greatly contribute to the success of my research. So, it's with great respect that I ask you to fill this questionnaire. I guarantee that your identity will be kept confidential and the information you provide only be used for academic purposes. I will be happy to share the findings of this research when it's completed.

Thank you in advance for taking your precious time to fill this questionnaire. Please try to answer all the questions openly, as your answers will have an influence on the outcome of the research. Your 30 minutes or less will greatly contribute to the growth and advancement of knowledge in the construction and real estate industry.

If you have any questions or comments, please don't hesitate to contact me. You can reach me by;

- Mobile :0913257546
- E-mail: Ademhus@gmail.com

With Regards,

Adem Hussien

Study title: **Causes of Delays in Construction Projects of Private Real Estates**

The questions below are related to your agency profile and experience in construction claims. Please indicate by filling the blank or by putting mark in the appropriate box.

The answers you provide are used for academic purpose only.

SECTION ONE: - General Information

1.1) Your agency profile (optional)

Name _____

Grade / Class _____

1.2) Type of agency

Owner ☐ Consultant ☐ Contractor ☐

1.3) Respondent Designation in the Company

Owner ☐ Project Manager ☐ Site Engineer ☐

Resident Engineer ☐ Site Supervisor ☐ Others ☐

1.4) Years of Work Experience (General)

0 to 5 years ☐ 6 to 15 years ☐ Above 15 years ☐

SECTION TWO: - Causes of delays

3.1) Please rank the delay causing factors below in what you consider to be encountered in a project based on the frequency of occurrence.

Please indicate on the boxes using the following criteria.

1.Never 2. Rarely 3. Sometimes 4. Often 5. Greatly often

Delay causes		1	2	3	4	5
Client related	Finance and payment of completed work					
	Slow decision making					
	Owner interference					
	Unrealistic contract duration imposed by owners					
Contractor related	Poor site management					
	Improper planning					
	Inadequate contractor experience					
	Mistake during construction					
	Improper method					
	Delay caused by subcontractor.					
Consultant related	Poor contract management					
	Inadequate experience of consultant					
	Mistakes and discrepancies in design documents					
	Long waiting time for approval of tests and inspections					
Material related	Poor quality material supply					
	Shortage of construction material					
Labour and equipment related	Labour supply labour productivity					
	Equipment availability and failure					
Contract related	Frequent change orders					
	Mistakes in design documents					
	Discrepancies in contract document					
Contractual relationship related	Major disputes					
	Negotiations during construction					
	Inappropriate organizational structure linking all parties involved in the project					
	Lack of communication between these parties					
External related	Poor weather condition					
	Changes in regulation					

	Problem with neighbours					
	Unfavourable site condition					

2.1) If you have comments regarding the causes of delay and/or their importance, please specify here:

_____

_____

_____

SECTION THREE: - Effects of delay on construction

3.1) Please rank effects of delay below in what you consider to be the most influential effect of delay.

The five-point scale ranged from 1 to 5.

1= Strongly Disagree 2= Disagree 3= Slightly Disagree 4= Agree

5= Strongly Agree

Effects	Strongly Disagree	Disagree	Slightly Agree	Agree	Strongly Agree
Cost overrun					
Time overrun					
Dispute					
Arbitration					
Litigation					
Abandonment					

3.2) If you have comments regarding delay effects, please specify here:

_____

_____

_____

Thank you