



**ST. MARY'S UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**DEPARTMENT OF PROJECT MANAGEMENT**

**ASSESSING THE CORRELATES OF DELAY IN BUILDING  
CONSTRUCTION PROJECTS IN THE CASE OF FE CONSTRUCTION  
PLC.**

BY

**MAHLET TADESSE BEKELE**  
ID; SGS/0281/2012A /

**July, 2021**  
**Addis Ababa, Ethiopia**

ASSESSING THE CORRELATES OF DELAY IN BUILDING CONSTRUCTION  
PROJECTS IN THE CASE OF FE CONSTRUCTION PLC.

BY

MAHLET TADESSE BEKELE  
ID; SGS/0281/2012A /

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

**July, 2021**  
**Addis Ababa, Ethiopia**

ST. MARY'S UNIVERSITY  
SCHOOL OF GRADUATE STUDIES

ASSESSING THE CORRELATES OF DELAY IN BUILDING CONSTRUCTION  
PROJECTS IN THE CASE OF FE CONSTRUCTION PLC.

BY  
MAHLET TADESSE BEKELE

APPROVED BY BOARD OF EXAMINERS

\_\_\_\_\_  
Dean, Graduate Studies

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Advisor

\_\_\_\_\_  
Signature

\_\_\_\_\_  
External Examiner

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Internal Examiner

\_\_\_\_\_  
Signature

## **DECLARATION**

I, Mahlet Tadesse, 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.

---

Name

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

---

Signature

**June, 2021**

## **Certification**

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

---

Adviser

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

---

Signature

**June, 2021**

## **Acknowledgment**

This project work has been reached in this result in the help of my Almighty God with his Mom and next it is a result of a collective effort outcome of a number of people around me. So I would like to give my feelings to thank the following individuals who are support me to successfully complete this project.

First I would like thanks to my advisor Temesgen Belayneh (PhD) for his time and commitment to my success and also for his guidance starting from proposal development and report writing. Second, I would like thanks to my uncle for everything. Third, I also acknowledge my academic colleagues for their support in various information exchanges together.

Last but not least in importance, I offer my sincere appreciation to all of those persons who contributed so much in one way or another, during the compilation of this project. Thank you all.

# Contents

CHAPTER ONE: INTRODUCTION .....	1
1.1. Background of the study.....	1
1.2. Statement of the problem .....	2
1.3. Research objectives .....	3
1.3.1. General objective.....	3
1.3.2 Specific objective .....	3
1.4. Research Questions .....	3
1.5. Significance of the study.....	4
1.6. Scope of the study .....	4
1.7 Limitations of the study.....	4
1.8. Organization of the Study.....	5
1.9 Definition of Terms .....	5
CHAPTER TWO: LITERATURE REVIEW .....	6
2.1 Theoretical Literature .....	6
2.1.1 Project.....	6
2.1.2 Definition of Delay .....	7
2.1.3 Project Delay.....	8
2.1.4 Classification of project delay.....	8
2.1.5 Causes of Delay in Construction Projects .....	11
2.1.6 Project Schedule .....	14
2.1.7 Methods in Minimizing Construction Project Delays .....	15
2.2 Empirical Review.....	16
2.3 Conceptual framework .....	17
CHAPTER THREE: RESEARCH METHODOLOGY .....	19
3.1 Introduction .....	19
3.2 Research Approach and Design .....	19
3.2.1 Research approach .....	19
3.2.2 Research Design.....	19
3.3 Target Population .....	20
3.4 Data collection .....	20
3.5 Ethical consideration .....	21

3.6 Data analysis .....	21
3.7 Validity and Reliability of the study .....	22
3.7.1 Validity .....	22
3.7.2 Reliability .....	23
CHAPTER FOUR: RESULT AND DISCUSSION .....	24
4.1. Respondents' characteristics .....	24
4.2. Existing status of project time schedule .....	26
4.3. Relative importance of the delay factors .....	26
4.3.1 Client related delay factors.....	27
4.3.2 Contractor related delay factors.....	27
4.3.3 Consultant related delay factors .....	28
4.3.4 Materials related delay factors.....	29
4.3.5 Labour and equipment related delay factors .....	30
4.3.6 Contract related delay factors .....	30
4.3.7 Contractual relationship related delay factors .....	31
4.3.8 External factors related delay factors.....	31
4.4 Summary of delay factors by RII rank .....	32
4.5 Respondents perception on delay mitigation .....	33
CHAPTER FIVE: SUMMARY, CONCLUSION & RECOMMENDATION.....	36
5.1 Summary .....	36
5.2 Conclusion.....	37
5.3 Recommendations.....	38
Reference .....	40
APPENDIX I .....	44
APPENDIX II .....	49



## List of Table

page number

Table 3.1: Reliability statistic-----	23
Table 4.1 Respondents' characteristics-----	25
Table 4.2 magnitude of delay-----	26
Table 4.3 Client related delay factors-----	27
Table 4.4: Contractor related delay factors-----	28
Table 4.5: Consultant related delay factors-----	29
Table 4.6: Materials related delay factors-----	29
Table 4.7: Labour and Equipment related delay factors-----	30
Table 4.8: Contract related delay factors-----	30
Table 4.9: Contractual related delay factors-----	31
Table 4.10: External factors related delay factors-----	32
Table 4.11: Summary of delay factors by RII rank-----	33
Table 4.12: Methods of minimizing construction delays-----	34

**List of Figure**

**page number**

Fig: 2.1 Conceptual framework of the study-----18

## **List of Acronyms**

**PMBOK**- Project Management Body of Knowledge

**IPMA**- International Project Management Association

**MoWUD**- Ministry of works & urban development

**CPM**- Critical path method

**SPSS** – Statistical package for social science

**RII**: Relative Importance Index

## ABSTRACT

Construction delays are common in construction industry and create major concerns for project performance. Construction delays are caused by many factors. The aim of this paper is to identify delay factors on building construction projects at FE Construction Company. This study conducted on selected site found in Addis Ababa. For this purpose, 29 different delay factors were identified, categorized into eight major groups namely, client related delay cause factor, contractor related delay cause factor, consultant related delay cause factor, material related delay cause factor, labour related delay cause factor, contract related delay cause factor, contractual related delay cause factor and external related delay cause factor. A conceptual framework was also developed using the identified variables for project delay. Explanatory research design was used to assess the correlates of delay causing factors in the selected projects. Primary and secondary data were also used for the achievement of the study. Primary data was collected using a questionnaire. A total of 45 out of 50 questionnaires were filled by different members of the selected 8 project site from FE Construction Company namely, arekayib project found in wemzeker library, opd project found in black lion hospital, a project found in 4 kilo campus, 22 golagole, akaki, mekanisa, semit 72 and legehar for apartment purpose. *The collected data is* quantified by the relative importance index method. The ranking of the factors and groups were demonstrated according to their importance level on delay. According to the finding results, the factors 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 were contributing the most to delays and it need attention. This project work finally forwarded some recommendations to minimize and control delays in construction projects. The key suggestions forwarded were: use appropriate construction method, complete and proper design at the right time, proper material procurement, effective strategic planning and proper project planning and scheduling.

**Key Words: delay cause Factors, building, Addis Ababa**

# CHAPTER ONE: INTRODUCTION

## 1.1. Background of the study

Construction projects play a great role in the economic development of nation. The construction industry is the tool through which a society achieve its aim of urban and rural area development. However, the current practice of construction industry faces a lot of problem and a rare event are completed on the scheduled time, budget and desired quality of the stakeholders. Construction projects are successful, when it is completed on schedule with in the agreed budget, expected quality level according to the specification. (Serani & Wodaje, 2020)

Building Construction delay means a time overrun either beyond the contract date or beyond the date that the parties have agreed upon for the delivery of the project. In both cases, a delay is usually a costly situation. Building construction 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 (Boston, 1976).

In Ethiopia, the construction industry is the highest recipient of government budget in terms of government development programs. Even though Ethiopian building construction industry is growing and many domestic and international contractors are involved, completion of the project as per the contract is still an issue. There are many problems and conflicts that inevitably occur frequently which contribute negatively to the completion of the project as per the intended completion time stipulated in the applicable contract agreements. The time overrun in building construction projects has become one of the most common problems in the industry that cause multitude of negative effects on the projects and its stakeholders (MoWUD, 2006).

The effect of delay may include time overrun, cost overrun, disputes, litigation and total abandonment (Murali & Yau, 2006). Some studies directly examine delays, attempt to identify their causes and recommend ways to avoid them. Construction project delays have a weakening effect on parties (Owner, Contractor, and Consultant) to a contract in terms of a growth in adversarial relationships, distrust, litigation, arbitration, cash-flow problems, and a general feeling of apprehension towards each other (Assaf & Al-hejji, 2002).

Therefore, this aspect has been constantly investigated by the researchers across the world with a great enthusiasm. Failure to deliver these projects on time discomfort both clients and end users who expect to benefit from them. This is totally undesirable to the concerned parties as it is costly for clients and contractors and has the potential to trigger disputes whose resolution is expensive.

## **1.2. Statement of the problem**

Delays in construction projects are more likely to happen in almost all projects due to the miscommunication between contractors, subcontractors, property owners or any other reasons. They could cause great impact on economic growth. And it is one of the common problems that upset the construction companies in terms of competitiveness and long term sustainable in the global market (Sweis *et al.*, 2008). The problem of project delay still not solved even today when the technology is advanced and project management practices are more common than before (Yang, *et al.*, 2013).

In a construction projects, delay causing factors became a main problem for projects to be extremely high cost, extended completion time and inferior quality deliverables. Building construction projects are exposed to many problems during construction that lead to the unnecessary delay and unable meet the contract time of the projects (Kang, 2010).

Cost and time overruns are the key problems of any construction projects. These issues are causing the negative impact on the development of country economic growth and prosperity (Raj, 2016). The magnitude of delay causing factors varies significantly from project to project and country to country (Wael, *et al.*, 2007).

Werku (2016), studies investigating the causes of construction delay in Ethiopia, showed that only 8.55% projects have been finished to the original targeted completed date and the remaining 91.75% delayed 352% of its contractual time. Construction project is considered one of the most common use problems causing a multitude negative effect on the project and its participating parties.

Similar kinds of problems have been encountered on the selected building construction projects in FE Construction Company. Those were schedule slippage because of a design issue that has been adjusted after the design was already finished and also regarding the material delay, the political

aspect of the country which makes it impossible to import raw material, owner interference and labour supply and labour productivity.

The causes of project delay may vary for specific project from country to country, region to region, and even project to project. The objective of this paper is to assess the correlates of delay in building construction projects in the case of FE Contractor and understand the respondent's perception on delay mitigation. To meet this goal, the concept of delay is analyzed, and the delay causes factors are then defined and identified through the application of a questionnaire to specialists from the selected projects. Therefore further study can be also undertaken to investigate major causes and the magnitude of their effect on project.

### **1.3. Research objectives**

#### **1.3.1. General objective**

Assessing the correlates of delay in building construction in the case of FE Construction Company would be the General objective of the study.

#### **1.3.2 Specific objective**

To meet the general objective, the study focused on the following specific objectives:

- To describe the current building construction projects schedule management in FE Construction Company.
- To determine the relative importance of building construction projects delay factors in FE Construction Company.
- To explore respondents perception on delay mitigation.

### **1.4. Research Questions**

- What is the current building construction projects schedule management in FE Construction Company?
- What is the relative importance of building construction projects delay factors in the FE Construction Company?
- What are respondent's perception on delay mitigation?

## **1.5. Significance of the study**

This research has a significant importance in understanding the extent of delay in building construction projects. It also helps us to know the major causes of building construction project delay in FE construction industry. It enables the organization to check and evaluate its project causes of delay. Besides, it can also propose ways of mitigation in order to control and mitigate project delay causes. The findings, conclusion, and recommendations of this study will provide possible solutions to minimize organizational building construction project delay in FE construction plc. In addition, it will also be important to the researcher as it adds theoretical and practical knowledge on how to conduct research and it may also be significantly important to scholars and researchers who require a basis for further research in this area.

## **1.6. Scope of the study**

Werku (2016), explained that construction delays are occurring in every phase of a construction project and are common problems in all construction projects in Ethiopia. This research focused on the assessment of causes of delay in the case of FE construction building projects, among the projects that are under construction, the researcher chose eight projects for the respondents of the questionnaire which are located in Addis Ababa cities. Therefore, the data for this study were gathered through detailed literature review, questionnaire survey with key professionals, and case studies.

The scope of this project is to carry out the assessment on the correlated factors of delay in ongoing/active building construction projects in FE construction firms. This study focused on the construction projects in Addis-Ababa.

## **1.7 Limitations of the study**

This study has limitations that identify potential gaps or problems in the research. Those limitations are;

- Due to stakeholder busy schedules, it was hard to collect the questionnaires and to have a proper interview.
- Due to the pandemic disease, Covid 19, the number of workers on the site has decreased, so it is difficult to access all respondents.



- Some respondents were hesitant to tell the truth, about the cause of delay in building construction project.

## **1.8. Organization of the Study**

This project is organized into five chapters. The first Chapter include background of the study, statement of the problem, objective of the study, research questions, research methodology, and scope of the study and limitation of the study. Chapter two is devoted to literature review informing the reader of what is already known in this area of study and discusses different concepts on project manager's competency components and project success. Chapter three discusses the methodology employed in the study, including, research design, research approach, sample size, data source and collection method, procedure of data collection and method of data analysis. Chapter four described the presentation, analysis and interpretation of the analyzed collected data through the proposed instruments, finally, chapter five presented general conclusions and recommendations based on what is discussed in the previous chapters.

## **1.9 Definition of Terms**

**Project Delay:** A project that is requiring any time more than what is actually needed to complete a project is considered as a delayed project (Fugar & Agyakwah-Baah, 2010).

## **CHAPTER TWO: LITERATURE REVIEW**

This chapter presents review of various literatures, both theoretical and empirical frame work to assess the correlates of delay in building construction projects, and mitigation alternatives to the projects in construction sector. Academic studies, websites of implementing organization and the like are considered to be sources of data. It shall also put forward a conceptual framework of the study based on the review.

### **2.1 Theoretical Literature**

#### **2.1.1 Project**

According to (PMBOK, 2013) a project is a temporary endeavor undertaken to create a unique product, service, or result. The temporary nature of projects indicates that a project has a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. Projects can also have social, economic, and environmental impacts that far outlive the projects themselves (PMBOK 5th edition). (IPMA) defines a project as a time and cost constrained operation to realize a set of defined deliverables up to quality standards and requirements.

According to Robert (2014) definition Project is a sequence of unique, complex, and connected activities that have one goal or purpose and that must be completed by a specific time, within budget, and according to specification. A Business focused definition of a Project by the same author (Robert, 2014) is a sequence of finite dependent activities whose successful completion results in the delivery of the expected business value that validated doing the project. (Levy, 2006) Also defines a project as a temporary endeavor undertaken to achieve a particular aim. A project is actually the response to a need, the solution to a problem. Further, it's a solution that promises a benefit typically a financial benefit. The fundamental purpose for most projects is to either make money or save money.

Some scholars considered that oftentimes project involves large, expensive, unique, complex, and high-risk ventures which are required to be completed within a particular date (time), involving money (cost), deliverable values (quality), and some expected outcomes (Atkinson, R, 1999). It

can be understood from existing studies that each project must have well-defined objectives and adequate resources to accomplish the tasks. Meanwhile, Olsen, P. R (1971) also states that a project is also a combination of human and non-human resources pulled together during a temporary organization to achieve a specified purpose.

By definition, a project is temporary in nature; that means that it has a specific start and finish. A project consists of a well-defined collection of small jobs tasks and ordinarily culminates in the creation of an end product or products deliverables. There will be a preferred sequence of execution for the project's tasks (the schedule). A project is a unique, one-time undertaking; it will never again be done exactly the same way, by the same people, and within the same environment (Levy, 2006).

### **2.1.2 Definition of Delay**

Definition of delay stated by various scholars in different ways. Delays are defined as events or occurrences that affect the time required to complete a particular task (Assaf & Al-Hejji, 2006).

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 & Ramya, 2015).

According to Dinakar (2014) Delay is the slowing down of work without stopping 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 & 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.

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.

### **2.1.3 Project Delay**

Delay in construction is a global phenomenon affecting not only the construction industry but the overall economy of countries as well. 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 (Faradi & El-Sayegh, 2006).

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 (Majid, 2006).

In the study of (Aibinu & Jagboro, 2002) 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.

Delay (Time overrun) is a condition the actual work does not complete in an estimated time period. Delay or time overrun is defined as a condition where a construction project does not complete within the designed time period. It happens when the work of contract does not complete in its prescribed time. Time overrun is a most common incident which occurs nearly in all the projects related to the construction industry (Muhammad, *et. al.*, 2017).

### **2.1.4 Classification of project delay**

Delays in construction projects have been put in various classifications by several authors but most of these classifications have a lot in common in terms of their fundamentals. Although various types of delays have been put in several studies, they are somewhat linked to one another. Delays can be seen in these four major categories as explained by (Trauner, *et al.*, 2009).

Kartam (1999) explained types of construction delay in to Critical or Non critical; Excusable or Non excusable; Compensable or Non compensable and Concurrent or Non concurrent.

#### **2.1.4.1 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 (Hamzah, *et al.*, 2011).

- The project itself
- The contractor`s plan and schedule (particularly the critical path)
- The requirement of the contract for sequence and phasing
- The physical constraint of the project, i.e. how to build the job from a practical perspective (Hamzah, *et al.*, 2011).

#### **2.1.4.2 Excusable or Non-Excusable Delays**

An excusable delay is a delay that is due to an unforeseeable event beyond the contractor`s or the subcontractor`s control. Delay to be excusable or non-excusable depends on the clauses incorporated in the contract. The authors note that standard construction contracts specify types of delay that will allow the contractor to an extension of time (Hamzah, *et al.*, 2011).

Many researchers give list of excusable delay in a project. Normally, based on common general provisions in public agency specifications, delays resulting from the following events would be considered as excusable (Hamzah, *et al.*, 2011);

- General labor strikes
- Fires
- Floods
- Owner-directed changes
- Errors and omissions in the plans and specifications
- Differing site conditions or concealed conditions
- Uncommon severe weather
- Intervention by outside agencies
- Epidemics and quarantine restrictions.

Non-excusable delays are events that are within the contractor's control or that are foreseeable. Non-excusable delays are delays that are either caused by the contractor or not caused by the contractor but should have been foreseen by the contractor. Also non-excusable delay does not entitle the contractor to either a time extension or monetary compensation. Some examples of non-excusable delays are:

- Late performance of sub-contractors
- Untimely performance by suppliers
- Faulty workmanship by the contractor or sub-contractors
- A project-specific labor strike caused by either the contractor's unwillingness to meet with labor representative or by unfair labor practices (Hamzah, *et al.*, 2011).

#### **2.1.4.3 Compensable or Non-Compensable delay**

Compensable delays is caused by the owner or the owner's agents. A compensable delay where the contractor is entitled to a time extension and to additional cost compensations. Relating back to the excusable and non-excusable delays, only excusable delays can be compensable. An example of non-completion of drawings in the required time by the architect of the owner and it leads to the extension of the schedule and it imposes economic damages to the owner by the contractor. In this condition, the contractor will have to face extra indirect costs for both extended field office and home office (Hamzah, *et al.*, 2011).

Non-compensable delays is a delay which is caused by third parties or incidents beyond the control of both the owner and the contractor. These delays are commonly called "acts of God" because they are not the responsibility or fault of any particular party. Non-compensable delays mean that although an excusable delay may have occurred, the contractor is not entitled to any added compensation resulting from the excusable delay. Thus, the question of whether a delay is compensable must be answered. Examples include natural calamity, unhealthy weather and wrong doing by masses (strikes, fires, acts of government in its sovereign capacity, etc). Due to this, contractor gets extension in tie and does not pay any compensation to the owner and contractor for delay damages (N. Hamzah, *et al.*, 2011).

#### **2.1.4.4 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 same are felt (in whole or in part) at the same time, this is more correctly termed ‘concurrent effect’ of sequential delay events (N. Hamzah, *et al.*, 2011).

Concurrent delays occur when both owner and the contractor are responsible for the delay. Generally, if the responsible parties of the delays are intertwined, neither the contractor can be held responsible for the delay (force to accelerate, or be liable for liquidated damages) nor can he recover the delay damages from the owner. Until the development of CPM schedule analysis, there was no reliable method to differentiate the impact of contractor caused delays from owner caused delays (N. Hamzah, *et al.*, 2011).

Concurrent delays arise when one event causes a delay simultaneously with another event. For example, if an owner denies access to a project site for two weeks, and a severe storm prevents a contractor from working on the project for one of two weeks as well, there will be a concurrent delay of one week. The contractor will be able to recover for delay damages for one week, as a severe storm is not a cause of delay that is compensable and would have prevented the contractor from performing even if the owner did not deny access to the site (N. Hamzah, *et al.*, 2011).

Concurrent delays are often more complex. Delays are categorized into ‘excusable compensable’, ‘excusable and non-compensable and non-excusable delays. More often, the excusable and non-excusable delays occur on separate but parallel chains of activities. When there are overlapping causes for the delay, the following principles usually are applied (N. Hamzah, *et al.*, 2011).

#### **2.1.5 Causes of Delay in Construction Projects**

According to Muhammad, *et al.*, (2017) Construction works involve huge amounts of money and most of the contractors find it very difficult to bear the heavy daily construction expenses when the payments are delayed. Work progress can be delayed due to the late payments from the clients because there is inadequate cash flow to support construction expenses especially for those

contractors who are not financially sound. And they also argue that Contract-related factors such as change orders (changes in the deliverables and requirements) and mistakes and discrepancies in the contract document result in cost overrun. Mistakes and discrepancies in the contract document can be in scope, deliverables, resources available and allocated, payment terms, achievement of various milestones, and the project duration. In most of the instances, time overrun leads to cost overrun.

According to Yogeswaran *et al.*, (1997), construction delays are occurring in every phase of a construction project and are common problems in construction projects. The actors in the industry (i.e. consultants, clients and contractors) have their own share in the process. There are also other factors that are external to these parties.

Construction delay is considered to be one of the most recurring problems in the construction industry and it has an adverse effect on project success in terms of cost, time, quality, and safety. There are several factors that cause delay in construction. Delay may be caused by Clients, Users, Consultants, Designers, Owners, Contractors and Suppliers (Yogeswaran, *et al.*, 1997).

Construction delay is a common problem in construction projects in Ethiopia and occurring in every type and phase of a construction projects. In Ethiopia, the construction industry is blooming and the building construction increasing from time to time all over the country. However the historical data of completed building projects shows that, none of the projects was completed as planned and within the estimated cost (Zack, 2003).

According to Faradi & El-Sayegh, (2006), Construction delays are occurring in every phase of a construction project and are common problems in construction projects in Ethiopia, and this is the major causes of project failure. 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.

Majid, (2006) identified causes of delay related to owners, consultants, contractors, Labor, Equipment, and external factors. According to their study Owner related causes include (slow decision making, delay in delivering the site, payment delay, improper planning and scheduling,



owner interference, change in orders, suspension of work, lack of communication, late decision making, conflicts among partners); Consultant (Inadequate experience, delay in approving drawings and samples, inadequate detailing and clarity in drawings, quality assurance control, mistakes & discrepancies in design documents); Contractor (delay in payment, delays in subcontractor work, poor site management and supervision, rework due to errors, inexperience, poor qualification of staff, in effective planning, frequent change of subcontractor); Labor & Equipment (shortage of labor, low productivity level of labors, in-experienced work force, delay in material delivery, shortage of materials, shortage of equipment, equipment break down, low productivity & efficiency, poor operator skill, lack of communication); and External factors (change in government, poor soil conditions regulations, delay in obtaining permits, climatic factors, accidents during construction, delay in commissioning).

Kartam, (1999) 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 follows:-

1) Client related causes:

- Finance and payment s of completed work
- Owner interference
- Slow decision making
- Unrealistic contract duration and requirements imposed

2) Contractor related factors

- Subcontractors
- Site management improper planning,
- Construction methods
- Improper planning
- Mistake during construction stage,
- Inadequate contractor experience

3) Consultant related causes

- Contract management
- Preparation and approval of drawings
- Quality assurance /control

- Waiting time for approval and inspection
- 4) Material related causes
- Quality of material
  - Shortage of material
- 5) Labor and equipment category causes
- Labor supply
  - Labor productivity
  - Equipment availability and failure
- 6) Contract related causes
- Change order
  - Mistakes and discrepancies in contract document
- 7) Contract relationships related causes
- Major disputes and negotiations
  - Inappropriate overall organizational structure linking to the project
  - Lack of communication
- 8) External causes
- Weather condition
  - regulatory changes
  - Problem with neighbors
  - Unforeseen site condition

### **2.1.6 Project Schedule**

A schedule is the conversion of a project action plan into an operating timetable. As such, it serves as the basis for monitoring and controlling project activity and, taken together with the plan and budget, is probably the major tool for the management of projects (Jack R. M., Samuel J. M. 2009). In a project environment, the scheduling function is more important than it would be in an ongoing operation because projects lack the continuity of day-to-day operations and often present much more complex problems of coordination. Indeed, project scheduling is so important .that a detailed schedule is sometimes a customer- specified requirement. Properly designed, detailed schedule

can also serve as a key input in establishing the monitoring and control systems for the project (Jack R. M., Samuel J. M. 2009).

### **2.1.7 Methods in Minimizing Construction Project Delays**

According to Divya & Ramya (2015) when there is a construction delay, time overrun is inevitable, there may be also a cost overrun and it can lead to the project to suffer financially, disputes may also arise among project stakeholders. Therefore project stakeholders must work to minimize risks that such delay will occur. At the time of construction delay, owners face a financial problem. However they try to compensate this from the income of the contractors, and more importantly minimize the risk that such delays will occur, depends largely on how the construction contract was drawn up. Divya & Ramya (2015) recommended following points in order to minimize and control delays in construction projects, those delay minimizing methods are:

- Frequent progress meeting
- Use up-to-date technology utilization
- Use proper and modern construction equipment
- Use appropriate construction methods
- Effective strategic planning
- Proper material procurement
- Clear information and communication channels
- Frequent coordination between the parties involved
- Proper emphasis on past experience
- Proper project planning and scheduling
- Complete and proper design at the right time
- Site management and supervision
- Collaborative working in construction
- Compressing construction durations

## 2.2 Empirical Review

Several studies have been conducted about causes of delay in construction projects for years in the past. Many researches advanced and modified various factors and groups that result for causing delays into several groups. It is normal for construction projects to face problems during the project implementation and delay is one of the major problems. Delay is a problem that should be addressed properly before it grows and sincerely affects project time, cost, and quality. Moreover, it also will contribute to a detrimental relationship between those involved in the project.

According to Asaf & Al-Hejji, (2006) delays in construction projects are a universal phenomenon. Delays happen to small and large projects in developing and developed nations, and usually accompanied by cost overruns. Delay generally has a harmful effect on clients, contractors, and consultants in terms of project progress, relationships, and communication among parties, and on financial aspects, which sometimes may develop into serious disputes or legal battles in court.

Battaineh, *et. al.* (2002) survey stated that the most significant cause of delay in the traditional type of contract, in perspective of contractor and consultant. It is also stated that to imparting the economic feasibility of capital project, extensive delays provide a fertile ground for costly disputes and claims. The result indicated the contractor and consultant agreed that owner interface, inadequate contractor experience, finance and payment, labor productivity, slow decision making, improper planning and subcontractor are among the top ten important factors.

In Saudi Arabia, Sadi (2006) conducted a research about construction projects delay in different type of projects in the state. It was concluded that 70% of projects experience time overrun. The survey was conducted with 23 contractors, 19 consultant and 15 owners. Seventy-three cause of delay was recognized and the causes are grouped into nine classes. The outcome of the survey that agreed by all three parties is change order. The overall results are stated that the factor related to labor, contractor, project, owner and consultant are in the highest rank.

In Florida, Ahmed (2003) identified the major causes of delay in building construction industries. The primary aim of this study is to identify the perception of different parties regarding causes of delays, the allocation of responsibilities and different types of delay. It was found that the consultants play a very important role in design-related delays because they are in charge of the design process in conjunction with the owner of the project.

Mohd, (2010) has made a survey in Majlis Amanah Rakyat (MARA), one of government agencies in Malaysia. MARA management procurement construction project phenomenal issues of delayed has been argument for a long time. Eighteen of delay causes have been identified. The respondents are consultants, resident engineers, and client, MARA itself consist of director, project officer and engineers. The studies has concluded that the cash flow and financial difficulties faced by contractor's poor site management and ineffective planning and scheduling by contractors are the main causes of the delay.

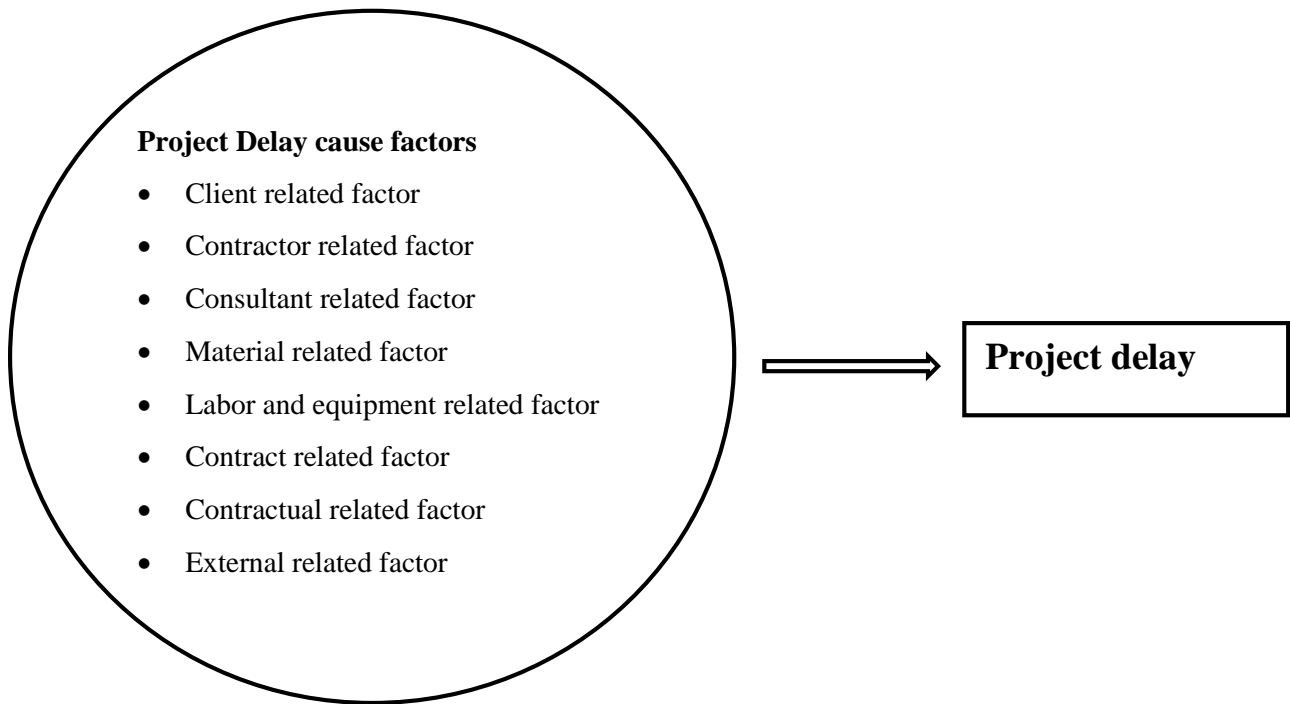
As stated by Murali, (2007) about the cause of delay in Malaysia. About 150 respondents participated in the survey. This study identified 10 most important causes of delay from a list of 28 different causes and those are contractor's improper planning, contractor's poor site management, inadequate contractor experience, inadequate client's finance and payments for completed work, problems with subcontractors, shortage in material, labor supply, equipment availability and failure, lack of communication between parties, and mistakes during the construction stag. Also the study identifies 6 different effects of delay.

### **2.3 Conceptual framework**

The framework is developed from work of author Abdella, *et al.*, (2002) who categorized delay causing factors in eight groups which have a potential to affect the performance of projects negatively or positively. If the performance of projects affected negatively the project would fall in to delay. The causes of project delay are listed in 8 categories for this specific study. The categories are: Client related factor, Contractor related factor, Consultant related factor, Material related factor, Labor and equipment related factor, Contract related factor, Contractual related factor and External related factor.

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 assessing the correlates of delay factors in building construction projects in FE Construction Company.

**Fig: 2.1 Conceptual framework of the study**



*Source: Derived from Abdella. et al., (2002)*

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

As Crawford (2005) stated research methodology is all about obtaining, organizing and analyzing data. This chapter describe the methods through which the objectives of the study can be answered. Accordingly, it states about the research design used, population and sampling procedures, data gathering methods and instruments, ethical consideration, validity and reliability of the study, and finally procedures/models of data presentation.

### **3.2 Research Approach and Design**

#### **3.2.1 Research approach**

There are three research approaches: qualitative, quantitative, and mixed methods. The approaches are not totally opposite or are distinct categories but they are different ends of a continuum (Saunders, 2009). This research employs a quantitative approach with the use of questionnaires collected from the project staff. Quantitative analysis techniques helping us to explore, present, describe and examine relationships and trends within our data (Saunders et al, 2009). Questionnaires are found to be effective due to the relative easiness of obtaining standard data appropriate for achieving the objectives of this study. Questionnaires were framed for the survey based on the identified delay cause factors. Also the researcher chose this method because is a means for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured, typically on instruments, so that numbered data can be analyzed using statistical procedures (Creswell, 2009).

#### **3.2.2 Research Design**

Research design are undertaken for different purposes. These can be categorized as exploratory, descriptive, and explanatory (Creswell, 2009). For this study, explanatory research design was used to provide the deep insight into a specific subject, which gives more opportunities for the research to study new things and question new things. The deep study of the subjects creates a

cycle and the critical thinking of the subject creates more questions and those question lead to more ways for the researcher to study more things related to that subject (Cooper & Schindler, 2014). So the study aims to assess the correlation of those delay cause factors with project schedule.

### **3.3 Target Population**

As the purpose of this study is to assess the correlates of delay factors in selected building projects, the target population of the study is project managers, site engineer, office engineer, coordinators and residential engineers of the project participating in and carrying out the projects at the time of the study. To identify causes of delay factors in building construction according to their seriousness, the respondents should be skilled and should directly involve on the projects. Since there were a limited number of skilled laborers on all projects, the researcher use small number target population. A Target population defined as “a set of all elements that belong to a certain defined group to be studied and used to generalize the result of the study.” Creswell, (2003). FE construction has many projects that are under construction and many more had been constructed. The research focused only on eight projects that are being carried out in Addis Ababa and the total population is 50. The researcher selected those projects because all of them are not completed through the given time and they are still under construction. A census survey was employed as the target population size is limited. Those projects are selected deliberately by the researcher using nonprobability purposive sampling for they are convenient for the researcher in both geographic location and availability of data. Purposive or judgmental sampling enables the researcher to use his/her judgment to select cases that will best answer the research questions (Saunders et al. 2009).

### **3.4 Data collection**

The study assessed the correlated of delay building construction project in FE Construction Company. The researcher use primary and secondary data collection methods. First, secondary data collected through literature review from different books, journals, internet, etc. to reviewing the researches that discussed the causes of delay in building construction project case of FE construction plc. For concept development and for the preparation of the questionnaires and it also



be used to limit questions that raised in the study and finally will be used to recommend better strategies for managing change.

Then primary data gathered through questionnaires. Questionnaires was used as a primarily data collection instrument. Neuman, (2000) recommends use of questionnaires for its potential to reach out to a large number of respondents within a short time; ability to accord respondent's adequate time to respond; offers a sense of privacy and confidentiality to the respondent. Therefore, this instrument selected as a quick and cost-effective way to collect data. This type of information is needed to know and investigate the actual practice at construction site regarding the causes of delay in building construction project case of FE Construction Company to achieve the first three objectives of this study.

To fulfill the purpose of the current research 50 questionnaires were distributed, and only 45 were returned, leading to 90% response rate. After checking the filled questionnaires, all of them found suitable and coded against SPSS for further analysis.

### **3.5 Ethical consideration**

This research followed ethically and morally acceptable processes throughout the research process. The data was collected with the full consent of the participants. In this regard, the names of the respondents were not listed, and Information was not available to anyone who was not directly involved in the study. In order to safeguard the rights of the participants, the benefits of the study were also explained to the participant.

In addition, the study used proper citation, follow truthful collection and analysis of data, obtain the consent of the case organization and staffs and keep the identity of respondents unanimous based on their consent to meet the ethical obligations of the research.

### **3.6 Data analysis**

According to (Aibinu & Jagboro 2002), the Relative Importance Index (RII) approach used to describe the relative importance of the specific causes and effects based on the likelihood of occurrence and effect on the project using the Likert scale. In addition, the higher value of the index of relative importance (RII) is the critical cause or impact component and is determined by equation (3.1)

$$RII = \frac{\sum W}{A * N} \dots \dots \dots \text{Equation 3.1.}$$

Where,

RII – is Relative Importance Index

W –The weight given to each factor by the respondents from 1, 2, 3, 4 and 5 for very low, low, moderate, high and very high, respectively.

A – The highest weight (i.e., 5 in this case), and;

N – The total number of respondents.

The importance indices were calculated for all delay causes factor 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 Validity and Reliability of the study**

#### **3.7.1 Validity**

Zikmund, (2003) has defined validity as "The ability of scale or measuring instrument to measure what it is intended to measure". The study done only in FE construction plc. Therefore, the population is homogenous and helps to have a robust and valid data. All possible efforts exert to make the data collection instruments easily understandable by the respondents so that the intended information collected thereby increasing trustworthiness of the ultimate findings. Different procedures taken to guarantee the validity of this research. First, literature review will use to assure content validity. Second, questionnaire will be adjust and the validity was verified based on the context of the company. In addition, it will assess and examine by the research advisor and senior project managers prior to the data collection to examine the instrument for the content validity and ethicality. Also, all reference materials are acknowledged with proper citation.

### 3.7.2 Reliability

Reliability refers to the extent to which your data collection techniques or analysis procedures will yield consistent findings (Saunders et al., 2009). It refers to the degree to which 29 measurement produces consistent outcomes. The reliability of the collected data has been tested using Cronbach's Alpha. Howard. M (2018) stated that Cronbach's alpha ranges from 0 to 1 in which values closer to 1 indicate a greater internal consistency of the variables in the scale. In other words, higher coefficient alpha values show greater scale reliability. Additionally, George & Mallery (2003) suggest a Cronbach's alpha value higher than 0.7 is considered to be reliable. The reliability gets stronger as it goes higher than 0.7 and poorer as it gets lower than 0.7.

**Table 3.1: Reliability statistic**

NO	Variable	No of item	Cronbach's Alpha
1	Client related factor	4	0.844
2	Contractor related factor	6	0.965
3	Consultant related factor	4	0.845
4	Material related factor	2	0.701
5	Labor and equipment related factor	2	0.754
6	Contract related factor	3	0.786
7	Contractual related factor	4	0.874
8	external related factor	4	0.816

*Source: Own Survey, 2021*

The Cronbach's alpha coefficient in the above table 3.1 shows that all the results are found to be greater than 0.7 which yielded good reliability. Therefore it can be concluded that all factors used indicate good internal consistency of the items in the scale.

## **CHAPTER FOUR: RESULT AND DISCUSSION**

The results and discussion below is devised in four parts corresponding to the Research questions and also the sections of the questionnaire. This section deals with the analysis and interpretation of data collected from the survey questionnaire. Responses for the measures on the questionnaire are summarized and presented using tables to facilitate easy understanding.

Of the 50 questionnaires distributed, 45 filled questionnaires were collected. Therefore, this indicate that response rate is 90%. According to Mugenda (2003) a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent; therefore, this response rate is adequate for analysis and reporting. The adopted questionnaire was developed using five scales ranking i.e. Linkert scale; where 1 represents strongly disagree, 2 Disagree, 3 Neutral, 4 Agree and 5 Strongly Agree. To analyze the collected data with that of the objective set for this research, Statistical procedures were carried out using SPSS Statistics.

### **4.1. Respondents' characteristics**

It include gender, age, educational level, work experience, work position and maximum size of the project lead distribution of the survey questionnaire respondents. And this questionnaire of this research was filled out by 45 respondents in total.

Among the total 45 respondents of the questionnaire, 32 (71%) have a Bachelor's degree while 13(29%) have Master's degree. This shows that majority of the respondents are educated to a level of Bachelor's degree. None of the respondents have Postgraduate diploma or any other qualifications. With regard to the respondents' educational background it shows that respondents are literate enough in order to understand and answer the research instruments correctly and respondents with different educational background are represented in the study. The other part of the demographics section asked about their overall experience in any company. It indicate to understand the level of respondent experience. The result listed on the below table (4.3). It showed that 5 year over all work experience found 8(17.8%) respondents', 8(17.8%) respondents have 6 to 10 years over all work experience. The other one is Between 11 to 15 years there is 13 (28.8%) respondents found. Also 11 (24.4%) respondents have 16 years- 20 years over all work experience. The rest classification above 20 year experience show that 5 (11.24%) respondents have

experience for long period. The results show that most of the respondent have more than ten year overall working experience. It shows that the participants well experienced. In terms of stake holder, 36 of them were contractor side (80%), while consultants were 9 (20%) of the sample. This results showed that most respondents are working at FE Construction Company.

In terms of job position, 8 (17.8%) of the respondents are Projects managers while project Coordinators were 7 (15.6%) of the sample. 11 (24.4%) respondents were office engineer. 10(22.2%) are site engineer and 9(20%) respondents were supervisor.

**Table 4.1 Respondents' characteristics**

Category		Frequency	Percentage
Education Level	Bachelor's degree	32	71%
	Master's degree	13	29%
Education Level Over all experience	Diploma	-	-
	PhD	-	-
	Less than 5 years	8	17.78%
	6 years-10 years	8	17.78%
Over all experience Stakeholder	11 years-15 years	13	28.8%
	16 years-20 years	11	24.4%
	Above 20 years	5	11.24%
	Contractor	36	80%
	Consultant	9	20%
Stakeholder Positions	Client	-	-
	Project managers	8	17.8%
	Project coordinators	7	15.6%
Positions	Office engineer	11	24.4%
	Site engineer	10	22.2%
	Supervisor	9	20%
	Managing director	-	-

Source: Own Survey, 2021

## 4.2. Existing status of project time schedule

This questionnaire of the research was filled out by 45 respondents in total; 13 of them were delayed less than 1 year (28.9%), while 17 (37.8%) were delayed between 1-2 year of the sample. And 15 (33.3%) were delayed between 2- 4 year.

**Table 4.2 magnitude of delay**

<b>Year of delay</b>	<b>Frequency</b>	<b>Percentage</b>
Less than 1 year	13	28.9%
1year-2 year	17	37.8%
2year-4 year	15	33.3%
Greater than 4 year	0	0
<b>Total</b>	<b>45</b>	<b>100</b>

*Source: Own Survey, 2021*

## 4.3. Relative importance of the delay factors

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, and consultant related factors, material related factor, labor and equipment related factor, contract related factors, contractual relationships related factors and external related factors. The objective of conducting the analysis for this section is to establish the groups of causes identified from the literature review and the ranking according to their significant influence towards construction project delays. A ranking method was used to achieve this objective and the significant of using these methods is it can reveal the most influential causes within each category of delays.

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.

### 4.3.1 Client related delay factors

From Table 4.3 the results show that the respondent ranked the most important client related delay causes factor in the building construction projects were owner interference (RII=0.83), slow decision making (RII=0.66), finance and payment of completed (RII=0.65)and unrealistic contract duration (RII=0.62).

Change orders by owner during construction was the most influencing factor for the client related delays by contractors. This is because, change orders in frequent might extend the site activity and affect the whole project scheduling which comes unable to complete the project on time. Delay in progress payments are the third most contributing factor for building construction delay in FE Construction Company.

**Table 4.3 Client related delay factors**

<b>Importance and ranking of client related delay causes by RII value</b>			
<b>Delay causes</b>	<b>Mean</b>	<b>RII</b>	<b>Rank</b>
Finance and payment of completed work	3.27	0.65	3
Slow decision making	3.32	0.66	2
Owner interference	4.16	0.83	1
Unrealistic contract duration imposed by owners	3.09	0.62	4

*Source: Own Survey, 2021*

### 4.3.2 Contractor related delay factors

As shown on the table 4.4 below, the most important and highly ranked contractor related delay causes factor in the construction of FE projects, are delay caused by sub-contractors (RII=0.75), poor site management (RII=0.60), improper planning (RII=0.51), Inadequate contractor experience (RII=0.47), mistake during construction (RII=0.44) and improper method (RII=0.39).

**Table 4.4: Contractor related delay factors**

<b>Importance and ranking of contractor related delay causes by RII value</b>			
<b>Delay causes</b>	<b>Mean</b>	<b>RII</b>	<b>Rank</b>
Poor site management	3.01	0.60	2
Improper planning	2.56	0.51	3
Inadequate contractor experience	2.36	0.47	4
Mistake during construction	2.22	0.44	5
Improper method	2.13	0.39	6
Delay caused by subcontractor	3.76	0.75	1

*Source: Own Survey, 2021*

#### **4.3.3 Consultant related delay factors**

In Table 4.5 shows the results of questionnaires analysis of causes related to consultant with regard to building construction delay in FE construction. This table shows the manipulation of factors rank using relative importance index. Thus, if these documents not produced and provided timely for the consultant it highly cause construction delay. This group of respondents, ranked mistakes and discrepancies in design documents and unclear and poor contractor management as the second and the third factor respectively. The last causes of delay in contractor related is inadequate experience of consultant.

the most important and highly ranked Consultant related delay causes in the construction of building projects in FE company, are Long waiting time for approval of tests and inspection(RII=0.77), Mistakes and discrepancies in design documents (RII=0.70), Poor contract management (RII=0.64) and inadequate experience of consultant (RII=0.46).



**Table 4.5: Consultant related delay factors**

<b>Importance and ranking of contractor related delay causes by RII value</b>			
<b>Delay causes</b>	<b>Mean</b>	<b>RII</b>	<b>Rank</b>
Poor contract management	3.25	0.64	3
Inadequate experience of consultant	2.29	0.46	4
Mistakes and discrepancies in design documents	3.51	0.70	2
Long waiting time for approval of tests and inspections	3.84	0.77	1

*Source: Own Survey, 2021*

#### **4.3.4 Materials related delay factors**

According to table 4.6 the most important and highly ranked material related delay causes factor in the construction of building projects, Shortage of construction material (RII=0.71) and Poor-quality material supply (RII=0.59).

**Table 4.6: Materials related delay factors**

<b>Importance and ranking of material related delay causes by RII value</b>			
<b>Delay causes</b>	<b>Mean</b>	<b>RII</b>	<b>Rank</b>
Poor quality material supply	2.98	0.59	2
Shortage of construction material	3.53	0.71	1

*Source: Own Survey, 2021*

#### 4.3.5 Labour and equipment related delay factors

As the table 4.7 describe below the ranking of labour and equipment related factor. Labour supply labour productivity would be the most influential among the two causes that able to affect the construction delays.

Equipment availability and failure is the second causes from the listed below. According to table 4.7, the most important and highly ranked labour and equipment related delay causes in the construction of building projects, are labour supply and labour productivity (RII=0.68) and equipment availability and failure. (RII=0.63).

**Table 4.7: Labour and Equipment related delay factors**

<b>Importance and ranking of Labour and equipment related delay causes by RII value</b>			
<b>Delay causes</b>	<b>Mean</b>	<b>RII</b>	<b>Rank</b>
Labour supply labour productivity	3.38	0.68	1
Equipment availability and failure	3.16	0.63	2

*Source: Own Survey, 2021*

#### 4.3.6 Contract related delay factors

According to table 4.8, the most important and highly ranked contract related delay causes factor in the construction of building projects, are frequent change order (RII=0.82), mistakes in design documents (RII=0.79), and discrepancy in contract documents (RII=0.73).

**Table 4.8: Contract related delay factors**

<b>Importance and ranking of contract related delay causes by RII value</b>			
<b>Delay causes</b>	<b>Mean</b>	<b>RII</b>	<b>Rank</b>
Frequent change orders	4.15	0.82	1

Mistakes in design documents	3.93	0.79	2
Discrepancies in contract document	3.67	0.73	3

Source: Own Survey, 2021

#### 4.3.7 Contractual relationship related delay factors

According to table 4.9, the most important and highly ranked contract related delay causes in the construction of building projects, are Inappropriate organizational structure linking all parties involved in the project (RII=0.72), Lack of communication between these parties(RII=0.67), Major disputes(RII=0.57), and Negotiations during construction (RII=0.48).

**Table 4.9: Contractual related delay factors**

<b>Importance and ranking of contractual related delay causes by RII value</b>			
<b>Delay causes</b>	<b>Mean</b>	<b>RII</b>	<b>Rank</b>
Major disputes	2.87	0.57	3
Negotiations during construction	2.53	0.48	4
Inappropriate organizational structure linking all parties involved in the project	3.55	0.72	1
Lack of communication between these parties	3.33	0.67	2

Source: Own Survey, 2021

#### 4.3.8 External factors related delay factors

There are four external related causes that contributed to the delay of building construction projects. They ranked based on relative important index the most influential Problem with neighbors, Unfavorable site condition and poor weather condition would be the second and third answered by the respondents, from the listed external related causes the list causes is Changes in regulation. According to table 4.10, the most important and highly ranked external related delay

causes factor in the construction of building projects, are problems with neighbors (RII=0.50), unfavorable site conditions. (RII=0.46), poor weather conditions, (RII=0.43), and changes in regulations, (RII=0.41).

**Table 4.10: External factors related delay factors**

<b>Importance and ranking of external related delay causes by RII value</b>			
<b>Delay causes</b>	<b>Mean</b>	<b>RII</b>	<b>Rank</b>
Poor weather condition	2.16	0.43	3
Changes in regulation	2.10	0.41	4
Problem with neighbors	2.55	0.50	1
Unfavorable site condition	2.31	0.46	2

*Source: Own Survey, 2021*

#### **4.4 Summary of delay factors by RII rank**

In Table 4.11 below, as ranked by the respondent, 10 most important factors causing delay in construction project are summarized and presented. Owner interference with (RII=0.83) is suggested as the most important factor causing delay on building construction projects. This is closely followed by Frequent change orders (RII=0.82). Mistakes in design documents (RII=0.79) comes third followed by Long waiting time for approval of tests and inspections (RII=0.77). Delays caused by subcontractors (RII=0.75) and Discrepancies in contract document (RII=0.73) ranks as fifty and six. Inappropriate organizational structure linking all parties involved in the project (RII=0.72) and Shortage of construction material (RII=0.71) comes seven and eight. Mistakes and discrepancies in design documents (RII=0.70) followed by Labour supply labour productivity (RII=0.68)

**Table 4.11: Summary of delay factors by RII rank**

<b>Top 10 importance and ranking delay causes factors by RII value</b>				
<b>Delay causes</b>	<b>causes</b>	<b>Mean</b>	<b>RII</b>	<b>Rank</b>
Owner interference	Client related	4.16	0.83	1
Frequent change orders	Contract related	4.15	0.82	2
Mistakes in design documents	Contract related	3.93	0.79	3
Long waiting time for approval of tests and inspections	Consultant related	3.84	0.77	4
Delays caused by subcontractors	Contractor related	3.76	0.75	5
Discrepancies in contract document	Contract related	3.67	0.73	6
Inappropriate organizational structure linking all parties involved in the project	Contractual related	3.55	0.72	7
Shortage of construction material	Material related	3.53	0.71	8
Mistakes and discrepancies in design documents	Consultant related	3.51	0.70	9
Labour supply labour productivity	Labour and Equipment related	3.38	0.68	10

*Source: Own Survey, 2021*

#### **4.5 Respondents perception on delay mitigation**

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.

As shown in Table 4.12, a total of fourteen methods of minimizing construction delays were identified based on the literature review. The questionnaire was developed and distributed to the targeted groups of respondents. Data from a questionnaire was analyzed and ranked based on

relative importance index. Depending on the rank listed out using relative importance index, respondents prioritized different methods for minimizing construction delays.

Respondents given use appropriate construction methods as the leading (RII=0.95), complete and proper design at the right time (RII=0.94) as the second and proper material procurement (RII=0.92) as the third method. Effective strategic planning (RII=0.89), Proper project planning and scheduling (RII=0.86), Clear information and communication channels (RII=0.85), Collaborative working in construction (RII=0.83), Site management and supervision Long (RII=0.82), Frequent coordination between the parties involved (RII=0.79), Use proper and modern construction equipment (RII=0.72), Compressing construction durations (RII=0.71), Proper emphasis on past experience (RII=0.69), Frequent progress meeting (RII=0.68) and Use up-to-date technology utilization (RII=0.66) those follow step by step can minimizing construction delays based on respondent answer.

**Table 4.12: Methods of minimizing construction delays**

<b>Methods of minimizing construction delays</b>			
<b>Proposed methods</b>	<b>Mean</b>	<b>RII</b>	<b>Rank</b>
Frequent progress meeting	3.38	0.68	13
Use up-to-date technology utilization	3.31	0.66	14
Use proper and modern construction equipment	3.62	0.72	10
Use appropriate construction methods	4.73	0.95	1
Effective strategic planning	4.47	0.89	4
Proper material procurement	4.62	0.92	3
Clear information and communication channels	4.27	0.85	6
Frequent coordination between the parties involved	3.93	0.79	9
Proper emphasis on past experience	3.44	0.69	12
Proper project planning and scheduling	4.29	0.86	5
Complete and proper design at the right time	4.71	0.94	2
Site management and supervision Long	4.09	0.82	8

Collaborative working in construction	4.16	0.83	7
Compressing construction durations	3.56	0.71	11

*Source: Own Survey, 2021*

In this study the result show that the top three construction delay minimizing building construction delay are use appropriate construction methods, complete and proper design at the right time and proper material procurement from the first top three methods minimizing construction delay in FE Construction Company.

## **CHAPTER FIVE: SUMMARY, CONCLUSION & RECOMMENDATION**

In previous chapter, data analysis and interpretation has been presented. In this chapter, major findings are going to be summarized and the subsequent conclusions will be made. Based on the conclusion, recommendations are forwarded in relation to literatures reviewed to better enhance the organizations project success. Therefore this chapter includes summary of the finding, conclusions and recommendations that would help in solving the occurrence of delay and its effects in the building construction of projects in FE construction plc.

### **5.1 Summary**

The study set out to assess correlates of delay causing factor in building construction projects at FE Construction Company in the selected projects. Data was collected through a structured questionnaire. Almost 90% response rate was achieved from all the questionnaires issued to respondents. From the analysis, the following findings were arrived at.

There were no mean scores with no influence at all, meaning all the delay cause factors mentioned in the study influenced project completion time. This leads up to the understanding that most of the factors are applied within the companies under study. All the factors score a cumulative mean greater than 2.10 but less than 4.16.

The results further indicated that, from all the identified 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 neighbors were the top most rated factors influencing project success. However, there was no factor with a cumulative mean greater than 4.16 which implies that none of the factors listed above were practiced or managed to a higher limit and therefore perceived to be extremely influencing project success. And among the top practice delay causing factors the involvement of the client is highly pronounced to extent that it is ranked 1st in being a delay causing factor. Relative importance index was also used to analyse the responses.



The result also shows that all the projects delayed between 1-2 years and it also shows that among different minimization method listed, the top five construction delay minimizing building construction delay are use appropriate construction methods, complete and proper design at the right time, proper material procurement, effective strategic planning and proper project planning and schedule.

Generally, the entire assessment of the practice level of the delay causing factors within FE Construction Company resulted in a high level of mean value score.

## **5.2 Conclusion**

This study is undertaken to identify the correlates delaying factors for FE building construction projects and to explore respondent's perception on delay mitigation as part of the objectives.

From the above findings, it was identified that all the factors fairly influence the successful completion of projects. And of these 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 neighbors were identified to be the top ones. This implies that all the factors were considered and that the selected building construction projects practice the items under those factors though at different levels.

Even though all factors were rated highly by the study participants, some items under the factors show average to low importance to project success. 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 a moderate causes of delay in the construction projects. It can be concluded that this factors contribute to change the company scope of work

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 at to be low importance of delay causing factors.

The study meets its objective by indicating methods of minimizing construction delay. Fourteen major methods for reducing construction delay forwarded for respondent to rank the best from the total methods. Based on the respondent, top best ways of reducing construction delay are use appropriate construction methods, complete and proper design at the right time and proper material procurement were rated higher as to contribute to complete the project on time.

### **5.3 Recommendations**

Building construction project is successful when the construction project activities are done by proper planning and scheduling, within the allocated budget and specified quality, under specified timeframe and by the satisfaction of the stakeholders. Delays are a part of the construction projects, however, they can be avoided or minimized when their causes are effectively identified and analyzed. Based on the above mentioned results and findings of this study, the following points can be recommended as ways to minimized and control delay in building construction projects at FE construction plc.

#### **For owners:**

- Owners should possess a comprehensive financial plan and cash flow enough to finance the construction projects on hand to avoid the project financing problems.
- Owners should effect immediately payment of the dues to the contractor for the work being carried as well as the payments of finished items according to the terms of the contract.
- Need to make sufficient time available for consultants to do a proper design
- Owners should make sure tender documents are complete, clear and free of errors and/or contradictions
- Owners should hire competitive and experienced contractors and consultants in the field of works.

#### **For consultants:**

- Consultants should avoid delaying the response to contractors' queries as well as the approval of submitted materials and shop drawings.

- Consultants should prepare a comprehensive and final designs and working drawings ahead to the commencement of works by the contractor and hold a sufficient number of design review sessions with the client before finalizing the design.
- Should avoid design errors and complexity of designs
- Should establish strong contract administration services to control and evaluate variation orders initiated by owners.
- Should have a thorough knowledge on the site conditions where the construction project is to be erected.

**For contractors:**

- Should develop a comprehensive financial plans and cash flows, to avoid the poor financing system of the project on hand.
- Should establish strong project management system led by professionals who mobilize and who understand the critical activities to handle and mitigate any delay that may rise during construction activities.
- Should mobilize resources and should start commencement of works immediately after possession of site.
- Should prepare materials procurement plan and state the lead time ahead for imported construction materials to minimize the delay caused from shortage of the imported resources.
- Every attempt must be made to retain the same labor gang throughout project duration.

Finally, Commitment to project can be evident from all stakeholders; similar studies can also be conducted in this area and stakeholders in construction also take in to account such issues and utilize the findings of such studies. I also suggest that future studies can focus on the magnitude of effects of causes on projects (the extent of delay and the contribution of each cause to delay).

## Reference

- A. Dinakar .,(2014), Delay analysis in construction project, International journal of emerging technology and advanced engineering.4,(5), 2250-2459
- Aibinu, A.A. and Jagboro, G.O. (2002), the effects of construction delays on project delivery in Nigerian construction industry: International Journal of Project Management. (20): 593-599
- Assaf, S.A. and Al-Hejji, S (2006) Causes of Delay in Large Construction Projects. International Journal of Project Management, 24, 349-357.
- Battaineh, *et.al.*, (2002) Causes of construction delay: Traditional contracts, January 2002, International Journal of Project Management 20(1):67-73
- Boston, US (1976) J.J. O'Brien Construction delay: responsibilities, risk and litigation, Cahners Books International, Inc.,
- C. kaliba et al, (2009) Cost escalation and schedule delays in road construction projects in Zambia, International Journal of Project Management 27(5):522-531,  
DOI:10.1016/j.ijproman.2008.07.003
- Creswell, J.W. (2003). Research Design, Quantitative and Mixed Approaches. (2nd Ed.).
- Chappell, D., Marshall, D, Powell-smith, V.& Cavender, S., 2005, Building Contract Dictionary, Blackwell Science, London.
- Dinakar, A.,2014, Delay analysis in construction project, International journal of emerging technology and advanced engineering.4,(5), 2250-2459
- Divya R. & Ramya S., (2015), Causes, Effects and Minimization of Delays in Construction Projects, National Conference on Research Advances in Communication, Computation, Electrical Science and Structures335-340
- Enshassi et al, (2009) Delays and cost overruns in the construction projects in the Gaza Strip
- Faradi, A.S., El-Sayegh, S.M. (2006). „Significant factors causing delay in the UAE construction industry“, Construction Management and Economics, 24 (11), 1167-1176
- Fugar and Agyakwah-Baah, (2010) Delays in Building Construction Projects in Ghana Australasian Journal of Construction Economics and Building 10(1/2),  
DOI:10.5130/ajceb.v10i1/2.1592

- Kang sik wei (2010). Causes, effects and methods of minimizing Delays in construction projects. *Journal of Management in Engineering*, 312-332.
- Kikwasi, G. J. (2012). „Causes and Effects of Delays and Disruptions in Construction Projects in Tanzania“, *Australasian Journal of Construction Economics and Building Conference Series 1 (2)* 52-59
- Kothari, C. (2004) *Research Methodology: Methods & Techniques*, 2nd revised ed., New Age publication, New Delhi, India
- Levy S. M. (2006). *Project Management in Construction*, McGraw Hill, USA.
- Mahamid ,(2013) Common risks affecting time overrun in road construction projects in Palestine: Contractors’ perspective
- Majid, Ibnu Abbas (2006), Causes and Effect of Delays in Acheh Construction Industry. Faculty of Civil Engineering, Universiti Teknologi Malaysia: Master Thesis.
- Mohd Razaki Abdullah (2010), Causes of Delay in MARA Management Procurement Construction Projects
- MoWUD, M. o. (2006). Plan for Accelerated and Sustained Development to end Poverty (PASDEP). Addis Ababa.
- Muhammad A. A., Ali R. K., Uroosa M., Shabeer H. K. (2017). „Time Overrun in Public Sector Construction Projects of Developing Countries: Case Study of Pakistan“. *Imperial Journal of Interdisciplinary Research (IJIR) Vol-3, Issue-5, 2017 ISSN: 2454-1362*, <http://www.onlinejournal.in>
- Murali and yau, (2006) Causes and effects of delays in Malaysian construction industry
- Murali Sambasivan (2007) Causes and effects of delays in Malaysian construction industry, *International Journal of Project Management*, 2007
- Nesru Serani and Tadele Wodaje , (2020) The Causes and Effects of Delay of Building Construction in Ethiopia, Southern Nation Nationalities of People Region in Gurage Zone (Case of Wolkite Town)
- Neuman, W.L. (2000) *Social research methods qualitative and quantitative approaches*. 4th Edition

N. Hamzaha\*, M.A. Khoiry, I. Arshad, N. M. Tawil, A. I. Che Ani (2011). Cause of Construction Delay - Theoretical Framework; The 2nd International Building Control Conference 2011, The National University of Malaysia, Bangi, 43600 Malaysia

Robert K. Wysocki (2014). Effective Project Management; Traditional, Agile, Extreme -(7th Edition), John Wiley & Sons, Inc., Indianapolis, Indiana. pp 69-98

Sadi assaf,(2006) Causes of delay in large construction projects

Sambasivan, M., Soon, Y.W. (2007). „Causes and effects of delays in Malaysian construction industry“, International Journal of Project Management, 25 (5), 517-526

Saunders, M. L. (2009). Research method for business students. Person education ltd.

Sekaran, U. (2003) Research Methods for Business: A Skill-Building Approach. 4th Edition, John Wiley & Sons, New York.

S. Kartam (1999). „Generic Methodology for Analyzing Delay Claims“, Journal of Construction Engineering and Management, Vol. 125, No. 6, pp 409-419.

Sweis, *et al* ., (2008) Delays in construction projects: The case of Jordan

Syed M. Ahmed, (2003) Delays in Construction: A Brief Study of the Florida Construction Industry

T. J. Trauner, W. A. Manginelli, J. S. Lowe, M. F. Nagata & B. J. Furniss (2009). Construction Delays: Understanding Them Clearly, Analyzing Them Correctly, Elsevier Inc., USA.

The Causes and Effects of Delay of Building Construction in Ethiopia, Southern Nation Nationalities of People Region in Gurage Zone (Case of Wolkite Town) Nesru Serani Dusso, Tadele Wodaje Bayeh 2\* 1. Civil and Environmental Research [www.iiste.org](http://www.iiste.org) ISSN 2224-5790 (Paper) ISSN 2225-0514 (Online) Vol.12, No.1, 2020

Wael *et al*, (2007) Comparative study of delay factors in Libyan and the UK construction industry

Werku Koshe, K. N. Jha. (2016) Investigating Causes of Construction Delay in Ethiopian Construction Industries. Journal of civil, Construction and Environmental Engineering. Vol. 1, No. 1, 2016, pp. 18-29. doi: 10.11648/j.jccee.20160101.13

Yogeswaran et al 1997 zack ( 2003 )an investigation into the use of construction delay and disruption analysis methodologies

Zack, J.G. (2003). Schedule delay analysis; is there agreement? Proceeding PMI-CPM College of Performance Spring Conference. May 7-9. Project Management Institute, College of Performance Management, New Orleans.

Zikmund, W.G. (2003) Business Research Methods. 7th Edition, Thomson/ South-Western.

**APPENDIX I**  
**ST. MARY'S UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**DEPARTMENT OF PROJECT MANAGEMENT**

**QUESTIONNAIRE**

**Dear respondent,**

You are kindly requested to participate on a research study for partial fulfillment of master's degree in Project Management. The study aims to assess the causes of delay in building construction projects; the case of FE construction plc. 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

Please don't write your name or any personal identifier on the questionnaire.

For any clarification needed please contact me on:

Mahlet Tadesse

+251-912-75-68-55

[mahitade94@gmail.com](mailto:mahitade94@gmail.com)

Thank you in advance, for your time.



## Part I: Respondent's characteristics

**Instruction:** Please put a tick mark (✓) in the check box corresponding to the choice that most represents you.

### 1. The highest level of education you have completed

Diploma  BSC/BA  MSC/MA

PhD  Other: Please specify \_\_\_\_\_

### 2. Over all Working experience

≤ 5  6-10  11-15  16-20  >20

### 3. Which of the stakeholder are you? (Please choose one).

Contractor  Consultant  Client

### 4. Respondent Designation in the Company

Managing director  Coordinator

Supervisor  project manager

Office engineer  Site engineer

If other please specify.....

## Part II: magnitude of delay

Please fill out how long was the projects delayed behind the project schedule

Less than 1 year  1 -2 years

2-4 years  Greater than 4 years

## Part III: Delay cause factors

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 factors		1	2	3	4	5
<b>Client related factors</b>	Finance and payment of completed work					
	Slow decision making					
	Owner interference					
	Unrealistic contract duration imposed by owners					
<b>Contractor related factors</b>	Poor site management					
	Improper planning					
	Inadequate contractor experience					
	Mistake during construction					
	Improper method					
	Delay caused by subcontractor					

<b>Consultant related factors</b>	Poor contract management					
	Inadequate experience of consultant					
	Mistakes and discrepancies in design documents					
	Long waiting time for approval of tests and inspections					
<b>Material related factors</b>	Poor quality material supply					
	Shortage of construction material					
<b>Labour and equipment related factors</b>	Labour supply labour productivity					
	Equipment availability and failure					
<b>Contract related factors</b>	Frequent change orders					
	Mistakes in design documents					
	Discrepancies in contract document					
<b>Contractual relationship related factors</b>	Major disputes					
	Negotiations during construction					
	Inappropriate organizational structure linking all parties involved in the project					
	Lack of communication between these parties					
<b>External related factors</b>	Poor weather condition					
	Changes in regulation					
	Problem with neighbors					
	Unfavorable site condition					

**Part IV: Methods to Minimizing Construction Delays (please put a tick mark in the box)**

Each scale represents the following rating:

- (5) Very high effective                      (4) High effective                      (3) Medium effective  
 (2) Low effective                      (1) Very low effective

**Question:**

Which of the following methods will minimize the construction delays?

no	Proposed method	1	2	3	4	5
1	Frequent progress meeting					
2	Use up-to-date technology utilization					
3	Use proper and modern construction equipment					
4	Use appropriate construction methods					
5	Effective strategic planning					
6	Proper material procurement					
7	Clear information and communication channels					
8	Frequent coordination between the parties involved					
9	Proper emphasis on past experience					
10	Proper project planning and scheduling					
11	Complete and proper design at the right time					
12	Site management and supervision Long					
13	Collaborative working in construction					
14	Compressing construction durations					

If there are any additional factors that have an impact on construction project delay, you can list on the space provided below. -----

-----  
 -----  
 -----  
 -----  
 -----

*Thank you for taking the time to complete this questionnaire.*

## APPENDIX II

<b>ranking delay causes factors by RII value</b>			
<b>Delay causes</b>	<b>Mean</b>	<b>RII</b>	<b>Rank</b>
Owner interference	4.16	0.83	1
Frequent change orders	4.15	0.82	2
Mistakes in design documents	3.93	0.79	3
Long waiting time for approval of tests and inspections	3.84	0.77	4
Delays caused by subcontractors	3.76	0.75	5
Discrepancies in contract document	3.67	0.73	6
Inappropriate organizational structure linking all parties involved in the project	3.55	0.72	7
Shortage of construction material	3.53	0.71	8
Mistakes and discrepancies in design documents	3.51	0.70	9
Labour supply labour productivity	3.38	0.68	10
Lack of communication between these parties	3.33	0.67	11
Slow decision making	3.32	0.66	12
Finance and payment of completed work	3.27	0.65	13
Poor contract management	3.25	0.64	14
Equipment availability and failure	3.16	0.63	15
Unrealistic contract duration imposed by owners	3.09	0.62	16
Poor site management	3.01	0.60	17
Poor quality material supply	2.98	0.59	18
Major disputes	2.87	0.57	19
Improper planning	2.56	0.51	20
Problem with neighbors	2.55	0.50	21
Negotiations during construction	2.53	0.48	22
Inadequate contractor experience	2.36	0.47	23
Unfavorable site condition	2.31	0.46	24
Inadequate experience of consultant	2.29	0.46	25
Mistakes during construction	2.22	0.44	26
poor weather condition	2.16	0.43	27
Changes in regulation	2.04	0.41	28
Improper method	1.93	0.39	29