



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

**ASSESSMENT ON THE CAUSES AND EFFECTS OF ROAD  
CONSTRUCTION PROJECT DELAY: CASE OF ADDIS ABABA CITY  
ROAD AUTHORITY**

**BY**

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**ID:SGS/0270/2013A**

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SCHOOL OF POST GRADUATE STUDIES

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DELAY: CASE OF ADDIS ABABA CITY ROAD AUTHORITY


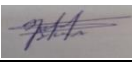
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## DECLARATION

I, Ellene Dejene, the undersigned person declare that the thesis entitled “*Assessment of Cause and Effects of Delay on Road Construction Projects, the Case Of Addis Ababa City Road Authority*” is my original work and submitted for the award of Master of Art Degree in Project Management from St. Mary University at Addis Ababa and it hasn’t been presented for the award of any other degree. Under this study, fellowship of other similar titles of any other university or institution of all sources of material used for the study has been appropriately acknowledged and notice.

Ellene Dejene

\_\_\_\_\_

\_\_\_\_\_

Name

Signature

Date

## **CERTIFICATION**

This is to certify that Ms. Ellene Dejene has properly completed her research work entitled “*Assessment of Cause and Effects of Delay on Road Construction Projects, the Case Of Addis Ababa City Road Authority*” with my guidance through the time. In my recommendation, her task is appropriate to be submitted as a partial fulfillment requirement for the Master of art Degree in Project Management.

**Dr. Temesgen Belayneh**

\_\_\_\_\_

**Name**

**Date & Signature**

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## **ABBREVIATIONS/ACRONYM**

AACRA	AACRA: Addis Abeba City Road Authority
ERA	Ethiopian Road Administration
GDP	Gross Domestic Product
USD	United States Dollar
GNP	Gross National Product
MoWUD	Ministry of Works and Urban Development
RSDP	Road Sector Development Program
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
ISO	International Organization for Standardization

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## **ABSTRACT**

*Delays of a construction project can be defined as the late completion of works as compared to the planned schedule or contract schedule.. Delay in completion of road construction projects are the most common and frequent problem in Addis Ababa city as well as in Ethiopia in general. The objective of this study is to identify the causes and effects of delay causing factors in Addis Ababa City Road Authority road construction projects. The study adopted a descriptive research design. A purposive sampling method was used in this study. The study was carried out based on literature reviews, questionnaire survey and document review of projects. 37 potential delay causes and 13 effects were selected from the reviewed literature and the causes were divided in to 5 as client related factors, consultant related factors, contractor related factors, material and equipment related factors and external related factors. These factors were ranked using the Likert scale by a total of 56 professionals and analyzed using Relative Importance Index (RII). The study indicates that the top major causes of delay in road construction are Cost of materials, Shortage of foreign currency, Delay in approving documents by consultant, Delay due to Sub-contractors, Delay of payment by the client, Shortage of construction material, Improper planning and scheduling, Reworks, Lack of modern technology equipment and Low bid by contractor. The study further determines that the major effects of delay are Time Overrun, Cost Overrun, Poor quality, Compromised Quality, Low Profit, Disputes, Negotiations, Court Cases, Litigations, Abandonment, Revocation, Arbitration and Bad reputation. In order to avoid/minimize the road construction project delay in the city, the study recommends the payments to be made on time by the client, the design documents should be reviewed and approved by the consultant on time and the contractor should select an experienced sub-contractors and work hand in hand to complete the project with the allocated budget and time.*

**Key Wors:** *Delay, Road Contruction, Cuases of Delay, Effects of Delay, Addis Ababa City Road Authority*

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

The construction industry plays an important role in establishing the infrastructure required for socio-economic and political development. It has prime importance that signifies the prosperity, health, and quality of life for the country's citizens.

The construction industry is multipart in nature because it involves different technology, equitable size of the projects; a high level of organizational complexity and different parties; client, contractor, consultant, Supplier, Bank, Insurance, permitting agency and public (Venkataramanan & Pinto, 2008). Since it opens an opportunity for the large employments; create a market for construction inputs providers and its services and the services delivered are an input for other sectors. Construction industry, being the largest employer in the country, it is also an engine for technology, innovation and overall development (Tekle 2012).

In the economy, the gross domestic product (GDP) plays a vital role in balancing various sectors. Overall, the construction sector accounts for USD 1.7 trillion worldwide, and in most countries, it impacts 5–7% of the total GDP (Kenny, C, 2007). Construction is not only the major sector of the economy but also, it is the one that accounts from 12% to 25% of the GNP of both developed and developing countries (Wubishet, 2004).

The National Construction Industry Policy takes into account of the fact that the realization of the objectives and goals of the identified priority sectors such as education, health, water, agriculture, manufacturing, tourism, mining, energy, construction, land and good governance operates on the availability of reliable, strong and competitive local construction industry which is capable of delivering quality services to its stakeholders. New investments in the construction and rehabilitation of infrastructure have given priority parallel with the maintenance of the existing constructed facilities so as to enable speedy development of the other sectors which depend upon the performance of the local construction industry. The interim policy is anticipated to provide guidance towards the increased involvement of the local construction industry in construction

activities. The Construction Industry Policy emphasizes the development of an efficient and self-sustaining roads network that is capable of meeting the diverse needs for construction, rehabilitation and maintenance of civil works for trunk, regional, districts and feeder roads network through the involvement of private sector. Public sector involvement in the enhancement of housing, infrastructure and other constructed facilities to assist in the mobilization of financial resources as well as capital investment have been emphasized. The pursuance of all the above general goals has carried out in tandem with all the other key national sectoral policies, e.g., agricultural policy, land policy, investment policy, industry and trade policy, energy policy, housing policy, health, education and all other sectoral policies which have direct or indirect impact on the construction sector.

Public construction projects in Ethiopia are parts of the country's development initiative. It shares considerable amount of the country's scarce financial resources. In Ethiopia, the construction industry is the highest recipient of government budget in terms of government development program. Consequently, public construction projects consume an average annual rate of nearly 60% of the government's capital budget (MoWUD, 2006). A construction project is commonly acknowledged as successful, when it is completed on schedule and within the agreed budget, with the highest quality and in the safest manner, in accordance with the specifications and to stakeholders' satisfaction. Functionality, profitability to contractors, absence of claims and court proceeding and "fitness for purpose" for occupiers have also been used as measures of project success (Takim & Akintoye. 2002).

Completion of construction projects by means of overall effective usage of cost and time will result in cost savings for the country and therefore contribute to economic development (Aibinu & Jagboro, 2002). Time delays and cost overruns usually lead to adverse effects on the growth of national economies, contribute to major financial losses, and hold back the development of the construction industry (Ahmed , 2016).

Delay defined as an event or act that increases time needed to execute or complete contract work demonstrates itself as further delays of work (Eastman (2018) and Doloi (2012). Construction delays are a common phenomenon in most countries, particularly in the developing ones. Many studies have shown that construction delays have negative effects on clients, contractors, and consultants (Ghaffari, 2013; Marzouk and El-Rasas, 2014). The causes and effects of these delay

factors in the road construction industry vary from country to country, due to different environments and the techniques applied in the construction processes.

Every project has a predetermined duration with a defined beginning and completion time (date). A project, which is not completed within the contract time (the specified time between the commencement date and the completion date that specified in the contract) is called a delayed project. A road construction project delays are challenging the developments of social and economy of a countries.

According to a study conducted on Ethiopian construction industry shows that in Ethiopia only 8.25% projects have been finished to the original targeted completion date. According to this study, the remaining 91.75% delayed off its contractual time. In regard to Addis Ababa road construction, delay is becoming the major challenges that the authority is facing and challenging the life of the residents. And also Most of the road construction projects in Ethiopia and Addis Ababa city are exposed to time and cost overrun due to this delays (Werku 2016).

Previous researches in this subject tried to show that the main causes of delay are finance and payments, improper project management, escalation of the materials price and claims. The effects were mentioned to be time overrun, cost overrun, abandonment and disputes which impacts all the parties involved in the project. However, the causes and effects of these delay factors in the road construction industry vary from country to country, due to various environmental situations, financial capacity and the technological advancements used in the construction processes. These are a result of different factors which are considered as the main causes for delay of road project construction in Ethiopia in general and in Addis Ababa in particular which comes from different sources such as government side, contractors side (weak financial capabilities, lack of experience, skill and knowledge in relation with project management, poor forecasting, poor estimation/analysis of the required inputs like financial resource, time resource, be over optimist, external factors like weather conditions, topography of the country, market-related factor (availability of key inputs domestically, market price fluctuation of input etc.) as reported on Road Sector Development Program RSDP 13 years“ performance and future plan report, (2011). Therefore, identifying the actual causes and effects of delay in order to minimize and avoid the delays and their corresponding expenses is crucial since delay in government road construction projects has a significant impact on economic and social activities of the country. As reported on Road Sector

Development Program 23 years there was a gap observed in some regions to properly handover and accept completed projects timely. This will have its own implication in terms of opening the roads to the society and contractual complications which were resulting to disagreement between contracting parties.

This thesis will assess the cause and effect of road construction delay focusing on Addis Ababa city road authority. The perceived causes and effects of delay regarding road construction projects of Addis Ababa City Road Authority will be assessed and identified. Recommendations based on the findings will be given to support successful completion of the projects.

## **1.2 Statement of the Problem**

The performance of the road sector plays a vital role in growing the economy of every country irrespective of the level of development. In today's highly competitive economic environment, the need for completing road construction projects within the allocated budget, resource, time frame and expected performance is highly important. So carefully managing these resources to the successful completion of the project is a crucial one. Many projects are not completed within the specified time on the contract, even if the completion date is stated on the contract agreement and signed by all the involved parties involved in the project (client, contractor, consultant etc...).

However, the problem of project delays in the construction sector in general and road construction in particular is becoming a common phenomenon that the construction industry is facing. Due to different factors which originate from different sources, it is common in developing countries like Ethiopia to experience project delay in road construction. Construction delay is one of the basic constraints to achieve the project objectives in developing countries (Islam and Trigunarsyah, 2017). This project time delays usually lead to adverse effects on the growth of national economies, contribute to major financial losses, and hold back the development of the economy and construction industry (Ahmed .2016).

Most of the road construction projects in Ethiopia and Addis Ababa city are exposed to time and cost overrun, (Fetene, 2008). Ethiopia prepared a Road Sector Development Program (RSDP) in 1997. Since then, five phases of RSDP were being implemented during the period from 1997 -

2020 (ERA 2016). However, delay was the major challenge to perform this strategic plan successfully.

According to the study conducted on Ethiopian construction industry by Werku (2016) shows that in Ethiopia only 8.25% projects have been completed by the original targeted completion date. According to this study, the remaining 91.75% delayed off from its contractual time. In regard to Addis Ababa Road construction, delay is becoming the major challenges that the authority and the residents are facing. Hence the impact of road construction project delay especially in Addis Ababa costs more the city and the country both economic and social aspect of the resident while it measured in terms of loss of revenue and lack of services not only in terms of cost overrun. If the delay is not identified and the corrective project management decision is not taken in time a project may incur extra cost and extension of project time, which gives rise to dissatisfaction to all the parties involved (Werku, (2016).

Currently delay has become a major barrier for the growth construction industry of developing countries like Ethiopia and the effects of these delays may be of considerable degree on the efficiency and effectiveness of the project. It is possible to reduce or prevent these delays by investigating their real causes. Therefore, it is essential to define the actual causes and effects of delays in order to reduce and avoid the delays in any construction project.

Therefore, with respect to the above the main intention of this thesis is to assess the causes and effects of delays on road construction projects and propose their mitigation measures.

### **1.3 Research Questions**

This research thus attempts to answer the following questions:

1. What are the most important causes of delay in road construction projects of Addis Ababa City Road Authority?
2. What are the effects of delay in road construction Projects of Addis Ababa City Road Authority?
3. What are the mitigation measures used to minimize road construction project delay?



## **1.4 Research Objectives**

### **1.4.1. General Objectives**

The general objective of this study was to assess the Cause and Effects of Delay on Road Construction Projects in Addis Ababa City Road Authority.

### **1.4.2. Specific Objectives**

The specific objectives of the study were:

1. To identify the major delay causing factors in the road construction projects of Addis Ababa City Road Authority.
2. To identify the effects of delay on road construction projects of Addis Ababa City Road Authority.
3. To rank the most significant delay causing factors and effects of delay in road construction projects of Addis Ababa City Road Authority.
4. To examine to what extent the causes of delay influences the road construction project AACRA

## **1.5 Scope of the study**

The construction industry as mentioned in the introduction part of this chapter is one of the broadest industries, which covers several varieties of projects. So studying the industry as a whole will be costly and time consuming due to this the scope of this study is limited to road construction projects in Addis Ababa city road Authority. The study focuses on assessing the main causes and effects of delay as a result of the actions on the part of owner, contractor, subcontractors, consultants or the government infrastructure with external related factors in terms of time. The group of respondents for this research involves client, consultant and contractor who are involved currently (2022) in Addis Ababa city road Construction Projects.

## **1.6 Significance of the study**

This study makes an effort to describe the cause and effects of road construction project delay. The significance of establishing the issues related to the road construction project delays is to provide a greater insight and understanding on the causes and effects of delays particularly among the main project players: Client, Contractors and consultants.

The findings of the study will further add value by proposing ways and inputs of mitigation measures for the management of AACRA to take corrective actions and make informed decisions to facilitate the successful execution of the project by eliminating the most important factors of delay.

Furthermore, the study could show a direction for further study for interested researchers and also will serve as a reference for future study in this thematic area.

## **1.7 Limitation of the Study**

This research has encountered limitations like budget limitation, lack of a well-organized and well-developed data in the project offices and Inadequate time to perform a large-scale analysis. There were problems related to data collection due to the busy schedule of the respondent and unable to return the questionnaires on time as well as afraid to provide exact information on delayed project. Most of the propose respondents for the study may have a busy schedule and couldn't find a free time to fill the questionnaires as it necessitate. The last but not least limitation of this study were Covid-19 pandemic as it prevents the researcher to contact the respondents freely.

## **1.8 Operational Definition of Terms**

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

**Project:** any temporary endeavor with a definite beginning and end and depending on its complexity, it can be managed by a single person or hundreds

**Construction Project:** project which intended to undertake the construction of buildings, infrastructures, and special purpose facilities.

**Road Construction:** the construction of a new roadway or the conversion of an existing unpaved road to a paved road

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

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

**Client:** A person or Organization who owns the project and has full authority to control the whole project

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

## **1.9 Organization of the Paper**

This study is organized in five consequent chapters. The first chapter introduces the back ground of the study, statement of the problem, basic research questions, objectives of the study, scope of the study, significance of the study, operational definition of terms and limitation of the study. The second chapter discusses on review of literatures with descriptions of different researchers related to the topics. The third chapter deals with the research methodology, design, sources of data, target population, sampling technique and sample size, validity and reliability of instrument and research ethics throughout the data collection and analysis. The fourth chapter presents results and discussion which prevails about the most important and frequently occurring causes and effects of delay. And the fifth chapter encompasses the summary, conclusions and recommendations based on the discussions of the previous chapters.

# **CHAPTER TWO**

## **REVIEW OF RELATED LITERATURE**

### **2.1. Review of Theoretical Literature**

#### **2.1.1. Introduction**

Construction project completion time often serves as a benchmark for assessing the performance of a project and the efficiency of the project organization. Timely completion is the main indicator for successful project. Often, the time required to complete construction of projects is more than the specified time in Contract. This construction project delay results an additional expense and time. Construction project delays also result in conflicts and mistrust among concerned parties (Client/owner, contractor and consultant). (Tushar, 2016). Along with delay, the frequently faced consequences are project failure, reduction of profit margin, and loss of trust of citizen in government funded projects, and overall, it causes a multitude of negative effects on the organizations and social economy of a country.

#### **2.1.2. Project**

According to the Project Management Institute (PMI), the term Project refers to “to any temporary endeavor with a definite beginning and end” and depending on its complexity, it can be managed by a single person or hundreds. According to the PMBOK (Project Management Body of Knowledge) 3rd edition, A project is defined as a “temporary endeavor with a beginning and an end and it must be used to create a unique product, service or result”. Project is a unique process consisting of set of coordinated and controlled activities with start and finish dates, undertaken to achieve and objective conforming to specific requirements including constraints of time, cost and resources (ISO 100006:2003). 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 (Robert, 2014).

### **2.1.3. Project Management**

The application of knowledge, skills, tools, and techniques to project activities to meet project requirements. Project management refers to guiding the project work to deliver the intended outcomes. Project teams can achieve the outcomes using a broad range of approaches (e.g., predictive, hybrid, and adaptive) (PMI, 2021). Project management is a series of planning, organizing, directing, and controlling of the organization resources to achieve specific goals and objectives. Furthermore, project management utilizes the systems approach to management by having functional personnel (the vertical hierarchy) assigned to a specific project (the Horizontal Hierarchy) (Kerzner, 2017).

Successful project management can then be defined as achieving a continuous stream of project objectives within time, within cost, at the desired performance/technology level, while utilizing the assigned resources effectively and efficiently, and having the results accepted by the customer and/or stakeholders (Kerzner, 2017). When a project is for construction and implementation of civil work physical infrastructures, the extents of project management difficulties become even more complex to achieve project success criteria factors of cost, schedule and performance quality (Bentator & Thumann, 2003). The difficulties in construction project management arise from the inherent nature of construction projects; such as complex and unique activities, mobile workforce, ingrained work cultures, environmental conditions, project-based setup, involvement of diverse sub-contractors and suppliers (Bentator & Thumann, 2003).

### **2.1.4. Construction Project**

Construction Project is a project which intended to undertake the construction of buildings, infrastructures, and special purpose facilities. Projects are classically defined by the need to complete a task on time, to budget, and with appropriate technical performance/quality (Antil and Woodhead, 1990).

### **2.1.5. Construction Project Management**

It is the planning, coordination and control of a project from conception to completion on behalf of the client/owner, requiring the identification of client/owner objectives in terms of utility, function, quality, time and cost; the establishment of relationships between resources; integration,

monitoring and controlling the contributors to the project and their output and evaluating and selecting alternatives in pursuit of the clients satisfaction with the project outcome (Walker, 2015).

### **2.1.6. Types of Construction Project**

According to Chitkara, (2009), the major Construction projects can be grouped in to Building Construction, Infrastructure Construction, Industrial Construction and Special Purpose Construction.

- **Building Construction Projects:** Building works include residential and commercial complexes, educational and recreational facilities, hospitals and hotels, warehouse and marketing facilities. Buildings constitute the largest segment of construction business. The building business serves mankind by providing shelter and services for its habitation, educational, recreational, social and commercial needs. The building works are mostly designed by the Architect/Engineering firms and are financed by public and private sector and individuals, Chitkara, (2009).
- **Infrastructure Projects:** These are highly capital intensive and heavy equipment and machinery oriented. It involve movement of large quantity of bulk materials like natural and crushed earth material, steel, concrete etc. These projects are includes dams and canals, high ways roads, rail ways, airport terminals, hydroelectric stations, water treatment and supply line, sewage disposal networks, telephone and electric line laying, dumps, and any construction activities which build infrastructures which are going to be the backbone for the growth of economy of a country. These works are designed by the specialist engineering firms and are mostly financed by government/public sector, (Chitkara, 2009).
- **Industrial projects:** These works include construction of manufacturing, processing and industrial plants like steel mills, petroleum refineries and consumer goods factories. Industrial works also include connected utility services, environmental works and human needs facilities. These works involve heavy investment and are highly specialized. Industrial Construction are finance by government, public and private enterprises, (Chitkara, 2009).

- **Special Purpose Projects:** These Construction projects include environmental works, emergencies, remedial works, installation and commissioning of equipment and complex key operations, (Chitkara, 2009).

### 2.1.7. Participants of Construction Project

As any other industries, there are different players that involve in construction project. The followings are the most common participants for all type of projects in the construction industry.

1. **Owner/Client:** An owner is a Person, Government, Organization, Ministry, Department, Society, Cooperative...etc. who owns the project and has full authority to control the whole project. He is mainly involved in the process for supporting the financial matter for the construction project to go through easily. He has to pay for fees and charges associated with the work and for the material and equipment and will be the owner of the project after completion
2. **Consultant:** A consultant is an organization/company hired by the owner/client of the project to oversee the project and assess building costs and contracts for construction projects. Consultant tasks include tasks like developing and supporting the development of the design, working with tasks related to project management, contract administration, inspecting the work of construction contractors, advising on sustainability and giving advice and helping develop the project. This may include providing other general technical and business assistance, working with contractors to decide and implement the building design, noting any environmental issues at the site, ensuring worker safety, keep a project running on budget, and handle any problems that may appear.
3. **Contractor:** It is an organization hired by the owner/client to complete the project and responsible for the execution of the whole work activities that are required for the completion of the project. The contractor also appoint subcontractor, who have special expertise, to execute certain parts of the project that cannot be constructed by the contractor.

- 4. Designer:** It is the party that transforms the owner's vision into a real-life project (blue print). It is responsible for the implementation of the project's original concept. The design incorporates all the project's architectural, structural, sanitary and electrical elements

#### **2.1.8. Delay**

In construction, the word “delay” refers to something happening at a later time than planned, expected, specified in a contract or beyond the date that the parties agreed upon for the delivery of a project (Keith, 2010). Lo, Fung and Tung (2006) define delay as 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. Construction delay may be described as a time overrun past the time negotiated by the construction parties for the project or the contract date to be finished. (Marzouk & El-Rasas, 2014). It is also a project slipping over its planned schedule and was considered as common problem in construction projects. To the owner, delay means loss of revenue through lack of production facilities and rentable space or a dependence on present facilities. In some cases, to the contractor, delay means higher overhead costs because of longer work period, higher material costs through inflation, and due to labor cost increases.

In the road construction industry, project delays may occur due to the elongation of the construction time as a result of various troubling factors that influence the construction workflow (Shebob, 2012). Delays of a construction project can be defined as the late completion of works as compared to the planned schedule or contract schedule. Delay is generally acknowledged as the most common, costly, complex and risky problem encountered in construction projects. Because of overriding importance of time and money for both the owner (client) in terms of performance and the contractor in terms of money, it is the source of frequent dispute and claims leading lawsuits. Delays occur in every construction projects and the magnitude of these delays varies considerably from project to projects. Some projects are only a few days behind schedule; some are delayed by over a year. Therefore, it is essential to define the actual causes of delay in order to minimize and avoid delay in any construction project. (Ahemed, 2003).



### 2.1.9. Types of Delay

Based on a study done by Hamzaha, Khoirya, Arshada, Tawilb and Anib (2011), there are three types of delays namely non-excusable delays, excusable delays and concurrent delays as illustrated in Figure 1.

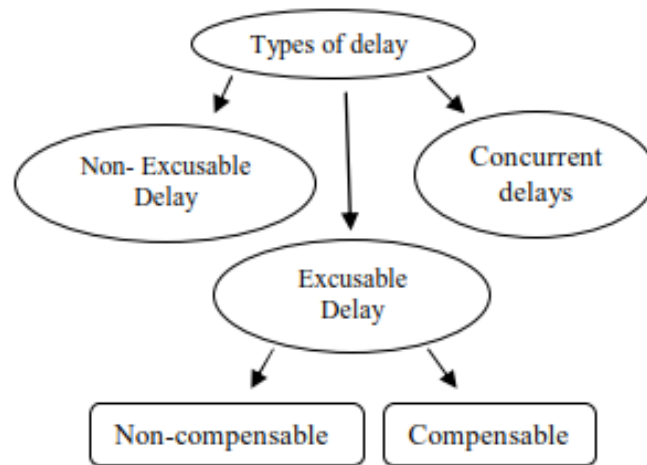


Figure 1: Types of delay

#### 1. Non – Excusable Delays

Non – Excusable Delays are those where the contractor was entirely responsible for extending the project’s duration. If this is the case, then the contractor will be liable for any costs or damages caused by the delay. Basically, these delays are caused by contractors or subcontractors or materials suppliers, through no fault of the owner, Wa’el, (2007). The contractor might be entitled to compensation from the delaying subcontractor or supplier, but no compensation is due from the owner. A non-excusable delay is delay caused by the contractor or its suppliers, through no fault by the owner, Hamzah, (2011). According to Hamzah, the contractor is generally not entitled to relief and must either make up the lost time through acceleration or compensate the owner. Werku, (2016) also defined these delays as delays, which the contractor either causes or assumes the risk for. These delays are caused by lack of performance of the contractor on the construction project such as a contractor failure to provide an adequate material to complete their job.

To the specific, according to Meaza, (2015) these delays can be caused by underestimates of productivity, improper project planning and scheduling, poor site management and supervision, wrong construction methods, equipment breakdowns, unreliable subcontractors or suppliers, late performance of sub-contractors, untimely performance by suppliers, A project-specific labor strike caused by either the contractor's unwillingness to meet with labor representative or by unfair labor practices as some example. Therefore, it is contractor's responsibilities to continue their work with no entitlement to claim for extension of time or delay damages until they completed the project. So, non-excusable delays usually result in no additional money and no additional time being granted to the contractor.

## **2. Excusable Delays**

An excusable delay is one that allows the contractor an extension of time, compensation, or both, because these delays are out of the contractor's control. Excusable delay is a delay that is caused due to an unforeseeable event beyond the contractors or the subcontractor's control. Excusable delays, also known as "force majeure" delays, (Wa'el, 2007) Most contracts allow for the contractor to obtain an extension of time for excusable delays, but not additional money. Usually, based on common general provisions in public agency specifications, delay resulting from the following events would be considered excusable such as fires, floods, owner directed changes, errors and omissions in the contract drawing, unexpected bad weather and etc. Excusable delays are divided into two: - compensable and non-compensable delays.

### **A. Compensable Delays**

According to Meaza (2015), a compensable delay is a delay where the contractor is entitled to a time extension and also additional compensation. Compensable delays are caused by the owner or the owner's agents. Only excusable delays can be compensable. Non-compensable delays means that although an excusable delay may have occurred, the contractor is not entitled to any added compensation resulting from the excusable delay. An excusable, compensable delay normally leads to a schedule extension and exposes the owner to financial damages claimed by the contractor. In this scenario, the contractor incurs additional indirect costs for both extended field office and home office overhead and unabsorbed home office overhead. Normally a Compensable

Delay is caused by the client/owner. It may be caused by a direct change, it may be caused by a suspension of work, or it may be caused by any of the constructive changes.

## **B. Non - Compensable Delays**

Non-compensable delays are 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, Hamzah, (2011). Non-compensable delay is a delay that is caused by third parties or incidents beyond the control of both the owner and the contractor. Examples typically include: unusual weather, strikes, fires, and acts of government in its sovereign capacity, etc. In this case, the contractor is normally entitled to claim extension of time but no compensation for delay damages. According to Ethiopian civil law/code Article 1973, Strikes that are foreseeable at the time of signing the contract are not considered excusable causes of delay. Therefore, both parties (the owner and Contractor) assume their own additional costs. The contractor absorbs his delay costs for being out on the project longer and the owner absorbs its cost normally in the form of the liquidated damages by granting a time extension to the contractor and extending the contract. One might consider it a form of a non-fault approach to delays. Neither party can control them nor do both parties accept any extra cost resulting from them.

## **3. Concurrent Delays**

According to Wa’el, (2007), If there is only one factor is delaying the construction project; it is usually quite easy to calculate both the time and money resulting from that single issue. Concurrent delay is a more complicated and this is very typical in construction project.

This situation happened when more than one factor delays the project at the same time or in overlapping periods of moment. This situation happened when more than one factor delays the project at the same time or in overlapping periods of moment, Hamzah, (2011). In this situation, both owner and contractor are responsible for the delay. Commonly concurrent delays which involve any two or more excusable delays result in extension of time. When excusable delays with compensation and non-excusable delays are concurrent, an extension of time can be issued or the delay can be distributed between the owner and the contractor. In analyzing concurrent delays,

each delay is assessed separately and its impact on other activities and the project duration is calculated. The following guidelines used for classifying these kinds of concurrent delays:

- If excusable and non-excusable delays occur concurrently, the contractor can only claim For extension of time;
- If excusable with compensation and excusable without compensation delays occur concurrently, the contractor is entitled to claim extension of time but no delay damages;
- If two excusable with compensation delays occur concurrently, the contractor is entitled to claim extension of time and delay damages.

## **2.2. Review of Empirical Literature**

### **2.2.1. Causes of Delay**

Santoso and Soeng (2016), analyzed construction project delay causes and their relationships with project duration, cost and quality in Cambodian roads. Risk identification was accompanied with grouping risk factors into five categories namely: contractor, owner, consultant, external and project. A questionnaire survey was adopted as a research instrument and the responses were analyzed by importance index technique. It has been observed that rain and flood were the most influencing factors on project duration. The research findings also indicated that several delay factors ranked among the highest ten were linked to contractor and project groups.

In Egypt, a study of exploring delay causes of road construction project has been conducted by Remon, (2016). This study sought to accomplish the following objectives: identifying the most important and less important causes of delays that affect highway constructions by identifying the severity of the delay causes from stakeholder's perspective. By using a questionnaire survey 293 delay causes categorized under 15 groups have been evaluated through literature review. And the study revealed that from overall results, it was found that the owner financial problem was considered the first cause affecting delay in road projects in Egypt. Shortage in equipment, inadequate contractor experience, shortage in materials, equipment failure, design errors, mistakes in soil investigation, poor subcontractor performance, rework due to change in design, poor site management and supervision by contractor were the prominent delay causes identified by study.

In Saudi Arabia, Assaf, (2006) conducted a research about construction project delay different type of project 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 India, Prasad, (2019) analyzed causes of project delays and mitigation measures in Indian construction projects. The survey comprised 60 causes/factors of delay that were clustered into 7 main groups: planning, design and engineering related factors, Procurement related factors, financial related factors, human resource related factors, project execution related factors, contract management and external related factors. The research findings indicate finance-related causes as the most critical causes of delay in Indian projects. Delay in settlement of claims, contractor's financial difficulties, delay in payment for extra work/variations by owner, late payment from contractor to subcontractor or suppliers, variation orders/changes of scope by owner during construction and changes in design by owner were the highly ranked delay causes. In respective to project type, Land acquisition and utility-related delays were the main reasons in transport projects identified by the study in specific to road projects.

Memon, (2012) conducted a study on time and cost performance in construction projects in Malaysia revealed that the most important delay factors were: design and documentation issues, financial resource management, project management and contract administration, contractors' site management, and lack of information and communication technology and slow decision making.

Ashraf & Ghanim, (2016) on the analysis of causes and effects of Delay in public construction projects in Jordan determined the frequency of occurrence, severity and importance of each of the 55 causes of delay they identified. Among the 55 causes, the top 22 factors were mentioned to be inadequate management and supervision by the contractor, client's changes of the design, inadequate planning and control by the contractor, using lowest bid that led to low performance, changes in the extent of the project, design and contract document error, late progress payments by the client, rework due to faults during construction and changes in the original design. They further identified low level productivity, technical problems faced by the contractor, incorrect construction methods followed by the contractor, lack of cooperation between client and

contractor, cash flow problems suffered by the contractor, delay due to sub-contractors works, no approval of contractor submittals, bureaucracy and changes of government regulations, drawings are not efficient enough, non-availability of consultant's staff on site, other public works on site, effect of local community and changes in the cost of resources (labor, material and equipment).

According to Obodoh & Chikasi, (2016), major causes and effects of construction project delays in Nigerian construction industries are identified as, Insufficient number of equipment, inaccurate time estimate, interim payment difficulties, change orders, inaccurate cost estimate, poor site management and supervision, inadequate modern equipment, shortage of construction materials, incompetent project team, improper project planning and scheduling and contractors' financial difficulties.

Khair (2016), similarly, studied the reasons and impacts of delay on Sudanese road construction. A literature-based framework containing 70 delay factors and 9 effects was prepared in a form of questionnaire and filled up by experts working in this field. The study illustrated the importance of each cause within the corresponding category. Furthermore, the researcher has offered some methods that would reduce the impact of delay on the project.

Kamanga and Steyn (2013), reported that the majority of contractors in Malawi failed to complete their projects in a timely manner including road projects. Therefore, this research has been carried out to identify the problems behind such delays. A questionnaire survey prepared with 72 delay causes categorized into 6 groups has been designed. The respondents were requested to assess the level of importance for each factor based of five point Likert-scale ranging from never occurring to continual occurring. The results indicated that the factor number one causing delay was shortage of fuel.

The investigation of causes of construction delay in Ethiopian Construction Industries identified 88 key delay causing factors, the most common and critical factors of construction delay were evaluated and identified to be; difficulties in financing project by a contractor, escalation of the materials price, ineffective project planning, scheduling or resource management, delay in progress payments for completed works, insufficient data collection and survey before design, lack of skilled professionals in the field of construction management in the organization, and inadequate and seasonal availability of experienced labor. Werku, (2016).

Amare, (2017) identified 10 causes of delay on the research they made during construction phase of road projects due to the failures of contractor, consultant, and employer in Addis Ababa City Road Authority. According to their study, poor financial control of the project, difficulty in financing a project by contractor, type of project bidding and award (lowest bidder), poor site management and supervision of contractor, selecting inappropriate contractors, lack of high-technology mechanical equipment, inaccurate initial project scope estimate, ineffective project scheduling, weak control of the project progress and lack of adequate training on construction management techniques for contractor's staffs were identified to be the top 10 causes of delay.

Meaza, (2015) has identified weakness on the owner as the most important causes of delay in the power distribution construction projects with its study conducted on causes of project implementation delay in the Ethiopian Electric Utility Enterprise. The study has identified Mistakes and discrepancies in design documents, frequent design change and variation order during construction, unclear and inadequate details in drawings, slow response and supervision, poor contract management, inaccurate site investigation and change in material type during construction as owners' responsibility; delayed progress payment, slow management decision, unrealistic project construction time, change and variation of project costs and prolonged procurement system are the most contributing factors on owner side. Contractor's financial problem on contractor side has been indicated as second factor in the study next to owners' related factors.

Shambel, (2018), with their study of Factors influencing Time and Cost Overruns in Road Construction Projects: Addis Ababa, Ethiopian Scenario identified financial problems, improper planning, land acquisition and construction delay, design changes, less materials and equipment supply by contractors, incomplete design are the main sources of delay and cost overrun respectively. And the study also indicated once identified the main causes it is necessarily to give solutions to complete the projects on time and estimated cost.

### **2.2.2. Effects of Delay**

The effects of delays are a result of factors which are not identified and resolved. Numerous factors can result in cost and time overruns in various types of projects, and client satisfaction likely to decrease if the cost of a project or schedule exceeds the planned budget. Kaliba, (2009).

A project experiences schedule overrun if the stipulated completion time is exceeded. Schedule overrun implies late delivery or completion based on the specified time that has been agreed by all the parties involved in the construction project, Sunjka & Jacob, (2013).

Critical factors in road construction projects in Jordan are delay and cost overrun. Other factors that contribute to construction cost and schedule overruns in public work projects should be identified, as recommended by Hazim, (2015).

The losses incurred due to schedule overruns result in disputes and claims (Sunjka & Jacob, 2013). The six main factors which caused delays in Iranian construction projects were identified by Pourrostan & Ismail (2012) as cost overrun, time overrun, total abandonment, disputes, litigation and arbitration.

Project delays can lead to arbitration between contractual parties. Some of the parties might not accept the mediator's decision and will appeal in an arbitration process. The decision to address the issue will also be made by the arbitrator. Projects will incur extra costs and time following the engagement of professional arbitrators, Sunjka & Jacob, (2013).

The findings of Aboubaker, (2018) on the study of the effects of delays in road construction projects in Tripoli reveal that the major outcomes of road construction project schedule overruns in Tripoli, Libya include cost overruns, time extensions, disputes, loss of profit, breaches of contract, poor quality of work and company's bad reputation.

These findings support the studies conducted by Honrao & Desai (2015) and Hasan, (2014). However, a total of eight outcomes of schedule overruns were identified by Sunjka & Jacob (2013), namely (a) budget overrun: a project is said to face a budget overrun if it is completed at a cost that is higher than that budgeted; (b) time overrun: a project is said to encounter time overrun if the stipulated completion time is exceeded; (c) bad public relations: consultants, contractors and clients risk their public reputation if projects are delayed; (d) poor project quality: issues related to project quality may arise if there is inferior workmanship and/or use of inferior quality materials; (e) arbitration: a project may incur additional cost and time following the engagement of professional arbitrators; (f) litigation: courts may be used to resolve disputes, especially when severe penalties are at stake; (g) total abandonment: unresolved issues that result in delays in the



execution of a project can lead to total abandonment; and (h) disputes and claims: these are the result of losses incurred due to delays by either party in the contract.

### **2.2.3. Minimization of construction delay**

According to Divya, (2015), when a construction delay occurs, there is no question that the owner suffers financially. However, the extent to which an owner can recover its loss of income from the contractor, and more importantly minimize the risk that such delays will occur, depends largely on how the construction contract was drawn up. Based on several studies of project success factors and rectification of delays in construction project, a total of 15 methods have been identified. According to a study by Amare, (2017) on causes of delays during construction phase of road projects due to the failures of contractor, consultant, And employer in Addis Ababa City Road Authority recommended to establish a system for financial control of the project and also upgrading on the financial capacity building of the construction sector.

Assaf, (2006) identified the following points in order to minimize and control delays in construction projects. According to him, owners should give special attention to the following factors: Pay progress payment to the contractor on time because it impairs the contractor's ability to finance the work, minimize change orders during construction to avoid delays, avoid delay in reviewing and approving of design documents than they anticipated, check for resources and capabilities, before awarding the contract to the lowest bidder. Contractors should also consider the following factors: enough number of labors should be assigned and be motivated to improve productivity, contractor should manage his financial resources and plan cash flow by utilizing progress payment, administrative and technical staff should be assigned as soon as project is awarded to make arrangements to achieve completion within specified time with the required quality, and estimated cost.

Assaf, (2006) added also, consultants should look to the following points: reviewing and approving design documents, consultants should be flexible in evaluating contractor's works. The construction team should practice the identified measures of reducing construction project delays such as: Site management and supervision, effective strategic planning, clear information and communication channels, use proper and modern construction equipment, and proper project planning and scheduling among other identified measures. Assaf, (2006) finally, recommended

that architects/design engineers should focus on the following points: producing design documents on time, mistakes and discrepancies in design documents have to be taken care off.

Werku, (2016) suggested some actions to be taken by the client/owner, contractor and consultant. Before the start of the construction phase, the client should verify if the sketches have incorporation, the lowest evaluated bidder approach should be avoided, skilled and competent supervisor or consultant should be hired with a good salary, the owner should also release payments depending on the contract duration of the arrangement. In the other hand, the contractor should negotiate benefits to provide preparation for the labor in order to provide a healthier working atmosphere and improved efficiency, appoint the right professional to the right role, establish a culture of time order and stockpiling of daily resources, and develop the right professional and the project manager as well as a top level management should apply proper project management tools and techniques, such as: proper planning, scheduling and monitoring, proper cash flow and resource scheduling together with strict monitoring and evaluation.

In order to prevent potential differences, the consultant should always plan a transparent and sufficient detail drawing and quantity bill without any mistakes, fair time and timeline for the project should be set, adequate data collection, survey and thorough site investigation and planning should be carried out before tendering, risk and escalation considerations should be taken into consideration during the calculation process. In order to prevent modifying orders, the requested fees, extra works and variation orders should be accepted on schedule, the scope of work should be specified prior to the construction process and the consultant should further provide the client with orientation on the problems found.

#### **2.2.4. Research Hypothesis**

The research hypothesis was developed from the empirical review of Remon, (2016), Assaf, (2006), Khair, (2016), Amare, (2017), Ashraf & Ghanim, (2016), Meaza, (2015), Sunjka & Jacob, (2013), Werku, (2016), and Aboubaker, (2018). Based on reviewed literature the research hypothesis is identified as follows:

- H<sub>1</sub>: Delay of payment by the Client have a significant effect on completion of road construction project

- H<sub>2</sub>: Inaccurate cost estimation by the consultant have substantial influence on the project completion
- H<sub>3</sub>: Shortage of construction materials have a significant impact on road construction project delay
- H<sub>4</sub>: Time overrun is expected to be the result of road construction project delay
- H<sub>5</sub>: Cost Overrun is expected to be the effect of road construction project delay

### **2.2.5. Conceptual Framework of the Study**

In relation to the literature review, the conceptual framework has underlined a number of factors that determine the rate of project execution at which the projects are completed. It outlined variables in road construction projects that affect the road construction performance. The variable in this case is the factors of delay of road construction projects implementation in the road construction sector and the subsequent effect is delays with time overrun, cost overrun, disputes between parties, underutilization and wastage of resources and total abandonment etc.

From the literature reviewed 37 causes and 13 effects are identified. According to Aziz, (2016) the causes of road construction delays are grouped as equipment related group, design related group, contractor related group, material related group, contract related group, consultant related group, financing related group, site related group, scheduling and controlling related group, owner related group, contractual relationship related group, labor related group, project related group, external related group and rules and regulations related group. Khair, (2016) summed up these groups in to contractor related, owner related, consultant related, government and external related factor. Therefore, this study re-clustered these factors in to 5 categories as client related, consultant related, contractor related, material and equipment related and external related factors.

As per the reviewed literatures, the effects of road construction delay are mentioned to be cost - overrun, time-overrun, compromised quality, arbitration, disputes, negotiations, court cases, litigation, low profit margin or financial loss, revocation of contract, total abandonment of project, loss of wealth and capacity, breaches of contract, poor quality of work and company's bad reputation and loss of other facilities.

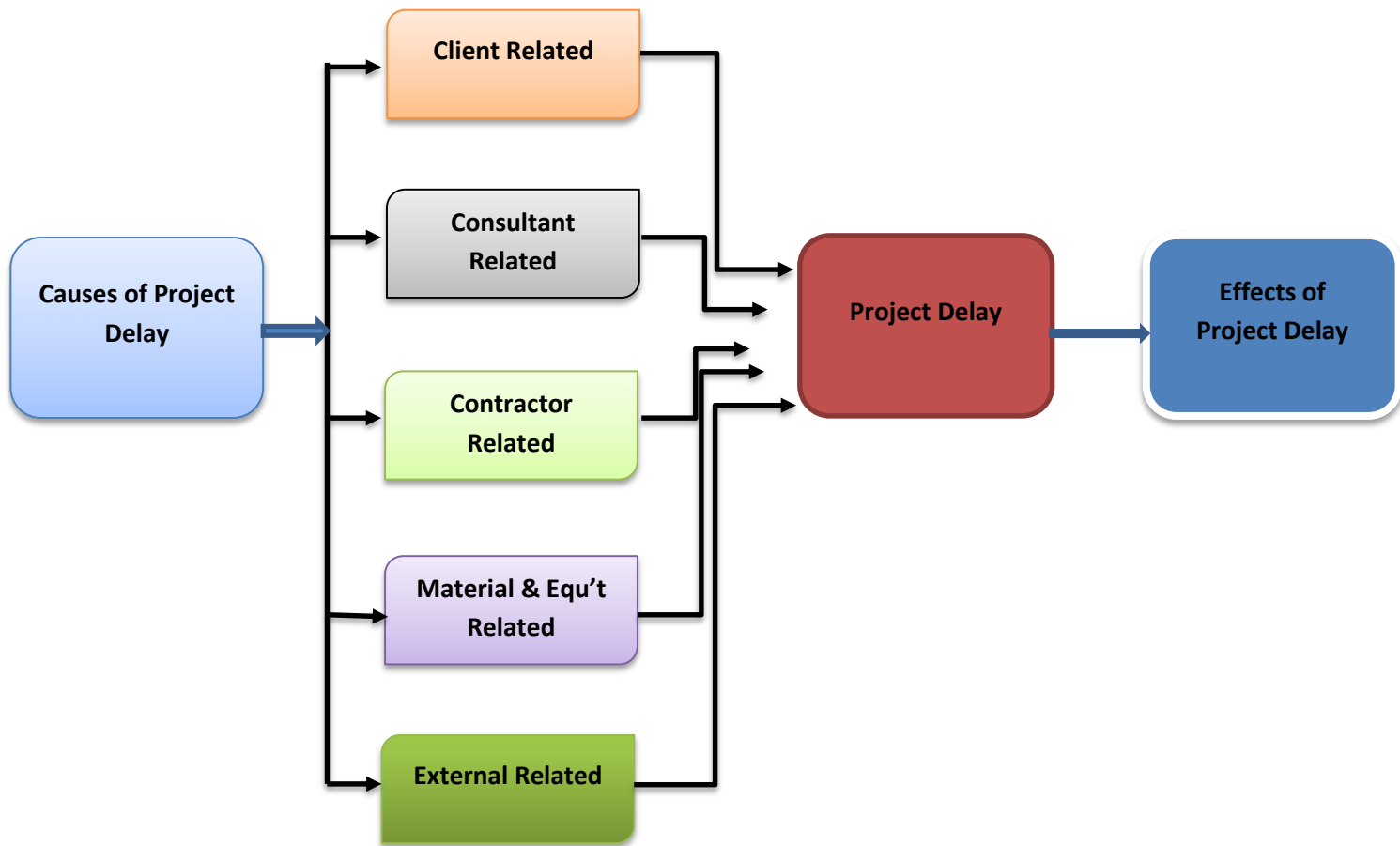


Figure 2: Conceptual Framework

Source: Aziz & Khair, (2016)

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1. Introduction**

This chapter explains the methodology and procedures that will be followed to determine the style and methods of collecting information and data from the study population through office and field sources. The study will identify and rank the factors that influence the duration of Addis Ababa city road construction projects and their effects based on the results of all the reviewed studies. It covers the study design, methodology, target population, sample procedure, data sources and types, data collection methods, data processing methods, ethical considerations.

#### **3.2. Research Design**

According to Vaus, (2001), an appropriate research design selection enables to ensure that the evidence obtained enables to answer the initial question as unambiguously as possible.

This study adopted a descriptive research design which is used to provide quantitative or numerical description of attitude, or opinions of participants to evaluate the perception of parties involved in the road construction process has been employed. Case study research method was used to collect relevant secondary data and primary data through review of documents. Quantitative research methods will be employed to analyze the total delay causing factors and effects of projects.

#### **3.3. Sources of Data**

The study employed two sources of data; Primary sources of data and Secondary sources of data. The primary source of data was obtained through direct personal investigations of respondents and survey using questionnaires. The collection modes were through; printed questionnaire's, emails and google forms.

The secondary data refers to the information which have already been collected, analyzed, documented and published by some other researchers or people. Therefore, the study or the findings were supported by the secondary data. The sources of data were the main parties in the construction namely; client/owner, contractor and consultant.

### **3.4. Target Populations**

The target population of the study were selected from client, contractors and consultants who are involved directly in the construction of the road projects with an experience in the road construction industry and currently involved in AACRA projects.

### **3.5. Sampling Techniques**

In this study, respondents were selected based on their experience, knowledge and participation in Addis Ababa City Road construction projects. The study adopted a purposive sampling method. According to Tayie (2005) a purposive sample is a technique that comprises of subjects who are selected based on certain specific characteristics needed for a study and rules out subjects who do not meet this standard. This necessitated the use of purposive sampling technique for the study.

### **3.6. Sample Size**

The sample size was calculated using the statistical formula ( $n = N \times 0.30$ ). This was done to predict the number of questionnaires that were provided to respondents based on the study's population and response rate. When the population is less than 1000, we can test 30 percent of the total population. In case that the population is greater than 1000, a sample size of 10 -20% can be used as a population agent (Gay and Airasian, 2003). This study considers a total population of 200 professionals by excluding the supportive staff from the projects that are currently active in Addis Ababa city. As a result, the test measure was determined by the equation below.

$$n = N * 0.3$$

$$n = 200 * 0.3 = 60$$

Where:

$n$  = Sample size of the study

$N$  = The population size and staffs who were working as consultant, contractor and client

$0.3$  = Represents 30% of the population size

Therefore, Out of the total population, this study took 60 respondents as sample size that was selected for the survey. Though the sample size is relatively small, the quality of the responses was considered to be highly reliable for the analysis due to relevant industry experience, personal level interactions and clearly understanding the questionnaires among the respondents (Vaus, 2001). From the target population the researcher purposively distributed 10 questionnaires to the client to reach out the population with adequate engineering background who able to answer the research questions and 30 questionnaires were distributed to the contractor and 20 to the consultant for those who have been actively engaged in the AACRA road construction projects.

Table 1 Sample Size of the Study

<b>No.</b>	<b>Respondents Company</b>	<b>Sample Size</b>
1	Client	10
2	Consultant	20
3	Contractor	30
	Total	60

### **3.7. Data Collection**

To get primary data a structured questionnaire was developed by the researcher which helped to obtain direct information from the targeted population. Thus, five points Likert rating scale was used in the study to show the frequency of occurrence of related delays by assigning number 1 to 5. The number 1 indicates very low level of frequency, while the number 5 represents very high level of frequency. For most influential effects of delay the number 1 indicates strongly disagree while the number 5 represents strongly agree.

Among the available techniques of secondary data collection methods, document review was employed to collect relevant secondary data from secondary sources (project completion reports, books, articles, magazines, internet, reports, contract documents and other's research papers). The information, which is relevant, was used as a benchmark against primary data which was collected to support the research.

In addition to the questionnaires, unstructured one-to-one interview was conducted with 5 purposely selected participants from sample size of the study. The respondents of interview were

from consultant, contractor and client who participated at different responsibility levels in the Addis Ababa City Road construction projects. Interview participants were drawn from those who filled in the questionnaire for the reason of triangulating the data and to collect reliable and actual information.

### 3.8. Validity and Reliability of the Instrument

Validity is defined as the extent to which a test to measure what is the actual accuracy and precision of a measurement procedure, Kothari (2004). Validity of content is also mentioned to be the degree to which the content element of the questionnaire instrument covers the concept being evaluated. The validity of data collection instruments was checked against the available literatures.

The questionnaires' reliability is checked using the Cronbach's Alpha test coefficient using SPSS software, which is widely used. The Cronbach's alpha coefficients indicate the degree of internal reliability, or how closely a group of items are associated. Cronbach's alpha values ranged from 0 to 1. In most social science research contexts, values above 0.70 are considered "rational" or acceptable. Always a higher value indicates a higher level of internal consistency.

Internal consistency of Cronbach's Alpha (Gliem and Gliem, 2003).

Table 2 Internal consistency of Cronbach's Alpha

S/N	Chronbach's Apha, $\alpha$	Internal Consistency
1	$\alpha \geq 0.8$	Very High
2	$0.8 > \alpha \geq 0.7$	High
3	$0.7 > \alpha \geq 0.5$	Midium
4	$\alpha < 0.5$	Low

$$\text{Cronbach's alpha, } \alpha = \frac{K}{k-1} \left( 1 - \frac{\sum V_i^2}{V_x^2} \right)$$



Table 3 Cronbach's Alpha test result of causes and effects of delay

<b>Factors</b>	<b>Cronbach's alpha, <math>\alpha</math></b>	<b>Internal Consistency</b>
Client Related	0.827	Very High
Consultant Related	0.813	Very High
Contractor Related	0.720	High
Material and Equipment	0.650	Midium
External Related	0.694	Midium
Effects of Delay	0.867	Very High

*Source: survey result, 2022*

Table 3.3 presents the results of the Cronbach's Alpha reliability test for the Five categories of causes of delay and the effects of delay in AACRA. As depicted in Table 3.3, the coefficient of internal consistency of the reliability test for the client-related and consultant-related delay factors is found to be 0.827 and 0.813, respectively. This implies that 82.7% of the answers provided by the respondents regarding owner-related causes of delays and 81.3% regarding the consultant-related causes of delays have excellent reliabilities.

Furthermore, Table 3.3 indicates that contractor-related delay factors have an internal consistency rated as good, with Cronbach's Alpha coefficients of 0.720. The material and equipment related and external related delay factors were recorded to have a satisfactory internal consistency with Cronbach's Alpha coefficients of 0.650 and 0.694, respectively. Finally, the effects of delay have an internal consistency rated as excellent, with Cronbach's Alpha coefficients of 0.867. This means that the questions correlate to each other as individual groups. Besides, according to the scale of the coefficient of the internal consistency (Cronbach's Alpha) in Table 3.2, it can be concluded that the collected data for all the items in the above table 3.3 are correlated, valid and reliable.

### **3.9. Method of Data Analysis**

The data that obtained from sample organization were analyzed according to the objective of the study. The questionnaires were collected and analyzed by using Statistical Package for Social Science (SPSS 20) and Microsoft Excel. 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). According to many researchers (Assaf, 1995, Iyer and Jha, 2005, Doloi, (2012) are of the opinion that mean and standard deviation of each individual attribute is not a suitable measure to assess overall rankings as they do not reflect any relationship between them and hence Relative Importance Index (RII) is best suitable for the study. Furthermore, (Prakash & Joseph, (2014); Ashraf & Ghanim, (2016)) used RII in their analysis to rank the different causes and effects from different perspectives.

RII is used to rank the different causes of delays from the perspective of clients, consultants, contractors and other stakeholders. The approach is also used to evaluate the different causes of delays, among different categories, the same methodology is used for this analysis. (i.e., Clients, consultants and contractors). The five-point scale ranged from 1 (Very Low) to 5 (Very High) is adopted and transformed to relative importance index (RII) for each factor.

The relative important index is computed as;

$$RII = \frac{\sum W}{A*N} \quad , \text{ or} \quad RII = \frac{1n1+2n2+3n3+4n4+5n5}{A*N}$$

Where:

RII = Relative Important Index

W = Weight given to each factor

A = Highest Wight (i.e., 5 in this case)

N = Total Number of Respondents

For the second formula,

n1, n2, n3, n4, n5 = Number of respondents answer each factor

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

Table 4. Classification of Relativity Important Index

Scale	Level of Contribution	RII
1	Very Low	$0.0 \leq RII \leq 0.2$
2	Low	$0.2 < RII \leq 0.4$
2	Average	$0.4 < RII \leq 0.6$
4	High	$0.6 < RII \leq 0.8$
5	Very High	$0.8 < RII \leq 1.0$

Source: Ashraf & Ghanim, (2016)

### **3.10. Ethical Considerations**

The necessary precautions were taken to make the study ethical. Respondents were informed ahead about the purpose of the data they were providing and it was with full consent of the participants. They have been told that the information they provide via the questionnaire is going to be used only for the purpose of academic study and remain confidential and also their privacy and identity will not be disclosed. Participation in the study is voluntary and confidentiality of the information was assured during as well as after data collection. The participants was informed about their right not to participate, privacy, risk and no direct benefits of the study and not to answer any question or all of the questions. Data collectors obtained verbal consent from employees after informing them about the nature of the study and that their participation was voluntary.

# CHAPTER FOUR

## RESULT AND DISCUSSION

### 4.1. Introduction

This chapter presents the result and discussion of the data collected from the distributed questionnaires, interviews and reviewed documents. A total of 37 potential delay causes were selected from the previous studies and grouped in to 5 namely, client related factors, consultant related factors, contractor related factors, material and equipment related factors, and external related factors. Similarly, 13 effects that have been selected from the past studies and reviewed literatures were ranked based on their potential effect. The data obtained through questionnaire was developed to assess the perceptions of owners, contractors and consultants on the relative importance of causes and effects of delays in the AACRA projects. The data collected through these methods were analyzed and the results are presented in this chapter.

### 4.2. Information of the Respondents

#### 4.2.1. Questionnaire Response Rate

A total of 60 Questionnaires were distributed to the three groups namely Client, Consultants and Contractors respondents and out of which 56 are collected. The below Table 5 Shows the number and the questionnaire rate of responses.

Table 5 . Questionnaire Response Rate

<b>Respondents</b>	<b>Number of Distributed Questionnaire</b>	<b>Number of Collected Questionnaire</b>	<b>Response Rate (%)</b>
Client	10	10	17.86
Consultant	20	19	33.93
Contractor	30	27	48.21
<b>Total</b>	<b>60</b>	<b>56</b>	<b>100</b>

*Source: survey result, 2022*

#### **4.2.2. Demographic Distribution of the Respondents**

The demographic characteristics of the respondents were presented in terms of frequency and percentage distribution. The variables included under this section are sex, age, respondent designation, level of education and years of work experience of respondents. The below table presents the demographic distribution of the respondents from all groups.

The below Table 6 indicates that the majority of the respondents were Male (41) which is 73.2% while the rest 15 were female which accounts for 26.8%. In terms of Age, the data shows that the majority of the respondents lies between in the age of 31 – 40 Years which makes 39.3% of the total population that participated in the study, followed by those aged between 18 – 30 years by making 33.9% out of the total respondents, the group that lies between the age of 41 – 50 and 51 – 60 accounts for 16.07% and 8.93% respectively and the respondents who are in the age of above 60 years were only 1.8% of the total participated population.

In terms of education level of the respondents, 43 of the participant respondent were first degree holders which is 75% of the total participants, they were followed by respondents having masters with a frequency of 14 which is 25%. And there is no respondent (0%) that a hold of certificate or diploma among the respondents which clearly shows the participants in the industry have a good educational background for the requirement of the sector.

In terms of respondent designation, the majority of the respondent were the site engineers (31) which is 55.6% of the total respondents followed by the office engineers (12) which is 21.42% and Project managers and resident engineers accounts for 14.9% and 8.93% respectively.

In terms of work experience of the respondents, the data shows that 17 (30.36%) of the respondents have 1-5 years of experience, 13 (23.22%) of the respondents have 6-10 years of experience, 16 (28.57%) of the respondents have 11-15 years of experience and 6 (10.71%) respondents have an experience of 16-20 years and 4 respondents (7.14%) have more than 20 years of working experiences. This implies that most of the respondents were having the necessary work experience to be able to perform their job.

Table 6. Demographic Distribution of the Respondents

Variables	Category	Company			Frequency	Percentage (%)
		Client	Consultant	Contractor		
Sex	Male	7	11	23	41	73.2
	Female	3	8	4	15	26.8
	<b>Total</b>	<b>10</b>	<b>19</b>	<b>27</b>	<b>56</b>	<b>100</b>
Age	18-30 Years	1	6	12	19	33.9
	31-40 Years	3	9	10	22	39.3
	41-50 Years	3	2	4	9	16.07
	51-60 Years	2	2	1	5	8.93
	> 60 Years	1	0	0	1	1.8
	<b>Total</b>	<b>10</b>	<b>19</b>	<b>27</b>	<b>56</b>	<b>100</b>
Education Level	Certificate	0	0	0	0	0
	Diploma	0	0	0	0	0
	Degree	4	14	24	42	75
	Masters	6	5	3	14	25
	<b>Total</b>	<b>10</b>	<b>19</b>	<b>27</b>	<b>56</b>	<b>100</b>
Designation	Project Manager	4	2	2	8	14.29
	Resident Engineer	0	5	0	5	8.93
	Office Engineer	4	4	4	12	21.42
	Site Engineer	2	8	21	31	55.36
	<b>Total</b>	<b>10</b>	<b>19</b>	<b>27</b>	<b>56</b>	<b>100</b>
Experience	1-5 Years	0	5	12	17	30.36
	6-10 Years	2	5	6	13	23.22
	11-15 Years	4	6	6	16	28.57
	16-20 Years	2	2	2	6	10.71
	>20 Years	2	1	1	4	7.14
	<b>Total</b>	<b>10</b>	<b>19</b>	<b>27</b>	<b>56</b>	<b>100</b>

Source: survey result, 2022

### 4.2.3. Information of the Interview

A qualitative standardized interview was used to perform the interview. The aim is to investigate further into the topics that emerged from the questionnaire survey and practitioners' experiences. The same demographic was used as in the quantitative stage of the study. Three professionals interested in the construction of housing were available for interviews. The first question sought to determine if there are delays in road construction projects in Addis Ababa City Road Authority. Delay in road construction projects are big issues that needs to be resolved quickly, according to 100% of respondents.

Table 7. Information of Interviewees

Company	Designation	Work Experience
Client	Office Engineer	8
Consultant	Resident Engineer	13
Contractor	Project Manager	17

*Source: survey result, 2022*

The above Table 7 shows the interview respondents working experience in the sector is 8 to 17 years of experience in road construction industry.

### 4.3. The Importance and Ranking of Causes of Delay

Delays in road construction projects happen due to various causes and factors. A total of 37 delay causing factors were identified and grouped in to 5 as client related factors, consultant related factors, contractor related factors, material and equipment related factors, and external related factors. Regarding to this respondent were asked to rank the delay causing factors based on the frequency of occurrence in Addis Ababa city road construction projects by using five points Likert scale.

Table 8 shows that the most important client related delay causes of road construction projects in Addis Ababa city road Authority were delay of payment by the client (RII=0.81), Land acquisition problems (RII=0.73), Change in scope of the project (RII=0.70), Poor decision making (RII=0.64), Change orders (RII=0.63), Owner financial problems (RII=0.56) and Lack of communication (0.59).

Hence, the hypothesis  $H_1$ : delay of payments by the client have a significant negative impact on road construction project delay is proven to be correct since delay of payment by the clients is ranked to be the 1<sup>st</sup> client related delay cause.

Table 8 .Importance and ranking of Client related delay causes

S. No.	Client Related Causes	RII	Rank	Level of Contribution
1	Delay of payment by the client	0.81	1	Very High
2	Poor decision making	0.64	4	High
3	Change orders	0.63	5	High
4	Owner financial problems	0.59	6	Average
5	Change in scope of the project	0.70	3	High
6	Land acquisition problems	0.73	2	High
7	Lack of communication	0.56	7	Average

*Source: survey result, 2022*

According to table 9 the most important and highly ranked consultant related delay causes of road construction projects in Addis Ababa city road Authority were Delay in approving documents (RII=0.84), Improper planning and scheduling (RII=0.76), Slow response and poor supervision (RII=0.68), Inaccurate cost estimation (RII=0.65), Incompetent project team (RII=0.56), Inadequate experience of Consultant (RII=0.54), Low performance (RII=0.52), Design errors (RII=0.28).

Therefore, the hypothesis H<sub>2</sub>: Inaccurate cost estimation by the consultant have substantial influence on the project completion is proven to be right since Inaccurate cost estimation by the consultant is the 4<sup>th</sup> consultant related delay cause.

Table 9 .Importance and ranking of consultant related delay causes

S. No.	Consultant Related Causes	RII	Rank	Level of Contribution
1	Inaccurate cost estimation	0.65	4	Average
2	Inadequate experience of Consultant	0.54	6	Average
3	Low performance	0.52	7	Average
4	Design errors	0.28	8	Low
5	Improper planning and scheduling	0.76	2	High
6	Delay in approving documents by consultant	0.83	1	Very High
7	Slow response and poor supervision	0.68	3	High
8	Incompetent project team	0.56	5	Average

*Source: survey result, 2022*

According to Table 10 the most important and highly ranked contractor related delay causes of road construction projects in Addis Ababa city road Authority were delay due to Sub-contractors (RII=0.82), Reworks (RII=0.75), Low bid by contractor (RII=0.74), Inadequate Contractor experience (RII=0.68),



Inaccurate time estimation (RII=0.67), Inappropriate construction methods of the contractors (RII=0.61), Poor Site Management (RII=0.57), Lack of Technology (RII=0.54), Poor resource management (0.52), and Technical problems by contractor (0.42).

Table 10. Importance and ranking of Contractor related delay causes

S. No.	Contractor Related Causes	RII	Rank	Level of Contribution
1	Inadequate Contractor experience	0.68	4	High
2	Delay due to Sub-contractors	0.82	1	Very High
3	Inappropriate construction methods	0.61	6	High
4	Inaccurate time estimation	0.67	5	High
5	Technical problems by contractor	0.42	10	Average
6	Poor Site Management	0.57	7	Average
7	Lack of Technology	0.54	8	Average
8	Poor resource management	0.52	9	Average
9	Low bid by contractor	0.74	3	High
10	Reworks	0.75	2	High

*Source: survey result, 2022*

According to table 11 the most important and highly ranked material and equipment related causes of road construction projects in Addis Ababa city road Authority were Cost of materials (RII=0.92), Shortage of construction material (RII=0.80), Lack of modern technology equipment (RII=0.74), insufficient equipment (RII=0.72), Poor quality of construction material (0.65), Unreliable supplier (0.57) and Late delivery of materials (0.56).

Therefore, the hypothesis H<sub>3</sub>: Shortage of construction materials have a significant negative impact on road construction project delay is proven to be correct since Shortage of construction materials was ranked 2<sup>nd</sup> among the material and equipment related causes.

Table 11 Importance and ranking of Material & Equipment Related Causes

S. No.	Material & Equipment Related Causes	RII	Rank	Level of Contribution
1	Shortage of construction material	0.80	2	Very High
2	Poor quality of construction material	0.65	5	High
3	Cost of materials	0.92	1	Very High
4	Late delivery of materials	0.56	7	Average
5	Insufficient equipment	0.72	4	High
6	Lack of modern technology equipment	0.74	3	High
7	Unreliable supplier	0.57	6	Average

*Source: survey result, 2022*

According to Table 12 the most important and highly ranked external related causes of road construction projects in Addis Ababa city road Authority were Shortage of foreign currency (RII =0.84), Unsuitable site condition (RII =0.65), Unavailability of utilities (RII=0.64), Beaurocracy and change in government policy (0.52) and Natural disasters (0.38).

Table 12 Importance and ranking of external related delay causes

S. No.	External Related Causes	RII	Rank	Level of Contribution
1	Natural disasters	0.38	5	Average
2	Unsuitable site condition	0.65	2	High
3	Beaurocracy and change in government policy	0.52	4	Low
4	Shortage of foreign currency	0.84	1	Very High
5	Unavailability of utilities (Water & Electricity)	0.64	3	High

*Source: survey result, 2022*

#### 4.4. Top Delay Causes

As mentioned in Table 13 below, the top ten delay causing factors of road construction regarding Addis Ababa City Road Authority are ranked and summarized in the table by analyzing the data collected from the respondent's perception.

Cost of materials is suggested to be the most important causing delay factor with RII=0.92 followed by Shortage of foreign currency with RII= 0.84. Delay in approving documents by consultant with RII=0.83 and delay due to Sub-contractors with RII=0.82 was ranked 3<sup>rd</sup> and 4<sup>th</sup> important delay causing factors

respectively. Delay of payment by the client and Shortage of construction material was ranked to be the top 5<sup>th</sup> and 6<sup>th</sup> with RII=0.81 and 0.80 respectively. The top 7<sup>th</sup> and 8<sup>th</sup> top delay causing factors were Improper planning and scheduling and Reworks with RII=0.76 and 0.75. Lack of modern technology equipment and Low bid by contractor were the 9<sup>th</sup> and 10<sup>th</sup> most important delay causing factors with RII of same 0.74.

Table 13 Top ten delay causing factors

S. No.	Top Ten Delay Causing Factors	RII	Rank	Level of Contribution
1	Cost of materials	0.92	1	Very High
2	Shortage of foreign currency	0.84	2	Very High
3	Delay in approving documents by consultant	0.83	3	Very High
4	Delay due to Sub-contractors	0.82	4	Very High
5	Delay of payment by the client	0.81	5	Very High
6	Shortage of construction material	0.80	6	Very High
7	Improper planning and scheduling	0.76	7	High
8	Reworks	0.75	8	High
9	Lack of modern technology equipment	0.74	9	High
10	Low bid by contractor	0.74	10	High

*Source: survey result, 2022*

#### 4.5. The Importance and Ranking of Effects of Delay

Delays in road construction projects outcomes various effects. A total of 13 important effects of delay were identified. Regarding to this respondent were asked to rank the most important effects of delay based on the frequency of occurrence in Addis Ababa city road construction projects by using five points likert scale.

Table 14 presents the ranking order of effects of road construction based on the primary data that is collected from the client, consultant and contractors of Addis Ababa City Road Authority, the ranking order of effects of road construction.

The analysis of data from the distributed questionnaire and interviews shows that the top five important effects of delay are time overrun (RII=0.94), cost overrun (RII= 0.91), poor quality (RII= 0.84), compromised quality (RII=0.80) and Low Profit (RII=0.78).

Therefore, the hypothesis H<sub>4</sub>: Time Overrun is expected to be the effect of road construction delay in AACRA and H<sub>5</sub>: Cost Overrun is expected to be the effect of road construction delay in AACRA are both proven to be right.

Table 14 The Importance and Ranking of Effects of Delay

S. No.	Effects of Delay	RII	Rank	Level of Contribution
1	Time Overrun	0.94	1	Very High
2	Cost Overrun	0.91	2	Very High
3	Poor quality	0.84	3	Very High
4	Compromised Quality	0.80	4	Very High
5	Low Profit	0.78	5	High
6	Disputes	0.76	6	High
7	Negotiations	0.74	7	High
8	Court Cases	0.72	8	High
9	Litigations	0.72	9	High
10	Abandonment	0.69	10	High
11	Revocation	0.67	11	High
12	Arbitration	0.66	12	High
13	Bad reputation	0.62	13	High

*Source: survey result, 2022*

#### 4.6. Discussion of The Results

The main purpose of this study was to assess and identify the causes and effects of road construction projects in Addis Ababa City Road Authority. Accordingly, the first objective of the research was to identify the delay causing factors that currently exist in the road construction projects of Addis Ababa City Road Authority. Results of the data analysis as depicted on table 13 shows that the first influential factor for the cause of delay is found to be cost of materials with RII value of 0.92 which was included in Material & Equipment Related Causes and this also ranked to be the second influential factor on the study of Werku & Jha, (2016). The second influential factor which is shortage of foreign currency for importation of materials with RII value of 0.84 under the category of external related were also ranked to be the eighth and third top causes of delay respectively on the study made by Kamanga & Steyn, (2013).

The third important factor, Delay in approving documents by consultant with RII value of 0.83 is also mentioned on the research result of Amare, (2017) in which the factor is ranked to be the fifth vital cause of delay on the study. Delay due to sub-contractors, which is the fourth important cause of delay in the study with RII value of 0.82 is also mentioned to be the prominent factor on

researches made by Ashraf & Ghanim, (2016). Delay of payment by the client which the fifth most vital delay causing factor in this study with RII 0.81 were also ranked fourth most influential delay causing factor on the study conducted by Werku & Jha. (2016).

In this study, Shortage of construction material has been ranked sixth important delay causing factor with RII 0.80 which also ranked to be seventh important delay causing factor on research made by Meaza, (2015). The seventh influential factor in this study is Improper planning and scheduling with RII 0.76 which is ranked as the 3<sup>rd</sup> most significant delay factor on the study made by Werku & Jha, (2016). Rework ranked as the 8<sup>th</sup> significant delay causing factor in this study with RII 0.75 and also it is ranked as 8<sup>th</sup> most significant delay factor on the study conducted by Ashraf & Ghanim, (2016). The 9<sup>th</sup> important factor as per ranked in the study, Lack of high technology mechanical equipment with RII value of 0.74, is also ranked as 6<sup>th</sup> important factors of delay on the study made by Amare, (2017). The 10<sup>th</sup> significant delay factor in this study is Low bid by contractor with RII Value of 0.74 which also ranked as the 4<sup>th</sup> significant delay factor in the study conducted by Ashraf & Ghanim, (2016).

However, the overall ranking of the causes of delays of the study does not coincide with the top rankings of the other studies. Since project is a unique endeavor, delay causing factors and their rankings may vary from country to country and also from project to project. Hence, the ranking of the causes and their classification of their group as client related, consultant related, contractor related, material and equipment related and external related also varies with other studies.

Based on the Importance and Ranking of Effects of Delay on Table 14 , the top effects were mentioned to be time over run ( RII=0.944) and cost over run (RII=0.91). These results correspond with the results reached by Prakash & Joseph, (2014), Eyasu (2013), Obodoh & Obodoh.(2016), Ashraf & Ghanim, (2016), Firdissa, (2018), and Aboubaker, (2018). The Third identified effect, poor quality of work, with RII value of 0.84 was mentioned as the sixth effect of delay on the study made by Aboubaker, (2018) and compromised quality, which was identified as the Fourth effect of delay with RII value of 0.80 on the study was also identified as the third effect on the study made by kikwasi (2013). In this study the fifth effects delay is Low profit with RII value of 0.78 which is also ranked as 7<sup>th</sup> effects of delay in the study made by Kamanga & Steyn (2013). The sixth most significant effects of delay in this study is Dispute which ranked as third in research made by Ashraf & Ghanim, (2016). Negotiations and Courts case are the Seventh and Eighth

effects of delay in this study while the same ranked as Fourth and Fifth most significant effects of delay in study made by Haseeb, (2011). The Ninth effects of delay in the study is Litigation which also ranked as 6<sup>th</sup> most significant effects of delay in the study conducted by Ashraf & Ghanim, (2016). Abandonments in this study ranked as the 10<sup>th</sup> most significant effect of delay which is ranked as 5<sup>th</sup> most significant effect in the study conducted by Ashraf & Ghanim, (2016).

# **CHAPTER FIVE**

## **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1. Summary**

The main purpose of this study was to assess the Cause and Effects of Delay on Road Construction Projects in Addis Ababa City Road Authority. The specific objectives of the study were to identify the major delay causing factors, to rank the most significant delay causing factors, to identify the effects of delay and to rank the most significant effects of the delay in Addis Ababa City Road Authority.

In order to achieve its objective, the study adopted a descriptive research design which is used to provide quantitative or numerical description of attitude, or opinions of participants to evaluate the perception of parties that involved in Addis Ababa City road construction Projects. From the total of 60 questionnaires, 10 questionnaires were distributed to the client, 20 to the consultant and 30 to the contractor. Out of the totally distributed questionnaire 56 were properly filled and returned back. The collected data was analyzed quantitatively using statically package for social science (SPSS) software and Microsoft excel. Relative importance index was used to rank the identified 37 causes and 13 effects in the study. the five points likert rating scale ranging from very low (1) to very high (5) and strongly disagree (1) to strongly agree (5) for cause and effects of delay respectively was used which was developed to get the perceptions from the client, consultant and contractor groups.

Results of the data analysis with regard to demographic characteristics of the respondents showed that the Majority of the respondents were male (73.2%). The age category 31-40 (39.3%) has covered the majority of the respondents followed by 18-30 (33.9%). In terms of level of education 75 % of the respondents were degree holders and 25% of the respondents had their master's degree. Majority of the respondents are from the site engineers' position (55.36%). The majority of the respondents have 1-5 years of experience (30.36%) followed by 11-15 years of experience (28.57%).

The findings of this study listed the top ten delay causing factors in Addis Ababa city road construction projects according to their relative importance index value. Thus, Cost of materials, Shortage of foreign currency, Delay in approving documents by consultant, delay due to Sub-contractors, Delay of payment by the client, Shortage of construction material, Improper planning and scheduling, Reworks, Lack of modern technology equipment and finally Low bid by contractor found to be the top ten most significant delay causing factors.

Similarly, the finding of this study ranked the top 5 most important effects of delay in Addis Ababa city road construction projects according to their relative importance index value. Thus, Time Overrun, Cost Overrun, Poor quality, Compromised Quality, Low Profit, found to be the most significant effects of delay.

## **5.2. Conclusion**

Construction project is a project that is bounded by limited time, resources, budget, and expected performance. In today's highly competitive economic environment, the need for completing road construction projects within the stipulated budget, time frame, and expected performance expectations is highly important and it is considered satisfactory when the project's target is met in terms of the above predetermined goals and to the satisfaction of all stakeholders.

The road construction industry is regarded as an important field of every economy in the world. This is due to the fact that the success of the industry helps support socio-economic development and the overall progress of economy and the growth of a nation . In road construction industry time is a very important project success measure and an important resource and tool in project management life cycle. Delays are one of the most series challenges that usually occur in road construction projects and the severity of these delays varies greatly from country to country and from project to project. Thus, identifying sources of delay and analyzing them is the basic requirement for reducing or avoiding delays in project execution. Therefore, This research was aimed at identifying the major cause and effects of delay at AACRA projects through a survey. The analysis was made based on the perceptions of the responsible parties involved in the construction process, namely, the client, consultant and the contractor.

From the conducted literature reviews and the questionnaires that was collected from the client, consultant and contractors the top delay causing factors are identified and the following conclusions are drawn.

**From the Client Related Causes:** Delay of payment by the client were ranked as the 5<sup>th</sup> top delay causing factor in Addis Ababa city road construction projects.

**From Consultatnt Related Causes:** Delay in approving documents by consultant and Improper planning and scheduling were ranked 3<sup>rd</sup> and 7<sup>th</sup> top delay causing factor in Addis Ababa city road construction projects respectively.



**From Contractor Related Causes:** Delay due to Sub-contractors and Reworks were the 4<sup>th</sup> and 8<sup>th</sup> top delay causing factor in Addis Ababa city road construction projects respectively.

**From Material & Equipment Related Causes:** Cost of materials and Shortage of construction material were ranked the 1<sup>st</sup> and 5<sup>th</sup> top delay causing factor in Addis Ababa city road construction projects respectively.

**From External Related Causes:** Shortage of foreign currency were ranked the 2<sup>nd</sup> among the top delay causing factor in Addis Ababa city road construction projects

**Time Overrun, Cost Overrun, Poor quality, Compromised Quality, Low Profit** found to be the top five most significant effects of delay respectively

### **5.3. Recommendations**

The results of the survey have identified the main causes of delay and the most frequent effect of the delay on road construction projects in Addis Ababa. To minimize or avoid delays that made the completion time of the projects double and triple of the initial contract time and effects of delay, concerned parties in sector and professionals are expected to work hand in hand for a common goal. Based on the findings of the project, the following recommendations are forwarded to the main stakeholders of the industry and other parties, which have a connection to the successful completion of a project.

**For Clients:** Clients are those parties, which are the ultimate user or owner of projects. In this regard, they are the one who at first place want to have the project completed on time and budget. However, they have to participate on the process of making their dream come true rather than giving the responsibility to others and blame them for the occurrence of delay and their effect. Therefore, the recommendations for the client are:

- The client have to made payments to the contractor on time to avoid delays
- To resolve land acquisition issues before the commencement of the project
- Need to avoid changing the scope of the project in order to avoid delay

**For Consultants:** The consultant plays a great role in translating client's idea into plans, drawings and specifications. Since most of the projects in Ethiopia are designed and supervised by the same consultant, their impact on quality, time and cost of the project is substantial. In addition, since they are involved on projects starting from the conceptual phase to the completion of the projects their importance is higher. Therefore, the following points are forwarded to consultants of the road's projects:

- Consultants must revise and approve the design documents on time and clients also shall make a timely and prompt decision
- They have to do a proper planning and scheduling by considering the fluctuation and the current escalation of the material prices.
- Consultants have to make the supervision deep enough to confirm that the contractor is undertaking the project on the pre scheduled time, resource and budget.

**For Contractors:** The Contractor is the one, which plays the important role to change the blue print into real world project. On this process the contractor have the responsibility of managing the different resources, which are intended to the project to the success of the project. Therefore, the following are expected from contractors:

- The contractors should select experienced sub-contractors and supervise them continuously to avoid delay that caused by the subcontractors.
- The contractors have to follow the specifications and guidelines that set by the client in order to avoid reworks.
- Contractors should understand consequences of offering lower prices than reasonable prices that considers the actual conditions of the construction project. Low offer would bring about downfall of contractors from the sector. Other wise quality and time will significantly be affected to compensate the lower prices.

In general, all since all parties are working for the benefit of their own, it must not be in such a way that the profits are on the expense of other. The success of a project guarantees success for all parties. So, all parties have to work hand in hand by giving equal tolerance and resistance for the occurrence of delay by external and environmental cause, which is beyond their control.

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## ANNEXURES

### Appendix I – Questionnaire



**St. Mary's University**  
**School of Postgraduate Studies**  
**(Filled by Employees – Employee Survey)**

**Dear Sir/Madam**

Greetings, welcome! My name is Ellene Dejene; I am a graduate student in the postgraduate program at St. Mary's University department of project management and currently working on my thesis entitled as "Assessment of Cause and Effects of Delay on Road Construction Projects in Addis Ababa City Road Authority." Therefore, it is your cooperation that helps the researcher to accomplish the research objectives.

Hence, I am friendly requesting you to share your experience and knowledge, and perception. This questioner will take you approximately 20 – 30 minutes to complete. In the course of our discussion I want to assured you that, the information you will share, will be kept confidential and will be used only for educational purpose. You have also the right to refuse not to answer, and also quit; if you feel discomfort with the questions. You are not forced to make any kind of contractual agreement that will abide you to stay till the end of the research. Here, I kindly request you to give honest and genuine answers to all the questions without which the research will not succeed. The finding of this study will be presented and reported to St. Mary's University department of project management.

**Thank You in advance for your cooperation!**

Ellene Dejene

## Section A: Respondent General Information

### 1. Gender

Male

Female

### 2. Age

18 – 30

31 – 40

41 – 50

51 – 60

Over 60

### 3. Level of Education

Certificate

Diploma

Degree

Master Degree

### 4. Company / Organization

Client

Consultant

Contractor

### 5. Designation in the company

Project Manager

Resident Engineer

Office Engineer

Site Engineer

### 6. Relevant Work Experience (Years)

1 – 5

6 – 10

11 – 15

16 – 20

>20



## Section B: Causes of Delay for Construction of Roads in AA City.

Please kindly rate each factors according to the following rating scale by putting a thick mark for each factor stated below based on the frequency of occurrence in AA City road construction projects.

Category	Very Low	Low	Medium	High	Very High
Rating	1	2	3	4	5

Causes of Delay		Frequency				
		1	2	3	4	5
Client Related	1. Late payment					
	2. Poor decision making					
	3. Change orders					
	4. Owner financial problems					
	5. Change in scope of the project					
	6. Land acquisition problems					
	7. Lack of communication					
Consultant Related	1. Inaccurate cost estimation					
	2. Inadequate experience of Consultant					
	3. Low performance					
	4. Design errors					
	5. Improper planning and scheduling					
	6. Delay in approving documents					
	7. Slow response and poor supervision					
	8. Incompetent project team					
Contractor Related	1. Inadequate Contractor experience					
	2. Delay due to Sub-contractors					
	3. Inappropriate construction methods					
	4. Inaccurate time estimation					
	5. Technical problems by contractor					
	6. Poor Site Management					
	7. Lack of Technology					
	8. Poor resource management					
	9. Low bid by contractor					
	10. Reworks					
Material and Equipment Related	1. Shortage of construction material					
	2. Poor quality of construction material					
	3. Cost of materials					
	4. Late delivery of materials					
	5. Insufficient equipment					
	6. Lack of modern technology equipment					
	7. Unreliable supplier					
External Related	1. Natural disasters					
	2. Unsuitable site condition					

	3. Beurocracy and change in government policy					
	4. Shortage of foreign currency					
	5. Unavailability of utilities (Water & Electricity)					

For additional suggestions and comments regarding the cause of road construction delay in AACRA.....  
 .....

**Section C – Effects of Delays**

Please kindly tick in the boxes according to your given scales, each scales measures the effects of delay in AA City road construction projects.

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

SL. No.	Effects of Delay	1	2	3	4	5
1	Cost Overrun					
2	Time Overrun					
3	Compromised Quality					
4	Arbitration					
5	Disputes					
6	Negotiations					
7	Court Cases					
8	Litigations					
9	Loss of Profit					
10	Revocation					
11	Abandonment					
12	Bad reputation					
13	Poor quality					

For additional suggestions and comments regarding the Effects of road construction delay in AACRA.....  
 .....

**Thank you for your time!**

## Appendix II – Interview

I am Ellene Dejene, a student of St Marry University. I am conducting an academic research on Assessment of Cause and Effects of Delay on Road Construction Projects in Addis Ababa City Road Authority. Therefore, it is your cooperation that helps the researcher to accomplish the research objectives. I have few questions that are related to the study:

Can I proceed? Thank you!

1. What is your educational level?
2. In which Company you are working? (Client, Consultant or Contractor).
3. What is your position in the company?
4. Are there delay in road construction projects in AACRA ?

Yes  No

1. If the answer is yes for Q.4, please answer the following questions.
5. What is the reason for occurrence of delay in this projects?
6. How do you measure and evaluate the planning, scheduling and controlling process of the projects?
7. What are the major reasons for delay of construction in the projects?
8. What are the major consequences of delay in the construction projects?
9. What are the reasons contributing for major cause of delay in the projects?
10. What are the reasons contributing for major effect of delay in the project?

**Thank you for your time!**