



**ST. MARY'S UNIVERSITY**

**DEPARTMENT OF PROJECT MANAGEMENT**

**ASSESSMENT ON ROAD PROJECT IMPLEMENTATION DELAY  
FACTORS IN ADDIS ABABA: THE CASE OF YOTEK CONSTRUCTION  
PLC**

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

**BY: ALEMTSEHAY MEHARI**

**ADVISOR: MULUADAM ALEMU (PHD)**

**DECEMBER, 2021**

**ADDIS ABABA, ETHIOPIA**

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## **DECLARATION**

I declare that this MBA in Project Management. Thesis is my original work, and has never been presented for the award of any degree in this or any other university and all source of materials used for the thesis have been duly acknowledged.

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**DECEMBER, 2021**

**ADDIS ABABA, ETHIOPIA**

## ENDORSEMENT

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

Adviser's Name and Signature:

A small, square image containing a handwritten signature in blue ink. The signature is stylized and appears to read 'Muluadam Alemu'.

MULUADAM ALEMU (Ph.D.)

## **ACKNOWLEDGEMENT**

First my innumerable praise to the Almighty God for giving me the opportunity, capacity and guidance throughout my life. Next I am deeply grateful and indebted to Muluadam Alemu (Ph.D), my advisor, for his valuable guidance and understanding through all the preparation of this paper. I would like to pass my deepest gratitude to my family and friends for their encouragement, suggestions, guidance and overall assistance to Successful accomplishment of this research I would also like to thank kumlachew for his generous time devotion from the early design of the proposal to the final write-up of the thesis by adding valuable, constructive and ever-teaching comments.

I am greatly indebted to my family for entirely financial coverage and supporting by any materials. My sincere appreciation and thanks also goes to my colleagues for the remarkable memories and constant moral support during the study period. I also feel great to express my thanks to the peoples who participated in the study for sparing their precious time to give the necessary data.

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## **Abstract**

*The main objective of this study to identify the key cause of road project implementation delay in YOTEK plc In Addis Ababa. This paper studied a list of road construction delay factors that gathered from literature having different types of construction, different countries, different periods and different numbers of delay causes. The questionnaire survey was distributed to 118 participants (clients, contractors, and consultants) and 88 were collected. The study applied Relative Importance Index (RII) calculated to identify delay causes of road project though out ranking. Case studies on two projects have been analyzed and identified a common factor for project time delay. The result of Relative Importance Index analysis indicates that type of project bidding and award (negotiation, lowest bidder), Construction mistakes and defective work, Material and labor wage escalations (inflation), Delay in approving major changes in the scope of work and inspection delays were the top five cause of project delay. Spearman ranking correlation coefficient has been employed to test the agreement level of the project parties on the identified delay factors. Accordingly the test results disclose good agreement on the causes between owners and Contractors has been revealed and a somewhat low correlation between Consultants and with both owner and Contractors. In order to optimally overcome the road project delays in the city, a recommendations partially a strategic planning integrations in order to overcome the impact of dependency from different parties are forwarded.*

**Key words:** *Road project, Yotek road project, case of project delay, contractors, owners*

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Road construction is also an important economic sector and a driving force behind a country's national economy. In both industrialized and developing countries, the building industry is a key contributor to economic and social growth. This industry's performance varies with the general economy, and it responds quickly to economic changes (Abdullah, 2013).

Many construction projects across the world face the most common construction problems: delays. Due to the unique circumstances of each project, delays vary by geography, construction project, and construction type or cost. Road construction, as one of the most visible areas of the building projects, is also an area where project delays are common and must be addressed quickly. Every construction project that is delayed wastes time and, as a result, money, which is the lifeblood of any economy. Time delays and cost overruns restrict the construction industry's progress and have a detrimental impact on national economies. They also contribute to considerable financial losses (Ahmed, *et al.*, 2016).

Construction delays are defined as time overruns that occur either after the contract expires or after the parties agree on a delivery date for the project (Marzouk & El-Rasas, 2014). Project delays can arise in the road construction industry due to the extension of construction time due to disruptive occurrences that disturb the construction workflow (Shebob, *et al.*, 2012). Furthermore, these delays have a negative impact on both the contractors and the project's beneficiaries.

Transport plays a critical role in aiding economic development in Ethiopia because of its topography, habitation pattern, and economic activity. Recognizing the importance of road transportation in promoting social and economic growth, as well as its function as a catalyst for achieving poverty reduction goals, Ethiopia's government has intensified its focus on improving the quality and scope of the country's road infrastructure. Following these core principles, the government created the Road Sector Development Program in 1997 to address road sector restrictions such as limited road network coverage and poor quality. The program was launched

with the goal of enhancing transportation efficiency and rural accessibility, among other things, and has been implemented in four phases till 2015, with the fifth phase currently wide (MOFED, 2015).

Yohannes Teklay launched YOTEK Construction plc. in 1998. In the last 21 years, the company has established itself as one of Ethiopia's leading private construction companies, providing services such as building, roads, special factory foundations, bridges, and various types of civil engineering edifices, all of which contribute to the development of the construction industry. YOTEK Construction is fully equipped with contemporary equipment and tools in line with the applicable requirements of the FDRE Ministry of Works and Urban Development /MoWUD/, and has worked in a variety of Ethiopian regions. The main concerns are providing high-quality services, meeting deadlines, and implementing cost-effective management strategies. But I observed road project delays though pilot study in this company due to different factors. This study therefore attempt to investigate the major case of road construction project delays specific to Addis Ababa, Ethiopia, by identifying the various forms of construction delays, their causes, and impacts from various perspectives, in order to evaluate the effect and importance of the discovered delay factors in road construction projects in Ethiopia.

## **1.2 Statement of the problem**

The primary purpose of roads is to provide access and mobility. At the moment, developing countries all over the world are focusing on improving and connecting their road networks. Given that a solid road network contributes to the development of the economy and national growth, road projects are being prioritized in their national budget (Ludwig, *et al.*, 2020).

The requirement to complete road construction projects within the specified cost, time period, and projected performance expectations is becoming increasingly critical in today's highly competitive economic environment. Without a question, the performance of the road sector is critical to the growth of every country's economy, regardless of its level of development. However, project delays in the construction business, in general, and road building in particular, are becoming a typical occurrence in the industry. In fact, the goal of all parties involved, including the project owner, contractors, engineers, and consultants in the various sectors, is to execute the project on time, on budget, with the desired quality, and in a safe manner. However,

due to a variety of variables originating from various sources, it is a regular occurrence in developing countries such as Ethiopia to see project delays in road development (Wambui *et al.*, 2015).

Empirical studies have been conducted on the effects of project delays in various nations and historical periods. For example, a study by Wijekoon, (2013), cost is the most significant cause of project delays; cost is one of the most important factors to consider throughout the project life cycle. The financial status of the contractors, payment delays by the owner, the political situation, poor communication between construction parties, lack of equipment efficiency, and high competition in bids are identified as the top risks affecting time overrun in road construction projects in Palestine by Mahamid, (2013).

Other negative consequences of road construction delays include lost time and contractors' inability to complete projects within agreed-upon deadlines. If road construction delays are to be effectively addressed, it is necessary to analyze and comprehend the interrelationships among the separate components (Wambui, *et al.*, 2015).

However, factors that contribute to construction delays are not restricted to the actual process of road construction; ineffective decision-making, untrained personnel, and inter-party dispute can all play a role (Aziz, *et al.*, 2016). Although the impacts of delays may appear to be identical, the circumstances that generate them are often very different. Regardless of the source or combination of causes, all delays are a problem for the project and contractor. However, there was discovered to be a link between the elements that cause road building delays and the involvement of specific circumstances (Ondari & Gekara, 2013). Several studies looked at the reasons of road building delays, with a primary focus on identifying some primary factors, but they were less focused on examining the interrelationships between these elements and calculating the combined impact of related factors (Ondari & Gekara, 2013).

According to a study conducted on the Ethiopian construction sector by Werku Jha, (2016), just 8.25 percent of projects in Ethiopia have been completed by the original projected completion date. According to the research, the remaining 91.75 percent missed their contractual deadline. In the case of Addis Ababa road construction, delays are becoming one of the authority's primary concerns, posing a threat to citizens' lives. The effects of project time delays differ depending on

the perspectives of the parties involved. For example, the owner perceives a delay as a loss of revenue and a lack of services, whereas the contractor sees it as a loss of money (Kikwasi, 2012).

Shimelis Mirssa (2019) conducted the on the determinants of road construction project delay on Addis Ababa road construction Authority. The study was applied Relative Importance Index (RII) to calculate that identify the top twenty and the least twenty delay causes of construction projects. The result of the study indicates that slow land expropriation due to resistance from occupants / slow site clearance; delays in contractor's progress payment by owner; shortage of materials/Equipment on site; difficulties in financing the project by contractor; delay to deliver the site among the top five factors contributing to road construction project time delay in the city.

Given the above-mentioned theoretical and empirical gaps, this paper was try to fill the gap and put a momentous exertion to examine and identifying the major causes for project delay in the study area. This research will be assumed to pin point the major factors that would optimize a road project delay in a construction industry by providing answers for the research questions using Relative importance Index and correlation analysis.

### **1.3 Research Question**

- What are the major causes of road construction project delays in the study area?
- Which factor is highly influential on time delay of the projects?
- Do the road construction project parties have common agreement on the factors causing project time delay?

### **1.4 Objective of the Study**

#### **1.4.1 General Objective**

The general objective of this study is to assess the road project delay factors in the case of YOTEK Construction Plc., Ethiopia.

#### **1.4.2 Specific Objectives**

More specifically this research will anticipate:

- To identify the major causes of delay in the road construction projects in the study area.
- To Identify the delay causes from the perspective of contractors, owners and consultants;
- To rank the overall and stakeholders factors according to their contribution to project.

## **1.5 Significance of the study**

The road is one of the most important economic sectors in Ethiopia, and it is the driving force behind the country's economic growth. However, it has a number of flaws that impair performance in terms of time, cost, and quality. With these facts in mind, the study attempts to describe the elements that contribute to road project delays. The implementation of this study is likely to yield a number of beneficial benefits. The importance of identifying difficulties connected to road construction project delays is to gain a better knowledge of the reasons of delays, especially among the project's primary players: contractors, clients, and consultants. This can be accomplished by putting theoretical principles addressed in a variety of literatures to use in real-world projects.

These findings are supposed to guide efforts to improve the performance of road building projects and to be valuable to construction stakeholders. As a result, these findings may inspire practitioners to concentrate on any delays that may have occurred in their current or future initiatives. As a result of the analysis, the responsible bodies will devise a strategy to address the issues that lead to project delays. Because effectively controlling these elements is dependent on how clearly the issues are identified as such. Furthermore, the study may point the way for further research for those who are interested, as well as act as a reference for future research in this field.

## **1.6 Scope of the Study**

The study was focused on roads constructions that were built by YOTEK PLC in the prior GTP II (2016-2020) and those that are now being built by the Addis City capital budget. Despite the fact that there are several issues with the execution of building projects, this study was emphasis on the primary causes of delays in achieving the planned road sector plan. It was applied a cross-section survey method to investigate the factors that influence road project delays. The questionnaire-schedule will be used as the data gathering instrument. This study doesn't focus on the consequence of project delay and limited to YOTEC Plc, consultants, and contractors.

## **1.7 Organization of the Study**

This study is designed to incorporate five chapters. The first chapter of the thesis introduces the general overview including the background of the study, statement of the problem, objectives,

basic research questions, significance of the study, and scope of the study. The second chapter deals with literature review that presents the in-depth review of the theoretical perspective on factors that would be identified to stimulate road project delay under different context. Chapter Three deals with the research methodology where variables to be analyzed, sampling methods, data source of the study, and sample size determination method are explained. Chapter Four focuses on discussing the study area and give emphasis on the presentation, interpretation, and discussion of the major findings of the study. Finally, Chapter Five recapitulates the study in terms of summary, conclusions and recommendations.



# CHAPTER TWO

## LITERATURE REVIEW

### 2.1 Theoretical Review

In today's fast-paced, deadline-driven environment, time is frequently recognized as a critical benchmark for evaluating project performance, according to Farhad Eizakshiri, *et al* (2015). Because the major goal of the project management principle is to complete the project on time, within budget, and according to the needed quality/specifications, construction time is frequently used as a benchmark for evaluating the performance of a project and the efficiency of project management. One indicator of a successful project was its completion on time. Time is money; every construction project that is delayed affects time and hence money, which is the lifeblood of any economy Remon Aziz (2016). One of the most critical aspects affecting project success, as well as quality and safety, is the timely completion of road building projects. However, in today's fast-paced construction sector, building project delays, especially road construction projects, are becoming more typical.

The construction sector has a poor reputation when it comes to dealing with delays. Time delay is a common occurrence that is virtually always related with construction projects. According to Sullivan (1986), as cited in Remon Aziz, *et al.* (2016), many construction projects around the world face one of the most significant construction problems: delays. Delays vary by country, by construction project, and by construction type or cost due to the unique circumstances of each project. And delays effect each person involved in the construction project differently, such as the owner or the contractor, who are both affected differently, but not in the same way as the consultant, who is the least affected of all. Along with delays, project failure, reduced business margins, and citizen distrust of government-funded initiatives are all common outcomes, resulting in a slew of bad implications for a country's organizations and social economy.

#### 2.1.1 Definition of the project delay

Different definitions of delay were found, and Ahmed, *et al.* (2001) concluded that delay is the most common, costly, difficult, and risky problem encountered in construction projects. The term "delay" refers to a time overrun that occurs after a contract's completion date has passed, or after

the parties have agreed on a delivery date for a project. Assaf Al-Hejji, (2016). Every plan a corporation prepares for conducting contract work has time as a key component. The schedule, the scope of work, and project circumstances all have a link. Furthermore, Werku Koshe & Jha (2016) describes construction delays as the late completion of work compared to the anticipated timeline or contract schedule. While on-time completion of projects is a measure of efficiency, the building process is subject to several variables and unpredictable events that arise from a variety of sources. Parties' performance, resource availability, environmental conditions, other parties' involvement, and contractual relationships are some of these sources. It is extremely rare for a project to be finished within the time frame set. Construction is a vast, volatile industry that requires large capital investments. Construction projects continue to be delayed, and project completion dates are being pushed back, despite today's superior technology and management grasp of project management approaches.

### **2.1.2 Type of delay**

Construction projects are influenced by a variety of elements from the design stage through the completion stage (Baloia, 2001). Various authors in the field categorize the reasons into various categories based on various criteria.

### **2.1.3 Intrinsic and Extrinsic delays**

According to Ahmed (2003), delay causes are divided into two categories: internal causes and external factors, which could be renamed Intrinsic and Extrinsic factors by other writers. External factors, on the other hand, are outside a management's control because they arise as a result of unforeseen circumstances. These variables are unrelated to the project participants. They can be termed act of God and may include the followings; weather conditions, natural disasters, government actions and material supplies.

This could be characterized in another way as the classification of internal and extrinsic elements. Extrinsic factors include elements such as the sociocultural, technological, economic, and political environments in which these organizations operate. Intrinsic factors are those that relate to construction organizations, whereas extrinsic factors include elements such as the sociocultural, technological, economic, and political environments in which these organizations operate. Extrinsic delays are difficult to influence or control, whereas intrinsic delays can be

handled through effective project management. Extrinsic elements including geopolitical risk, inflation, and currency rate fluctuations are commonly referred to as "global risk factors" (Baloia, 2001).

#### **2.1.4 Delay of Construction Projects in Ethiopia**

Ethiopia's construction industry is booming, and road networks are expanding across the country on a regular basis. However, historical data on completed road projects reveals that none of the projects were completed on time or on budget (Shambel & Patel, 2018). According to Werku and Jha (2016), construction delays occur at every stage of a project and are a prevalent problem in Ethiopian construction projects, and they are one of the leading causes of project failure. In their research to "examine causes of construction delay," Werku and Jha identified five major factors that cause delays in Ethiopian public building development. Contractor financial difficulties, material price increases, ineffective planning and scheduling by contractors, delays in progress payments for completed works, and a lack of skilled professionals in construction project management in contractor organizations were identified as the five key factors for construction project delays, according to the study's findings.

#### **2.1.5 Causes of construction projects delay source.**

Many parties are involved in the construction industry, causing several issues and turning the industry into a high-risk trade sector. Every project has a set timetable, a budgeted cost, and a quality expectation. All of this is spelled out in the contract documents. The parties have filed several claims and disputes as a due to poor contract management and other unforeseen events. Delay is a key source of claim and an often encountered problem in the construction industry, where its characteristics are well established but fundamental factors and their consequences are not. As a result, numerous projects are running behind time. Delays may occur from the feasibility stage of the project and persist until the construction work is completed due to poor management. Three parties are involved in the lifecycle of a construction project: the owner, consultant, and contractor. As a result, they are the primary cause of project schedule delays (Islam & Trigunaryyah, 2017). Project delays are also caused by other variables such as the country's general economy, resource price inflation, a lack of managerial service, environmental problems, and so on. Al-Hejji & Assaf (2006). Many projects fail to generate enough money as a

result of delays. Delays also have a negative influence on business for both contractors and developers, for example, by lowering the company' brand. It also raises building costs due to a variety of variables such as rising resource prices, economic slump, extreme weather, political turmoil, and so on. Schedule performance, along with cost and quality, is one of the most important aspects of project success. However, there are a number of issues that can create delays throughout the project life cycle for a variety of reasons. The first step in minimizing project delays is to identify the reasons that are causing them and then either remove or control them. As a result, identifying possible delays is a necessity for enhancing project schedule performance Ahmed, *et al* (2001).

A number of studies have been conducted around the world to look into project delays and the reasons for them. According to Wael, *et al*, (2007), there are two types of causes for construction project delays: internal and external sources. Causes emerging from four parties involved in the project are among the internal causes of delay. These parties include: - The owner, Designers, Contractors, and Consultants.

Other delays, which are not caused by these four parties, are due to external factors such as the government, materials suppliers, or weather (Ahmed, *et al.*, 2003) cited in Wael, *et al* (2007). However, different numbers of delay causes for different types of construction in road construction have been identified, ranging from 293 delay causes in Egypt (Remon Aziz, *et al*, 2016) to 47 delay causes in Bahrain (Rehab Hasan, *et al*, 2014), and the same concept is true in general construction type. The study of the causes of delays in road construction projects was undertaken with the goal of broadening the scope of research into road projects, as timely completion of road construction projects has a substantial impact on both the country's economic and social aspects.

#### **2.1.6 Delay factors of road construction project**

Delay is a key source of claim and an often encountered problem in the construction industry, where its characteristics are well established but fundamental factors and their consequences are not. As a result, numerous projects are running behind time. Delays may occur from the feasibility stage of the project and persist until the construction work is completed due to poor management.

Several studies have been undertaken to identify construction project delay factors, and as a result, numerous causative elements have been identified during the last several decades. And the majority of academics agree that identifying a collection of causes of delay is a valid approach of enhancing a project's timetable performance. While some authors believe that lessons may be gained from similar causes of delay (Durdyev *et al.*, 2017; Gündüz *et al.*, 2013), others believe that they should be tailored to the project's environment or the country in which it is being carried out (Hampton *et al.*, 2012; Ogunlana *et al.*, 1996) cited on Remon Aziz, *et al* (2016).

However, our analysis of the literature on the subject reveals that there are a number of common causes that have been documented by the majority of researchers in this field, which are listed below. It's worth noting that the recognized reason of project delays might lead to a variety of different forms of project delays (internal types particularly i.e. in owners, contractors and consultant). After a deep reviewing a number of studies across different countries, a number of causative factors of construction project pointed out have been identified for this study. Among there viewed studies conducted at different countries, in Egypt, Remon Aziz, *et al* (2016) on their study of exploring delay causes of road construction project identified 293 delay causes categorized under 15 groups have been evaluated through literature review and M.M. Marzouk and El-Rasas, (2014) has identified 43 delay causes which were grouped to seven categories: owner related, consultant related, contractor related, material related, labor and equipment related, project related, and external related on his study of analyzing delay causes in Egyptian construction projects.

. Dinakar (2014) has identified about 63 causes for delays which have been divided into 7 categories containing 9 causative factors each. Assaf, Al-Hejji (2006) on his study entitled Cause of delay in large construction project in Saudi Arabia has identified 43 delay causes which were grouped to nine categories: Project, owner, contractor, consultant, Material, design, Equipment, labor, and external factors. In Tanzania, Kikwasi, (2012) on its study presented on Conference Series with a title of "Causes and effects of delays and disruptions in construction projects in Tanzania" has identified 23 cause of delay in construction project and In India, Prasad, *et al* (2019) analyzed causes of project delays and mitigation measures in Indian construction projects with a 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. In Ethiopian too Werku Koshe Jha, (2016) conducted a questioner survey of the 88 cause of construction delay factors under eight broad categories namely client related, consultant/supervisor related, contractor related, designer related, labor related, material related, equipment and external related categories.

In addition to the studies listed above, the study has identified the following factors causing delays in construction projects for the study purpose and has categorized the factors that cause delays in the four categories listed below based on a deep review of studies like Ahmed, *et al.*(2003) and Wael *et al.* (2007) and so much more as indicated on the empirical review of this study, the study has identified the following factors causing delays in construction projects for the study purpose and has categorized the factors that cause delays,

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### **Factor in Categories**

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#### **1. Contractor's responsibility**

- Poor site management and supervision by contractor
  - Improper construction methods implemented by contractor
  - Inadequate contractor experience causing error
  - Ineffective planning and scheduling of project by contractor
  - Poor subcontractor performance/delays
  - Conflicts in sub-contractors schedule in execution of project
  - Shortage of site labor
  - Poor qualification of the contractor's technical staff
  - Coordination problems with others
  - Construction mistakes and defective work
  - Shortage of materials/Equipment on site
  - Delay in commencement
  - Reworks due to defects/ in construction materials
  - Financing by contractor during construction
  - Delay in site mobilization by contractor
  - Often change of subcontractors
  - Contractors inefficiency in handling resources
-

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**2. Owner responsibility**

- Slowness of the owner decision making process
- Change orders by owner during construction (variation)
- Owner financial problems/client finance/economic ability for the project
- Slow land expropriation due to resistance from occupants  
Owner
- Design changes by owner or his agent during construction  
Owner
- Delay to deliver the site
- Delays in contractors progress payment by owner
- Delay in approval of completed work by owner/client
- Excessive bureaucracy in project owned operation
- Poor scope definition/ Changes in client's requirements
- Type of project bidding and award (negotiation, lowest bidder)
- Mistakes and discrepancies in contract documents
- Poor contract management
- Unclear contract conditions/terms
- Complicated administration process of client
- Bribes (kickbacks) & personal interest (prejudices)  
'corruption'; Fraudulent practices;
- Lack of coordination with the contractor and utility providers
- Poor communication and coordination of the owner with other parties.
- Inadequate progress review;

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**3. Consultant responsibility**

- Delay of design submittal from consultant
  - Delay in approving major changes in the scope of work
  - Inspection delays (delay in performing inspection and testing by consultant)
-

- 
- Lack of experience of consultant in construction projects;
  - Poor communication and coordination of the consultant with other parties
  - Lack of consultant's site staff
  - Mistakes and discrepancies in design documents
  - Rework due to change of design or deviation order
  - Wrong or improper (poor) (inappropriate) design

---

#### **4. External related factors**

- Poor weather conditions
  - Conflict, war, revolution, riot, and public enemy External
  - Poor government judicial system for construction dispute settlement
  - Changes in laws and regulations, transportation delays
  - External work due to public agencies (utilities and public services) and Delay in providing services from utilities (such as water, electricity)
  - Obtaining permits from municipality (government)
  - Exchange rate (Price) fluctuation/economies
  - Material and labor wage escalations (inflation)
  - Shortage (availability) in construction materials;
  - Unreliable suppliers
  - Social, religions and cultural factors;
  - Political situation
- 

## **2.2 Empirical Review**

The construction sector is enormous, complicated, and requires a lot of money. Delays in the completion of a construction project are one of the most serious issues confronting the construction industry, and they may be a huge issue for project participants, leading to costly disputes and strained relationships. Every construction project experiences delays, and the magnitude of these delays varies greatly from project to project. Many studies have looked into



the reasons behind project delays in the public sector. For this study, the findings of such investigations were examined.

Remon Aziz, *et al.* (2016), undertook a study in Egypt to investigate the causes of road construction project delays. The following goals were pursued in this research: a. determining the most important and least important causes of delays in highway building; b. determining the severity of the delay causes from the perspective of stakeholders. Through a literature search, 293 delay causes were classified into 15 groups using a questionnaire survey. And the survey indicated that, based on the overall findings, the owner's financial problems were the primary factor causing delays in road projects in Egypt. The study identified equipment shortages, insufficient contractor experience, material shortages, equipment failure, design errors, mistakes in soil investigation, poor subcontractor performance, and rework due to design changes, poor site management, and contractor supervision as the leading causes of delays.

In Tanzania, Kikwasi, (2012), in a study titled "Causes and Effects of Delays and Disruptions in Construction Projects in Tanzania," identified seven highly ranked causes as design changes, delays in payment to contractors, information delays, funding problems, poor project management, compensation issues, and disagreement on the valuation of work done as "design changes, delays in payment to contractors, information delays, funding problems, poor project management, compensation issues, and disagreement on the valuation of work done as "

In Egypt, a study of ranking delay factors in construction project after Egyptian revolution by Remon Aziz, (2013) has ranked contractors related factors on the first and equipment related factors were ranked on second. And owners related factors, project related factors, design related factors, consultant related factors, external related factors, Material and labor related factors are the factors ranked from third to the last. These studies has set identifying delay factors, categories, rank and address the most contributing factors as the objective of the research. By using a questionnaire survey 99 delay factors categorized under 9 groups reviewed through literature have been evaluated in the study. The study has also used case study as methodology of ranking the factors.

In India, Prasad, *et al* (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, contractors 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.

In Bahrain, Rehab Hasan, *et al*, (2014) investigated causes of delays in road projects. The study aimed to identify and rank the causes of delay based on their frequencies of occurrence and their severity in road projects. Accordingly, the survey comprised of 47 causes/factors of delay that was classified by responsibility into six groups: Causes related to contractor, Causes related to owner, Causes related to consultant, Causes related to services and utilities, Causes related to Government regulations, Causes related to Government regulations, Causes related to external environment have been identified. The study concluded that even each category identified has a significant contribution for road project delay, but causes related to services and utilities are the most critical factors as indicated by the high values of their severity means. Lack of planning, shortage of manpower and materials from contractor side, suspension of work, budget availability and delay in decision making from owner side and lack of experience from consultant side are the significant causes identified from the other categories and recommendation made on it remarkably.

In Jordan Al-Momani, (2000) has conducted a quantitative analysis on construction delay to determine the causes and the level of time extension of public projects. Using a random sample of 130 public projects, the study concluded that poor design and negligence of the owner, change orders, weather condition, site condition, late delivery, economic conditions, and increase in quantities are the main causes of delay.

In Saudi Arabia, Hussein Abdellatif and Adel Alshibani, (2019) assessed major factors causing delay in the delivery of manufacturing and building projects in Saudi Arabia. The survey comprised 22 causes/factors of delay and two categorizations were made: the first is based on the

impact of the cause, and the second is based on the frequency of occurrence of the identified cause that has been found that the top five impacted causes of delay in the delivery of industrial projects in Saudi Arabia. These are: difficulties in financing project by contractor/manufacturer, late procurement of materials, late delivery of materials, delay in progress payments, and delay in approving design documents, respectively. In terms of frequency, the top five identified causes are: delay in progress payments, difficulties in financing project by contractor/manufacturer, slowness in decision making, late procurement of materials, and delay in approving design documents, respectively.

In Malaysia, Wael A., *et al*, (2007) has identified the major causes of delays in construction projects in Malaysia using a survey. The primary aim is to identify the perceptions of the different parties regarding the causes of delays, the allocation of responsibilities and the types of delays. Accordingly, the survey comprised the causes/factors of delay in to four categories by responsibility: Causes related to contractor, Causes related to owner, Causes related to consultant, Causes related to external factors and identified top ten factors. Financial difficulties and economic problems (owner) on the first rank, Financial problems (contractor) and Supervision too late and slowness in making decisions (consultants) on second and third ranks respectively. Slow to give instructions(consultants), Lack of materials on market (external), Poor site management (contractor ) Materials shortages on site (contractor), Construction mistakes and defective work (contractor ), Delay in delivery of materials to site (contractor ), Slowness in making decisions (owners), Lack of consultant's experience (consultants), Incomplete documents (consultants) are the factors identified from the fourth rank to last tenth.

In Ethiopia, Werku Koshe, Jha, (2016) conducted a questioner survey in Ethiopia to investigate causes of construction delay designed to assess the opinion of clients, design engineers, consultants, and contractors in order to evaluate the frequency of occurrence and degree of severity of the 88cause of construction delay factors under eight broad categories namely client related, consultant/supervisor related, contractor related, designer related, labor related, material related, equipment and external related categories have been identified throughout the literature review. The study revealed that from overall results, it was found that five most significant factors that cause delay in Ethiopian public building construction have been identified. According to the study result, contractor's financial difficulties, escalation of material price,

ineffective planning and scheduling by contractors, delay in progress payments for completed works, lack of skilled professional in construction project management in contractor organization were the five key factors identified for delay of construction projects.

Wubishet, *et al* (2017) has conducted a survey and case study on Causes of Cost Overrun in Federal Road Projects of Ethiopia in Case of Southern District. The study has identified six to prated factors for a project cost overrun and these were material price fluctuation, cost underestimation, delay in supply of raw materials, inadequate review of contract documents, lack of coordination at the design phase and lack of cost planning during pre- and post- contract stage have the highest impacts on the performance of project costs from the client's, consultants and contractors perspective.

Meaza Alemayehu, (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 36 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, Patel (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. The study also indicated once identified the main causes it is necessarily to give solutions to complete the projects on time and estimated cost.

### 2.3 Conceptual framework

The conceptual framework has highlighted a number of aspects that impact the rate at which projects are completed in connection to the literature study. It outlined the factors that influence the performance of road construction projects. The variable in this case is the factors that cause delays in the implementation of road construction projects in the road construction sector, with the resulting delays including time overruns, cost overruns, disputes between parties, underutilization and waste of resources, and total abandonment, among others.

The following delays factor categories have been identified for the purpose of this study from the previous studies that have been carried out on addressing the causes of delays in construction projects industry. The conceptual framework outlined the cause of delay in the implementation of project and the outcomes of delay.

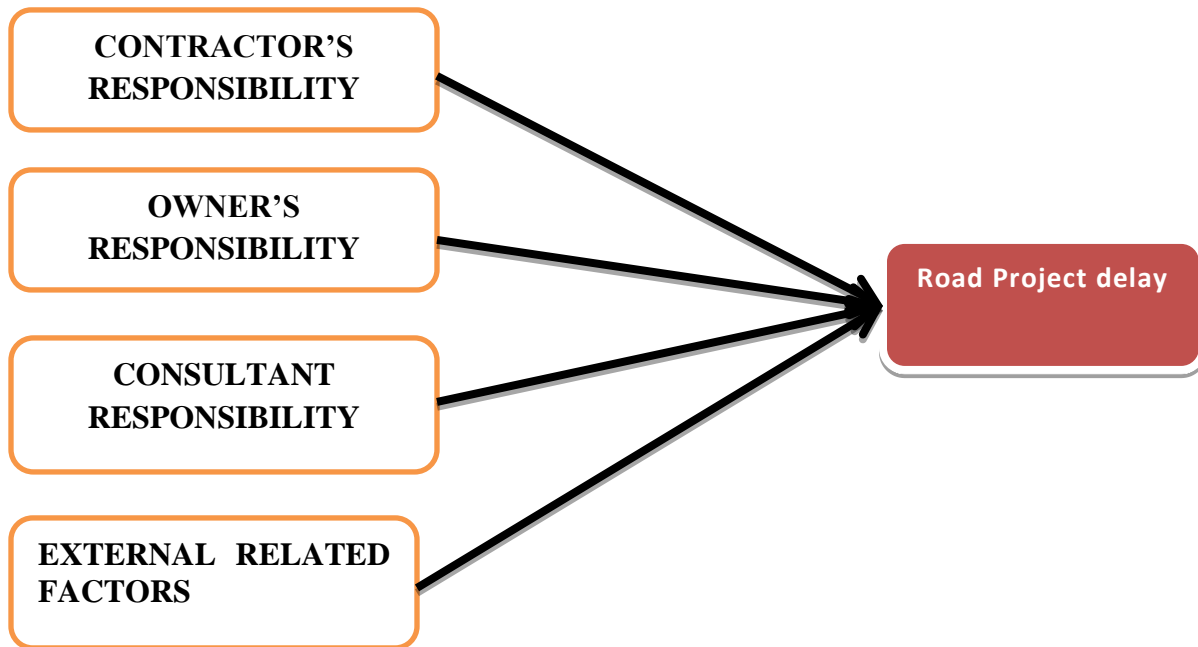


Figure 2. 1 Conceptual framework

# **CHAPTER THREE**

## **RESEARCH METHODOLOGY**

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

This research used a cross-sectional survey method to determine the factors that affected road project delays in Addis Ababa. Because of the cross-sectional character of this research, a descriptive research design was used to provide a detailed explanation of the findings presented in tables, as well as to draw conclusions about the factors that influence road projects. This study applied both qualitative and quantitative research methods. The qualitative and quantitative methods are the two primary methodological approaches to diverse investigations. Quantitative research, on the other hand, is more descriptive, drawing inferences based on statistical techniques and frequently employing graphs and figures in its analysis (Ghauri & Grønhaug, 2005).

### **3.2 Population of the study**

Because the number of ongoing road projects is only 20, and the research does not consider closed projects in the authority, the study's target populations are clients, contractors, and consultants who are directly involved in the construction of road projects, regardless of their experience in road construction projects. YOTEK construction senior specialists and personnel representing road projects under study were among the responders in this survey. According to the YOTCK construction annual report, 2021 from the MIS department, there are 1245 active respondents in project offices in the 20 road projects. The target populations of this study were 485 employees who are working in the selected two road projects which are performing in Addis Ababa.

### **3.3 Sample Size Determination**

In order to determine the representative sample sizes for the total target population of this study, the researcher applied Yemane (1967) simplified formula. Accordingly, the required sample size at a 95 % confidence level with a degree of variability (the more homogenous a population the smallest sample size required to be, to obtain a given level of precision). The required sample

size can be calculated according to Yamane’s formula the uppermost part is for 5%, and the lower one for 10% level of significance. For this study the level of precision the middle of upper and lower part equal to 8 % is used to obtain a required sample that represents a true population.

$$n = \frac{N}{1 + N(e)^2} \qquad n = \frac{485}{1 + 1100(0.08)^2} = 118$$

Where “n” is sample size, “N” is the total population and “e” is the level of precision. Accordingly, the total sample size for this study is 118. In the case of this study a total of 118 respondents will be selected from three project site by simple sampling technique.

### **3.4 Sampling Technique**

The study has applied both random and non-random sampling technique to select a representative sample of employees in the study area. As a result, the researcher used a purposive technique to choose two projects sites from a total of twenty. The reason to select these two projects is the researcher familiarity and good knowledge of the areas to achieve the objective of the study. Finally, from the total 485 employees, 118 samples were selected using systematic randomly sampling because the list of employees are available.

### **3.5 Source of Data**

The main data source of this study was primary data sources. Primary data was collected using key informant interview, questionnaires, and discussions to assess the cause of project delay in Addis Ababa. Secondary data was gathered from published and unpublished data sources. Published sources were included from local government; from various publications of foreign government; from published journals; from books, magazines and newspapers; from reports and other sources of published information. The sources from unpublished data: from research workers, public/private individuals and organizations.

### **3.6 Methods of Data Collection**

The study employs a survey method as it enables the researcher to collect the opinion on the cause of project delay in Addis Ababa from all a stakeholder of road project construction. According to Creswell (2008), a survey research provides a quantitative or numeric description

of trends, attitudes, or opinions of a population by studying a sample of that population. In addition, in order to identify the factors in detail, among the projects two road project with long delay time have been selected and the projects have been reviewed in detail as data collection for the study. According to Slake (1995), are an inquiry method in which the researcher investigates a program, event, action, or process in depth. As a result, researchers aim to obtain specific information from customers using a project document review and interview methods with the counter team as a periodic review. In addition to a Five Point Likert scale questionnaire (very little impact to very impact factor) about the severity level of project delays, the survey includes different personal information about the respondents (personal experience, his/her stay as a worker on the road project, responsibility, and others).

### **3.7 Methods of Data Analysis**

#### **3.7.1 Descriptive analysis**

The data gathered from the sample organization was analyzed in light of the study's objectives. Data collections using the questionnaire were analyzed using the help of Statistical Package for Social Science as a quantitative data collection method (SPSS version 20) and Excel. Data editing and coding were performed by the researcher to guarantee logical completeness and consistency of responses. After the data is edited, it was examined qualitatively and quantitatively for data collected using various data gathering equipment. The quantitative (ordinal) data collected through questionnaires was examined using various descriptive statistical approaches such as frequency to determine the relative importance index of various factors that contribute to road construction delays. Quantitative data analysis was done using the inferential statistic Spearman correlation coefficient.

Calculating the Relative Importance Index (RII) and ranking factors in each category based on the Relative Importance Index (RII) are two steps in data analysis. Many researchers (Assaf, *et al.*, 1995; Faridi and El-Sayegh, 2006; Iyer and Jha, 2005; Kumaraswamy and Chan, 1998) cited in Doloi *et al.*, (2012) believe that the mean and standard deviation of each individual attribute are not suitable measures to assess overall rankings because they do not reflect any relationship between them, and that the Relative Importance Index (RII) is the best

$$RII = \frac{\sum w}{A*N} \dots\dots\dots Eq. 3.1$$



$$\sum W = 1n1 + 2n2 + 2n3 + 2n4 + 2n5$$

Where, RII = Relative Importance Index,

= 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),

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

N = total number of respondents.

### 3.7.2 Econometrics model analysis

The Spearman's coefficient of rank correlation is used to see if each pair of parties (respondents) agrees or disagrees on the cause of delays during the construction phase of road projects due to the failure of the owner, consultant, and contractor. Owner versus consultants, owner versus contractors, and consultants versus contractors are the pairs of parties evaluated for agreement. According to Salleh (2009), Spearman's formula is as follows:

$$\rho = 1 - \frac{6 \sum di^2}{n(n-1)}$$

Where  $\rho$  = Spearman coefficient

d = the difference between ranks

n = number of subjects or pairs of ranks

### 3.8 Definition of Variables

**Road project 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 (Pickavance, 2005). 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.

**Contractor’s responsibility:** a contractor is responsible for planning, leading, executing, supervising and inspecting a building construction project. The responsibility extends from the beginning to the end of the project, regardless of its scope. Contractors accomplish their duties

by planning activities, supervising workers, and ensuring the project follows local codes and laws (Michael Tobias, 2021).

**Owner Responsibility:** In the construction industry, the term 'owner' typically refers to the person or organization that owns a built asset (such as a building, bridge, tunnel, etc.) or land. But it may also refer to ownership of the components of a project. This can be important, for example, in determining whether an ownership of a component lies with a supplier or whether it has transferred to the client

**Consultant Responsibility:** Consultants are professionals, typically, appointed by the client to perform expert tasks on a project. This might include: - Providing advice on setting up and defining the project. Developing and co-coordinating the design, Preparing production information and tender documentation. Consultants offer advice and expertise to organizations to help them improve their business performance in terms of operations, profitability, management, structure and strategy. Although the workload can be heavy, consulting is a sociable profession with plenty of networking opportunities.

### **3.9 Reliability and validity**

According to Joppe M. (2000), instrument validity refers to the ability to accurately measure what is intended to be measured based on the study's objectives.

It is used to ensure that all relevant variables are included while excluding irrelevant ones. It also ensures that all variables under consideration are appropriately measured.

Testing of the reliability of the five-point scale utilized in the survey was carried out using Cronbach's alpha coefficient. In this study, the researcher used the rule of thumb developed by (George & Mallery 2003), where an alpha value  $\geq 0.90$  is excellent,  $\geq 0.80$  is good,  $\geq 0.70$  is acceptable,  $\geq 0.60$  is questionable,  $\geq 0.50$  is poor,  $\leq 0.50$  is unacceptable. As shown in Table 4.2, the summary of the reliability coefficient of the scale was established by Cronbach's Alfa using the SPSS package, which reflected Alfa coefficient to be in the range from 0.798 to 0.913. This is considerably higher than the acceptable reliability 0. The result ensures that the questionnaire is reliable.

Table 3. 1 Reliability test results by Cronbach's Alpha

No.	Category of data/ Factors	Cronbach's Alpha
1	Contractors	0.810
2	Owners	0.913
3	Consultant	0.878
4	External	0.798

Source: Own survey (2021)

### 3.10 Ethical Consideration

There were certain ethical protocols that are followed by the researcher .The first is asking explicit consent from the respondents .This ensures that their participation to the study is not out of their own will. The researcher also ensured that the respondents are aware of the objectives of the research and their contribution to its completion. One other ethical measure includes treating the respondents with respect and courtesy. This make the respondents are at ease and more likely to give honest responses to the questionnaire. They were told about their right to refuse and withdraw from participating in the research. For the concern of confidentiality, the name of the study participants was not included in the questioner and data was kept safe and only for the intended purpose.

## **CHAPTER FOUR**

### **DATA PRESENTATION, ANALYSIS AND INTERPRATION**

#### **4.1. Introduction**

This chapter presents the findings of a research conducted at YOTEC plc in Addis Ababa to determine the causes of road construction delays. To generate raw data for analysis, this study used a survey and a case study. Surveys were used to collect information from a huge number of people in a short amount of time. The poll was done through a questionnaire on projects that had encountered time overruns. The purpose of the survey questionnaire was to discover the common reasons that cause time overrun, and the questionnaires were created with that in mind. Case studies were utilized to supplement the analysis, which included an in-depth examination of a project's archive. To test the agreement among the grouped rankings, influencing factors based on relative relevance index and spearman ranking correlation were used.

This study primarily used two separate strategies to examine the acquired data in order to find the top-rated factors that affect the project time schedule among all three stakeholders. A descriptive approach to direct interpretation of the case study and survey results to identify the top rated influencing factors based on relative importance index and spearman ranking correlation to test the agreement among the grouped ranking.

#### **4.2. Questionnaire survey**

A number of one hundred eighteen (118) questionnaires were distributed and were filled out by eighty eight (88) experienced construction professionals including project manager/ manager, Contract administrators and own force engineers from Client side, Engineers and site supervisors from contractors and consultants with a response rate of 75 %. Since a result of the questionnaire collecting, it can be concluded that enough questionnaires were returned to analyze the data and conclude in this study, as Burgess (2001) states that in a questionnaire survey research, a response rate of 60% +/-20% is appropriate for data analysis. The information gathered was examined using the Relative Importance Index (RII) approach. The results of the investigation identified the most common contributing variables and categories that cause delays.

#### 4.2. 1. Demographic Characteristics of Respondents

Respondents are selected from a wide range of professionals engaged in the road construction sector: contractors, clients and engineers were among the target population. The sample consisted of Client representative (counter engineers or contract administrators from YOTEK plc, structural engineers, project managers, consultants.

Table 4. 1. Demographic Characteristics of Respondent

<b>Item</b>	<b>Category</b>	<b>Frequency</b>	<b>Percent</b>
<b>Education</b>	TVET/Diploma	24	27.3
	Degree	53	60.2
	Masters and above	11	12.5
	Total	88	100.0
<b>Experience</b>	less than 5 years	21	23.9
	5 - 10 years	58	65.9
	16-15 years	9	10.2
	Total	88	100.0
<b>Responsibility</b>	Engineer	19	21.6
	Supervisor	25	28.4
	Manager	17	19.3
	Client/Owners	27	30.7
	Total	88	100.0

Source: Own survey (2021)

According to table 4.1 above, majority (60.2%) of the employees in the road construction was degree holders while only 12.5% of the employees were masters and above education levels. On the other hand 65.9% of the employees have working 5 years up to 10 years in YOTEK PLC whereas 10.2% of the employees were working 11 up to 15 years in road construction sectors.

From the total of 88 respondents 30.7% of the respondents are clients/ owners have followed by 28.4% of them are supervisors, 21.6% of the respondents are engineers, and 19.3% of the respondents are sit manager. This implies that majority of the respondents who were participated in this study were clients/ owners.



Shortage of materials/Equipment on site	261	0.59	10
Poor site management and supervision by contractor	260	0.59	11
Delay in commencement	245	0.56	12
Poor qualification of the contractor's technical staff	242	0.55	13
Delay in site mobilization by contractor Often change of subcontractors	235	0.53	14
Inadequate contractor experience causing error	225	0.51	15
Coordination problems with others	224	0.51	16

Source: Own survey (2021)

Table 4.3 shows that the project's construction mistakes and defective work received the highest RII value of 0.83, putting it top. This means that project managers in Addis Ababa need to have significant project management expertise and experience to effectively avoid road construction delays. Project execution also necessitates the use of proper tools and techniques.

Conflicts in sub-contractors schedule in execution of project and financing by contractor during construction were the second and the third case of road project delay in Addis Ababa with RII 0.75 and 0.67 respectively. On other side delay in site mobilization by contractor often change of subcontractors, inadequate contractor experience causing error and Coordination problems with others were the least factors of road project delay with RII 0.53, 0.51 and 0.51 respectively.

Table 4. 4 Owner Related Factors

<b>Owner Related Factors</b>	<b>W</b>	<b>RII</b>	<b>Rank</b>
Type of project bidding and award (negotiation, lowest bidder)	377	0.86	1
Delays in contractors progress payment by owner	348	0.79	2
Slowness of the owner decision making process	342	0.78	3
Design changes by owner or his agent during construction Owner	333	0.76	4
Slow land expropriation due to resistance from occupants Owner	326	0.74	5
Poor communication and coordination of the owner with other parties.	321	0.73	6

Poor scope definition/ Changes in client's requirements	346	0.63	7
Inadequate progress review	268	0.61	8
Delay to deliver the site	257	0.58	9
Poor contract management	257	0.58	10
Excessive bureaucracy in project owned operation	254	0.58	11
Delay in approval of completed work by owner/client	248	0.56	12
Unclear contract conditions/terms	242	0.55	13
Mistakes and discrepancies in contract documents	241	0.55	14
Complicated administration process of client	241	0.55	15
Change orders by owner during construction (variation)	239	0.54	16
Owner financial problems/client finance/economic ability for the project	238	0.54	17
Bribes (kickbacks) & personal interest (prejudices) "corruption"; Fraudulent practices;	229	0.52	18
Lack of coordination with the contractor and utility providers	208	0.47	19

Source: Own survey (2021)

The above table indicates that the owner related factors for road project delay, the most important factors of road project delay was the type of project bidding and award (negotiation, lowest bidder) the score RII value 0.86. The second and the third factors related to owners' contribution were delays in contractors' progress payment by owner with the score RII value 0.79 and slow land expropriation due to resistance from occupant owner with the score RII value 0.78.

On the other side owner financial problems/client finance/economic ability for the project, bribes (kickbacks) & personal interest (prejudices) "corruption"; Fraudulent practices and lack of coordination with the contractor and utility providers are the least factors of road project delay in Addis Ababa with the score of RII value 0.54, 0.52 and 0.47 respectively.

Table 4. 5 Consultant Related Factors



<b>Consultant Related Factors</b>	<b>W</b>	<b>RII</b>	<b>Rank</b>
Delay in approving major changes in the scope of work	352	0.80	1
Inspection delays (delay in performing inspection and testing by consultant)	351	0.80	2
Poor communication and coordination of the consultant with other parties	342	0.78	3
Delay of design submittal from consultant	321	0.73	4
Lack of consultant's site staff	320	0.73	5
Wrong or improper (poor) (inappropriate) design	320	0.73	6
Mistakes and discrepancies in design documents	312	0.71	7
Rework due to change of design or deviation order	295	0.67	8
Lack of experience of consultant in construction projects;	271	0.62	9

Source: Own survey (2021)

According to table 4, the key determinants of road project delay with related consultant cases were delay in approving significant changes in the scope of work and inspection delays (delay in performing inspection and testing by consultant), as indicated above, and their RII score value was 0.80. With a RII score of 0.78, the third reason of road project delays in Addis Ababa was the consultant's poor communication and coordination with other stakeholders.

Mistakes and discrepancies in design documents rework due to change of design or deviation order, and lack of consultant expertise in construction project, on the other hand, was the three least factors of road project delay, with RII scores of 0.71, 0.67, and 0.62, respectively.

Table 4. 6 Table External related factors

<b>External related factors</b>	<b>W</b>	<b>RII</b>	<b>Rank</b>
Material and labor wage escalations (inflation)	361	0.82	1
Political situation	346	0.79	2
Conflict, war, revolution, riot, and public enemy External	323	0.73	3
Social, religions and cultural factors	318	0.72	4
Poor weather conditions	306	0.70	5

Shortage (availability) in construction materials	306	0.70	6
Exchange rate (Price) fluctuation/economies	294	0.67	7
Poor government judicial system for construction dispute settlement	277	0.63	8
Delay in providing services from utilities (such as water, electricity)	277	0.63	9
Obtaining permits from municipality (government)	246	0.56	10
Changes in laws and regulations, transportation delays	240	0.55	11
External work due to public agencies (utilities and public services)	231	0.53	12

Source: Own survey (2021)

As observed in table 4.6 above material and labor wage escalations (inflation) was the first rank factor of road project delay score of RII value 0.82 which was followed by political situation, Conflict (war, revolution, riot, and public enemy external) and Social, religions and cultural factors with the RII score value 0.79 and 0.73 respectively. According to Shimelis Miressa (2019) political situation, conflict (war, revolution, riot, and public enemy external) and social, religions and cultural factors are not major factors due to suitability of pace in our county. This result indicates that there is inconsistent.

On the other side obtaining permits from municipality (government), changes in laws and regulations, transportation delays and external work due to public agencies (utilities and public services) were the least three factors of road project delay which consider as external factors and their RII score value 0.56, 0.55 and 0.53 respectively. According to Shimelis Miressa (2019) those factors are level of cases for project delay. This result indicates that there is a consistent factor for project delay.

Table 4. 7 Overall RII and ranking of the top 15 project delay causes

<b>Delay cause description</b>	<b>Related group</b>	<b>W</b>	<b>RII</b>	<b>Rank</b>
Type of project bidding and award (negotiation, lowest bidder)	Owner	377	0.86	1
Construction mistakes and defective work	Contractors	366	0.83	2
Material and labor wage escalations (inflation)	External	361	0.82	3
Delay in approving major changes in the scope of work	Consultant	352	0.80	4

Inspection delays (delay in performing inspection and testing by consultant)	Consultant	351	0.80	5
Delays in contractors progress payment by owner	Owner	348	0.79	6
Political situation	External	346	0.79	7
Slowness of the owner decision making process	Owner	342	0.78	8
Poor communication and coordination of the consultant with other parties	Consultant	342	0.78	9
Design changes by owner or his agent during construction Owner	Owner	333	0.76	10
Conflicts in sub-contractors schedule in execution of project	Contractors	331	0.75	11
Slow land expropriation due to resistance from occupants Owner	Owner	326	0.74	12
Conflict, war, revolution, riot, and public enemy External	External	323	0.73	13
Poor communication and coordination of the owner with other parties.	Owner view	321	0.73	14
Delay of design submittal from consultant		321	0.73	15

Source: own survey (2021)

Accordingly table 4.7 above the overall delay factors by related group among these types of project bidding and award (negotiation, lowest bidder) is the highest rank from the owner group, Construction mistakes and defective work is the second rank with the score value of RII is 0.83 in the contractor group and the third rank is material and labor wage escalations (inflation) with the score value of RII is 0.82 in the external cases. Delay in approving major changes in the scope of work, and Inspection delays (delay in performing inspection and testing by consultant) are the fourth and fifth rank with the score value of RII 0.80 in the consultant group.

### 4.3 Correlation Analysis

The strength of associations of pairs of variables under study was determined by correlation relationships. The commonly used methods for ascertaining the strength of association between two variables is the Spearman rank correlation method.

#### 4.3.1 Spearman's Correlation

The correlation coefficient  $\rho$  (Spearman coefficient) ranges from -1.0 to +1.0. The closer  $\rho$  is to +1 or -1, the closer the two variables are related. The value of  $\rho$  close to 1 implies there is the strong positive linear relationship between the two variables while the value of  $\rho$  close to -1

shows a strong negative linear relationship between the two variables (Daud, Ahmad, &Yusof, 2009) cited in (Karim, *et al.*, 2013).

Ideally, the correlation coefficient value of  $\pm 1$  is said to be a perfect correlation. If the correlation coefficient value lies between  $\pm 0.5$  and  $\pm 1$ , it is said to have a high degree of correlation. For correlation coefficient value between  $\pm 0.3$  and  $\pm 0.5$ , the degree of correlation is moderate. The small degree of correlation occurs when the correlation coefficient lies between  $\pm 0.1$  and  $\pm 0.3$ . Meanwhile, zero coefficient value represents no correlation at all (Cohen, 1998).

Table 4. 8 Spearman's rho Correlation Coefficient

Category	Contractor	Consultant	Owner
Contractor	1.000	.185*	.766**
Consultant	.185*	1.000	.227*
Owner	.766**	.227*	1.000

Source: Own survey (2021)

\*. Correlation is significant at the 0.05 level

\*\*. Correlation is significant at the 0.01 level.

The significance of both category values were less than 0.05 or 0.01, so the correlation coefficients of both areas are significant at  $\alpha = 0.01$  or  $\alpha = 0.05$ . It can be said that the areas are valid to measure what it was set to achieve the primary aim of the study.

The results of the correlation between contractor and consultant, contractor and owner, and owner and consultant were 0.185, 0.766, and 0.227, respectively. The results obtained from Spearman rank correlation coefficient, the degree of agreement between contractor and consultant is 0.185 which is low when it is evaluated with the agreement of Contractor and consultant. The Spearman rank correlation coefficient shows some sort of agreement between the parties was 0.766 with contractor and owner.

In general, these findings demonstrate a low correlation between the owner and the contractor, implying contradictory and consequently opposing viewpoints between both parties. The contractor and the owner, on the other hand, were in agreement. Because of their contractual relationship, the consultant's position in the construction of projects may be perceived as more favorable to the owner. However, because the correlation with the owner is high but low with construction, this might be viewed as an impartial view of the consultant between the contractor and the owner. Though the study's findings may be a realistic reflection of what is happening in the city's road building projects and may even be useful to those involved, the researcher does not intend to generalize the findings.

#### 4.4 Case study analysis

##### 4.4.1 Project I

Table 4. 9 Summary of Project I case study

Project Name: <b>Shiromeda</b> – Hamerenoh Kidanemihiret Church <b>asphalt</b>		
Project commencement date: <i>March 25, 2020</i>		
Project Close out date: <i>October 28, 2021</i>		
Project Duration: One year and seven month project.		
Number of Extension of time: Three times – 720 days (176, 202, 342 days)		
Project time overrun: Almost two years (133%)		
Current Project status: 62.8% (As of October 2021)		
Time claim (EOT) Summary:		
<b>Time Claim (EOT)</b>	<b>Number of days</b>	<b>Reason for extension</b>
Extension of Time 1:	176	Right of way problem (ROW)
		Design change
		Rain fall and water pipeline
Extension of Time 2:	202	Addition work order or Rework due to change of design or deviation order
		adverse weather condition
Extension of Time 3:		Late renewal of Right of way problem
		Late decision
		Additional work order
Total claim days	720	

Source: EOT document review

According to the project contract (4.8), the project started on October 1, 2015 and was due to be completed and closed out on March 25, 2020. The project had a 1.73 km length and a one-year and seven month duration, which meant the project, was expected to be completed and closed out on October 28, 2021. However, as noted in the overview above, the project was delayed due to right-of-way issues, the failure to timely redirect a water pipeline found on the road, and late site delivery. In addition to contractor poor performance and design issues encountered during implementation, late decision, addition work order, or deviation order were compensable delays because the source of the delay was owners and external variables connected to site clearance.

#### 4.4.2 Project II

Table 4. 10 Summary of Project II case study

Project Name: FaFa		
Project commencement date: <i>March 7, 2020</i>		
Project Close out date: <i>November 24, 2021</i>		
Project Duration: One year and eighty month project.		
Number of Extension of time: Two times – 993 days (287, 706 days)		
Project time overrun: Almost three years (300%)		
Current Project status: 22.76% (As of October 2021)		
Time claim (EOT) Summary:		
<b>Time Claim (EOT)</b>	<b>Number of days</b>	<b>Reason for extension</b>
Extension of Time 1:	287	Right of way problem (ROW)
		late site delivery
		Rain fall
		Cost overrun
		Utility reconciliation
Extension of Time 2:	706	Lately signing of supplementary agreements ( Ethio telecom, and EEU civil works )
		Addition work order or Rework due to change of design or deviation order
		Adverse weather condition
		Political situation
		Inflation

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Total claim days	993
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Source: EOT document review

According to the project contract (table 4.9), the project began in March 7, 2020 and was due to be completed and closed out on November 24, 2021. The project had a length of 5.8 kilometers and a two-year and eighty month period, which meant the project, was expected to be completed and closed out on November 24, 2021. However, due to various delays, the contractor was granted two extensions of time. These delay causes range from contractor-related to external-related problems, with the owner-related factors, particularly the project's right of way (ROW) difficulty serving as the foundation for the project's delay. In addition to contractor poor performance and design problems encountered during implementation, late decision, utility relocation, addition work order or deviation order, and late approval were compensable delays as the cause of the delay was owners and external factors related to site clearance and Delay due to adverse weather conditions.

# **CHAPTER FIVE**

## **SUMMARY, CONCLUSION AND RECOMMENDATION**

### **5.1 Summary**

The findings of the study shows majority (65.9%) of the respondents who participated in the study have the experience 5-10 years and their education level is degree holders which show that they have adequate qualification to better understand and adopt the system.

- ✓ Base on the result of the Relative Importance Index (RII) the top five road project delay cases:- Construction mistakes and defective work, conflicts in sub-contractors schedule in execution of project, financing by contractor during construction, improper construction methods implemented by contractor, and ineffective planning and scheduling of project by contractor under the related group of contractors.
- ✓ Type of project bidding and award (negotiation, lowest bidder), Slowness of the owner decision making process and design changes by owner or his agent during construction owner, and slow land expropriation due to resistance from occupants owner under owner related factors.
- ✓ Delay in approving major changes in the scope of work, inspection delays, poor communication and coordination of the consultant with other parties, delay of design submittal from consultant, and lack of consultant's site staff under Consultant related factors.
- ✓ Material and labor wage escalations (inflation), Political situation, Conflict, war, revolution, riot, and public enemy external, and Social, religions and cultural factors under external related factors

The results of the correlation between contractor and consultant, contractor and owner, and owner and consultant were 0.185, 0.766, and 0.227, respectively. The results obtained from Spearman rank correlation coefficient, the degree of agreement between contractor and consultant is 0.185 which is low when it is evaluated with the agreement of Contractor and consultant. The Spearman rank correlation coefficient shows some sort of agreement between the parties was 0.766 with contractor and owner.



## 5.2 Conclusion

The aim this study was identifying the major causes of delays in road construction projects in Addis Ababa in the case of YOTCK plc through a survey and case study, and quantifies the perceptions of different parties relating to causes of the delay. A hybrid of questionnaires survey and case study (project extension time document review and interview) has been used to provide helpful evidence on road construction project time delay. The study has applied descriptive analysis the factors have been ranked using a relative importance index. Spearman Rank Correlation Coefficient has been employed to test the agreement of the grouped respondents (owners/clients, consultants, and contractors).

Based on the result of Relative Importance Index (RII), type of project bidding and award, Construction mistakes and defective work, Material and labor wage escalations (inflation), Delay in approving major changes in the scope of work, Inspection delays, the top five (5) factors that contribute to road construction project time delay in the city according to the respondent's point of view.

Respondents have also forwarded the following delay causing factors with open-ended questionnaire, besides the ranking factors. Among this lack of material supply on time, design problem, right of way (ROW), change in design, delay in design approval machinery problem, Selection of insufficient contractor, delay in payment of executed work, inadequate site investigation before the project started, lack of integration with utility providers, lack of proper planning like planning at procurement stage, consultant selection, design stage and implementation stage.

In the case of case study and open ended questionnaire, right of way problem, design related problem, lack of integration with utility providers, delay in payment of executed work, Shortage of materials/Equipment on site, and Delay to deliver the site were the common factors that respondents have pointed out as the main cause of road construction project time delay.

The degree of agreement of contractors with owners and consultants on ranking of the factors affecting project time delay was low, according to the Spearman rank correlation coefficient, which could be interpreted as either a lack of common understanding on the degree of the factors affecting project time delay, poor communication among the parties, or a lack of frequent project

progress reviews with the parties. Although the degree of agreement between the owner and contractor was good, the contractor perspective may be seen as more beneficial to the owner due to their contractual connection. However, because the correlation with the owner is high but low with construction, this might be viewed as an impartial view of the consultant between the contractor and the owner. Though the study's findings may be a truthful reflection of what is happening in the city's road building projects and may even be useful to those involved, the researcher does not intend to generalize the findings.

### **5.3 Recommendation**

Based on the bases on of the finding the data analysis, constructive recommendations forwarded as possible actions that can help manage the factors

- ✓ Owner should be as fast as possible in decision making in order not to hinder the work to complete the project on time. In order to do this proper/effective communication channels and timely progress review of the project performance needs to be done. In addition, a structural responsibility needs to be considered in the organization.
- ✓ A long term strategic integration and planning is required with utility providers to overcome the delay factors that arise as a result of utility relocation.
- ✓ In case of design change, owner may demand some design changes during construction but such design change needs to optimized to a limit having no adverse effect on the activities on the critical path.
- ✓ The client should make ready the site of work along with appropriate design before all and make ready for the proper planning, and allocate appropriate budget, that align with the schedule of the construction contract.

### **5.4 Agenda for Future Research**

Detailed studies needs be carried out to estimate the probability of delay (which is very important on project success and should be carefully taken into account before bidding stage) in construction projects by developing and utilizing the findings of this study. The scope of this research is the road construction in Addis Ababa the future researcher has included the road project out of Addis Ababa and also it study the effect of project delay on economic growth the country.

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# Appendix A

St. Mary's University

Dear Respondents

I am post graduate student of St. Mary's University in School of Graduate Studies. This questionnaire is a part of the research project conducted for the fulfillment of requirement of Master of Arts in Project Management. This research is designed to collect information on how you feel about the Road project delay in Addis Ababa, Ethiopia in the case of YOTEC Plc.

NB. As your responses to the statement below are of great importance to my research, I kindly request you to answer the questions honestly, carefully and genuinely. This information will be used wholly and exclusively and only for the academic purpose and your response will be treated confidentially.

If you have any question(s), please call at +251-91 379 5097

Thanks for your participation

**Instruction:** please Put ( ✓ ) on the your response

## Part I: Demographic Characteristics

### 1. Education Background

Less than 12  TVET/diploma  Degree  Masters and above

### 2. Experience

1-5 years  5-10 years  10-15 years  More than 15 years

### 3. How long do you stay in the road construction project?

1-5 year  5-10 years  10-15 years  More than 15 years

### 4. Responsibility \_\_\_\_\_

### 5. How do you rate the overall road project delay?

V. Low  Low  neutral  High  Extremely High

**Part II: Road project delay factors related questions**

**Notice!** 1= Very Low, 2= Low, 3= Neutral, 4= High, 5= Extremely High

Factor in Categories	Measurement Scale				
	1	2	3	4	5
<b>1. How do you rate the contribution of Contractor’s responsibility related factors on Road project delay?</b>					
Poor site management and supervision by contractor					
Improper construction methods implemented by contractor					
Inadequate contractor experience causing error					
Ineffective planning and scheduling of project by contractor					
Poor subcontractor performance/delays					
Conflicts in sub-contractors schedule in execution of project					
Shortage of site labor					
Poor qualification of the contractor's technical staff					
Coordination problems with others					
Construction mistakes and defective work					
Shortage of materials/Equipment on site					
Delay in commencement					
Reworks due to defects/ in construction materials					
Financing by contractor during construction					
Delay in site mobilization by contractor					
Often change of subcontractors					
Contractors inefficiency in handling resources					
<b>2. How do you rate the contribution of Owner responsibility related factors on Road project delay?</b>					
Slowness of the owner decision making process					
Change orders by owner during construction (variation)					
Owner financial problems/client finance/economic ability					

for the project					
Slow land expropriation due to resistance from occupants Owner					
Design changes by owner or his agent during construction Owner					
Delay to deliver the site					
Delays in contractors progress payment by owner					
Delay in approval of completed work by owner/client					
Excessive bureaucracy in project owned operation					
Poor scope definition/ Changes in client's requirements					
Type of project bidding and award (negotiation, lowest bidder)					
Mistakes and discrepancies in contract documents					
Poor contract management					
Unclear contract conditions/terms					
Complicated administration process of client					
Bribes (kickbacks) & personal interest (prejudices) 'corruption'; Fraudulent practices;					
Lack of coordination with the contractor and utility providers					
Poor communication and coordination of the owner with other parties.					
Inadequate progress review;					
<b>3. How do you rate the contribution of Consultant responsibility related factors on Road project delay?</b>					
Delay of design submittal from consultant					
Delay in approving major changes in the scope of work					
Inspection delays (delay in performing inspection and testing by consultant)					
Lack of experience of consultant in construction projects;					

Poor communication and coordination of the consultant with other parties					
Lack of consultant's site staff					
Mistakes and discrepancies in design documents					
Rework due to change of design or deviation order					
Wrong or improper (poor) (inappropriate) design					
<b>4. How do you rate the contribution of External related factors on Road project delay?</b>					
Poor weather conditions					
Conflict, war, revolution, riot, and public enemy External					
Poor government judicial system for construction dispute settlement					
Changes in laws and regulations, transportation delays					
External work due to public agencies (utilities and public services) and					
Delay in providing services from utilities (such as water, electricity)					
Obtaining permits from municipality (government)					
Exchange rate (Price) fluctuation/economies					
Material and labor wage escalations (inflation)					
Shortage (availability) in construction materials;					
Unreliable suppliers					
Social, religions and cultural factors;					
Political situation					
Unexpected underground condition					



What are the main reasons of road project delay?

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How do you rate the road project delay?

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What types of variation happen due to project delay?

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