School of Built Environment, College of Technology and Built Environment

Assessment of Road Project Delay Factors: In the Case of Addis Ababa

BY: YARED ALEMU
ADVISOR: Dr. DAGNACHEW ADUGNA

A Thesis Submitted to the School of built Environment in Partial Fulfillment of the Requirements for the Degree of Masters of science in Urban Planning

Addis Ababa

June, 2025

School of Built Environment, College of Technology and Built Environment

DECLARATION

I hereby declare that this thesis entitled “ASSESSMENT OF ROAD PROJECT DELAY FACTORS: IN THE CASE OF ADDIS ABABA" has been carried out by student researcher under the guidance and supervision of Dr. Dagnachew. Therefore, the thesis is original and has not been submitted for the award of any degree or diploma to any university or institution.

Name	Date	Signature
_____	_____	_____

School of Built Environment, College of Technology and Built Environment

Approval Certificate

This is to certify that the thesis entitled “ASSESSMENT OF ROAD PROJECT DELAY FACTORS IN THE CASE OF ADDIS ABABA" is a genuine work done by Mr. Yared Alemu under my guidance and supervision and only submitted to Addis Ababa, School of Built Environment, College of Technology and Built Environment for the award of the Degree of Master of urban planning. Therefore, I kindly declare that no part of this thesis has been submitted to any other university or institution for the award of any degree or diploma.

Signed by the Examining Committee

Name of the Advisor	**Signature**	**Date**
_____	_____	_____
External Examiner		
_____	_____	_____
Internal Examiner		
_____	_____	_____
Dean of Graduate		
_____	_____	_____

ACKNOWLEDGEMENT

Above all, I am deeply thankful to the Almighty God for giving me the strength, perseverance, and patience to see this research through to completion.

I would like to extend my heartfelt appreciation to my advisor, **Dr. Dagnachew Adugna**, whose thoughtful guidance, constructive feedback, and consistent support made a significant difference throughout the process of this study. His mentorship has been both reassuring and intellectually inspiring.

My sincere thanks also go to the **Addis Ababa City Roads Authority (AACRA)** for their cooperation and for granting me access to critical data, documentation, and staff members involved in ongoing road construction projects. I am especially grateful to the professionals—clients, contractors, and consultants—who generously shared their time and insights by participating in the survey.

Lastly, I want to thank my **family and friends** for their steady encouragement, understanding, and moral support during this journey. Their belief in me, especially during the most challenging moments, helped keep me focused and motivated.

Abstract

Road construction is a vital component of national development, particularly in rapidly urbanizing cities such as Addis Ababa. Despite ongoing infrastructure investments, persistent delays in project execution continue to undermine economic efficiency and public service delivery. This study investigates the key factors contributing to delays in road construction projects under the Addis Ababa City Roads Authority (AACRA) and proposes strategies to mitigate them. A quantitative research approach was employed, using structured questionnaires administered to 104 professionals from client organizations, consulting firms, and contracting companies. The collected data were analyzed using the Relative Importance Index (RII) to rank delay factors based on stakeholder perception. The findings reveal that the most significant causes of delay include delayed utility relocations, price escalation of construction materials, prolonged land compensation processes, foreign currency shortages, and poor contractor management. Other notable factors include inadequate supervision, delayed design approvals, and shortages of materials and equipment. Based on these results, the study recommends: (1) enhancing inter-agency coordination to streamline utility relocation and land compensation processes; (2) improving contractor prequalification and performance monitoring; and (3) establishing reliable financing and foreign currency allocation mechanisms. The study contributes valuable insights for policymakers, project managers, and stakeholders aiming to improve the efficiency and timeliness of urban infrastructure delivery in Addis Ababa.

Keywords: *Road construction delays, project management, urban infrastructure, Addis Ababa City Roads Authority (AACRA), Relative Importance Index (RII)*

Table of Contents

List of Table

List of Figure

List of Acronyms and abbreviations

AACRA	Addis Ababa City Road Authority
ERA	Ethiopian Road Authority
GDP	Global Domestic Product
ISO	International Organization for Standardization
PMI	Project Management Institute
RSDP	Road Sector Development Program
RII	Relative Importance Index
ROW	Right-of-Way
SPSS	Statistical package for the social science
SUE	Subsurface utility engineering

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Road construction is an important economic sector that drives a country's national economy. In both industrialized and developing countries, the building industry is a key contributor to economic and social growth. The construction business fluctuates with the general economy and responds quickly to changes in the economy (Alhomidan, 2013).

Any developing country's development and economic growth are dependent on the road construction business. Haseeb (2011) in emerging nations like Ethiopia, the road transport industry plays a critical role in accelerating economic growth by providing a market access incentive for agricultural goods and other outputs in regular consumer decisions. The importance of road infrastructure in expanding education, social and health services, trade, and employment opportunities is enormous.

Roads aid in economic development and poverty reduction. Total economic growth, agricultural growth, population increase, urban poverty reduction, and rural poverty reduction are all affected by road development. Without infrastructure, efficient markets, appropriate health services, a diverse rural economy, and balanced industrial development would be meaningless (Haseeb et al., 2011; Alaghbari et al., 2007; Kaliba et al., 2009).

The backbone of effective development initiatives is a noble infrastructure. Infrastructure for transportation is a productive factor that directly supports economic growth and public health (Kaliba et al., 2009). The availability of road infrastructure is also linked to lower energy use and fewer health problems. According to Haseeb et al. (2011), Africa's dismal trading performance is largely due to inadequate infrastructure, particularly in transport systems. Furthermore, the convenience and quality of road infrastructure significantly influence food prices. Road investments benefit the poor by boosting the rural non-farm economy (Alaghbari et al., 2007), and in metropolitan areas, an increase in paved roads is positively and significantly associated with growth in GDP per capita (Kaliba et al., 2009).

Construction time is frequently used to assess a road project's success and the efficiency of its project management (Eizakshiri et al., 2015). Constructing an accessible and efficient road to meet the above-mentioned economic and social needs is usually hampered by the challenge of completing multiple projects on time and within budget (Assaf & Al-Hejji, 2006). Time overrun is the most typical occurrence in almost all road building projects, and it is regarded as one of the most common issues that negatively impact project success due to the triple constraints of time, cost, and quality (Remon et al., 2016).

Many construction projects throughout the world confront one of the most significant construction issues: delays (Assaf & Al-Hejji, 2006). Delays vary by region, construction type, and project size due to the unique circumstances surrounding each project (Remon et

al., 2016). Road construction, which is one of the most visible aspects of the construction industry, is especially prone to delays and requires prompt responses to mitigate their impacts (Mahamid, 2013). Time is money; every construction project that is delayed affects time and thus money, which is the lifeblood of any economy (Remon et al., 2016). Time delays and cost overruns frequently have a negative impact on national economies, cause significant financial losses, and stifle the construction industry's progress (Senouci et al., 2016).

A number of studies have been conducted on the effects of project delays in various nations and historical periods. Cost is one of the most important factors to consider throughout the project life cycle, according to a study by Wijekoon, (2013). 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 among the top risks affecting time overrun in road construction projects in Palestine, according to Mahamid, (2013). Shah Ali et al. (2011), Salleh, (2009), Omayo, et al. (2013), and Shaban (2008) investigated the elements that contribute to building project postponement in various areas.

Transport plays a critical role in facilitating economic development in Ethiopia because of its topography, habitation pattern, and economic activity (Haseeb et al., 2011). Recognizing the importance of road transportation in promoting social and economic growth, as well as its role as a catalyst for poverty reduction, the Ethiopian government has intensified its focus on improving the quality and scope of the country's road infrastructure (Alaghbari et al., 2007). In alignment with these principles, the government launched the Road Sector Development Program (RSDP) in 1997 to address critical challenges such as limited road network coverage and poor quality. The initiative aimed to enhance transportation efficiency and rural accessibility and has been implemented in multiple phases—four completed by 2015, with the fifth phase starting in 2016 (ERA, 2016).

Ethiopia's road network is improving year after year. Through the Road Sector Development Programs (RSDP), the Ethiopian government has actively pursued both new road construction and the expansion of existing infrastructure in recent years (ERA, 2016). During the Growth and Transformation Plan II (GTP II) period from 2015/16 to 2019/20, the Government of Ethiopia (GOE) set a target to expand the national road network to 220,000 kilometers. According to ERA's 2016 report, the federal road network at that time totaled 28,032 kilometers, with 14,632 kilometers paved and 13,400 kilometers unpaved (ERA, 2016). Although the RSDP's performance has steadily improved, there remains considerable room for enhancement in efficiency and coverage (Kaliba et al., 2009).

Despite the sector's expansion and its strong contribution to the national economy, various obstacles have been identified, necessitating targeted solutions to sustain the sector’s growth rate in the foreseeable future (Kaliba et al., 2009). One of the major challenges

facing the sector is project execution delays, which have the potential to stall or obstruct planned economic progress if not addressed promptly (Assaf & Al-Hejji, 2006; Senouci et al., 2016).

Given the strategic importance of road construction to Addis Ababa's development goals and the widespread implications of project delays, there is a clear need for empirical research that identifies the root causes of these delays and proposes practical solutions. Understanding the perspectives of key stakeholders, including clients, contractors, and consultants is essential to formulating realistic and sustainable improvement strategies. This study seeks to fill that gap by assessing the major delay factors in road construction projects under AACRA's jurisdiction and offering evidence-based recommendations to enhance timely project delivery.

1.2 Statement of the Problem

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 (Doloi et al., 2012). Without question, the performance of the road sector is critical to the growth of every country's economy, regardless of its level of development (World Bank, 2020). However, project delays in the construction industry in general, and road building in particular, are becoming an increasingly prevalent occurrence (Assaf & Al-Hejji, 2006; Sambasivan & Soon, 2007). The purpose of all parties involved, including the project owner, contractors, engineers, and consultants in the sectors, is to finish the project on time, on budget, with specified quality, and in a safe manner (Frimpong et al., 2003). 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 (Werku & Jha, 2016; Kamanga & Steyn, 2013).

According to Islam and Trigunarsyah (2017), one of the primary constraints to achieving project objectives in developing nations is construction delay. Project delays typically have a negative impact on national economies; contribute to significant financial losses, and stifle economic and construction industry progress. Senouci and colleagues (2016), various studies have identified various factors and groups responsible for delays across/within a continent/country, and have assigned varying rankings to these causes and groups. The causes and groups that create delays differ by country, region, and project, and there are no underlying factors that can be assumed to be the most or least effective delay causes (Remon et al, 2016).

In Ethiopia, government-led construction projects form a major component of the national development agenda, absorbing a significant portion of the country's limited financial resources. The construction sector receives the highest share of government investment among all sectors, with public infrastructure projects accounting for nearly 60% of the government's annual capital budget (Ministry of Urban Development and Construction,

2019). This substantial allocation underscores the strategic importance of the construction industry in driving economic growth, improving public services, and creating employment opportunities.

According to a study conducted on the Ethiopian construction sector by Koshe, (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 development, delays are becoming a big burden for the authorities and posing a threat to citizens' lives. The effects of 16 project delays differ depending on the viewpoints of the people concerned. For example, the owner sees a delay as a loss of revenue and a lack of services, while the contractor sees it as a loss of money (Kikwasi, G.J, 2012). As a result, road project delays, particularly in Addis Ababa, cost the city and the country more in terms of both economic and social aspects of the residents, as assessed in terms of lost revenue and absence of services rather than just cost overrun. According to data from the AA road authority's contract administration (2018/19), even though the authority is now working on 23 projects, three of which are street lights, nearly 17 of the other 20 road projects are behind schedule, two are new, and one is nearing completion. This means that out of 20 road projects, 85 percent are behind schedule. If the delay is not discovered and a remedial project management decision is not made in a timely manner, the project may incur additional costs and extend the project time, causing discontent among all parties involved (Werku, 2016).

Project delays are a widespread issue in the construction industry across both developed and developing countries. However, they are particularly pervasive in developing nations, where the problem is often more severe due to capacity constraints, financial limitations, and governance issues. In nearly every construction project, delays occur—ranging from minor overruns of a few days to significant postponements lasting several months or even years (Wael et al., 2007). Ethiopia is no exception. The majority of road development projects, especially in Addis Ababa, continue to suffer from both time and cost overruns (Fetene Nega, 2008).

To address systemic infrastructure deficiencies, Ethiopia introduced the Road Sector Development Program (RSDP) in 1997. This long-term national initiative, overseen by the Ethiopian Roads Authority (ERA), has been implemented through a series of structured phases to expand and modernize the country's road network (ERA, 2016). The five phases of the RSDP include:

- RSDP I (1997–2002): Focused on the rehabilitation of existing roads and institutional capacity-building. It laid the groundwork for planning, financing, and decentralizing road development to regional levels.
- RSDP II (2002–2007): Introduced the expansion of regional and rural roads, emphasizing agricultural connectivity and poverty reduction.

- RSDP III (2007–2010): Continued the rural access agenda while integrating road safety and maintenance as priorities.
- RSDP IV (2010–2015): Scaled up urban road development, especially in Addis Ababa, and incorporated performance-based contracting mechanisms.
- RSDP V (2015–2020): Focused on high-standard expressways and inter-regional corridors, aiming to integrate Ethiopia's economy with neighboring countries.

Despite these planned and phased interventions, implementation challenges chiefly in the form of project delays remain a significant barrier to success. A study by Shambel and Patel (2018) on ten completed road projects in Addis Ababa revealed time overruns ranging from 25% to a staggering 264.38%. These findings underscore the magnitude of the delay problem, especially within the capital, which serves not only as Ethiopia's political and economic center but also as the diplomatic capital of Africa.

Given the strategic importance of efficient and high-standard roads in Addis Ababa for both national development and international connectivity, delays in urban road construction projects have substantial economic, social, and institutional repercussions. Although city administrators have made efforts to enhance infrastructure delivery, chronic delays continue to hinder progress. These delays are attributed to a complex mix of administrative inefficiencies, financial bottlenecks, capacity shortfalls, and environmental challenges—all of which demand coordinated, evidence-based solutions (ERA, 2016; Werku & Jha, 2016).

Many studies have shown that project schedule overruns have serious consequences for project owners, contractors, and consultants alike (Ghaffari, 2013; Marzouk & El-Rasas, 2014). If delays are not identified early and addressed through timely project management decisions, they can result in increased costs, extended timelines, and widespread dissatisfaction among stakeholders involved in the construction process. In developing countries like Ethiopia, these delays have become a significant obstacle to efficient infrastructure delivery. The consequences are particularly damaging in the road sector, where timely execution is essential for sustaining economic growth and public service provision.

Reducing such delays requires a thorough understanding of their underlying causes. Several studies have emphasized the importance of identifying both the root causes and effects of delays to develop effective mitigation strategies. However, the majority of published research in Ethiopia has focused on the broader construction sector—such as Werku (2016) on the general construction industry, Wubishet (2004) on public construction, and Meaza (2015) on the Ethiopian Electricity Utility Enterprise. Only a limited number of studies have concentrated specifically on road construction, and even fewer have examined projects under the Addis Ababa City Roads Authority.

Given these gaps, this study aims to fill the void by identifying the primary causes of road construction delays within the study area. The findings are intended to inform practical

strategies that can help optimize road project performance and minimize delays in future developments.

1.3 Research questions

This study aims to address the following research questions:

1. What are the major factors contributing to delays in road construction projects under the Addis Ababa City Roads Authority (AACRA)?
2. How do different stakeholders, clients, contractors, and consultants, contribute to these project delays?
3. What are the economic and operational impacts of road construction delays in Addis Ababa?
4. What practical strategies can be implemented to minimize delays in road construction projects managed by AACRA?

1.4 Research Objectives

1.4.1 General Objective

To assess the causes of delays in road construction projects under the Addis Ababa City Roads Authority and to propose practical strategies to minimize those delays.

1.4.2 Specific Objectives

- To identify the most critical factors contributing to delays in road construction projects.
- To evaluate the roles and responsibilities of key stakeholders (client, contractor, and consultant) in contributing to project delays.
- To examine the economic and operational impacts of road project delays in Addis Ababa.
- To develop evidence-based strategies aimed at minimizing or managing project delays effectively.

1.5 Significance of the study

Understanding the underlying reasons for inefficiency in road construction projects will be made easier with the help of a study on project delays. The project stakeholders will be able to focus their efforts and allocate resources to remove the specific limiting reasons and consequently shorten project delays once the biggest delay-causing elements have been identified.

This study will play a significant part in determining the reasons behind and consequences of timetable delays in road construction projects. According to Mohamed (2013), time,

cost, and quality are the three main indicators of a project's success. Finding and rating the delay reasons and their impacts will have a significant impact on minimizing the delay problem and will contribute to the success of a project because time is one of the pillars of construction project management and project success. The study's findings will also be valuable because they will suggest methods and mitigation strategies for AACRA management to use as they decide how to repair problems and move on with projects by removing the major causes of delays.

The study will also be significant to researchers since it will add to their theoretical and practical understanding of how to do research. Additionally, it may be helpful to those researchers who need a foundation for additional research in this field.

1.6 Scope of the research

This study focuses on assessing the factors contributing to delays in road construction projects administered by the Addis Ababa City Roads Authority (AACRA). Spatially, the research encompasses all sub-cities and project sites managed under AACRA's jurisdiction, providing a comprehensive city-wide assessment rather than a focus on a specific geographic subset. Projects implemented across various districts, regardless of size or location, were considered in order to capture a holistic picture of delay-related issues within the capital.

Thematically, the study investigates not only the causes of project delays but also their perceived impacts, possible mitigation strategies, and delay measurement practices. This includes delays arising during the pre-construction and construction phases and focuses on technical, managerial, financial, and external factors. The research does not extend to other infrastructure types outside road construction, nor does it deeply assess post-completion project performance or lifecycle cost evaluations.

Stakeholder perspectives are central to this research. Data was collected from multiple levels of AACRA personnel including management officials, technical staff such as engineers and planners as well as from external project actors such as contractors and consultants involved in project execution. These diverse viewpoints offer a multidimensional understanding of delay dynamics from both administrative and operational angles.

In terms of time frame, the primary data for the research was collected during the 2023/2024 Ethiopian fiscal year. However, the scope of analysis includes road projects that were initiated between 2019 and 2024, regardless of whether they have been completed or are still in progress. This five-year span allows for the identification of recurring patterns and trends in project delays, capturing insights from both ongoing and completed road construction projects under AACRA's administration.

1.7 Limitation of the Study

While this study provides valuable insights into the causes of delays in road construction projects under the Addis Ababa City Roads Authority (AACRA), several limitations should be acknowledged. First, the research focused exclusively on asphalt road projects both newly initiated and older projects that remained unfinished excluding other types such as cobblestone roads or routine maintenance works. As a result, the findings may not be generalizable to all types of road infrastructure managed by AACRA.

Geographically, data was collected only from three sub-cities Yeka, Bole, and Akaki-Kality due to logistical and time constraints. Although these areas reflect a range of project conditions, the exclusion of other sub-cities may limit the broader applicability of the results. Furthermore, the primary data collection was conducted intermittently over a four-month period within a single year. While this allowed for a manageable data-gathering process, it restricted long-term observation of evolving project conditions.

In terms of stakeholder representation, the study primarily included responses from AACRA staff and contractors. However, certain important groups such as residents affected by the construction projects and AACRA departments like human resources were not represented in the data collection. Their perspectives could have offered additional insights into institutional and social aspects of project delays.

Methodologically, the research relied mainly on quantitative data, which allowed for measurable comparisons but limited the depth of understanding that qualitative insights might have provided. Additionally, access to detailed financial documents, such as project budget utilization and disbursement records, was restricted. This limited the ability to conduct a deeper financial analysis of delay-related factors.

Despite these limitations, the study provides a meaningful contribution to the understanding of delay factors in Addis Ababa's road construction sector and offers a foundation for further research and policy improvement.

1.8 organization of the paper

There are five subsequent chapters to this study. The background of the investigation, statement of the problem, fundamental research questions, aims of the study, significance, scope, and limitations of the study are all introduced in the first chapter. The second chapter provides a survey of the literature along with profiles of various researchers who have studied the subjects. The third chapter covers the research design, methodology, data sources, target audience, sampling strategy, sample size, instrument validity and reliability, and research ethics throughout data collecting and analysis. The fourth chapter contains findings and debate that are widely accepted regarding the most significant and frequent causes and effects of delay. The summary, findings, and recommendations based on the discussions of the previous chapters are included in the fifth chapter.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 Theoretical Review

2.1.1 Introduction

In the fast-paced, deadline-driven world we live in today, time is often cited as a crucial benchmark for assessing the performance of projects, Eizakshiri, et al (2015). Construction time often serves as a benchmark for assessing the performance of a project and the efficiency of a project management as the main objective of the project management principle is to complete the project on time, within its budget, and according to the required quality/specifications. Timely completion was one indicator for successful project. Time is money; delay in a certain construction project affects time and thus money, which is the lifeblood of any economy, Remon,, et al, (2016). The timely completion of road construction projects is considered one of the most important factors referring to the project success, as well as the quality and the safety. However, in current dynamic construction industry, Construction project delays are becoming a common phenomenon including road construction projects.

2.1.2 Overview of Project and Project Management

A project is commonly defined as a temporary endeavor undertaken to create a unique product, service, or result. It involves a series of interdependent activities designed to achieve specific objectives within a defined timeline, budget, and scope. Wysocki (2014) describes a project as a finite set of coordinated tasks that, when successfully completed, deliver tangible business value and justify the resources invested. Similarly, Gary (2003) notes that a project is typically initiated to solve a problem or fulfill a need, with the expectation of measurable benefits, often in the form of financial gains or improved service delivery. According to the quality expert Dr. Juran, a project can be understood as a problem scheduled for resolution emphasizing its solution-oriented nature.

In contrast to ongoing operations, projects are characterized by their uniqueness, constraints, and one-time execution. They are deemed successful when they meet their predefined objectives within the constraints of time, cost, quality, and stakeholder satisfaction. This necessitates the use of project management practices that are systematic, goal-driven, and resource-aware.

Project management, as defined by the Project Management Institute (PMI, 2013), is the application of knowledge, skills, tools, and techniques to project activities in order to meet project requirements. It encompasses planning, executing, monitoring, and controlling all aspects of a project to ensure that objectives are met efficiently and effectively. Unlike routine operations, project management focuses on one-off, non-repetitive efforts and is

essential when coordinating diverse resources, including personnel, materials, and financial capital.

Kerzner (2009) defines project management as the planning, organizing, directing, and controlling of organizational resources to achieve a relatively short-term objective. He emphasizes that successful project management is not merely about task completion but also about delivering results within time, budget, and performance expectations. Kerzner introduces the "4Ps" framework as a critical model for effective project management:

1. People – The human resources who execute and manage the project.
2. Product – The specific deliverable or output of the project.
3. Process – The methodologies and workflows used to complete tasks.
4. Project – The defined scope, objectives, and environment within which the work is carried out.

The synergy of these four components is essential to achieving success in any project.

In infrastructure projects such as those managed by the Addis Ababa City Roads Authority (AACRA) the complexity and scale of operations make project management indispensable. Effective planning, stakeholder coordination, and risk mitigation are crucial in ensuring that such projects are completed on time, within budget, and to the required quality standards.

Figure 1: Project Management concerns

Project management processes fall into five groups:

1. Initiation: kicking off the project.
2. Planning: planning all of the work of the project.

3. Execution: actually performing the work.
4. Managing and controlling: all of the work you do during the project to monitor progress.
5. Closing: completing and delivering the project and adjourning the team.

Table 2.1 Project management process groups (PMI, 2017)

		Project Management Process Groups				
		Initiating	Planning	Executing	Monitoring & Controlling	Closing
Knowledge Areas	Project integration management	•Develop project charter	•Develop project management plan	•Direct and manage project work •Manage project knowledge	•Monitor and control project work •Perform integrated change control	•Close project or phase
	Project scope management		•Plan scope management •Collect requirements •Define scope •Creat WBS		•Validate scope Control scope	
	Project schedule management		•Plan schedule management •Define activities •Sequence activities •Estimate activity durations •Develop schedule		•Control schedule	
	Project cost management		•Plan cost management •Estimate costs •Determine budget		•Control costs	
	Project quality management		•Plan quality management	•Manage quality	•Control quality	
	Project resource management		•Plan resource management •Estimate activity resources	•Acquire resources Develop team Manage team	•Control resources	
	Project communications management		•Plan communication management	•Manage communications	•Monitor communications	
	Project risk management		•Plan risk management Identify risks	•Implement risk responses	•Monitor risks	

			•Perform qualitative risk analysis •Perform quantitative risk analysis •Plan risk responses			
	Project procurement management		•Plan procurement management	•Conduct procurements	•Control procurements	
	Project stakeholder management	•Identify stakeholders	•Plan stakeholder engagement	•Manage stakeholder engagement	•Monitor stakeholder engagement	

2.1.3 The Importance of Project Management

Project management plays a crucial role in the success of modern organizations by enabling them to plan, execute, and deliver projects efficiently and competitively. It integrates the application of knowledge, tools, skills, and structured methodologies across five key phases: initiation, planning, execution, monitoring and controlling, and closing (PMI, 2013). Each of these stages supports the alignment of project goals with organizational strategies, ensuring that outcomes deliver value within defined constraints.

Effective project management allows organizations to meet customer demands, adapt to market changes, and allocate resources optimally. Project managers play a pivotal role in this process. According to Kerzner (2009), they are responsible for coordinating teams, managing budgets, setting timelines, and addressing unforeseen issues throughout the project lifecycle. Their ability to balance competing priorities—such as cost, time, and quality makes them essential to the successful delivery of complex projects.

Moreover, project management contributes to minimizing waste, maximizing efficiency, and improving stakeholder satisfaction. As noted by Wysocki (2014), project management frameworks provide organizations with the structure necessary to measure progress, control scope, and reduce risk. By systematically monitoring performance and ensuring accountability, organizations are better positioned to complete projects on time and within budget. This not only enhances internal performance but also builds trust with external stakeholders, clients, and funders.

2.1.4 What is Project Analysis?

Project analysis is a structured process used to evaluate the feasibility, efficiency, and performance of a project through data-driven methods. It involves the systematic examination of key project components such as budget adherence, scheduling accuracy, resource allocation, and compliance with regulatory standards. According to PMI (2013), project analysis supports informed decision-making by identifying potential risks, estimating project benefits, and ensuring alignment with organizational objectives.

Project analysts play a critical role in this process by tracking financial performance, forecasting budgets, and producing reports that measure deviations from project plans. As highlighted by Kerzner (2009), these professionals help monitor progress by generating variance reports and identifying areas that require corrective action. The insights they provide are essential for project managers to maintain control over project scope, cost, and quality.

In large-scale infrastructure or public works projects, such as road construction programs managed by agencies like the Ethiopian Roads Authority (ERA) or Addis Ababa City Roads Authority (AACRA), project analysis is indispensable. It ensures that resources are used efficiently, risks are minimized, and public accountability is maintained (ERA, 2016). Ultimately, project analysis enhances transparency, improves decision-making, and contributes to the successful delivery of complex projects.

Reason for project analysis

1. Requirements analysis prevents scope creep.
2. Requirements analysis serves as concrete evidence in contractual disputes.
3. Requirements analysis keeps projects on time and on budget.
4. Requirements analyses find out weakness and give suggestion.

2.1.5 Key Issues in Project Analysis

Project analysis plays a critical role in ensuring that projects meet their objectives effectively and efficiently. One of its primary functions is to identify weaknesses within the planning and execution processes and provides actionable recommendations for improvement. Numerous studies and practical experiences have demonstrated that failure to detect and address common project planning flaws can lead to project delays, cost overruns, and stakeholder dissatisfaction (Kerzner, 2009; PMI, 2013).

1. Scope Creep

Scope creep refers to uncontrolled changes or continuous growth in a project's scope without corresponding adjustments to time, cost, or resources. It typically results from

inadequate scope definition or a failure to enforce change control mechanisms. To manage this issue, project managers must establish a clear Work Breakdown Structure (WBS) and ensure all changes are vetted through a formal change control board (Wysocki, 2014).

2. Over allocation of Resources

Over-allocation of resources is a recurring challenge in infrastructure projects, often resulting in staff burnout, missed deadlines, and compromised quality. This issue typically arises when team members are assigned tasks beyond their capacity. Implementing effective resource planning and regular workload monitoring through project tracking tools can help optimize productivity and reduce performance risks (Doloi et al., 2012).

3. Poor Stakeholder Management

Stakeholders can significantly influence project success. A failure to engage and manage them appropriately can result in resistance, misalignment, and delays. Developing a stakeholder communication plan is vital to identify interests, manage expectations, and ensure consistent engagement throughout the project lifecycle (Kerzner, 2009).

4. Inaccurate Time and Cost Estimates

Unreliable estimates often arise from guesswork or insufficient historical data. These inaccuracies can cascade into flawed schedules and budgets. Maintaining a repository of historical project data and involving experienced personnel in estimation can improve accuracy and reduce associated risks (PMI, 2013).

5. Absence of Risk Management

Risk is inherent in all construction projects, and failure to identify and address potential risks early can lead to reactive crisis management during execution. Developing a proactive risk management plan—with defined mitigation and contingency strategies—is essential for ensuring timely and successful project delivery (Zou et al., 2007).

6. Inexperienced or Untrained Project Managers

Many infrastructure projects are managed by technical professionals who lack formal project management training. Although technically competent, these individuals often face challenges in areas such as coordination, communication, and stakeholder engagement. Addressing this skills gap through targeted capacity building and professional development is essential for improving project outcomes (Toor & Ogunlana, 2009).

7. Lack of Team Planning Sessions

Inclusive planning that engages the entire project team fosters shared ownership, clarity of roles, and alignment with project goals. When key team members are excluded from the planning phase, it often results in poor coordination, fragmented execution, and reduced accountability. Regular joint planning sessions can significantly improve collaboration and enhance team cohesion (Kerzner, 2017).

8. Corruption

Corruption remains a pervasive challenge in public infrastructure projects, particularly in developing countries. It may take the form of embezzlement, favoritism in procurement, or the manipulation of project costs and timelines. Such practices undermine project efficiency and public trust. Strengthening institutional oversight, audit systems, and transparency in procurement processes is essential to minimize this risk (Wells, 2015).

9. Poor Communication

Effective communication is critical to project success. Miscommunication among project teams, contractors, or stakeholders can lead to misunderstandings, duplicated efforts, and preventable delays. Project managers should ensure timely, accurate, and two-way communication at all levels to maintain alignment and responsiveness throughout the project lifecycle (PMI, 2021).

10. Critical Chain Mismanagement

Critical Chain Project Management (CCPM) is particularly useful in large-scale infrastructure projects involving multiple, interdependent disciplines. However, mismanagement of critical tasks and buffers can disrupt sequencing, delay deliverables, and affect overall project performance. Ensuring proper scheduling, resource allocation, and buffer control is vital to prevent cascading delays (Leach, 2005).

2.1.6 Project Management Knowledge Areas

Project management involves a broad range of functions and activities that ensure the successful completion of a project within its defined scope, time, and budget. To support this, the Project Management Institute (PMI) has identified ten knowledge areas, each representing a key aspect of project management. These knowledge areas serve as a foundation for planning, organizing, monitoring, and executing project tasks and are integral to the Project Management Body of Knowledge (PMBOK Guide) (PMI, 2013). Understanding these areas allows project managers to align project activities with organizational goals and manage constraints effectively.

1. Project Integration Management

Project integration management involves coordinating all elements of a project to ensure that they function together seamlessly. It includes processes such as developing the project charter, creating the project management plan, and directing and managing project work. Integration ensures that changes are managed appropriately and that the overall vision of the project is maintained throughout its lifecycle. This knowledge area plays a critical role in unifying stakeholder expectations, balancing competing objectives, and managing interdependencies (PMI, 2013).

2. Project Scope Management

Project scope management focuses on defining and controlling what is included and excluded from the project. It involves processes such as scope planning, requirements gathering, scope definition, creation of the Work Breakdown Structure (WBS), scope validation, and scope control (Wysocki, 2014). Failure to manage scope effectively often leads to "scope creep," where unapproved changes or additions derail project timelines and budgets. Proper scope management ensures that only necessary work is performed, directly contributing to project success.

3. Project Time Management

Time management is essential for maintaining the project schedule and meeting deadlines. This knowledge area includes defining and sequencing activities, estimating activity durations, developing the schedule, and controlling the schedule. Project delays defined as the extension of time beyond the scheduled completion are a frequent issue in road and infrastructure projects and can result in increased costs and lost opportunities (Assaf & Al-Hejji, 2006). Effective time management uses tools such as Gantt charts and critical path analysis to visualize dependencies and adjust timelines dynamically.

4. Project Cost Management

Cost management ensures that the project is completed within the approved budget. This involves cost estimation, budgeting, and cost control. Resource planning is also part of this knowledge area, as it determines what physical or human resources are needed and in what quantity. Cost control uses performance measurement techniques such as Earned Value Management (EVM) to compare actual project performance against the planned cost baseline (PMI, 2013).

5. Project Quality Management

Quality management aims to ensure that the project will satisfy the needs for which it was undertaken. It includes three key processes: quality planning, quality assurance,

and quality control. According to the International Organization for Standardization (ISO), quality is the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs. Juran (1992) defined quality in two ways: the presence of features that satisfy customer needs and the absence of defects. Applying quality management ensures customer satisfaction and prevents costly rework or failures (Kerzner, 2009).

6. Project Human Resource Management

Human resource management involves planning, acquiring, and managing the project team. It includes defining roles and responsibilities, developing staffing plans, team development, and conflict resolution. A well-structured human resource plan ensures that skilled personnel are available and motivated to complete the project. Effective team leadership contributes directly to productivity and project cohesion (Wysocki, 2014).

7. Project Risk Management

Risk management addresses uncertainties that may impact project objectives either positively or negatively. The processes include risk identification, qualitative and quantitative risk analysis, risk response planning, and risk monitoring and control. Given the complexity of infrastructure and road projects in Ethiopia, managing risks such as inflation, resource shortages, or weather-related delays is essential. A proactive approach to risk helps project managers mitigate threats and capitalize on opportunities (PMI, 2013).

8. Project Procurement Management

Procurement management covers the processes involved in acquiring goods and services from external suppliers. These processes include procurement planning, conducting procurements, controlling procurements, and closing contracts. Effective procurement involves vendor selection, contract negotiation, and relationship management. Delays in procurement or poorly managed contracts can disrupt timelines and lead to disputes. In public-sector projects, procurement must also comply with transparency and accountability standards (Kerzner, 2009).

9. Project Stakeholder Management

Stakeholders are individuals or organizations affected by or capable of influencing a project. Stakeholder management involves identifying stakeholders, planning stakeholder engagement, managing communications, and monitoring stakeholder relationships. Effective stakeholder management ensures that the project has the necessary support and that potential conflicts are resolved early. Failure to involve

stakeholders appropriately can lead to misalignment, resistance, and delays (PMI, 2013).

10. Project Communication Management

Communication is fundamental to project success. This knowledge area involves planning, managing, and monitoring communications across the project lifecycle. It ensures that the right information reaches the right people at the right time. Poor communication has been cited as one of the leading causes of project failure. Project managers must use tools such as stakeholder communication matrices, progress reports, and collaborative platforms to maintain transparency and alignment (Kerzner, 2009; Wysocki, 2014).

Together, these ten knowledge areas form the backbone of effective project management. By systematically addressing each of them, project managers can ensure that complex, high-risk projects such as road construction in urban settings are delivered successfully. In the context of Addis Ababa's growing infrastructure needs, applying these principles is essential to overcoming the technical, financial, and administrative challenges that commonly lead to project delays.

2.1.7 Construction Project

A construction project, often simply referred to as a "project," is a temporary and goal-driven endeavor involving the organized process of building, modifying, refurbishing, or dismantling a physical structure or built environment. These projects may involve the creation of roads, bridges, tunnels, buildings, or other infrastructure systems. According to Wysocki (2014), a project is characterized by its uniqueness, defined time constraints, and resource limitations, all of which also apply to construction activities. Construction projects, therefore, require careful planning, coordination, and execution to meet their scope, time, and budget objectives while maintaining acceptable quality and safety standards.

According to the Construction Design and Management (CDM) regulations, construction work includes a wide array of activities such as building, alteration, conversion, commissioning, renovation, demolition, and the installation or removal of mechanical, electrical, or communication systems. It also covers site preparation activities like excavation and the assembly of prefabricated elements on-site. The scope of construction work is broad, encompassing both initial construction and the subsequent maintenance, repair, or dismantling of the built asset (Kerzner, 2009).

Typically, a construction project begins with an overarching business requirement, which is then translated into feasibility studies, design briefs, and financial planning. Once the design and planning stages are approved, the project moves into execution

and ultimately completion. Most construction projects are one-off in nature, meaning that the project team, design, and financing are assembled for that specific task. Upon completion, the team is often disbanded, making it difficult to retain lessons learned or maintain long-term collaboration (PMI, 2013). Exceptions to this are repeat developers such as government agencies, commercial chains, or real estate firms engaged in ongoing development.

Types of Construction Projects

Construction projects are commonly categorized based on their scale, function, and end use, which helps stakeholders understand the unique challenges and regulatory requirements involved. The following are the six major types of construction projects:

1. Residential Construction

Residential projects involve the construction of structures intended for habitation. These include single-family homes, duplexes, townhouses, apartments, and condominiums. While residential construction may seem straightforward, variations in building types can significantly affect engineering requirements, project scale, material use, and legal compliance. For instance, a high-rise apartment building may resemble a commercial project more than a single-family home in terms of complexity, budgeting, and permitting needs (Wysocki, 2014).

2. Commercial Construction

Commercial construction encompasses buildings designed for business purposes, such as offices, retail stores, hotels, shopping malls, and restaurants. These projects are typically more complex than residential projects due to the need for specialized infrastructure, accessibility requirements, energy codes, and sustainability goals. Commercial projects often involve multiple stakeholders, including architects, developers, investors, and regulatory agencies, requiring high levels of coordination and professional expertise (PMI, 2013).

3. Institutional Construction

Institutional projects refer to facilities designed for public or social use, including schools, hospitals, government buildings, and places of worship. While these projects may share design and engineering characteristics with commercial construction, they often have additional requirements related to public safety, accessibility, and regulatory oversight. Institutional construction may be funded by public or private entities and must frequently meet strict compliance with government codes and stakeholder needs (Kerzner, 2009).

4. Industrial Construction

Industrial construction involves the development of facilities used for manufacturing, processing, storage, or distribution. These include factories, refineries, warehouses, and power plants. Due to their technical nature, industrial projects often require highly specialized designs, custom equipment installations, and rigorous adherence to environmental and safety regulations. Furthermore, these projects frequently necessitate collaboration between engineers, technicians, and regulatory bodies to ensure compliance and functionality (Assaf & Al-Hejji, 2006).

5. Heavy Civil Construction

Heavy civil projects, also known as infrastructure or public works projects, involve large-scale construction activities such as highways, bridges, tunnels, airports, railways, and utility systems. These projects are typically sponsored by government agencies and require substantial planning, permitting, and funding. Heavy civil construction is characterized by complex engineering, long lead times, and significant public impact. Pre-construction phases can span years due to feasibility studies, environmental assessments, and land acquisition issues (ERA, 2016). The barriers to entry for contractors in this sector are high, often requiring specialized equipment, certifications, and a proven track record.

6. Mixed-Use Construction

Mixed-use projects integrate two or more types of construction (e.g., residential, commercial, and recreational) within a single development. They are designed to create vibrant, walkable communities that combine living, working, and leisure spaces. Examples include urban developments with ground-floor retail, mid-level office space, and residential units above. While such projects offer financial and functional benefits, they introduce complexities in zoning, design, stakeholder coordination, and construction phasing. Developers often use mixed-use construction as a strategy to diversify investment and mitigate market risks (PMI, 2013).

There are four primary types of mixed-use projects:

- Vertical mixed-use: multiple functions stacked within one building.
- Horizontal mixed-use: multiple buildings within the same site performing different functions.
- Transit-oriented developments: combining public transit with dense residential/commercial structures.
- Live-work-play communities: large-scale developments integrating housing, offices, retail, and entertainment.

Challenges in Construction Projects

Construction projects are often susceptible to a range of challenges including cost overruns, time delays, poor quality control, safety hazards, and regulatory hurdles. These problems are frequently caused by issues such as inadequate planning, scope creep, poor communication, and misalignment among stakeholders (Assaf & Al-Hejji, 2006). In developing countries like Ethiopia, factors such as limited contractor capacity, shortage of materials and unstable weather conditions further compound these challenges (ERA, 2016).

Furthermore, construction projects often involve multiple stakeholder's clients, contractors, consultants, suppliers, and regulatory authorities each with differing priorities and expectations. Effective project management is thus essential to coordinate activities, manage risks, and ensure that the project meets its objectives (Kerzner, 2009; PMI, 2013).

In summary, construction projects represent complex and highly specialized undertakings that require careful planning, execution, and management. From residential homes to industrial plants and public infrastructure, each type of construction project presents unique technical, logistical, and regulatory challenges. Understanding the classification and characteristics of different construction project types is essential for effective planning, risk management, and resource allocation. As construction activities continue to expand in urban centers like Addis Ababa, it becomes increasingly important to develop capacity and systems that can support the unique demands of each project type, from residential buildings to large-scale civil infrastructure. This foundational understanding will also help in identifying the root causes of project delays and in crafting strategies to improve project performance in Ethiopia's construction sector..

2.1.8 Parties in construction Project

Construction projects, particularly large-scale public infrastructure initiatives such as road development, involve multiple stakeholders who each play a vital role in ensuring the successful delivery of the project. These parties operate with distinct responsibilities and perspectives, yet must collaborate effectively throughout the project lifecycle. According to Kerzner (2009), stakeholder coordination and role clarity are essential to avoid conflicts, reduce delays, and enhance project outcomes. The major participants in road construction projects typically include the client (or owner), contractors, consultants, and designers.

Client or Project Owner

The client, often referred to as the project owner, is the entity that initiates and finances the construction project. In the context of public road construction in Ethiopia, this is typically a government agency such as the Ethiopian Roads Authority (ERA) or Addis Ababa City Roads Authority (AACRA). Clients are responsible for defining project objectives, securing funding, and ultimately owning the infrastructure upon completion. In some cases, clients may also be involved in procurement and supply chain activities, providing materials or equipment necessary for the execution of the project (ERA, 2016). Their decisions at the planning and pre-construction stages heavily influence project scope, timelines, and resource allocation.

Contractors

Contractors are the primary agents responsible for the execution of the actual construction work. They are contracted by the client to deliver the project in accordance with the agreed specifications, budget, and schedule. Their responsibilities include organizing labor, securing materials, supervising daily operations, and maintaining the construction site. Depending on the nature of the contract, contractors may also provide their own equipment and handle logistics. In complex projects, main contractors often delegate portions of the work to subcontractors who have specialized expertise—such as electrical installations, concrete work, or road surfacing. Wysocki (2014) emphasizes that effective contractor performance is critical to avoiding delays and ensuring that technical specifications are met.

Consultants

Construction consultants serve as intermediaries between the client and the contractor, ensuring that the project progresses according to plan and meets technical, legal, and financial standards. Their scope of work includes cost estimation, tendering support, schedule development, quality control, vendor selection, and contract administration. Consultants also help resolve disputes and evaluate contractor claims, playing a key role in maintaining transparency and accountability (PMI, 2013). In many Ethiopian road projects, consultancy firms are engaged to monitor construction progress and ensure compliance with national standards and international best practices (ERA, 2016).

Designers

Designers are responsible for converting the client's vision into a functional and technically sound plan. They develop the architectural, structural, electrical, and sanitation blueprints that guide the construction phase. Depending on the project's complexity, design tasks may be carried out by multidisciplinary teams comprising

architects, civil engineers, mechanical engineers, and urban planners. According to Kerzner (2009), effective design coordination is essential to avoid rework and cost overruns during execution. In the Ethiopian context, design consultants are typically selected through competitive bidding and must ensure that plans comply with local regulations, environmental standards, and the client's expectations.

Understanding the roles and responsibilities of these key participants is essential for analyzing the causes of project delays, cost overruns, and quality concerns in road construction. Miscommunication or misalignment between parties often leads to disputes, poor coordination, and inefficiencies. Therefore, the success of a project depends not only on the technical capability of each participant but also on their ability to collaborate within a clearly defined management framework (PMI, 2013; Kerzner, 2009). As road construction projects in Addis Ababa continue to expand in size and complexity, strengthening role clarity and stakeholder integration remains a critical concern for policymakers and project managers alike.

2.1.9 Definition of Delay

Delay is one of the most common and disruptive challenges in the construction industry, particularly in large-scale infrastructure projects. It generally refers to the situation where a project or a segment of it takes longer to complete than initially agreed upon by the contracting parties. According to Marzouk and El-Rasas (2014), a construction delay occurs when the actual completion of a project surpasses the planned duration, either stated in the contract or agreed upon informally. Delays may arise from time spent beyond the deadline in working toward completion or through inactive periods caused by unforeseen circumstances.

Assaf and Al-Hejji (2006) emphasize that construction delays often originate from problems in workflow, coordination, material procurement, or labor shortages. These issues are particularly relevant in road construction projects, where logistical and environmental uncertainties are common. Shebob et al. (2012) further define delay as a disruption in the construction timeline caused by multiple problematic elements, including both internal and external project factors.

In its simplest form, delay refers to the difference between the scheduled and actual completion dates (Faradi & El-Sayegh, 2006; Chan, 2001). B. Bramble and M. Callahan (1987) define it more specifically as the period during which the completion of a construction project, or any part thereof, is prolonged due to unexpected conditions or deficiencies in planning and execution.

Wei (2010) adds that a delay can be defined as any event or situation that occurs later than anticipated, or after the scheduled or contractually agreed deadline. Fung et al.

(2006) describe delay not as a complete halt but as a slowdown that pushes the project timeline beyond the agreed schedule.

Delays are not only frequent but also complex and costly. Alaghbari et al. (2007) describe delay as one of the most sophisticated problems faced in the construction sector. It affects all parties involved—clients, contractors, and consultants—often resulting in disputes, cost overruns, and in some cases, litigation. Bassioni and El-Razek (2008) note that delays negatively impact project stakeholders by reducing productivity, increasing financial pressure, and disrupting resource planning.

Obodoh and Obodoh (2016) view delays as conditions that arise when one or more parties involved in a project fail to fulfill their responsibilities on time, whether collectively or individually. These delays often lead to cascading issues such as halted workflows, contractual conflicts, and the need for renegotiation or legal action.

For contractors, delays can be particularly damaging, as they often result in increased overhead, labor, and material costs. Moreover, delays diminish opportunities for reinvestment, cause disruptions to cash flow, and may lead to penalties. For clients, delays compromise timely project delivery and inflate costs, potentially undermining the project's economic viability. In many cases, these outcomes escalate into arbitration, litigation, or even total project abandonment (Aibinu & Jagboro, 2002).

2.1.10 Types of Delay

Delays in construction projects can be classified in various ways depending on their cause, responsibility, and impact on the overall schedule. Understanding the different types of delay is essential for planning risk mitigation strategies, assigning responsibility, and resolving disputes.

Ramya et al. (2015) define construction delay as the failure to complete a project within the scheduled or agreed-upon time. Zack (2003) expands on this by explaining that delay is any event requiring more time than contractually allocated to perform or complete specific tasks. Similarly, Majid (2006) describes delay as a deviation from the original project schedule, where the required activities are not completed within the intended timeframe, thus reducing productivity and increasing risks.

Delays are typically categorized based on their criticality, cause, and responsibility. One common classification system includes five major types: critical vs. non-critical, excusable vs. non-excusable, compensable vs. non-compensable, and concurrent delays (Kanase et al., 2017; Ahmed, 2015).

1. **Critical Delay**
   A critical delay affects the project's overall timeline and results in a late completion.

Delays on the project's critical path typically fall into this category and often trigger legal or financial consequences.

2. **Non-Critical Delay**
   These delays do not impact the final project deadline and usually affect tasks with available float time. While disruptive, they may not warrant schedule or budget changes.

- **Excusable Delay**
  This type of delay is typically outside the control of contractors or project participants such as extreme weather events, natural disasters, or regulatory changes. Contractors are usually not penalized for these delays, and time extensions are often granted.

- **Non-Excusable Delay**
  These are delays for which the contractor is directly responsible, such as poor planning, labor shortages, or equipment failure. Such delays often result in penalties or financial liability.

- **Concurrent Delay**
  Concurrent delays occur when both the contractor and the client (or another party) contributes to the delay during the same period. These are complex to resolve and often require expert judgment or legal arbitration.

Other researchers propose slightly different frameworks. For example, Rosazuwad (2010), Chai and Yusof (2015), and Elawi et al. (2015) group delays into three major categories:

- **Owner-Related Delays:** Delays caused by late payments, change orders, or inadequate site access provided by the client.
- **Contractor-Related Delays:** Arising from poor planning, low productivity, or failure to mobilize resources effectively.
- **External Delays:** Including weather conditions, governmental interference, or economic instability**.**

Understanding the type of delay is crucial not only for documentation and accountability but also for determining appropriate remedies and legal outcomes. Aibinu and Jagboro (2002) identify six major effects of construction delay: time overrun, cost overrun, disputes, arbitration, litigation, and project abandonment. These effects can seriously undermine the economic and social value of a project and reduce public trust in infrastructure delivery.

Given the complexity of delay types and their interrelationships, effective project planning and monitoring tools—such as Gantt charts, critical path method (CPM), and risk management frameworks—are essential to detect and mitigate delays before they escalate (PMI, 2013; Wysocki, 2014).

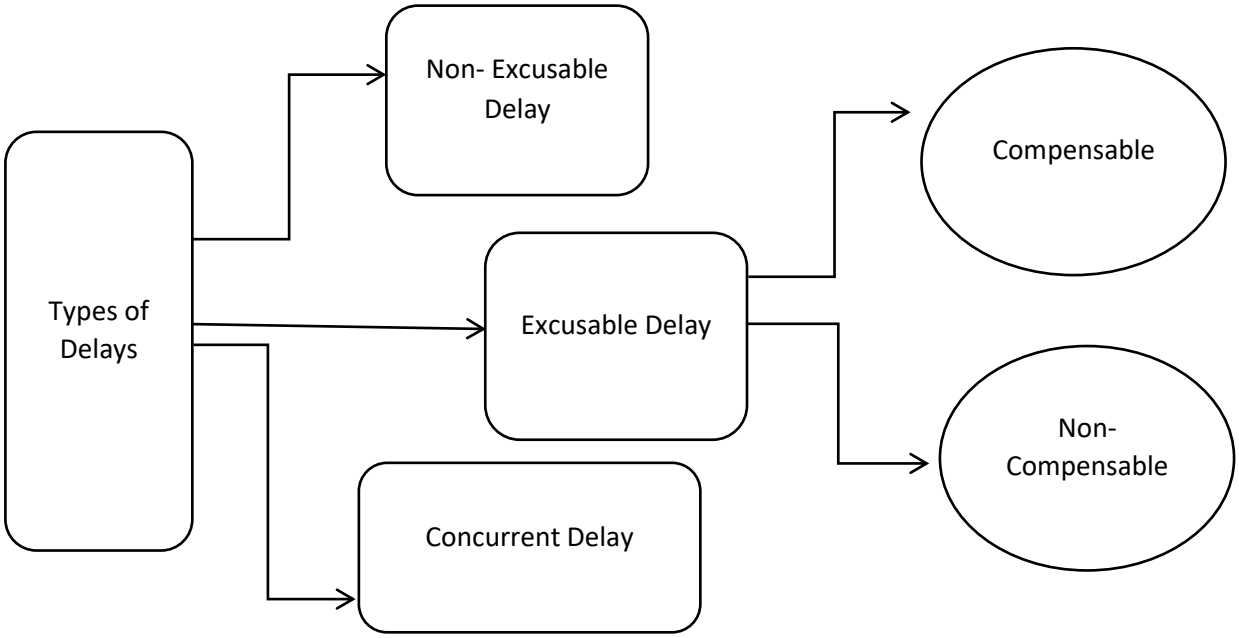

Figure 2: Type of delays

2.2 Review of Empirical literature

2.2.1 Causes of Delay

Delays are a persistent challenge across the global construction industry and frequently result in project overruns, disputes, and reputational damage. In road infrastructure projects, these delays can significantly hinder national development by interrupting the flow of goods and services, disrupting budgets, and diminishing stakeholder confidence. According to the Project Management Institute (PMI, 2013), approximately 72% of certified project managers report encountering significant delays during their careers, suggesting that the issue is not only common but systemic. Identifying and understanding the root causes of construction delays is, therefore, critical to developing effective mitigation strategies and improving project performance.

Numerous studies have classified delay causes into categories such as client-related, contractor-related, and external factors (Assaf & Al-Hejji, 2006; Aibinu & Jagboro, 2002). While some causes are external and uncontrollable—such as weather or

inflation others arise from predictable project management deficiencies that can be proactively addressed. Among these, the most frequently cited causes include poorly defined project scope, inadequate planning and scheduling, poor stakeholder communication, budget inaccuracies, and ineffective material and equipment management.

Poorly Defined Scope of Work

One of the primary contributors to project delays is an inadequately defined scope of work. In construction, the scope serves as a contractual framework that outlines deliverables, responsibilities, timelines, and performance expectations. When this scope is vague or incomplete, misunderstandings and conflicts arise, often resulting in delays, cost overruns, or rework. Marzouk and El-Rasas (2014) emphasize that scope misalignment between stakeholders often leads to cascading coordination issues that impede progress.

Inadequate Planning, Organization, and Scheduling

Planning and scheduling are core project management functions. However, inadequate front-end planning is often cited as a major reason for delay in construction projects. A poorly prepared schedule that lacks clear activity definitions, sequencing, or resource allocation leads to workflow disruptions and inefficient task execution. According to Wysocki (2014), project organization must include administrative planning—such as handling contracts, permits, change orders, drawings, and timekeeping. The absence of centralized documentation or tracking systems can further compound inefficiencies and communication breakdowns.

In large-scale infrastructure projects, like urban road construction, the failure to align procurement schedules with construction milestones or workforce availability often leads to delays. When these elements are poorly coordinated, even minor disruptions can escalate and halt entire project phases.

Ineffective Communication with Stakeholders

Communication is widely acknowledged as a critical success factor in construction projects. Ineffective communication among team members, subcontractors, clients, and consultants leads to misinformation, conflicting priorities, and missed deadlines. Kerzner (2009) argues that the project manager plays a central role in disseminating updates, coordinating stakeholders, and maintaining transparency in project goals and progress. In road construction, where activities often span multiple agencies and public interests, a lack of real-time information exchange can lead to duplication of efforts, legal disputes, or regulatory violations.

Communication gaps also hinder the resolution of unanticipated challenges, such as site access issues or supplier delays. Failure to inform key stakeholders in a timely manner often results in reactive rather than proactive decision-making, further compounding project delays.

Budget Inaccuracies and Financial Mismanagement

Budgeting is a complex and often underestimated aspect of construction project planning. Inaccurate cost estimation, underfunding, or unforeseen price escalations can disrupt progress and force work stoppages. Factors such as inflation, fluctuating material prices, and labor market shortages can all affect financial planning. According to Aibinu and Jagboro (2002), cost overrun is one of the six primary consequences of construction delay, frequently linked to poor financial forecasting or unplanned scope changes.

In road construction, financial mismanagement may lead to contractor disputes, delayed payments, and halted procurement of critical materials. Publicly funded projects, in particular, face heightened scrutiny when delays result from overspending. Even smaller deviations from the budget can negatively affect client trust and regulatory compliance, especially when audits reveal irregularities.

Poor Material and Equipment Management

Material and equipment mismanagement is another prevalent cause of construction delay. Construction sites often face issues such as poor storage, damage to supplies, incorrect orders, or equipment downtime. These inefficiencies not only contribute to cost escalation but also directly affect the project schedule. Shebob et al. (2012) emphasize that mismanagement in logistics—such as delayed delivery of materials or the unavailability of proper equipment—can lead to hours or even days of lost productivity.

Renting incorrect or incompatible equipment for the job, or failing to maintain machinery, adds further complications. In many cases, project teams are forced to reorder supplies or reschedule key activities, which disrupts the critical path and overall progress.

Poorly Defined Scope of Work

One of the leading causes of delay in construction projects is an inadequately defined scope of work. The scope acts as a foundational roadmap that outlines all deliverables, responsibilities, and performance expectations. A vague or inconsistent scope results in confusion, conflicts, and frequent scope changes—often referred to as "scope creep"—which ultimately extend the project timeline and increase costs. Misalignment between

the contractor, client, and consultant on scope expectations is a common driver of such delays (Marzouk & El-Rasas, 2014; PMI, 2013).

Inadequate Planning and Scheduling

While inadequate planning is a common delay factor, its impact differs across regions and project types. In developing contexts like Ethiopia, poor front-end planning such as skipped feasibility studies or unrealistic schedules frequently results in misaligned procurement, delayed approvals, and inefficient task sequencing (Aibinu & Jagboro, 2002; Wysocki, 2014). In road construction, where activities are tightly interlinked, even small planning gaps can cause widespread disruption. Unlike developed settings that often rely on digital tools and integrated systems, many local projects still use outdated, manual approaches, compounding scheduling failures.

Poor Communication and Coordination

Communication failures also vary in severity depending on project complexity and stakeholder structure. In public road projects, fragmented information flow between government bodies, contractors, and consultants leads to reactive decision-making and delayed issue resolution. Kerzner (2009) highlights the need for strong centralized communication, yet many local projects lack unified platforms or clear protocols. In contrast, studies from advanced contexts suggest that adopting real-time communication tools and early coordination frameworks significantly reduces delays. This highlights the need for context-sensitive solutions to communication breakdowns.

Budget Inaccuracies and Financial Constraints

Construction projects are particularly sensitive to budget-related issues, especially in developing economies. Budget overruns are a leading contributor to project stoppages. Aibinu and Jagboro (2002) point out that inaccurate cost estimation, delayed payments, and lack of financial planning significantly impact project continuity. In public infrastructure projects, the consequences are even more pronounced, as delayed government disbursements or underfunded contractors often halt procurement and workforce mobilization. Delays in progress payments and unexpected increases in material or labor costs are among the most cited financial-related causes of delay.

Material and Equipment Mismanagement

The efficient management of materials and equipment is crucial for timely project delivery. Delays can result from ordering incorrect materials, damage during storage, lack of equipment availability, or incompatibility with site conditions. Shebob et al. (2012) highlight the importance of logistics planning and supplier coordination in mitigating these issues. Renting unsuitable machinery or failing to procure materials in

sync with the construction schedule creates idle time and disrupts workflow, especially in labor-intensive road construction projects.

Weather and Force Majeure Events

Unfavorable weather conditions such as rain, extreme heat, or storms—are another cause of unavoidable delays, especially in large outdoor projects. Although such events cannot be controlled, their impacts can be mitigated through proper scheduling buffers and contingency planning. Severe weather can halt earthworks, delay concrete curing, or damage partially constructed structures, especially in early construction stages (Prakash & Joseph, 2014). Force majeure events also include natural disasters and unexpected legislative changes, which are difficult to predict but must be considered in risk assessments.

Delay Classification and Stakeholder Responsibility

Delays are often classified based on responsibility: owner-related, contractor-related, and external. Owner-related delays typically stem from design changes, funding issues, or decision-making bottlenecks. Contractor-related delays include poor site management, lack of skilled labor, and delayed procurement. External delays, on the other hand, include weather, regulatory hurdles, and supply chain disruptions (Haseeb et al., 2011).

In their study on India's construction sector, Prakash and Joseph (2014) categorized delays across seven dimensions: client, contractor, consultant, materials, equipment, labor, and external factors. Poor coordination, delayed approvals, and subcontractor inefficiency were top contributors. Similar findings were echoed by Haseeb et al. (2011) in Pakistan, where 16 critical delay factors were identified, including outdated construction techniques, poor site supervision, and financial mismanagement.

A study by Samarah and Bekr (2016) in Jordan identified 55 delay causes, with 22 primary ones including frequent design changes, scope changes, late payments, and poor contractor planning. Other notable causes were rework due to quality issues, technical problems, and bureaucratic delays. Similarly, Kamanga and Steyn (2013) reported that fuel shortages, delayed utility relocations, and contractor cash flow problems were significant delay drivers in road projects across Malawi and Southern Africa.

In Nigeria, Obodoh and Obodoh (2016) identified financial difficulties, inaccurate project planning, change orders, and inadequate equipment as the major sources of delay in road projects. Alaghbari et al. (2018), studying delays in Yemen, highlighted contractor payment delays, poor site supervision, and funding gaps as key delay causes.

Aziz and Abdel-Hakam (2016) grouped 15 delay categories in Egyptian road projects—including labor shortages, contractor-related delays, and project financing problems. In Sudan, Khair et al. (2016) classified delays as contractor-, consultant-, owner-, government-, or externally induced. In Kenya, Seboru (2015) reported that decision-making delays by client organizations, payment delays, and rain were among the top-ranked delay causes in 141 analyzed cases.

In Ethiopia, Amare et al. (2017) identified ten delay factors specific to Addis Ababa City Road Authority projects, such as poor contractor supervision, lack of mechanical equipment, and inaccurate scope estimation. Similarly, Werku & Jha (2016) analyzed 88 delay causes in Ethiopian construction industries and concluded that inadequate financial capacity, poor project planning, and labor shortages were most critical.

As demonstrated by empirical findings across various national contexts, delays in construction projects are typically multifaceted, involving financial, managerial, technical and environmental dimensions. While external factors like weather cannot be eliminated, many causes such as poor planning, communication gaps, and resource mismanagement can be addressed through improved project governance and early-stage risk analysis. In the case of Addis Ababa, understanding these delay causes is vital for addressing inefficiencies and enhancing the performance of road construction initiatives.

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 will decrease if the cost of a project or schedule exceeds the planned budget (Kaliba et al., 2009).

These findings support the studies conducted by Honrao & Desai (2015) and Hasan et al. (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 budgetted;

(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.

The consequences of delay are different for different project participants which also depend on the type of project. The general consequences are cost overrun; time overrun etc. For the owner/client delay is the loss of money, loss of time, loss of other facilities etc. For the contractor, delay means the loss of wealth for more expenditure on equipment's, other materials and for hiring the skilled labour. (Tushar, 2016).

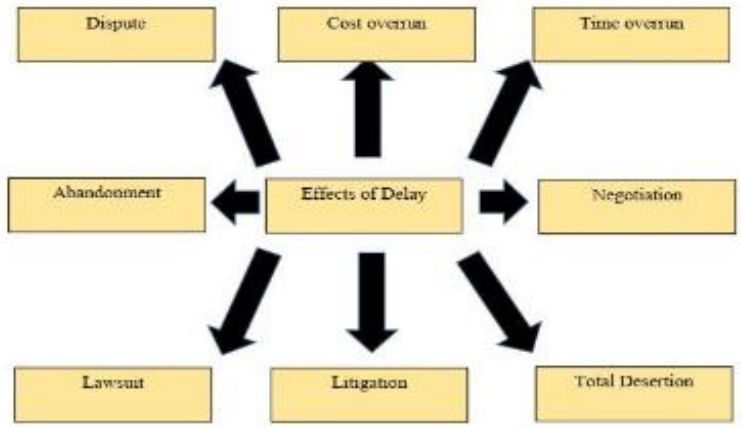

Figure 3 : Effects of delay (Tushar K et al, 2016)

2.2.3 Minimization of Delay

Delays in construction projects particularly in road infrastructure remain a persistent challenge despite continuous advancements in project planning and delivery methods. The construction industry is inherently vulnerable to uncertainties, and even minor disruptions can lead to substantial time and financial losses (Assaf & Al-Hejji, 2006). As highlighted in the preceding sections, delays arise from a combination of managerial, financial, technical, and environmental factors. Therefore, addressing these issues

requires a comprehensive mitigation strategy that considers the multidimensional nature of construction projects.

Several scholars and local studies have emphasized the importance of proactive delay management. For instance, Haseeb et al. (2011) advocate for integrated frameworks that enhance coordination, planning accuracy, and risk anticipation, while Aibinu and Jagboro (2002) stress the role of stakeholder collaboration and early decision-making in avoiding schedule overruns. In the Ethiopian context, researchers have proposed a variety of practical solutions tailored to the challenges of urban road construction, including improving procurement procedures, contractor selection, and site readiness before project mobilization (Abate, 2020; Mekonnen, 2019).

Based on this body of literature and supported by primary data collected from stakeholders in Addis Ababa, this study categorizes delay minimization strategies under four thematic dimensions: managerial, interpersonal, technical, and technological. This classification provides a structured lens for understanding how various interventions ranging from effective planning and resource coordination to communication enhancement and technology adoption can collectively reduce delays and improve project outcomes.

2.2.3.1 Management

Effective construction management involves the structured planning, coordination, and control of a project from initiation to completion. This includes aligning project objectives such as functionality, quality, cost, and schedule with resource planning, and establishing clear communication among stakeholders. It also requires integrating and monitoring the performance of various contributors while evaluating alternatives to achieve client satisfaction (Kerzner, 2017).

Construction management enables project participants to apply their expertise at appropriate stages, maximizing value for the client. The key actors namely the owner, contractor, and consultant each play a significant role in delay prevention. As supported by studies, delay mitigation from a management perspective is often categorized by five major elements: time management, financial management, manpower allocation, work scope definition, and project control systems (Aibinu & Jagboro, 2002).

Table 2.2: Minimizing Delay Items under Management Category

categories	Items
Time	Specification of a realistic duration to execute the project
	Proper planning and scheduling
Control	Obtaining the required approvals of the project from authorities
	Development of a good system for site management and supervision

Administration	Construction management companies to help minimize delays or their Impacts
	Joint efforts of participants in the construction
	Site conditions have to be improved
Financial	Payment to the contractor on time for the work being carried and finished based on contract.
	Ensure adequate and available source of finance
	Improving cash flow & plan the cash flow before start project
Manpower	Employ employer based on their work/skills speciation in construction project
Work scope	Work scope needs to be well defined
Design	Prepare always clear and adequate detail drawing and BOQ (Bill of quantity) without any mistakes
	Accurate initial study and design

To address delays effectively within the management dimension, specific focus areas must be identified and monitored. Key elements include time management, which involves proper scheduling and timely decision-making, and control mechanisms, which ensure that progress aligns with project plans. Administrative efficiency, such as streamlined communication and document handling, also plays a critical role in maintaining momentum throughout the project lifecycle.

Furthermore, financial management ensuring timely disbursement of funds and budget control is essential in preventing cost-related delays. Manpower planning, including proper labor allocation and skill matching, supports continuous workflow. Clearly defining the work scope helps avoid misunderstandings or scope creep that can lead to rework. Lastly, delays related to design changes or deficiencies must be minimized through thorough design reviews and coordination prior to execution. These areas collectively form the basis for delay mitigation strategies under the management category (Assaf & Al-Hejji, 2006)

2.2.3.2 Interpersonal Factors

While effective project management structures are essential for mitigating delays, the interpersonal dynamics among project stakeholders equally influence construction outcomes. In the context of developing countries like Ethiopia, the success of road infrastructure projects is often undermined by weak communication channels, insufficient collaboration, and persistent interpersonal conflicts between owners,

contractors, consultants, and suppliers. These human-centered issues may not be as immediately apparent as material shortages or funding delays, but they significantly disrupt workflow and decision-making processes, ultimately causing project slowdowns (Assaf & Al-Hejji, 2006; Gebrehiwet & Luo, 2017). Studies in the Ethiopian construction sector highlight that ineffective stakeholder coordination and lack of trust frequently result in misunderstandings, duplicated efforts, and delayed responses to project needs (Ayalew et al., 2016). Thus, addressing interpersonal challenges is critical to improving project performance and ensuring timely completion.

Table 2.3 Minimizing Delay Items under Interpersonal Categories

Items
Hiring experienced personnel in the field of work and avoid choose low biding.
Avoiding delaying the response to contractor's queries and approval the submitted submittals and shop drawings.
Proper communication and coordination
Training programs for their workers in order to update their knowledge
Motivate the labor

Interpersonal challenges such as miscommunication, conflicting interests, and lack of trust have been widely recognized as key contributors to project delays, particularly in multi-stakeholder environments like road construction (Girma, 2015). These issues become more severe when roles are unclear or communication protocols are weak, often resulting in delayed approvals, design revisions, or inaccurate progress reporting (Alemayehu, 2014). In the Ethiopian context, studies reveal that unresolved disputes and adversarial relationships between contractors and consultants have led to prolonged disruptions, especially in the absence of formal conflict-resolution mechanisms (Tekalign, 2018). Moreover, deficiencies in leadership, emotional intelligence, and team coordination further undermine project efficiency. To address these problems, scholars have recommended interpersonal skills training for project personnel, regular coordination meetings, and transparent communication channels. Yonas (2016) highlights that improved stakeholder engagement and mutual respect significantly contributed to the timely delivery of several urban road projects in Addis Ababa. Ultimately, fostering effective human interaction is as vital as technical competence in minimizing delays and enhancing project outcomes.

2.2.3.3 Technical

Technical challenges are significant contributors to delays in road construction projects, often arising from inadequate planning, poor design, and deficiencies in equipment and materials. In the context of Addis Ababa, insufficient site investigations, such as limited soil testing and topographical surveys, frequently result in unforeseen

ground conditions. These conditions necessitate design modifications and cause work stoppages, thereby extending project timelines (Alemayehu, 2014). Additionally, design errors and lack of integration between engineering teams and contractors create confusion during construction, leading to frequent revisions and delayed approvals (Tekalign, 2018). These problems underscore the importance of comprehensive and coordinated design processes to minimize technical disruptions.

Table 2.4 Minimizing Delay Items under Technical Categories

Items
Inspection and testing by consultants in construction
Design documents should be approved promptly
Time allowed for developing the design is increased.
Select qualified designers to minimize potential claims.
Producing design documents should be on time as a mistake can be corrected soonest

Material and equipment-related technical issues also play a major role in prolonging project durations. Delays in procurement, unreliable suppliers, and the unavailability of quality construction materials negatively affect workflow and schedule adherence (Girma, 2015). Furthermore, the scarcity of modern machinery and skilled operators in Ethiopia reduces operational efficiency, especially in tasks requiring mechanization, such as asphalt paving and earthmoving (Yonas, 2016). Without appropriate technological support and timely material delivery, construction teams face frequent halts, contributing to cumulative delays. Therefore, improving technical capacity through better site investigations, design coordination, procurement management, and adoption of suitable construction technologies is critical to enhancing project performance and ensuring timely completion.

2.2.3.4 Technology

Technology broadly refers to the practical skills, knowledge, and tools used to improve processes and achieve specific goals. In the construction industry, technological advancements play a vital role in minimizing project delays by enhancing efficiency, accuracy, and safety (Hwang & Ng, 2013). The application of modern technology facilitates improved planning, scheduling, resource allocation, and real-time monitoring of project progress, which are critical for managing complex road projects like those in Addis Ababa.

Table 2.5 Minimizing Delay Items under Technology Categories

items
Uses of monitoring tools or software
Building information modeling
Productivity can be enhanced by using the modern equipment's

One key technological advancement is the adoption of electronic monitoring systems that allow project managers to closely supervise labor productivity and site activities with greater precision and responsiveness (Abdul-Rahman et al., 2017). Similarly, specialized software tools such as Building Information Modeling (BIM), Primavera, and other project management applications help create detailed project models, effectively schedule tasks, and continuously monitor progress. These tools reduce errors, ensure adherence to timelines, and enable early identification and resolution of potential delays.

Modern construction equipment also significantly contributes to mitigating delays. Contractors are encouraged to invest in advanced, well-maintained machinery tailored to the project's demands. Mechanized earth-moving machines, automated concrete mixers, and computer-controlled paving equipment accelerate work processes and improve precision compared to manual methods. Additionally, technology reduces reliance on human labor for repetitive or hazardous tasks, thereby lowering the risk of human error and improving site safety—one of the common causes of delays (Pheng & Wee, 2001; Tekalign, 2018).

To complement technology adoption, researchers have proposed various strategies to minimize delays in road construction. Prakash and Joseph (2014) identified fifteen measures including regular progress meetings, use of modern technology, proper planning and scheduling, clear communication channels, and close supervision. Among these, site management, strategic planning, and effective communication were deemed most effective. Similarly, Obodoh and Chikasi (2016) emphasized the importance of adequate finance, competent project management, resource availability, and skilled subcontractors in delay mitigation. They further recommended continuous training programs to improve contractors' administrative and project management skills, alongside awarding contracts to experienced professionals and timely payment processes.

Specific to Ethiopia, Seboru (2015) highlighted the need to streamline client payment systems, reduce bureaucratic delays, and promote better contractor planning, including scheduling weather-independent operations during rainy seasons. Amare et al. (2017) recommended establishing a consolidated project information database to support stakeholders with accurate data, enhancing capacity building through initiatives like the

ERA Master program, and fostering knowledge exchange between firms. These recommendations aim to strengthen the overall efficiency of road project delivery in Addis Ababa.

Furthermore, Khair et al. (2016) stressed the pivotal role of skilled project managers and the use of suitable resources and procedures to reduce delays. Werku and Jha (2016) outlined actions for owners, contractors, and consultants such as verifying project designs before construction, avoiding the lowest bidder approach, hiring competent supervisors, timely payments, and promoting a culture of proper planning, resource management, and monitoring. Aziz and Abdel-Hakam (2016) added that ensuring equipment availability, employing reputable contractors, managing price fluctuations of materials like bitumen, and engaging qualified designers are essential for smooth project execution.

Computer-aided design and project management tools further enhance collaboration by providing shared access to updated project data. This digital coordination reduces misunderstandings and supports timely decision-making, which minimizes delays and rework caused by design changes or variation orders.

In summary, the integration of advanced technology in construction projects serves as a critical strategy to mitigate delays. Modern equipment and digital tools not only boost labor productivity and improve safety but also empower managers with sophisticated planning and control capabilities. Consequently, projects, including those in Addis Ababa, are more likely to meet their timelines and contractual obligations, fostering successful outcomes.

2.2.4 Empirical Review

The construction sector inherently demands substantial capital investments due to its large-scale and complex nature. One of the most critical challenges faced in this industry is project delays, which can trigger costly disputes, damage stakeholder relationships, and undermine overall project success. Delays are common across construction projects worldwide, but their causes and severity often vary significantly depending on contextual factors. This empirical review examines key findings from international studies on delay causes and mitigation measures, providing valuable insights relevant to road construction projects such as those in Addis Ababa.

In Egypt, Aziz et al. (2016) conducted an extensive study exploring delay factors in road construction projects. Their research identified 293 potential causes categorized into 15 groups, surveyed through stakeholder questionnaires. The findings highlighted owner-related financial difficulties as the leading cause of delays. Other significant contributors included inadequate equipment, contractor inexperience, material shortages, equipment failure, poor subcontractor performance, design errors, and

ineffective site management. These factors collectively emphasize the multifaceted nature of delays in highway projects, underlining the critical roles of financial management and technical competency.

Similarly, Prasad et al. (2019) examined delays in Indian construction projects, identifying 60 causes grouped into seven categories: planning, design and engineering, procurement, finance, human resources, project execution, contract management, and external factors. Financial constraints were a recurrent theme, with delays often linked to variation orders, contractor financial troubles, late payments, and changes in owner design. Particularly for transport infrastructure, land acquisition and utility-related delays emerged as primary obstacles, reflecting challenges commonly faced in developing countries' urban expansion projects.

In a related Egyptian study, Aziz (2013) evaluated delay causes in building projects post the Egyptian revolution. Contractor-related factors ranked highest, while equipment-related issues were least significant. Owner-related, design, consultant, external, material, and labor factors were also analyzed, emphasizing the importance of categorizing and ranking causes to prioritize interventions effectively.

Kikwasi (2012) investigated delays in Tanzanian construction projects and identified seven primary factors: design changes, late contractor payments, funding problems, poor project management, and disputes over valuation and compensation. Medium-ranking causes included conflicts among parties, schedule alterations, procurement difficulties, bureaucratic hurdles, and contractor competence issues. These findings resonate with common challenges in Sub-Saharan Africa, where governance and resource management constraints influence project delivery.

In Bahrain, Hasan et al. (date not specified) studied road construction delays by categorizing 47 delay factors into owner-, contractor-, consultant-, utilities-, government-, and external-related causes. The study found utilities and services issues to be the most severe delay causes. Additional significant factors included poor planning, manpower and material shortages, work suspensions, budget constraints, slow decision-making, and consultant inexperience. These results highlight the complexity of coordinating multiple stakeholders and managing external dependencies in road projects.

Other regional studies also corroborate these themes. Al-Momani (2000) analyzed 130 Jordanian public projects, identifying poor design, owner negligence, change orders, weather, site conditions, late deliveries, economic factors, and scope increases as major delay drivers. In Malaysia, Wa'el et al. (2007) surveyed project participants and classified delay causes into consultant-, owner-, contractor-, and external-related

categories. Financial difficulties, delayed decisions, and slow oversight were among the top reasons cited across these groups.

Collectively, these empirical studies underscore several recurring causes of construction delays: financial constraints, design changes, inadequate planning, stakeholder coordination challenges, resource shortages, and administrative inefficiencies. Understanding these factors is vital for developing effective mitigation strategies tailored to the local context of Addis Ababa's road construction sector, which shares many of these challenges. This review thus lays a foundation for proposing targeted interventions to minimize delays and enhance project performance.

2.2.5 Related Studies in Ethiopia

Several empirical studies have been conducted in Ethiopia to investigate the causes of delays and cost overruns in construction projects, reflecting the sector's unique challenges in the local context. These studies primarily focus on public infrastructure and building projects, highlighting recurring issues related to financial constraints, planning, management, and external influences.

Werku and Jha (2016) conducted a comprehensive questionnaire survey targeting clients, design engineers, consultants, and contractors to assess 88 delay factors categorized under eight broad groups: client-related, consultant/supervisor-related, contractor-related, designer-related, labor-related, material-related, equipment-related, and external factors. Their findings emphasized five critical factors that frequently delay public building construction projects in Ethiopia: contractors' financial difficulties, escalating material prices, poor planning and scheduling by contractors, delayed progress payments for completed work, and a shortage of qualified professionals in construction project management within contractor organizations. This study highlights the multifaceted nature of delays, underscoring both financial and managerial weaknesses.

In a related study focused on federal road projects, Wubishet et al. (2017) combined survey and case study methods to analyze causes of cost overruns in the southern districts of Ethiopia. The top contributors identified included fluctuating material prices, underestimation of project costs, delays in raw material supply, inadequate contract document review, poor coordination during the design phase, and insufficient cost planning both before and after contract awarding. These factors directly affect the financial performance and timely completion of road projects and are commonly echoed in construction projects throughout the country.

Meaza (2015) examined delays specifically in power distribution projects managed by the Ethiopian Electric Utility Enterprise. This study pointed to owner-related weaknesses as the most significant contributors to delays. Owner responsibilities such

as errors and inconsistencies in design documents, frequent design modifications and variation orders, insufficient details in drawings, slow supervision and contract management, inaccurate site investigations, and material changes during construction were highlighted. Additional owner-side delay factors included delayed progress payments, slow management decisions, unrealistic construction schedules, frequent changes in project scope and cost, and a prolonged procurement process. Contractor financial issues were ranked as the second most important cause, reinforcing the importance of financial stability alongside effective project governance.

Shambel and Patel (2018) focused on road construction projects in Addis Ababa and identified the main factors affecting time and cost overruns. Their study revealed that financial problems, improper planning, land acquisition delays, design changes, insufficient supply of materials and equipment by contractors, and incomplete designs were the key causes of delays and cost escalations. The authors stressed the necessity of implementing targeted solutions to mitigate these issues in order to ensure timely and budget-compliant project completion.

Beyond these studies, other research in Ethiopia corroborates the centrality of financial constraints and project management deficiencies as critical drivers of delays. For example, research by Alemayehu and Dessalegn (2014) highlighted bureaucratic delays and ineffective communication among stakeholders as notable contributors to slow project progress in public works. Similarly, Teklu and Berhanu (2019) found that external factors such as regulatory hurdles, political instability, and inadequate infrastructure significantly impact project schedules, particularly in road construction.

Collectively, these Ethiopian studies reveal a complex interplay of financial, managerial, technical, and external challenges that impede timely project delivery. Addressing these issues requires a holistic approach that strengthens financial management, improves planning and design processes, enhances stakeholder coordination, and streamlines regulatory frameworks. Understanding these local factors is essential for designing effective strategies to minimize delays in Ethiopia's road construction sector, directly supporting the objectives of this thesis.

2.2.6 Potential strategies to minimize road construction projects

Several studies highlight the importance of streamlining permit and approval processes to reduce delays in road construction projects. Lengthy and complex bureaucratic procedures often cause significant hold-ups before work can even begin. Simplifying these processes and ensuring clear guidelines can accelerate project initiation and reduce administrative bottlenecks.

Effective labor management is another critical strategy. Delays frequently arise from labor shortages, absenteeism, or poor workforce productivity. Improving labor

planning, providing adequate training, and maintaining good labor relations can help ensure that the required workforce is available and motivated throughout the project lifecycle.

Securing and managing funding effectively is consistently emphasized as essential. Delays often occur when there are interruptions or uncertainties in project financing, causing payment delays to contractors or suppliers. Ensuring reliable and timely flow of funds can minimize cash flow problems that hinder progress on site.

Strengthening the capacity of contractors and consultants also plays a significant role in minimizing delays. Enhancing technical skills, project management expertise, and organizational capabilities allows contractors and consultants to better plan, coordinate, and execute their responsibilities, reducing errors and rework that cause schedule overruns.

Efficient material and equipment logistics are vital to keeping projects on track. Delays in the procurement and delivery of materials and machinery can halt construction activities. Developing reliable supply chains and maintaining adequate inventory levels help to prevent such disruptions.

Improved project planning and scheduling, utilizing modern tools and techniques, can better identify potential risks and allocate resources optimally. Properly detailed and realistic schedules enable early detection of possible delays, allowing timely interventions to keep the project on course.

Institutional and regulatory reforms are often proposed to create a more supportive environment for construction projects. Clear policies, enforcement of standards, and streamlined regulations reduce uncertainties and conflicts that frequently cause delays.

Finally, strengthening community and stakeholder engagement helps in addressing external factors that can delay projects, such as local opposition or land disputes. Early and continuous communication with affected parties facilitates smoother project implementation by reducing conflicts and enhancing cooperation.

2.2.7. Research gap

While several studies in Ethiopia have examined the causes of delays in construction projects, many are limited in scope and context. For example, Werku and Jha (2016) provided a broad national assessment of delay factors but did not focus on urban-specific conditions or municipal-level projects. Wubishet et al. (2017) addressed cost overruns in federal road projects but did not explore delays in city-administered infrastructure. Similarly, Meaza (2015) concentrated on utility-based projects, and Shambel and Patel (2018) analyzed both time and cost overruns in Addis Ababa but did not explicitly link delay causes to stakeholder perspectives across different organizational levels within AACRA.

These studies provide useful insights into the general construction environment in Ethiopia but often overlook the complex and unique challenges of road construction in urban centers like Addis Ababa. Specifically, they do not sufficiently capture how different stakeholders such as municipal engineers, consultants, and contractors perceive and experience delays within city-managed road projects. This leaves a notable gap in the literature regarding the urban governance, institutional limitations, and coordination challenges that characterize road infrastructure projects under AACRA. By focusing on stakeholder perspectives across multiple sub-cities in Addis Ababa, this study seeks to fill that gap and contribute a context-specific understanding of delay factors in municipal road construction.

2.2.8 Conceptual framework of the study

This study adopts a conceptual framework that categorizes the major causes of delays in road construction projects under the Addis Ababa City Roads Authority (AACRA) into five key groups: client-related, contractor-related, consultant-related, external, and material/equipment-related factors. These categories reflect the complex, multi-stakeholder environment of urban municipal road construction in Addis Ababa.

Client-related factors primarily refer to issues originating within AACRA, including delayed decision-making, late disbursement of progress payments, and poor coordination among internal departments. Given the layered nature of municipal governance, these administrative inefficiencies often hinder timely project progress.

Contractor-related factors involve challenges such as weak project planning and scheduling, shortage of skilled labor, and limited capacity to effectively engage with bureaucratic procedures. Many local contractors struggle with public procurement processes and compliance requirements, which exacerbates delays.

Consultant-related factors include slow supervision, late or incomplete design revisions, and poor coordination with both AACRA and contractors. These shortcomings frequently result in rework, design discrepancies, and unclear technical guidance, disrupting the construction timeline.

External factors are those beyond the direct control of project stakeholders, but which significantly impact project delivery. In the AACRA context, these include municipal bureaucracy (such as prolonged permitting and inter-agency coordination delays), urban land acquisition and compensation disputes, foreign currency shortages affecting imported materials and machinery, as well as inflation and cost escalation pressures.

Material and equipment-related factors reflect logistical and operational issues, including delayed procurement of construction materials, challenges in accessing imported goods due to forex constraints, and breakdowns or shortages of essential

machinery. In many AACRA projects, inadequate equipment maintenance and lack of spare parts have also contributed to extended downtime.

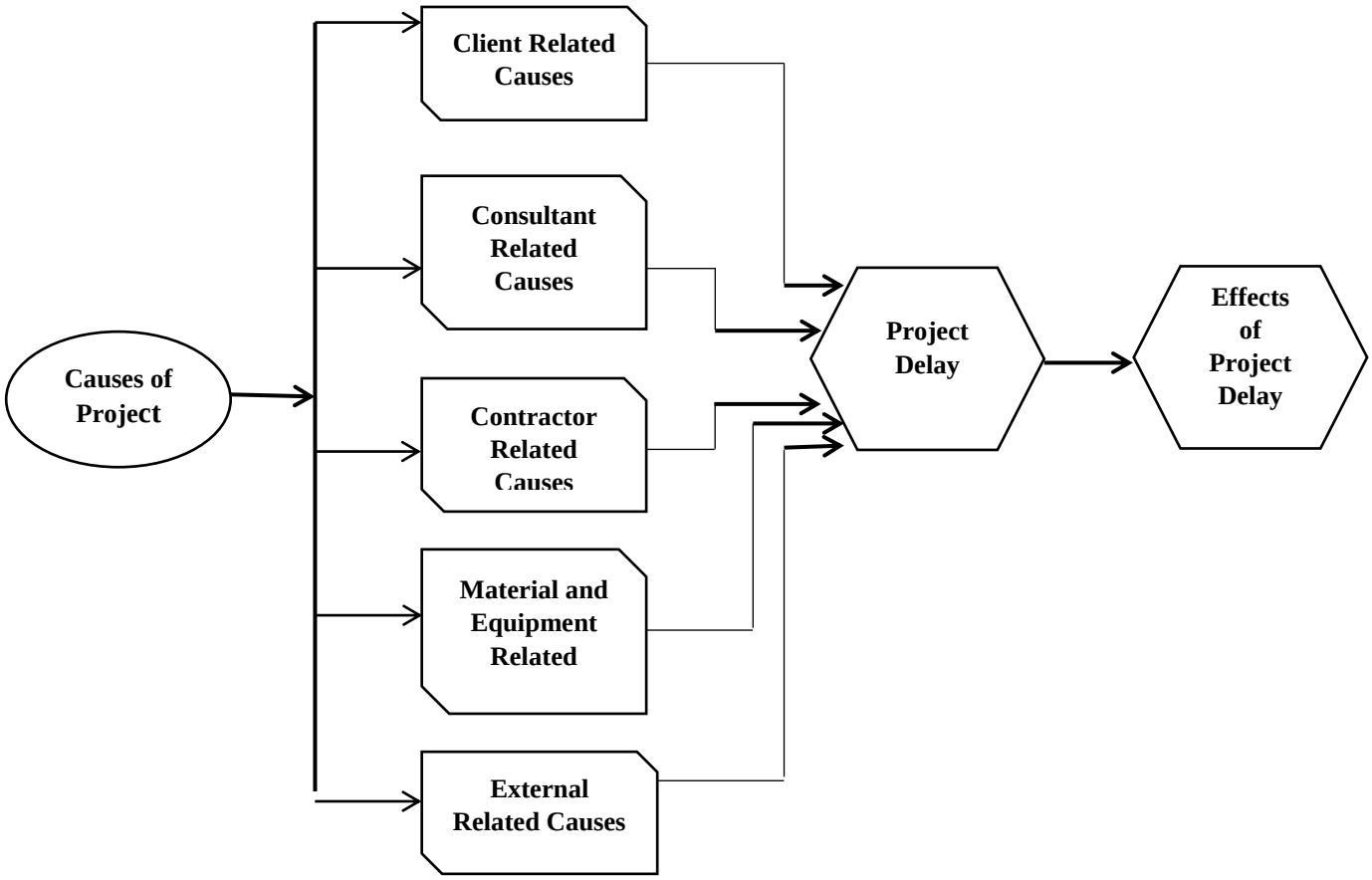

Figure 4: Conceptual Framework

Together, these five categories of delay factors represent the core variables analyzed in this study. They are drawn from both the existing literature and observations from the Addis Ababa road construction environment. Each category interacts with the others to influence the timeliness and efficiency of project execution. The framework thus supports a comprehensive, stakeholder-informed analysis of the factors contributing to delays in urban road projects managed by AACRA.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with the methodology and procedures that were followed to determine the style and methods of collecting information and data from the study population through office and field sources. The study identified and ranked 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. This chapter discusses research design, population, sample size and sampling design, data collection methods, validity and reliability of instrument, methods of data analysis as well as research ethics that was followed in the research.

3.2 Research Design

The study aimed to identify the factors which are considered as grounds for road project delay in Addis Ababa. So in order to optimize the objective of the study, a descriptive nature research design which is used to provide quantitative or numerical description of attitude, or opinions of participants to evaluate the perception of parties involve in the construction process has been employed. This research type could enable the study to describe and validate the extent to that the identified factors by intensive literature review contribute to roads construction project delay for the case study, Addis Ababa road authority. Thus, quantitative research methods were employed to analyze the total delay causing factors and effects of projects.

3.3 Research Strategies

This study employed a survey-based research strategy to investigate the causes of delays in AACRA-administered road construction projects. Surveys were selected due to their effectiveness in collecting standardized information from a broad group of stakeholders, including contractors, consultants, and AACRA staff. This approach allows for the aggregation of diverse viewpoints across multiple projects and sub-cities, making it suitable for identifying common patterns and perceptions related to construction delays.

Surveys are particularly advantageous in terms of cost-efficiency, logistical feasibility, and the ability to maintain anonymity, which can encourage more candid responses. Given the scale of AACRA's operations and the dispersed nature of its projects, surveys provided a practical means to gather data within a limited timeframe and budget. The structured format of the questionnaire also allowed for easier quantification and comparison of factors contributing to delays.

However, the use of surveys also presents several important limitations. One key concern is response bias, where participants may overstate or understate certain issues

due to social desirability, misunderstanding, or personal interest. Additionally, low response rates a common challenge in organizational surveys can affect the representativeness of the data and potentially skew the results. Another limitation is the inherent difficulty of capturing complex causal relationships through closed-ended self-report items. Construction delays are often the result of dynamic, interrelated factors that may not be fully captured in a structured survey format.

To mitigate some of these challenges, the questionnaire was carefully designed based on an extensive literature review and validated by experts before distribution. Multiple follow-up attempts were also made to improve the response rate. Nevertheless, the study acknowledges that surveys may not fully reveal deeper institutional or systemic issues that would benefit from qualitative inquiry, such as in-depth interviews or case studies.

Despite these constraints, the survey method was deemed appropriate for the study's objective of identifying, ranking, and analyzing delay factors from multiple stakeholder perspectives across a broad sample of road projects. It enabled the collection of quantifiable data that can inform both academic understanding and practical recommendations for AACRA and other relevant authorities.

3.4 Sources of Data

This study utilized both primary and secondary data sources to ensure a comprehensive understanding of the causes of delays in road construction projects managed by AACRA.

Primary data was obtained through structured questionnaires distributed to key project stakeholders, including AACRA staff, contractors, and consultants. These respondents were selected based on their direct involvement in the planning, execution, and supervision of road projects within Addis Ababa. The survey captured perceptions on a range of delay factors, their frequency, and severity across multiple project sites.

Secondary data was gathered from official project records and documents made available by AACRA. These included project implementation reports, baseline schedules, progress evaluations, and completion status summaries. Selection of secondary data sources was based on three key criteria: (1) relevance to the projects included in the primary data set (i.e., between 2019 and 2024), (2) completeness and consistency of documentation (i.e., documents that included start dates, delays, payments, or work interruptions), and (3) accessibility through formal request to the AACRA documentation unit.

The scope of secondary data review covered project documentation from selected asphalt road construction projects implemented in the Yeka, Bole, and Akaki-Kality sub-cities. These documents were reviewed to identify factual records of delays, variation orders, project extensions, and financial disbursement timelines. Where available, contractor performance, evaluations and minutes of coordination meetings were also examined to triangulate survey responses.

Integration between primary and secondary data was achieved through cross-verification and pattern comparison. For example, survey responses citing payment delays were compared with actual disbursement records from the reviewed project files. Similarly, references to contractor planning issues or design revisions were checked against documented site instructions and variation orders. This process helped to validate stakeholder perceptions, reduce respondent bias, and provide a more evidence-based interpretation of delay causes.

By combining self-reported survey data with documentary evidence, the study ensured both breadth and depth of analysis, enhancing the credibility of its findings and supporting more accurate recommendations for delay mitigation.

3.5 Target Population, sampling technique and sample size

3.5.1 Target Population

The focus populations of this study were among the client/owner, consultants, contractors, the project managers, office engineers, site engineers and supervisors with an experience in the road construction industry and currently involved in AACRA projects.

3.5.2 Sample size

The total sample size for this study consisted of 137 respondents, drawn purposively from contractors, consultants, and AACRA staff directly involved in road construction projects. The purposive sampling technique was used due to the need to target individuals with specific roles and knowledge related to the subject matter. While this method ensures that only informed participants are included, it may limit the generalizability of the findings due to its non-probabilistic nature.

The size of 137 was guided by a combination of logistical feasibility, past similar studies, and access to professionals across selected sub-cities (Yeka, Bole, and Akaki-Kality). Comparable studies on construction delays in Ethiopia (e.g., Werku & Jha, 2016; Shambel & Patel, 2018) have used sample sizes ranging between 80 and 150, suggesting that this number falls within a practical and accepted range for stakeholder-based research in the sector. Additionally, a small-scale pilot study involving 15 participants

was conducted to refine the questionnaire and assess general responsiveness, which confirmed the suitability of the tool and the relevance of the selected sample categories.

To assess the statistical adequacy of the sample, a basic sample size calculation was conducted using Cochran's formula for an assumed population of 2,000 professionals (AACRA and affiliated contractors/consultants), a 95% confidence level, and a 7.5% margin of error:

$$n = \frac{Z^2 \cdot p(1-p)}{e^2} = \frac{(1.96)^2 \cdot 0.5 \cdot (1-0.5)}{(0.075)^2} \approx 171$$

Given this result, the target sample size would ideally be around 171 participants. However, the study reached 137 respondents, which corresponds to approximately 80% of the ideal target. While this slightly reduced sample size may limit the statistical power, the high relevance and direct involvement of respondents in AACRA projects enhance the reliability of the findings.

To address non-response bias, follow-up efforts were made through repeat contact and reminders, particularly with contractor and consultant respondents. The final response rate was approximately 82%, and missing or partial responses were reviewed and excluded from analysis if they did not meet minimum completeness standards. The impact of non-response was mitigated by ensuring that all stakeholder categories were proportionally represented in the final sample.

While the sample size imposes limitations on broader statistical generalization, it remains sufficient for exploratory analysis and comparative insight among stakeholder groups within the context of municipal road construction in Addis Ababa. The study therefore acknowledges the limitations while maintaining that the selected sample allows for credible and contextually grounded conclusions.

3.5.3 Sampling technique

This study employed a purposive sampling technique, selecting participants who had direct involvement in the planning, supervision, and execution of road construction projects under the Addis Ababa City Roads Authority (AACRA). The target groups included project engineers, construction managers, consultants, site supervisors, and other technical professionals from both AACRA and private contracting firms. These individuals were purposefully selected based on their firsthand experience with project implementation and their ability to identify and evaluate delay-related factors.

Other administrative departments such as human resources, finance, and logistics were not included in the primary data collection, as their roles are typically indirect and less

involved in the day-to-day management of road construction activities. While these teams may influence certain administrative or procurement aspects, their perspectives were considered outside the central focus of this research, which aimed to capture technical, managerial, and field-based delay factors. The exclusion of these groups may limit the study's ability to assess internal institutional inefficiencies fully particularly those related to staffing processes, financial flows, or logistical coordination. This limitation is acknowledged in Section 1.7.

The sampling was conducted during the 2022/2023 Ethiopian fiscal year, which served as the primary data collection period for this study. This year was selected due to the active implementation of several AACRA road construction projects and the resumption of works previously delayed by COVID-19 disruptions. It also coincided with improved institutional access and stakeholder availability, allowing the researcher to reach targeted professionals across multiple sub-cities. While the primary data collection occurred over a single year, the study included both ongoing and past projects implemented between 2019 and 2023. This allowed the research to capture retrospective insights as well as current project realities. However, relying on a single-year data collection window may limit the ability to observe longitudinal trends or seasonal variations in delay patterns. This limitation is recognized and mitigated by the inclusion of secondary data from multiple project years and the careful selection of experienced respondents familiar with projects across the full time range.

Several macro-environmental factors influenced project delays during this timeframe and were considered in both the questionnaire design and interpretation of findings. These include:

- **Severe inflationary pressures** affecting material and labor costs;
- **Foreign currency shortages**, which delayed the importation of key construction equipment and materials;
- **Institutional reforms and restructuring within AACRA**, which temporarily slowed decision-making and contract processing;
- **Post-pandemic procurement and labor disruptions**, which reduced availability of inputs;
- **Increased bureaucratic load** due to parallel donor-funded and city-funded infrastructure programs requiring overlapping regulatory approvals.

These conditions added to the complexity of project execution during the selected time frame and were considered integral to understanding the nature and severity of delay factors in the Addis Ababa context.

3.6 Data Collection

The study employed both primary and secondary data collection methods to ensure a comprehensive and triangulated understanding of the factors contributing to delays in AACRA-administered road construction projects.

For the primary data, a structured questionnaire was developed by the researcher to gather first-hand information directly from targeted respondents, including AACRA staff, contractors, and consultants involved in road project planning and implementation. The questionnaire was designed based on a thorough literature review and expert validation to ensure its relevance and clarity. It consisted of both close-ended and scaled items, using a five-point Likert scale ranging from *Strongly Disagree (1)* to *Strongly Agree (5)*. This approach allowed respondents to express their level of agreement with various statements related to project delay causes, impacts, and potential mitigation strategies. The data gathered through this method provided quantifiable insights into stakeholder perceptions, which are summarized in Tables 3.1 and 3.2.

In addition to the primary data, secondary data was collected through an extensive document review process. Relevant sources included project implementation reports, contract documents, project completion summaries, academic research papers, books, journal articles, and government publications. These documents were selected based on their relevance to the projects under investigation—particularly those implemented between 2019 and 2023 under AACRA's management. The secondary data served not only to supplement the primary findings but also to provide an objective benchmark for evaluating the accuracy and completeness of stakeholder responses.

By combining these two data sources, the study aimed to enhance the reliability and validity of its findings. The integration of structured stakeholder feedback with documented project histories allowed for a richer and more contextualized analysis of delay factors affecting urban road construction in Addis Ababa.

Table 3.1 Likert Scale for Occurrence of Related Delay Causes

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

Table 3.2 Likert Scale for most Influential Effects of Delay

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

3.7. Method of Data Analysis

After data collection, the responses were carefully coded and edited to ensure accuracy and completeness. The data was then entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 20, a widely used tool for quantitative analysis in social science and engineering research.

The analysis began with descriptive statistics, including frequencies, percentages, and mean values, to summarize the demographic characteristics of the respondents and provide an overview of the general distribution of responses. This step helped in understanding the composition of the sample and the initial trends in the data.

To assess and rank the importance of the various delay-causing factors and their perceived impacts, the study employed the Relative Importance Index (RII) method. RII is particularly useful in construction management research for comparing the significance of multiple factors based on stakeholder perceptions. Each factor's RII score was calculated from the Likert-scale responses, and the results were then used to establish a prioritized list of the most critical causes of delay. This analysis was conducted separately for each stakeholder group clients (AACRA), contractors, and consultants to identify both common and divergent views across the project chain.

The use of both descriptive statistics and RII analysis allowed for a comprehensive examination of the collected data. It facilitated the identification of key delay factors in a structured and quantifiable manner, ultimately contributing to a more evidence-based understanding of the challenges facing road construction projects in Addis Ababa.

3.8 Method of Data Presentation

To effectively communicate the results of the data analysis, the study employed a combination of tabular and graphical presentation techniques. Specifically, the analyzed data were presented using frequency tables, bar charts, and ranking tables. These methods were selected for their clarity and suitability in illustrating patterns, comparisons, and the relative weight of responses.

Frequency tables were used to summarize the demographic characteristics of the respondents and provide an overview of response distributions for key variables. These tables helped present descriptive statistics in a structured and accessible format. Bar charts were utilized to visually compare the degree of agreement or disagreement with various delay factors across different stakeholder groups. The use of visual aids allowed for quicker interpretation of trends and facilitated cross-group analysis, particularly among AACRA staff, contractors, and consultants. Ranking tables, generated through the Relative Importance Index (RII) analysis, were used to order the delay factors based on their perceived significance. This format made it easier to highlight the most and least critical issues influencing project delays, as perceived by each respondent group.

The integration of these presentation methods enhanced the clarity and interpretability of the findings, enabling a comprehensive comparison across stakeholder categories and supporting the development of well-informed conclusions and recommendations.

3.9 Validity and reliability of instrument

To ensure the effectiveness of the research tool in capturing the key delay factors in road construction projects under AACRA, both validity and reliability assessments were applied to the structured questionnaire.

Content validity was established through an extensive review of literature on road project delays, previous empirical studies, and national construction reports. Items were selected and adapted from validated questionnaires used in related research and tailored to reflect the realities of AACRA-administered urban projects. Further, consultations were held with subject matter experts from AACRA, contractors, and academic advisors to confirm the clarity, relevance, and contextual appropriateness of each item. This process helped ensure that the instrument adequately covered all relevant dimensions of the study — including causes of delay, their impacts, and mitigation strategies.

The final questionnaire included:

- Section 2: 40 Likert-scale items across five delay factor categories (client, contractor, consultant, external, and material/equipment)
- Section 3: 22 Likert-scale items capturing various impacts of delays, grouped into cost-related, time and quality-related, and stakeholder-related consequences
- Section 4: 24 Likert-scale items addressing mitigation strategies across planning, capacity, communication, financial, and institutional themes

To assess reliability, the internal consistency of the Likert-scale items was tested using Cronbach's Alpha. This analysis was conducted using SPSS software, focusing on each major thematic section of the questionnaire. The following results were obtained:

- **Delay Causes (Section B)**: $\alpha = 0.881$
- **Impacts of Delays (Section C)**: $\alpha = 0.862$
- **Mitigation Strategies (Section D)**: $\alpha = 0.887$
- **Overall Scale (B + C + D combined)**: $\alpha = 0.876$

These values indicate a high level of internal consistency, as all alpha values exceed the commonly accepted threshold of 0.70 for social science research. This confirms that the grouped items within each section reliably measure their respective constructs.

Item-total statistics were also reviewed. All items showed positive item-total correlations, and none displayed a significant increase in alpha if deleted. This suggests that each item contributed meaningfully to the construct it was intended to measure.

While the instrument demonstrated strong reliability and content validity, it is acknowledged that Likert-scale questionnaires, by nature, rely on self-reported perceptions, which may introduce subjectivity or response bias. To address this, the study triangulated survey responses with secondary data sources such as project reports and AACRA documentation, enhancing the overall credibility of the findings.

3.10 Research Ethics

This study was conducted in accordance with established ethical standards for academic research. Ethical approval and guidance were obtained from the researcher's academic institution prior to data collection. All participants involved in the survey were informed about the purpose of the study and participated voluntarily, with full consent. They were assured that their responses would be used solely for academic purposes and that they could withdraw at any stage without any consequences.

Anonymity and confidentiality were strictly maintained throughout the research process. Personal identifiers such as names, job titles, or contact details were neither collected nor disclosed. Respondents were encouraged to express their views freely based on their professional experience, without fear of judgment or repercussions.

For secondary data, organizational documents such as project reports, progress records, and internal evaluations were reviewed with the explicit permission of AACRA. These materials were handled responsibly, and no sensitive or confidential information was disclosed in the thesis. The findings presented are used exclusively for this research and will not be shared or repurposed for any non-academic objective.

In sum, the study ensured transparency, voluntary participation, respect for privacy, and responsible data handling in all phases of the research.

CHAPTER FOUR: RESULTS and DISCUSSION

4.1. Demographic Profile and Response Rate of Respondents

4.1.1 Demographic Profile

The demographic characteristics of the respondents are summarized using frequency and percentage distributions. This section includes variables such as gender, age, job designation, educational background, and years of work experience.

Table 4.1: Distribution of Respondents by Sex

Respondent Gender	Organization type			Total
	Client/owner	contractor	Consultant	
Male	39	27	17	83
Female	7	5	9	21
Total	46	32	26	104

As indicated in Table 4.1, the majority of respondents were male, accounting for 83 individuals (80%), while female participants comprised 21 individuals (20%). Although the data reveals a greater representation of male respondents, this outcome is not emphasized as a key finding, since the sampling technique employed was convenience sampling. Moreover, the purpose of the study was not to examine gender distribution within the construction industry, but rather to assess factors related to project delays.

Table 4.2: Distribution of Respondents by Age

Age	Frequency	Percentage (%)
18-30 years	49	47%
31-40 years	31	30%
41-50 years	16	15%
51-60 years	8	8%
Above 60 years	-	0%
Total	104	100%

As shown in table 4.2 of the age category, the data shows that the majority of population that participated were aged between 18-30 years making 47%, and those aged between 31-40 years made 30% out of the total respondents, followed by those aged between 41-50 years accounting 15%, and 8% of the respondents were aged between 51-60 years .On the other hand, there were no respondent above the age category of 60 years.

Table 4.3: Distribution of Respondents by level of Education

Level of Education	Frequency	Percentage
Diploma	7	7%
First Degree	61	59%
Masters	36	34%
Total	104	100%

As shown in table 4.3, the level of education respondents with a first degree dominated the study with a number 59 having a percent of 59%; they were followed by respondents having masters with a frequency 36 and a percentage of 34%. Only 7 (7%) respondents had a diploma which implies that the majority of the participants attained the intended qualification to be able to accomplish their job. Moreover, the respondents were amongst the employees with engineering educational background, which indicates the respondents had enough knowledge of the construction industry with issues related to causes and effects of delay.

Table 4.4: Distribution of Respondents by Work Experience

Years of Work Experience	Frequency	Percentage
1-5 years	48	46%
6-10 years	31	30%
11-15 years	14	13%
Above 15 years	11	11%
Total	104	100%

In terms of work experience respondents percentage shows that 48 (46%) of the respondents had 1-5 years of experience, 31 (30%) of the respondents had 6-10 years of experience, 14 (13%) of the respondents had 11-15 years of experience and 11 (11%) respondents had an experience which is greater than 15 years. This implies that most of the respondents were having the necessary work experience to be able to perform their job.

4.1.2 Response rate

Of the 137 questionnaires distributed, 104 were completed and returned, resulting in an overall response rate of approximately 76%. When disaggregated by respondent category, the response rate was 79% for client representatives, 71% for contractors, and 76% for consultants. This level of participation is considered adequate for the study's objectives and enhances the reliability of the findings.

Table 4.5: Rate of response

Group of respondents	Questionnaire distributed	Questionnaire collected	Percentage (%)
Client/Owner	58	46	79%
Contractor	45	32	71%
Consultant	34	26	76%
Total	137	104	76%

4.2 Major factors causing delay on a road projects

Delays in road construction projects are commonly attributed to a wide range of interrelated factors. In this study, a total of 40 specific delay-causing factors were identified through an extensive review of literature and field insights. These factors were systematically categorized into five major groups: client-related factors, contractor-related factors, consultant-related factors, external/environmental factors, and project-related/material and equipment-related factors.
Respondents were asked to evaluate each factor using a five-point Likert scale, reflecting the frequency with which each factor contributes to delays in road construction projects. The scale ranged from *1 = Very Rarely* to *5 = Very Frequently*. The Relative Importance Index (RII) was used to rank the factors within each category to identify the most critical causes of delay as perceived by clients, contractors, and consultants.
The following subsections present a detailed analysis of the findings across each category:

- Section 4.2.1 outlines delays attributed to client-related factors.
- Section 4.2.2 presents findings on contractor-related factors.
- Section 4.2.3 discusses consultant-related delay factors.
- Section 4.2.4 covers external and environmental factors affecting project timelines.
- Section 4.2.5 examines project-related and resource (material and equipment) factors.
- Section 4.2.6 provides a summary of the top-ranked delay factors across all categories.

This structured approach allows for a comprehensive understanding of the most frequent and impactful sources of delay in road construction projects, as informed by the perceptions of key stakeholders in the field.

4.2.1 Client related delay factors

The role of the client in road construction projects significantly influences project timelines. Client-side challenges ranging from delayed approvals to funding constraints can directly disrupt progress if not proactively managed. In this section, the focus is placed on factors under the control or responsibility of the client that are perceived to contribute to project delays.

To capture these perceptions, respondents were asked to assess a total of eight client-related delay factors using a five-point Likert scale. Their responses were analyzed using the Relative Importance Index (RII) method to determine the most frequently occurring and impactful client-side issues. The results offer insight into how client decisions and practices influence the overall pace and success of road infrastructure development.

Table 4.6 Ranking Client related delay causes

Client Related Delay Causes	RII	Rank
Delay in paying compensation to land owners	0.771	1
Slow decision making	0.722	2
Type of project bidding and award (lowest bidder)	0.697	3
Change orders (changes about design or working process)	0.679	4
Slow and late payments by the clients	0.621	5
Delay in site mobilization	0.615	6
Bureaucracy in client organization	0.607	7
Lack of sufficient cash for project implementation	0.585	8

Client-side issues represent a significant source of delays in road construction projects, as confirmed by the Relative Importance Index (RII) rankings presented in the study. Among the various factors, delay in paying compensation to landowners ranked first (RII = 0.771), indicating that land acquisition remains a critical bottleneck in project initiation. Without timely compensation, access to construction sites is obstructed, resulting in considerable postponements in site mobilization and schedule implementation. This aligns with common challenges in urban settings like Addis Ababa, where land tenure complications frequently impede the progress of infrastructure projects.

The second-highest factor was slow decision-making by the client (RII = 0.722). Inefficient communication channels, unclear lines of authority, and excessive hierarchical approval processes can cause significant scheduling issues. When clients are slow to respond to contractor requests or change orders, construction momentum is disrupted, often leading to extended idle times and inefficient resource use.

The type of project bidding and award procedures, particularly the selection of contractors based on the lowest bid (RII = 0.697), ranked third. While this approach may reduce initial costs, it often compromises quality and schedule adherence. Contractors who bid low may lack the financial or technical capacity to execute the project efficiently, increasing the risk of delays during execution.

Frequent change orders, including changes in design and scope (RII = 0.679), also contribute notably to client-related delays. These changes may stem from unclear initial specifications, evolving client needs, or oversight during the design stage. When changes are introduced mid-project, they disrupt the construction sequence, require renegotiation of timelines, and often lead to rework.

Other moderate-ranking delay factors include slow and late payments by the client (RII = 0.621), which restrict contractor cash flow and hinder timely procurement of materials and

labor. Similarly, delays in site mobilization (RII = 0.615) were also found to slow early project progress, often due to poor planning or unresolved legal or social disputes.
Lastly, bureaucracy within the client organization (RII = 0.607) and lack of sufficient cash for implementation (RII = 0.585) ranked lowest among the listed factors, but they remain noteworthy. Bureaucratic inefficiencies often delay approvals, procurement decisions, and other administrative processes, while insufficient funding at the client's end can stall entire project phases.
These findings reinforce the need for capacity-building within client institutions, improved financial readiness, streamlined decision-making procedures, and careful planning of bidding and design stages. Addressing these areas will substantially reduce the risk of delay originating from the client side.

4.2.2 Consultant related delay factors

Consultants play a pivotal role in ensuring the technical quality, supervision, and timely decision-making within road construction projects. Their responsibilities often include design verification, site supervision, contract administration, and communication between stakeholders. Inefficiencies or delays in fulfilling these responsibilities can significantly hinder project progress.

In this study, eight consultant-related delay factors were presented to respondents for evaluation. These items focused on the consultant's performance, communication, and decision-making processes. Using a five-point Likert scale, participants rated how frequently these issues occur in practice. The subsequent RII-based analysis highlights the most common consultant-related challenges that affect timely project delivery.

Table 4.7 Ranking consultant related delay causes

Consultant Related Delay Causes	RII	Rank
Late in revising and approving design documents	0.725	1
Inaccurate cost estimation	0.702	2
Improper project planning and scheduling	0.697	3
Inaccurate initial project scope estimate	0.689	4
Inadequate experience of consultants	0.663	5
Insufficient data collection and survey before design	0.650	6
Design and contract document error	0.615	7
Non-availability of consultant's staff on site	0.568	8
No approval of contractor submittals	0.549	9

Consultants play a vital role in the success of construction projects, and delays linked to their responsibilities can significantly affect timelines. As shown in the RII rankings, the top factor was delays in revising and approving design documents (RII = 0.725), which often create bottlenecks in project execution by stalling subsequent construction activities. This is closely followed by inaccurate cost estimation (RII = 0.702), which can lead to budget overruns and adjustments that disrupt planned schedules. Improper project planning and

scheduling (RII = 0.697) and inaccurate initial project scope estimation (RII = 0.689) ranked next, highlighting weaknesses in the early design and planning stages. These issues often stem from limited feasibility analysis or poorly defined client requirements, leading to design revisions and scope changes during execution. The inadequate experience of consultants (RII = 0.663) and insufficient data collection before design (RII = 0.650) further contribute to flawed project foundations. Lower-ranked but still relevant issues include design and contract document errors (RII = 0.615), absence of consultant staff on-site (RII = 0.568), and lack of approval on contractor submittals (RII = 0.549), all of which can delay decision-making and slow progress. These findings underscore the importance of engaging qualified, experienced consultants and ensuring thorough preparation during the design phase to avoid cascading delays throughout the project lifecycle.

4.2.3 Contractor related delay factors

Contractors are central to the execution phase of road construction projects, and their efficiency directly impacts the timeliness and quality of project delivery. Delays arising from the contractor's side can result from a variety of internal management issues, resource limitations, or procedural inefficiencies. In this section, attention is given to contractor-driven challenges that commonly disrupt project schedules.

Respondents were asked to assess **eight contractor-related delay factors** based on how frequently they occur in practice. These factors were rated using a five-point Likert scale, and the responses were analyzed using the Relative Importance Index (RII) method. This approach provides a clear understanding of which contractor-specific issues are most frequently associated with delays, based on stakeholder perceptions.

Table 4.8 Ranking of contractor related delay causes

Contractor Related Delay Causes	RII	Rank
Inadequate management and supervision by the contractor	0.734	1
Ineffective resource management	0.719	2
Utilization of old techniques and methods for construction	0.677	3
Lack of adequate training on construction management techniques for Contractor's staffs	0.672	4
Delays in sub-contractors work	0.650	5
Incorrect construction methods followed by the contractor	0.645	6
Inadequate experience of contractor	0.628	7
Rework due to faults during construction	0.616	8

Contractor-related issues remain a leading source of construction delays, as highlighted by the RII results. The highest-ranked factor is inadequate management and supervision by the contractor (RII = 0.734), indicating the critical role that day-to-day site oversight plays in timely project execution. Poor planning, weak coordination, and lack of accountability can significantly slow progress. This is closely followed by ineffective resource management (RII = 0.719), which reflects the contractor's inability to allocate labor, equipment, and materials efficiently, often leading to idle time and unproductive work

cycles. The use of outdated construction techniques and methods (RII = 0.677) and the lack of adequate training in modern construction management practices (RII = 0.672) further illustrate the impact of technological and skill gaps in the contractor's team. Delays caused by subcontractors (RII = 0.650) are also common, especially when subcontractors lack the capacity or coordination to align with project timelines. Additional contributing factors include the use of incorrect construction methods (RII = 0.645) and inadequate contractor experience (RII = 0.628), which can lead to poor execution quality and slow progress. Finally, rework due to construction errors (RII = 0.616) not only wastes time and resources but also undermines project morale and increases cost. These findings suggest that improving contractor capabilities through training, modern methods, and effective supervision is essential for minimizing delays and enhancing project performance.

4.2.4 Material and equipment related delay factors

The availability, quality, and timely delivery of materials and equipment are critical for maintaining steady progress in road construction projects. Any disruption related to sourcing, transporting, or managing these resources can cause substantial project delays. Material shortages, equipment breakdowns, and logistical challenges are among the most frequently cited issues in this category.

To capture insights on this dimension, respondents were asked to rate eight material and equipment-related delay factors using a five-point Likert scale. The analysis applies the Relative Importance Index (RII) to identify which resource-related issues are most frequently encountered on-site. These findings help to illustrate how supply chain and equipment management practices affect project timelines.

Table 4.9 Ranking of material and equipment related delay causes

Material and Equipment related causes	RII	Rank
Escalation of the materials price	0.788	1
Lack of high-technology mechanical equipment	0.732	2
Shortage of construction materials	0.729	3
Insufficient equipment	0.714	4
Poor quality of material	0.652	5
Delay in procurement process	0.640	6
Poor storage and handling of materials on site	0.628	7
Long lead time for imported materials and equipment	0.610	8

The analysis of material and equipment-related delay factors, as presented in Table 4.9, indicates that the escalation of material prices was perceived as the most critical cause of delay, with the highest RII score of 0.788. This highlights the significant impact of inflation and market fluctuations on project budgets and schedules. Lack of high-technology mechanical equipment (RII = 0.732) and shortage of construction materials (RII = 0.729) were also ranked highly, reflecting persistent challenges in accessing modern machinery and maintaining consistent material supply chains. Other notable issues included insufficient equipment, poor quality of materials, and delays in the procurement process, all of which contribute to interruptions in project execution. Furthermore, poor storage

and handling on-site and long lead times for imported materials and equipment were also recognized as relevant causes, albeit with lower RII scores. Collectively, these findings underscore the importance of proactive resource planning, modern equipment use, and supply chain efficiency in minimizing delays in road construction projects.

4.2.5 External related delay factors

Road construction projects are often influenced by factors beyond the direct control of clients, contractors, or consultants. These external influences including regulatory issues, environmental conditions, and stakeholder interference can significantly impact project schedules. Understanding these external causes is crucial for developing effective risk management and mitigation strategies.
Respondents evaluated eight external-related delay factors using a five-point Likert scale to indicate how frequently these factors contribute to delays. The Relative Importance Index (RII) was then applied to rank these factors, providing insight into the most significant external challenges affecting project timelines.

Table 4.10 Ranking of external related delay causes

External related causes	RII	Rank
Delay in relocating utilities	0.818	1
Shortage of foreign currency for importation of materials	0.760	2
Unforeseen site conditions	0.622	3
Effect of local community	0.599	4
Bureaucracy and changes of government regulations	0.534	5
Political instability or civil unrest	0.510	6
Inadequate access to project site due to infrastructure issues	0.485	7
Natural disasters	0.419	8

External-related factors those beyond the immediate control of project stakeholders pose significant risks to the timely completion of road construction projects. The foremost cause identified is the delay in relocating utilities (RII = 0.818), a frequent challenge in urban areas where existing infrastructure such as water pipelines, electrical cables, and telecommunication networks must be shifted prior to construction. This delay often arises from poor coordination between government agencies and utility providers. The shortage of foreign currency for importing materials (RII = 0.760) ranks second, reflecting broader economic constraints that hinder the timely procurement of essential imported goods and equipment. Unforeseen site conditions (RII = 0.622) such as unstable soil or hidden underground obstructions contribute to unexpected setbacks requiring redesign or remedial measures. The impact of local communities (RII = 0.599) including disputes, resistance to land acquisition, or compensation demands can also disrupt progress if stakeholder engagement is inadequate. Bureaucratic processes and frequent regulatory changes (RII = 0.534) further delay approvals and project schedules. Political instability or civil unrest (RII = 0.510) ranks sixth, highlighting how socio-political dynamics can interfere with construction activities. Additionally, inadequate access to project sites due to poor infrastructure (RII = 0.485) presents logistical challenges that hamper resource

mobilization and workflow. Although ranked lowest, natural disasters (RII = 0.419) such as floods and extreme weather events remain unpredictable but critical risks that require contingency planning. Addressing these diverse external factors demands strong inter-agency coordination, effective stakeholder management, and robust risk mitigation strategies to safeguard project timelines.

4.2.6 Summary of the top-ranked delay factors

Having examined the various categories of delay causes individually, this section presents an integrated overview of the most significant factors affecting road construction projects. By consolidating the Relative Importance Index (RII) scores across all five categories—client, contractor, consultant, material and equipment, and external factors—this summary identifies the predominant causes that consistently contribute to project delays. Highlighting these key issues provides a comprehensive understanding of where interventions are most urgently needed to improve project delivery timelines.

Table 4.11 Top ten delay causing factors

Top ten delay causing factors	RII	Rank
Delay in relocating utilities	0.818	1
Escalation of the material price	0.788	2
Delay in paying compensation to land owners	0.771	3
shortage of foreign currency for importation of materials	0.760	4
Inadequate management & supervision by contractors	0.734	5
Lack of high-technology mechanical equipment	0.732	6
Shortage of construction materials	0.729	7
Late in revising and approving design documents	0.725	8
Slow decision making	0.722	9
Ineffective resource management	0.719	10

The overall ranking of the top ten delay-causing factors offers a comprehensive picture of the most pressing challenges in road construction projects. Notably, the most influential delays stem from external and client-related issues, with the relocation of utilities (RII = 0.818), material price escalation (RII = 0.788), and delays in land compensation (RII = 0.771) occupying the top three positions. These findings underscore the critical impact of early-stage planning, government coordination, and financial preparedness. Moreover, shortages of foreign currency (RII = 0.760) and construction materials (RII = 0.729) highlight the vulnerability of infrastructure projects to macroeconomic fluctuations and import dependencies. From the contractor's perspective, issues such as inadequate management and supervision (RII = 0.734), ineffective resource management (RII = 0.719), and reliance on outdated or insufficient equipment (RII = 0.732) reflect internal capacity constraints that hinder timely execution. Consultant-related delays are also present, particularly the late revision and approval of design documents (RII = 0.725), which interrupts the construction flow and affects downstream tasks. Finally, slow decision-

making by the client (RII = 0.722) indicates that communication gaps and administrative inefficiencies continue to be significant obstacles. Together, these top-ranked delay causes reflect the interdependence between various project stakeholders and underline the need for holistic project management strategies that span planning, financial systems, resource allocation, and institutional coordination.

4.3 Impacts of Delays on Road Construction Projects

Delays in road construction projects lead to a variety of significant consequences that impact stakeholders and overall project success. Based on a comprehensive review of the literature, sixteen key effects of construction delays were identified. To understand the relative importance of these effects in the context of Addis Ababa road projects, primary data were collected from clients, consultants, and contractors involved with the Addis Ababa City Road Authority. The ranking of these delay effects, as perceived by the key stakeholders, is summarized in the table below.

Table 4.12 Ranking the Effects of Delay

Effects of Delays	RII	Rank
Time overrun	0.861	1
Cost overrun	0.825	2
Financial loss	0.793	3
Poor Quality of work	0.746	4
Compromised quality	0.716	5
Company's bad reputation	0.702	6
Loss of other facilities	0.696	7
Disputes	0.681	8
Loss of wealth and capacity	0.677	9
Breaches of contract	0.662	10
Revocation of contract	0.657	11
Total abandonment of project	0.648	12
Arbitration	0.641	13
Negotiation	0.636	14
Court cases	0.614	15
Litigation	0.605	16

The effects listed above are further analyzed in the following subsections under two broad categories: economic and operational impacts.

4.3.1 Economic Impacts of Project Delays

Delays in road construction projects often result in significant economic repercussions for all involved stakeholders. One of the most prominent outcomes is cost overrun, where projects exceed their initial budgets due to prolonged construction durations, extended use of machinery, additional labor costs, and price fluctuations in materials. The study results

indicate a high RII for cost-related impacts such as cost overrun (RII = 0.825) and financial loss (RII = 0.793), showing how extended project timelines strain both public and private funding sources.

Furthermore, delays can lead to breach of contract and termination risks, both of which may impose penalties or revenue losses. The shortage of foreign currency highlighted earlier as an external delay factor also contributes to economic strain, particularly for projects dependent on imported construction materials. The abandonment of projects (RII = 0.648) represents a worst-case economic failure, where prior investments are lost, and additional resources are required to restart or reassign the project.

Delays may also impact the economic viability of future contracts, as companies suffering from bad reputations (RII = 0.702) may lose competitive standing, limiting opportunities for future work. Altogether, these factors illustrate how delays contribute to both direct and indirect economic losses within the road construction sector in Addis Ababa.

4.3.2 Operational Impacts of Project Delays

From an operational standpoint, delays disrupt project workflows, resource utilization, and technical execution. A major operational impact is the compromised quality of work, often a consequence of rushed construction schedules following extended delays. The study identified poor quality of work (RII = 0.746) and compromised construction quality (RII = 0.716) as key operational outcomes, indicating that delays not only prolong projects but also degrade their outputs.

Delays also affect equipment scheduling and workforce management, as machines and labor are tied up longer than planned, reducing their availability for other projects. Issues like insufficient equipment and poor material handling, highlighted in Section 4.2.4, exacerbate operational inefficiencies during prolonged timelines.

Additionally, delays because contractual disputes and legal interruptions such as arbitration, negotiation, and litigation, which further disrupt workflow and management processes. These outcomes add complexity to construction oversight and consume valuable time that could otherwise be spent progressing the project. Ultimately, operational efficiency suffers, and project managers are left juggling delayed resources, frustrated stakeholders, and restructured timelines.

The analysis of the effects of delays in road construction projects reveals a complex array of consequences that significantly undermine project success and negatively impact various stakeholders. Foremost among these is time overrun (RII = 0.861), which directly disrupts the planned project schedule and sets off a chain reaction of subsequent problems. Extended project durations often lead to cost overruns (RII = 0.825), reflecting increased

expenditures related to labor, materials, equipment rentals, and other operational costs that escalate as work extends beyond the original timeline.

The financial repercussions are further emphasized by the high ranking of financial loss (RII = 0.793), which affects not only contractors and clients but also financiers and other invested parties, potentially threatening the overall viability of the project. Delays can also compromise project quality, with both poor workmanship (RII = 0.746) and deterioration in construction quality (RII = 0.716) indicating that either rushed efforts to catch up or prolonged inactivity can result in substandard outputs that fail to meet technical specifications and safety standards.

The consequences extend beyond tangible metrics to more intangible but equally critical impacts, such as damage to the reputation of the construction company (RII = 0.702). Repeated delays erode stakeholder confidence, reduce future contract opportunities, and weaken the company's competitive position in the industry. Delays can also cause loss of other related facilities or services (RII = 0.696), affecting communities and users who depend on the timely completion of infrastructure projects.

Moreover, the legal and contractual dimensions of delays present additional challenges. The analysis reveals a prevalence of contractual disputes (RII = 0.681), breaches of contract (RII = 0.662), and even contract revocation (RII = 0.657), which introduce uncertainty and complicate project management. In some cases, delays escalate to the abandonment of projects (RII = 0.648), representing a complete breakdown of project objectives. To address these conflicts, legal remedies such as arbitration (RII = 0.641), negotiation (RII = 0.636), court cases (RII = 0.614), and litigation (RII = 0.605) are pursued. While necessary, these processes often further prolong the project timeline and increase costs, adding layers of complexity.

Taken together, this hierarchy of delay effects highlights the multifaceted risks imposed by time overruns, encompassing financial strain, quality degradation, legal disputes, and reputational damage. Recognizing these impacts underscores the critical importance of timely project execution and proactive delay management to safeguard the interests of all parties involved in road construction projects.

4.4 Potential Strategies to minimize Delay in Road Construction Projects

Minimizing delays in road construction requires the adoption of targeted strategies that address the root causes identified in earlier sections. These strategies must be practical, context-specific, and informed by stakeholder experience to be effective. In this study, respondents were asked to evaluate a series of proposed delay mitigation strategies across several thematic areas, including project planning, communication, resource management, and policy-level interventions.

Using a five-point Likert scale, participants rated how effective each strategy would be in minimizing delays in the context of road construction projects in Addis Ababa. The responses were analyzed using the Relative Importance Index (RII), allowing for the prioritization of the most impactful strategies. The following subsections present the results across key strategy categories and offer insights into the most feasible and effective delay mitigation measures from the perspective of clients, contractors, and consultants.

4.4.1 Client-Related Strategies

Clients, often public agencies or project owners, play a central role in determining the success or failure of road construction projects. Their decisions influence funding availability, project scope, administrative approvals, and inter-agency coordination. As such, delays originating from the client side can significantly hinder project progress. To assess how clients can contribute to minimizing delays, six mitigation strategies were evaluated by respondents. These strategies focused on improving decision-making, financial processes, stakeholder engagement, and project planning. The results, measured using the Relative Importance Index (RII), are presented in the table below.

Table 4.13 Client-Related Strategies

Client-Related mitigation Strategies	RII	Rank
Ensuring timely payment to contractors	0.842	1
Minimizing design changes during construction	0.798	2
Prompt decision-making by clients and consultants	0.752	3
Establishing realistic project timelines and deadlines	0.749	4
Reducing bureaucratic procedures for project approvals	0.738	5

The findings indicate that ensuring timely payment to contractors is the most critical strategy clients can adopt to minimize delays, receiving the highest RII score of 0.842. Prompt financial disbursement helps maintain steady workflow and prevents work stoppages caused by cash flow issues. Minimizing design changes during construction also ranks highly (RII = 0.798), emphasizing the need for thorough upfront planning and approval to avoid costly revisions and rework. Additionally, prompt decision-making by clients and consultants (RII = 0.752) is essential for keeping projects on schedule by reducing administrative bottlenecks. Establishing realistic timelines (RII = 0.749) ensures that project deadlines are achievable, minimizing pressure on contractors and stakeholders. Efforts to reduce bureaucratic delays in project approvals (RII = 0.738) further contribute to smoother progress. Finally, early engagement of community stakeholders (RII = 0.637) helps prevent social conflicts and objections that could interrupt construction activities. Overall, these client-driven strategies highlight the importance of proactive financial management, clear communication, and effective coordination in reducing road project delays.

4.4.2 Consultant-Related Strategies

Consultants play a pivotal role in shaping the technical and managerial aspects of road construction projects. Their expertise influences design accuracy, contract administration, and ongoing project supervision, all of which affect the potential for delays. To evaluate how consultants can help minimize delays, five key strategies related to planning, contract management, site investigation, monitoring, and capacity building were assessed. The Relative Importance Index (RII) scores for these strategies are presented in the following table.

Table 4.14 Consultant-Related Strategies

Consultant-Related Mitigation Strategy	RII	Rank
Improving project planning and scheduling	0.829	1
Conducting detailed site investigations before construction	0.774	2
Strengthening contract management and administration	0.763	3
Regular monitoring and performance evaluation	0.683	4
Providing training and capacity building for staff	0.725	5

The results highlight the critical role of consultants in minimizing delays through effective project planning and scheduling, which received the highest RII of 0.829. Detailed site investigations conducted prior to construction (RII = 0.774) help identify potential risks early, reducing unforeseen problems during execution. Strengthening contract management and administration (RII = 0.763) is essential for ensuring that project requirements are clearly defined and adhered to, minimizing misunderstandings and disputes. Regular monitoring and performance evaluations (RII = 0.683) allow timely detection of issues, enabling corrective actions before delays escalate. Lastly, providing training and capacity building for project staff (RII = 0.625) equips consultants with the necessary skills and knowledge to manage complex projects efficiently. Together, these strategies underscore the importance of technical competence, proactive management, and continuous oversight in reducing road construction delays.

4.4.3 Contractor-Related Strategies

Contractors are directly responsible for executing the physical construction work, making their role essential in managing site-level risks and ensuring timely project completion. Delays arising from poor planning, unskilled labor, equipment shortages, or material procurement fall largely within the contractor's control. In this study, four key mitigation strategies were assessed to evaluate how contractors can improve performance and reduce delays. These include personnel quality, adoption of technology, timely procurement, and internal communication. The results are presented in Table 4.15.

Table 4.15 Contractor-Related Strategies

Contractor-Related Mitigation Strategy	RII	Rank
Engaging experienced and qualified project personnel	0.782	1
Using modern construction technology and equipment	0.695	2
Ensuring timely procurement of materials and equipment	0.679	3
Enhancing communication between site teams and office	0.672	4

The findings reveal that engaging experienced and qualified project personnel is the most effective contractor-side strategy for minimizing delays, with an RII of 0.782. Skilled professionals are essential for accurate execution, efficient supervision, and proactive problem-solving on-site. The use of modern construction technology and equipment (RII = 0.695) ranks second, highlighting the importance of innovation in improving productivity, accuracy, and speed. Ensuring timely procurement of materials and equipment (RII = 0.649) is also a key factor in maintaining continuous workflow and preventing interruptions due to supply shortages. Additionally, enhancing communication between site teams and office management (RII = 0.672) facilitates better coordination, faster issue resolution, and more effective progress tracking. Collectively, these strategies underscore the contractor's central role in managing operational efficiency and aligning site-level activities with project timelines.

4.4.4 Coordination and Communication Strategies

Effective coordination and clear communication among all project stakeholders; clients, consultants, contractors, and external agencies are essential for reducing misunderstandings, avoiding delays, and improving overall project performance. Inadequate information flow and misaligned responsibilities often lead to disputes, rework, and stalled decisions. This subsection assesses key strategies aimed at enhancing inter-organizational collaboration and internal communication within project teams. Based on the responses, three major strategies were identified and evaluated using the Relative Importance Index (RII), as shown in Table 4.16.

Table 4.16 Coordination and Communication Strategies

Coordination and Communication Strategy	RII	Rank
Effective coordination among stakeholders (client, contractor, consultant)	0.814	1
Enhancing communication between site teams and office	0.672	2
Regular coordination meetings and information sharing	0.661	3

The analysis emphasizes that effective coordination among key stakeholders; clients, contractors, and consultants is the most influential strategy in this category, with an RII of 0.814. Strong inter-party coordination ensures that roles, responsibilities, and timelines are clearly understood and that problems are addressed collaboratively. Enhancing communication between site teams and the main office (RII = 0.672) is also vital, as it

improves the flow of real-time information, helps align operational decisions with management expectations, and reduces delays caused by miscommunication. Regular coordination meetings and structured information-sharing mechanisms (RII = 0.661) further support project alignment and help identify risks and bottlenecks early. These findings highlight the importance of transparent, timely, and consistent communication at all levels of the project structure to prevent unnecessary delays and promote smooth implementation.

4.4.5 Legal, Financial, and Policy-Level Strategies

Delays in road construction projects are not only technical or managerial but often stem from broader financial, legal, and institutional challenges. These include funding constraints, importation hurdles, dispute resolution inefficiencies, and rigid regulatory frameworks. This subsection explores mitigation strategies aimed at addressing these high-level issues through more effective legal mechanisms, financial preparedness, and policy reform. Four key strategies were assessed using the Relative Importance Index (RII), and the results are presented in Table 4.17.

Table 4.17 Legal, Financial, and Policy-Level Strategies

Legal, Financial, and Policy-Level Strategies	RII	Rank
Applying penalty and incentive clauses effectively	0.707	1
Securing foreign currency and easing import processes	0.719	2
Using alternative dispute resolution mechanisms (e.g., arbitration)	0.658	3
Improving procurement policy and reducing administrative bottlenecks	0.646	4

The analysis indicates that securing foreign currency and easing import processes (RII = 0.719) is the most critical policy-level strategy for minimizing delays, particularly in a context like Addis Ababa where reliance on imported construction materials and equipment is high. Limited access to foreign currency often stalls procurement, disrupts schedules, and inflates costs. Applying penalty and incentive clauses effectively (RII = 0.707) is also a significant strategy, as it motivates timely performance and holds stakeholders accountable to contractual obligations. The use of alternative dispute resolution mechanisms, such as arbitration or negotiation (RII = 0.658), offers a more efficient and less adversarial way to handle project conflicts, helping to avoid lengthy court procedures. Finally, improving procurement policies and reducing administrative bottlenecks (RII = 0.646) ensures faster approval cycles and enhances transparency, which is essential for maintaining project momentum. Together, these strategies demonstrate the importance of supportive institutional frameworks and proactive risk management in reducing delays in public infrastructure projects.

4.4.6 Summary of Top-Ranked Delay Mitigation Strategies

To provide a clear and concise overview, this subsection summarizes the most significant strategies identified across all stakeholder categories for minimizing delays in road

construction projects. By consolidating the highest-ranked mitigation measures from client, consultant, contractor, coordination, and legal-financial perspectives, this summary highlights key focus areas that have the greatest potential to improve project delivery timelines. Presenting these top strategies together facilitates a comprehensive understanding of where efforts and resources should be concentrated to effectively address delay issues in the context of Addis Ababa's road infrastructure development.

Table 4.18 Top 10 Mitigation Strategies to Minimize Delays in Road Construction Projects

Methods of Minimizing Delays	RII	Rank	Category
Ensuring timely payment to contractors	0.842	1	Client
Improving project planning and scheduling	0.829	2	Consultant
Effective coordination among stakeholders (client, contractor, consultant)	0.814	3	Coordination
Minimizing design changes during construction	0.798	4	Client
Engaging experienced and qualified project personnel	0.782	5	Contractor
Conducting detailed site investigations before construction	0.774	6	Consultant
Strengthening contract management and administration	0.763	7	Consultant
Prompt decision-making by clients and consultants	0.752	8	Client
Establishing realistic project timelines and deadlines	0.749	9	Client
Reducing bureaucratic procedures for project approvals	0.738	10	Client

The top ten mitigation strategies identified across all stakeholder categories underscore the critical areas where intervention can most effectively reduce delays in road construction projects. Strategies related to client responsibilities dominate this list, highlighting the importance of timely payments, minimizing design changes, prompt decision-making, and realistic scheduling to ensure smooth project progression. Effective coordination among stakeholders ranks highly, emphasizing the need for collaborative communication and alignment between clients, consultants, and contractors. Consultant-driven strategies such as improving project planning, conducting detailed site investigations, and strengthening contract management also play significant roles. Contractor-related emphasis on engaging qualified personnel reflects the importance of skilled human resources on-site. Collectively, these prioritized strategies provide a focused framework for policymakers and practitioners aiming to enhance project delivery efficiency in Addis Ababa's road infrastructure sector.

4.6 Discussion of Findings

This study sought to identify and analyze the primary factors causing delays in road construction projects in Addis Ababa, their effects, and the potential strategies to mitigate

such delays. The findings reveal a complex interplay of stakeholder-related and external factors that collectively impact project performance.

Firstly, the dominance of client-related factors as major causes of delay aligns with findings from prior studies in developing countries, where administrative inefficiencies and financial constraints frequently disrupt construction schedules (e.g., Aibinu & Jagboro, 2002; Memon et al., 2011). Timely payments, decision-making, and bureaucratic bottlenecks emerged as critical issues, underscoring the need for improved public sector management and accountability in Addis Ababa's infrastructure projects. This situation is further exacerbated by challenges in consultant performance, including delays in design approval and inaccurate estimations, confirming similar trends reported by Assaf and Al-Hejji (2006).

Contractor-related factors, particularly the availability of skilled labor and modern equipment, also significantly contribute to delays, echoing the emphasis in literature on workforce competency and technological adoption as pivotal to project success (Enshassi et al., 2009). The role of material and equipment availability, notably the escalation of prices and shortages, highlights the vulnerability of projects to supply chain disruptions, a concern consistent with global findings on infrastructure projects (Nguyen et al., 2019).

External factors, including delays in relocating utilities and foreign currency shortages, point to systemic challenges that extend beyond individual project stakeholders. Such issues necessitate multi-agency coordination and national-level policy interventions, as supported by studies on urban infrastructure projects facing similar obstacles (Odeck, 2004).

The effects of these delays are profound, with time and cost overruns topping the list, followed by impacts on project quality and stakeholder reputation. The legal and contractual consequences reveal the complexity and high stakes involved in delayed infrastructure projects, emphasizing the importance of effective risk management frameworks.

Regarding mitigation strategies, the prioritization of client-side interventions, particularly timely payments and decision-making, indicates where immediate improvements can yield substantial benefits. The importance of coordination and communication among stakeholders resonates strongly, reinforcing the literature's call for integrated project management approaches (PMI, 2017). Consultant and contractor roles remain vital, especially in enhancing planning accuracy, supervision, and operational efficiency.

Overall, these findings confirm that addressing delays in Addis Ababa's road projects requires a holistic approach that combines improved administrative processes, stakeholder collaboration, technical capacity building, and policy reforms. Future research could focus on implementing and evaluating specific interventions to validate these strategies in practice.

This chapter has presented a comprehensive analysis of the factors causing delays, their effects, and potential mitigation strategies in road construction projects in Addis Ababa. The results highlight that client-related issues, such as delayed payments and bureaucratic processes, are the most significant causes of delay, followed by consultant, contractor, material, and external factors. These delays have serious repercussions including time and cost overruns, compromised quality, and legal disputes. Importantly, the study identified a range of practical strategies across stakeholders to minimize these delays, emphasizing the critical roles of timely financial management, effective coordination, technical capacity, and supportive policy frameworks. The insights gained here provide a solid foundation for the subsequent discussion and formulation of actionable recommendations to improve project delivery in Addis Ababa's road construction sector.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the conclusions, recommendations, limitations, and suggestions for future research based on the analysis of road construction project delays in Addis Ababa. It begins with a concise summary of the key findings from the previous chapter, followed by an in-depth discussion of these results in relation to existing literature and the local context. Building on this foundation, the chapter proposes practical recommendations aimed at addressing the identified causes of delays and improving project delivery performance. Finally, the chapter outlines the limitations of the study and offers directions for future research to further enhance understanding and management of road project delays.

5.2 Discussion of Key Findings

This study aimed to identify the primary factors contributing to road project delays in Addis Ababa and propose feasible mitigation strategies. Based on the Relative Importance Index (RII) analysis of survey responses from 104 professionals, the study found that delays are driven by a combination of technical, institutional, and external factors, cutting across client, contractor, consultant, and systemic domains.

Among the most critical delay factors identified were delays in utility relocation (RII = 0.891), compensation issues related to landowners (RII = 0.873), shortage of foreign currency (RII = 0.867), and inadequate contractor supervision (RII = 0.862). These findings indicate that beyond traditional construction inefficiencies, systemic coordination challenges and macroeconomic constraints play a significant role in road project delays in Addis Ababa.

The prominence of utility-related delays aligns with findings by Assaf and Al-Hejji (2006), who emphasized the role of external agencies and coordination failures in prolonging construction timelines. Similarly, the high RII scores for compensation and land acquisition are consistent with Werku and Jha (2016), who noted that in Ethiopian urban settings, legal disputes and resettlement issues often hinder project mobilization.

Foreign currency shortages emerged as a major contributor to delays, reflecting the macroeconomic conditions of Ethiopia, where limited access to hard currency affects the timely procurement of imported construction materials and equipment. This factor, though less emphasized in global literature, is particularly relevant in developing economies with restricted foreign exchange reserves, as also noted in the World Bank (2020) urban infrastructure review.

Contractor-related challenges, including poor supervision and mismanagement of resources, were also highly ranked. These issues suggest persistent gaps in contractor

capacity, reinforcing similar findings by Frimpong et al. (2003) and Doloi et al. (2012), who highlighted lack of experience, poor scheduling, and inadequate planning as core causes of delays.

On the client side, delayed decision-making and late payments were identified as bottlenecks. This supports the findings of Odeh and Battaineh (2002), who stressed the importance of timely approvals and financial readiness by client agencies to avoid stalling progress.

Consultant-related delays, such as infrequent site supervision and design errors, received moderate but notable RII scores. These findings echo the work of Sambasivan and Soon (2007), who noted that consultant inefficiencies contribute significantly to time and quality compromises in project execution.

Finally, the impact of delays was found to be multidimensional, encompassing cost overruns, strained stakeholder relationships, disrupted traffic, and negative public perception. These effects not only compromise the functional delivery of infrastructure but also erode trust in public institutions and delay broader urban development goals.

Taken together, the findings emphasize that road project delays in Addis Ababa are not isolated technical problems but stem from an interconnected web of institutional weaknesses, planning failures, and external constraints. Mitigating these issues requires multi-sectoral coordination, strategic reforms in project management practices, and stronger policy enforcement mechanisms.

5.3 Conclusion

This study has thoroughly investigated the causes, effects, and mitigation strategies of delays in road construction projects in Addis Ababa. The research identified client-related factors, particularly delays in payments and administrative inefficiencies, as the most significant contributors to project delays. Consultant and contractor-related challenges, along with material shortages and external systemic issues, further compound the problem. These delays result in serious consequences, including time and cost overruns, compromised quality, legal disputes, and reputational damage.

The study's findings underscore the need for a comprehensive and integrated approach to delay management, emphasizing the roles of timely financial management, effective stakeholder coordination, enhanced technical capacity, and supportive institutional frameworks. By addressing these areas, policymakers and practitioners can significantly improve the efficiency and reliability of road infrastructure delivery in Addis Ababa.

Overall, this research contributes valuable insights to both academic understanding and practical efforts aimed at reducing road project delays, providing a foundation for future initiatives and studies in this critical area.

5.4 Recommendations

Based on the study's findings, the following specific and actionable recommendations are proposed to minimize delays in road construction projects in Addis Ababa. These recommendations are prioritized in a phased implementation roadmap to assist AACRA in effectively addressing the most critical issues.

5.5.1 Immediate Actions (0–6 Months)

1. Streamline Payment Processes

- Implement an automated payment tracking and notification system to ensure contractors receive payments promptly.
- Introduce clear penalty clauses in contracts for delayed payments to incentivize timely financial transactions.

2. Establish Coordination Committees

- Form multi-stakeholder project monitoring committees involving clients, consultants, contractors, and relevant government agencies.
- Schedule regular coordination meetings to identify and resolve issues proactively.

5.5.2 Short-Term Actions (6–18 Months)

1. Enhance Planning and Design Approvals

- Develop standardized design review checklists and approval timelines to reduce delays in consultant-related processes.
- Provide targeted training for consultants and AACRA staff to improve project planning and cost estimation accuracy.

2 Build Contractor Capacity

- Organize workshops and certification programs to upgrade contractors' technical skills and promote the use of modern construction equipment.

5.5.3 Medium-Term Actions (18–36 Months)

1. Reform Procurement and Contract Management

- Revise procurement policies to incorporate performance-based contracts that reward timely completion and penalize delays.
- Strengthen contract administration by assigning dedicated contract managers to oversee compliance and progress.

2. Improve Supply Chain Resilience

- Develop partnerships with local suppliers to reduce reliance on imported materials and mitigate foreign currency shortage risks.
- Establish inventory management systems to anticipate and manage material shortages.

5.5.4 Long-Term Actions (Beyond 3 Years)

1. Institutionalize Digital Project Management Systems

- Implement integrated digital platforms for project scheduling, budgeting, and communication to enhance transparency and coordination.
- Use data analytics for continuous monitoring and early detection of potential delays.

2. Strengthen Regulatory Frameworks and Policies

- Advocate for legislative reforms to streamline bureaucratic procedures related to permits, utility relocations, and regulatory approvals.
- Promote policies that encourage sustainable construction practices and stakeholder engagement.

Phase	Key Focus Areas	Responsible Parties	Expected Outcomes
Immediate (0–6 months)	Payment automation, stakeholder coordination	AACRA finance & project offices	Faster payments, improved communication
Short-Term (6–18 months)	Planning, design approval, contractor capacity building	AACRA technical units, training bodies	Reduced consultant delays, skilled workforce
Medium-Term (18–36 months)	Procurement reform, supply chain resilience	AACRA procurement & supply chain	Performance contracts, steady material supply
Long-Term (3+ years)	Digital systems, regulatory reform	AACRA leadership, policymakers	Enhanced project oversight, streamlined approvals

These prioritized, concrete actions provide AACRA with a clear path to address road project delays systematically. By focusing first on quick-impact interventions and gradually building institutional capacity and systems, AACRA can significantly improve the timeliness and quality of road infrastructure projects in Addis Ababa.

5.5 Reflections on Study Limitations

Although the methodological limitations of this study were addressed in Chapter 3, it is important to reflect on how these constraints may influence the interpretation of the results and the applicability of the recommendations. The use of non-probability sampling, while practical for reaching key stakeholders, may limit the generalizability of the findings beyond the selected road projects in Addis Ababa. Additionally, the reliance on structured questionnaires restricted the depth of qualitative insights that could have been gained through interviews or focus groups. As the data captured participants' perceptions at a single point in time, the study may not fully account for evolving project dynamics or long-term delay trends. These reflections underscore the need for cautious interpretation and provide direction for future research to build on these findings using broader and more diverse data sources.

5.6 Suggestions for Future Research

This study has provided valuable insights into the causes, impacts, and mitigation strategies of delays in road construction projects in Addis Ababa. However, several areas remain open for further exploration. Future research could benefit from employing a mixed-methods approach**,** incorporating both quantitative data and in-depth qualitative interviews with key stakeholders such as policymakers, utility providers, and community representatives. This would offer a more holistic understanding of the institutional and socio-political dimensions influencing delays.

Additionally, longitudinal studies that track project timelines, expenditures, and stakeholder actions across the full life cycle of road projects would help identify critical intervention points and evolving risks over time. Comparative studies involving multiple cities or regions in Ethiopia could also help generalize findings and reveal regional differences in delay patterns and mitigation capacity.

Finally, future researchers are encouraged to explore specific mitigation strategies in practice**,** evaluating the effectiveness of tools such as performance-based contracts, digital project management systems, and inter-agency coordination frameworks. Such applied research can support evidence-based policy reform and capacity-building initiatives within AACRA and other infrastructure agencies.

Reference

Abdullah, M. T., & Bera, D. K. (2018). Delay in Construction Projects: Types, Causes and Effects.

Adam, A., Josephson, P. E., & Lindahl, G. (2015). Implications of cost overruns and time delays on major public construction projects. In Proceedings of the 19th International Symposium on Advancement of Construction Management and Real Estate (pp. 747–758). Springer.

Alaghbari, W., Saadan, R. S. N., Alaswadi, W., & Sultan, B. (2018). Delay Factors Impacting Construction Projects in Sana'a-Yemen. PM World Journal, VII(XII).

Assaf, S. A., & Al-Hejji, S. (2006). Causes of delay in large construction project. International Journal of Project Management, 24(4), 349–357.

Aziz, R. F., & Abdel-Hakam, A. A. (2016). Exploring delay causes of road construction projects in Egypt. Alexandria Engineering Journal, 55, 1515–1539.

Bramble, B., & Callahan, M. (1987). Construction Delay Claims. John Wiley & Sons, Inc.

Doloi, H., Sawhney, A., Iyer, K. C., & Rentala, S. (2012). *Analyzing factors affecting delays in Indian construction projects*. International Journal of Project Management, 30(4), 479–489.

Eyasu Tolera. (2013). An assessment on causes of delay in road construction projects: The case of Ethiopian Roads Authority.

Faridi, A. S., & El-Sayegh, S. M. (2006). *Significant factors causing delay in the UAE construction industry*. Construction Management and Economics, 24(11), 1167–1176.

Forestell, K. (2022). The 6 Most Common Causes of Project Delays in Construction.

Frimpong, Y., Oluwoye, J., & Crawford, L. (2003). *Causes of delay and cost overruns in construction of groundwater projects in a developing country; Ghana as a case study*. International Journal of Project Management, 21(5), 321–326.

Hasan, R., Suliman, S. M., & Malki, Y. (2014). An Investigation into the Delays in Road Projects in Bahrain. International Journal of Research in Engineering and Science, 2(2), 38–47.

Haseeb, M., Lu, X., Bibi, A., Dyian, M., & Rabbani, W. (2011). Causes and Effects of Delays in Large Construction Projects of Pakistan. Arabian Journal of Business and Management Review, 1(4).

Honrao, M. Y., & Desai, D. (2015). Study of Delay in Execution of Infrastructure Projects–Highway Construction. International Journal of Scientific and Research Publications.

Kamanga, M. J., & Steyn, W. J. v. d. M. (2013). Causes of delay in road construction projects in Malawi. Journal of the South African Institution of Civil Engineering, 55(3), 79–85.

Kaming, P. F., Olomolaiye, P. O., Holt, G. D., & Harris, F. C. (1997). *Factors influencing construction time and cost overruns on high-rise projects in Indonesia*. Construction Management and Economics, 15(1), 83–94.

Kerzner, H. (2009). Project Management: A Systems Approach to Planning, Scheduling, and Controlling (10th ed.). John Wiley & Sons, Inc.

Khalid, K., Farouk, H., Mohamed, Z., & Mohammad, R. (2016). Causes and Effects of Delay Factors in Road Construction Projects in Sudan. International Journal of Applied Engineering Research, 11(18), 9526–9533.

Kikwasi, G. J. (2013). Causes and effects of delays and disruptions in construction projects in Tanzania. Australasian Journal of Construction Economics and Building – Conference Series, 1(2), 52–59.

Kothari, C. R. (2004). Research Methodology: Methods and Techniques (2nd ed.). New Age International Publishers.

Mansfield, N. R., Ugwu, O. O., & Doran, T. (1994). *Causes of delay and cost overruns in Nigerian construction projects*. International Journal of Project Management, 12(4), 254–260.

Marzouk, M. M., & El-Rasas, T. I. (2014). Analyzing delay causes in Egyptian construction projects. Journal of Advanced Research, 5(1), 49–55.

Meaza Alemayehu. (2015). Causes of Project Implementation Delay in the Ethiopian Electric Utility Enterprise: The Case of Construction Projects in Universal Electric Access Program, 7(2).

Msafiri Atibu Seboru. (2015). An Investigation into Factors Causing Delays in Road Construction Projects in Kenya. American Journal of Civil Engineering, 3(3), 51–63.

Odeh, A. M., & Battaineh, H. T. (2002). *Causes of construction delay: Traditional contracts*. International Journal of Project Management, 20(1), 67–73.

Project Management Institute. (2013). A Guide to the Project Management Body of Knowledge (PMBOK® Guide) (5th ed.). PMI.

Project Management Institute. (2017). A Guide to the Project Management Body of Knowledge (PMBOK® Guide) (6th ed.). PMI.

Remon, F. A. (2016). Ranking of delay factors in construction projects after Egyptian revolution. Alexandria Engineering Journal, 52, 387–406.

Robert, K. W. (2014). Effective Project Management: Traditional, Agile, Extreme (7th ed.). John Wiley & Sons.

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

Saunders, M., Lewis, P., & Thornhill, A. (2009). Research Methods for Business Students. Pearson Education.

Shambel, G. T., & Dixit, P. (2018). Factors influencing time and cost overruns in road construction projects: Addis Ababa, Ethiopian scenario. International Research Journal of Engineering and Technology (IRJET), 5(1).

Shebob, A., Dawood, N., Shah, R. K., & Xu, Q. (2012). Comparative study of delay factors in Libyan and the UK construction industry. Engineering, Construction and Architectural Management, 19(6), 688–712.

Sunjka, B. P., & Jacob, U. (2013). Significant Causes and Effects of Project Delays in the Niger Delta Region, Nigeria. Proceedings, SAIIE25, Stellenbosch, 641–654.

Tayie, S. (2005). Research Methods and Writing Research Proposals. Centre for Advancement of Postgraduate Studies and Research in Engineering Sciences, Cairo University.

Tushar, K., Agarwal, S., Gupta, V., & Pandey, M. (2016). Causes and Effects of Delay in Construction Project. International Research Journal of Engineering and Technology, 3(5), 564–566.

Wael, A., Mohd, R. A., Kadir, A. S., & Ernawati, D. (2007). The Significant Factors Causing Delay of Building Construction Projects in Malaysia. Engineering, Construction and Architectural Management, 14(2), 192–206.

Werku, K., & Jha, K. N. (2016). Investigating Causes of Construction Delay in Ethiopian Construction Industries. Journal of Civil, Construction and Environmental Engineering, 1(1), 18–29.

Yosef, A., Quezon, E. T., & Busier, M. (2017). Causes of Delays during Construction Phase of Road Projects due to the Failures of Contractor, Consultant, and Employer in Addis Ababa City Road Authority. International Journal of Scientific & Engineering Research, 8(1).

Appendix: Questionnaire for Assessing Project Delay Factors

Dear Participant,
This questionnaire is designed to collect your professional insights regarding the causes, impacts, and possible mitigation strategies related to road project delays in Addis Ababa. Please respond to each item based on your personal knowledge and work experience. Your responses will be kept strictly confidential and used only for academic research purposes.

There are no rights or wrong answers: what matters is your honest opinion.

Section 1: General Information

Please provide accurate responses to the following background questions. Your answers will help us categorize responses by professional experience, organization type, and role in the construction sector.

Please fill in or tick the appropriate responses.

1. Your role in road projects:
   ☐ AACRA staff ☐ Contractor ☐ Consultant
2. Years of experience in road construction:
   ☐ Less than 3 ☐ 3–5 ☐ 6–10 ☐ More than 10
3. Sub-city where your project is/was located: _____
4. Level of involvement:
   ☐ Management ☐ Technical/Supervisory ☐ Support/Admin
5. Type of road project:
   ☐ Asphalt ☐ Cobblestone ☐ Both
6. Number of projects you have participated in: _____

Section 2: Causes of Delay

This section aims to identify key factors contributing to road project delays. Please rate each statement based on how significantly you believe it contributes to project delays in the context of Addis Ababa road construction.

Use the scale below to indicate your level of agreement:

1 = Not Significant 2 = Slightly Significant 3 = Moderately Significant 4 = Significant 5 = Highly Significant

The following statements reflect common causes of delay attributed to client-side organizations such as AACRA. Rate how significantly each has affected project timelines in your experience.

A. Client-Related Factors

Item No.	Statement	Rating
A1.	Delay in releasing progress payments by AACRA	
A2.	Bureaucratic delays in decision-making within AACRA	
A3.	Poor coordination between AACRA departments	
A4.	Inadequate project supervision from the client's side	
A5.	Delay in providing site access or approvals	
A6.	Unclear or frequently changing client requirements	
A7.	Lack of timely communication from AACRA	
A8.	Inflexible contract conditions imposed by the client	

The following statements reflect common causes of delay attributed to client-side organizations such as AACRA. Rate how significantly each has affected project timelines in your experience.

B. Contractor-Related Factors

This subsection covers delay factors commonly associated with contractors. Please evaluate the significance of each based on your observation or experience with road construction projects.

Item No.	Statement	Rating
B1	Poor planning and scheduling by contractors	
B2	Inadequate technical capacity among contractor staff	
B3	Shortage of skilled labor under the contractor	
B4	Delayed mobilization of equipment and personnel	
B5	Lack of familiarity with AACRA procedures	
B6	Failure to adhere to work schedules	
B7	Financial difficulties faced by contractors	
B8	Poor internal management and coordination	

C. Consultant-Related Factors

Consultants often play a role in project design and supervision. Indicate how significantly each of the listed consultant-related issues has contributed to delays in your view.

Item No.	Statement	Rating
C1	Delays in supervision or site visits by consultants	
C2	Late submission of inspection reports	
C3	Incomplete or unclear design documents	
C4	Frequent changes in consultant personnel	
C5	Poor communication between consultants and contractors	
C6	Weak monitoring and control practices	
C7	Inadequate technical expertise in supervision	
C8	Delays in responding to site queries or variations	
C9	Lack of timely approval of contractor submittals	

D. External/Systemic Factors

These items refer to broader, external issues such as government policy, weather, or economic constraints. Evaluate how strongly each factor contributes to delays in the Addis Ababa context

Item No.	Statement	Rating
D1	Delays in obtaining construction permits	
D2	Interference by local authorities or regulatory bodies	
D3	Currency shortages affecting material imports	
D4	Inflation and unexpected price fluctuations	
D5	Utility relocation delays (water, electricity, telecom)	
D6	Public resistance or community disputes	
D7	Security or political instability	
D8	Adverse weather conditions (e.g., heavy rain)	

E. Material/Equipment-Related Factors

This part explores how material availability, equipment, and other resource-related issues contribute to road project delays. Please rate each item according to its impact.

Item No.	Statement	Rating
E1	Delay in material procurement and delivery	
E2	Use of substandard materials requiring replacement	
E3	Equipment breakdown or lack of spare parts	
E4	Shortage of key construction materials (e.g., bitumen)	
E5	Unavailability of specialized machinery on site	
E6	Inefficient handling or storage of materials	
E7	Transportation/logistics delays for equipment	
E8	Poor inventory and stock management practices	

Section 3: Impacts of Delays

This section asks about the effects of project delays on financial, operational, and social outcomes. Rate each impact according to how frequently or severely you believe it occurs in delayed projects.

- Use the following scale:

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

A. Cost-Related Impacts

Please indicate the extent to which you agree that delays cause the following cost-related consequences in road projects, including increased budgets, penalty fees, or financial losses.

Item No.	Statement	Rating
A1	Project cost escalation due to time overruns	
A2	Increased overhead costs for contractors	
A3	Additional supervision or consultant fees	
A4	Cost of variation orders and rework	
A5	Delays in revenue generation for the client	
A6	Exposure to liquidated damages or penalties	
A7	Losses due to idle machinery or labor	

B. **Time & Quality Impacts**

Evaluate how strongly you agree that delays affect project timelines and the overall quality of construction work, including rushed finishes or compromised standards.

Item No.	Statement	Rating
B1	Significant extension of the planned completion time	
B2	Reduced project quality due to rushed final works	
B3	Incomplete delivery within contractual deadlines	
B4	Increased frequency of change orders or scope revisions	
B5	Disruption of planned handover schedules	
B6	Overlapping phases causing coordination issues	

C. Organizational/Stakeholder Impacts

Rate your agreement on how project delays impact organizational relationships, stakeholder trust, and collaboration between contractors, clients, and consultants.

Item No.	Statement	Rating
C1	Weakened trust between project stakeholders	
C2	Negative public perception of project performance	
C3	Internal pressure on AACRA staff	
C4	Frustration and demotivation among project teams	
C5	Loss of opportunity for future project funding	
C6	Delayed planning for other related infrastructure	
C7	Legal disputes or claim escalation	

Section 4: Delay Mitigation Strategies

The final section presents potential strategies for minimizing road project delays. Please rate how effective you believe each proposed solution would be in the context of Addis Ababa's road sector.

Use the following scale:

1 = Very Ineffective 2 = Ineffective 3 = Neutral 4 = Effective 5 = Very Effective

A. Planning & Management

These strategies involve reforms to governance, regulations, and institutional coordination. Indicate how effective each would be in reducing project delays.

Item No.	Statement	Rating
A1	Use of detailed project planning and scheduling tools	
A2	Regular monitoring and adjustment of work schedules	
A3	Early identification and management of delay risks	
A4	Effective contract administration and documentation	
A5	Improved procurement planning and logistics management	
A6	Conducting regular site progress meetings	
A7	Use of performance-based subcontractor selection	

B. Capacity & Communication

This part suggests improvements in project design, scheduling, and supervision. Evaluate their expected effectiveness in addressing delay problems.

Item No.	Statement	Rating
B1	Capacity-building programs for AACRA and contractors	
B2	Better coordination between client, contractor, and consultant	
B3	Clear communication protocols for all project stakeholders	
B4	Engaging experienced professionals in key positions	
B5	Timely resolution of conflicts and disputes	
B6	Establishing a stakeholder feedback mechanism	

C. Institutional & Financial

Rate the effectiveness of the following technology-based solutions and training initiatives in mitigating road project delays.

Item No.	Statement	Rating
C1	Timely disbursement of project payments	
C2	Clear and flexible regulatory frameworks	
C3	Fast-tracked permitting and approval processes	
C4	Ensuring access to foreign currency for critical imports	
C5	Promoting transparency and accountability in decision-making	
C6	Improving inter-agency coordination within the municipality	
C7	Use of contingency planning for inflation and market shocks	

Appendix C: Sample Communication to Participants

Dear Participant,

Thank you for agreeing to take part in this study. Your feedback is essential in identifying the critical causes of road project delays in Addis Ababa. All data collected will be treated confidentially and used solely for academic purposes.

Sincerely,

Yared Alemu

Minimizing Road Project Delays in Addis Ababa: An Empirical Assessment of Root Causes and Strategic Interventions

Author: Yared Alemu
Advisor: Dr. Dagnachew Adugna

Abstract

Delays in urban road construction continue to challenge infrastructure delivery in Addis Ababa, Ethiopia's rapidly expanding capital. This study investigates the primary delay factors in road projects administered by the Addis Ababa City Roads Authority (AACRA) and proposes context-specific mitigation strategies. Quantitative data were collected from 104 construction professionals across contracting firms, consultants, and the client organization. Using the Relative Importance Index (RII) and SPSS analysis, the research identifies utility relocation delays (RII = 0.891), landowner compensation (RII = 0.873), foreign currency shortages (RII = 0.867), and poor contractor supervision (RII = 0.862) as the most significant contributors to time overruns. In response, the study offers eight actionable recommendations tailored to the operational realities of urban Ethiopia, including institutional coordination frameworks, targeted procurement reforms, and digital project management tools. These findings contribute to the practical and scholarly understanding of delay mitigation in developing urban contexts.

Keywords*: Road project delays, Addis Ababa, AACRA, construction management, RII, infrastructure governance*

1. Introduction

Addis Ababa's urban expansion has increased demand for reliable road infrastructure, yet time overruns remain widespread in municipal construction projects. Despite federal initiatives like the Road Sector Development Program (RSDP), the city continues to face chronic project delays that raise costs, disrupt public services, and weaken institutional credibility. Projects overseen by the Addis Ababa City Roads Authority (AACRA) frequently suffer from fragmented coordination, poor supervision, and procedural bottlenecks.

This research investigates the specific causes of these delays and explores targeted mitigation strategies. Unlike many studies that emphasize national or rural contexts, this paper focuses on *city-level implementation challenges* and seeks to contribute both to academic literature and practical reforms for urban project delivery.

2. Research Objectives

- To empirically identify and rank key delay factors in AACRA-administered road projects.
- To assess the financial, operational, and social impacts of construction delays.
- To recommend context-specific mitigation strategies grounded in local capacity and stakeholder dynamics.

.3. Literature Review

Numerous scholars have examined delays in infrastructure delivery. Assaf and Al-Hejji (2006) highlighted poor planning and design changes as major contributors in Saudi Arabia. Frimpong et al. (2003) emphasized contractor inefficiencies and funding challenges in Ghana. In East Africa, Seboru (2015) identified land acquisition and project monitoring gaps as primary issues in Kenyan road projects.

In Ethiopia, Werku and Jha (2016) observed a combination of weak planning, contractor inexperience, and finance-related delays. However, few studies address Addis Ababa's *urban-specific complexities*, such as congested land use, overlapping jurisdictions, and the political economy of land compensation—factors that this study brings to the forefront.

4. Methodology

A descriptive quantitative research approach was employed. Structured questionnaires were administered to 104 experienced professionals from AACRA, contractors, and consultants. Respondents rated the significance of 45 delay factors using a 5-point Likert scale.

Data Analysis:
SPSS Version 20 was used to compute the Relative Importance Index (RII) for each delay factor. Cronbach's alpha ($\alpha = 0.87$) confirmed the instrument's reliability. Results were presented through ranking tables and visual charts.

5. Results and Discussion

5.1 Top Delay Factors

Rank	Factor	RII
1	Delay in utility relocation	0.891
2	Delay in compensation to landowners	0.873
3	Shortage of foreign currency	0.867
4	Inadequate contractor super vision	0.862
5	Bureaucratic procurement procedures	0.856

These findings confirm the *multi-institutional nature* of delays, where failures in utility agencies, land administration, central banking, and contractor management converge to disrupt timelines.

5.2 Stakeholder-Specific Delays

- **Client-side (AACRA)**: Slow decision-making, delayed payments, lack of pre-construction clearance.
- **Consultants**: Weak oversight, delayed design approvals, and poor site supervision.
- **Contractors**: Inadequate planning, unskilled labor, poor equipment utilization.

5.3 Broader Impacts

- **Financial**: Escalated costs due to inflation and repeat mobilizations.
- **Social**: Disruption of transport access and negative public sentiment.
- **Operational**: Delayed integration with larger urban transport networks.

6. Strategic Recommendations

6.1 Institutional Coordination

Establish a city-level *Integrated Infrastructure Task Force* comprising AACRA, utility providers, and land management bodies. Mandate joint review meetings for each project phase.

6.2 Utility and Land Clearance Reform

Ensure 100% utility relocation and compensation are completed before site handover. Enforce this as a condition for contract activation.

6.3 Currency and Procurement Adjustment

Collaborate with the National Bank of Ethiopia to fast-track foreign exchange for road projects exceeding a specified budget threshold. Introduce e-procurement tools to reduce manual tendering delays.

6.4 Performance-Based Contracting

Adopt Key Performance Indicators (KPIs) to monitor contractor delivery. Link payment schedules to performance milestones to discourage slow mobilization.

6.5 Technology Integration

Implement digital project tracking systems (e.g., MS Project, Primavera) accessible to all stakeholders. Use mobile apps for real-time inspections and approvals.

6.6 Capacity Development

Launch continuous training programs in contract management and modern construction techniques for public and private sector professionals.

7. Conclusion

The root causes of road project delays in Addis Ababa are deeply institutional and interdependent. Addressing these requires a shift from isolated project-level fixes to integrated governance reforms. This study offers a framework of locally grounded interventions that can guide AACRA and its partners toward more timely, transparent, and cost-effective urban road delivery.

By linking empirical analysis to actionable recommendations, this research contributes to the evolving discourse on infrastructure delivery in African cities under rapid urban transformation.

References

Assaf, S. A., & Al-Hejji, S. (2006). Causes of delay in large construction project. International Journal of Project Management, 24(4), 349–357.

Haseeb, M., Lu, X., Bibi, A., Dyian, M., & Rabbani, W. (2011). Causes and Effects of Delays in Large Construction Projects of Pakistan. Arabian Journal of Business and Management Review, 1(4).

Kamanga, M. J., & Steyn, W. J. v. d. M. (2013). Causes of delay in road construction projects in Malawi. Journal of the South African Institution of Civil Engineering, 55(3), 79–85.

Ministry of Urban Development and Construction (2019). *Construction Industry Transformation Strategy*. Addis Ababa: Government of Ethiopia

Seboru, M.A. (2015). An Investigation into Factors Causing Delays in Road Construction Projects in Kenya. *American Journal of Civil Engineering*, 3(3), 51–63.

Werku, K. & Jha, K.N. (2016). Investigating Causes of Construction Delay in Ethiopian Construction Industries. *Journal of Civil, Construction and Environmental Engineering*, 1(1), 18–29.

World Bank (2020). *Ethiopia Urban Infrastructure Review*. Washington, DC: The World Bank.