ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

ADDIS ABABA INSTITUTE OF TECHNOLOGY

SCHOOL OF CIVIL & ENVIRONMENTAL ENGINEERING

Assessment of Pacing Delay in Construction Contracts

(A Case on Selected Roads under Ethiopian Roads Administration)

A Thesis

By

Kenaw Maru

Advisor: Abraham Assefa (PhD)

A Thesis submitted to School of Graduate Studies of Addis Ababa University

in partial fulfillment of the requirements for the degree of Master of Science

in Civil Engineering

(Construction Technology and Management)

November 2024

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

ADDIS ABABA INSTITUTE OF TECHNOLOGY

SCHOOL OF CIVIL & ENVIRONMENTAL ENGINEERING

Assessment of Pacing Delay in Construction Contracts

(A Case on Selected Roads under Ethiopian Roads Administration)

MSc Thesis

By

Kenaw Maru

APPROVED BY THE BOARD OF EXAMINERS

ABRAHAM ASSEFA	Abraham A.	11/14/24
Advisor	Signature	date
Girmay Kahssay		15/11/24
External Examiner	Signature	date
		19/11/24
Internal Examiners	Signature	date
	Abrham Gebre (Dr.) Dean, School of Civil & Environmental Engineering	
Chairman	Signature	date

DECLARATION

I hereby affirm that the thesis entitled "Assessment of Pacing Delay in Construction Contracts (A case on Selected Roads under Ethiopian Roads Administration)" represents my original research. This thesis has not been submitted to any other university and is not currently under consideration for any degree. Furthermore, I have properly acknowledged all sources of material utilized in the preparation of this thesis.

Signature _____ Date _____

Kenaw Maru

ACKNOWLEDGEMENTS

I wish to express my heartfelt gratitude to all individuals who have supported me during the preparation and completion of this thesis. I am especially thankful to my advisor, Dr. Abraham Assefa, for his unwavering guidance and timely feedback throughout the entire process. Additionally, I would like to acknowledge my close friends and colleagues for their contributions of information and data pertinent to this research. I am particularly grateful to the professionals associated with the Employer, Contractor, and Consultant for their invaluable assistance and collaboration during the data collection. Lastly, I extend my sincere appreciation to my parents for their constant moral support throughout my academic journey.

In conclusion, I am profoundly grateful to the Almighty God for His blessings.

ABSTRACT

Delay is one of the major sources of claims and disputes in construction and the impact of construction delays is not limited to the construction industry, but it also affects the entire economy of the nation.

In construction contracts, Though employers are obligated to provide extra time for project completion they are not responsible for delay costs resulting from concurrent delays caused by contractors. When the contractors know the employers contention, contractors may argue that the delays dependent the were a deliverate decision following the employers independent delay. However, many Contractors failed to sufficiently demonstrate that the Contractor's pacing of the works were intentional, concurrent delays following the employers' delays.

The purpose of the research is to assess existance of pacing delay in construction contracts and its relation with concurrent delay, highligh the practice of pacing delay provisions in the International contracts, identify the required procedures during implementation of pacing delay. To this end the review of related literatures, shows that pacing delay is not a concurrent delay which instead is characterized by the contractor's proactive approach to adjust the schedule of the works in response to delays caused by the Employer or external factor and it is a recognized business in the international construction contract, particularly in USA and UK. However, the case has not been researched in Ethioipian and broad African context and as a result, the existance of pacing delay has not been fully undrstood. Further, the questionnaire survey shows that 93.3% of the repondants agreed on importance of pacing delay clauses for effective management of delays under federal road projects in Ethiopia. Besides, the survey further sugests, the provision of pacing delay clauses in the Contract document along with enhancing communication, keeping comprehensive records, and establishing consensus on delay criteria, can significantly mitigate the risks of project

Finally, further research should be done to get an in depth understanding on the practical application of pacing delays.

Keywords: Project, Delay, Pacing Delays and Concurrent delay

Table of Contents

List of Figures

List of Tables

ACRONYMS

AACE	American Association of Cost Engineers
CA	Contract Administrator
CoPA	Conditions of Particular Application
DAT	Delay Analysis Technique
DB	Design Build
DBB	Design Bid build
ERA	Ethiopian Roads Administration
FIDIC	International Federations of Consulting Engineers
GCC	General Conditions of Contract
GOE	Government of Ethiopia
PMBOK	Project Management Body of Knowledge
SCC	Special Conditions of Contract
SCL	Society of Construction Law
TRO	Time-Related Overhead

CHAPTER 1: INTRODUCTION

1.1 Research Background

The Ethiopian Roads Administration, as the duly appointed representative of the Federal Democratic Republic of Ethiopia, oversees the design, construction, and maintenance of federal road projects, often engaging various national and international contracting firms for these tasks.

To facilitate the administration and execution of specific road projects, a contract agreement is established, which serves as a legally binding document outlining various conditions and clauses agreed upon by the Employer and the contractor. Among the components of these work contracts, the general conditions of contracts (GCC) and their amendments, referred to as conditions of particular applications (CoPA), are essentially defined the rights and obligations for the contracting parties during implementation stage.

Typically, the contracts issued by the Ethiopian Roads Administration adhere to the standard Conditions of Contracts set forth by the International Federation of Consulting Engineers (FIDIC). The FIDIC Conditions of Contract for Works of Civil Engineering Construction, Fourth Edition (1987) (the Red Book) and the FIDIC Conditions of Contract for Design-Build and Turnkey, 1995 (the Orange Book) are the most frequently utilized versions of FIDIC contracts for projects employing design-bid-build and design-build delivery methods, respectively.

Sub-clause 69.4 [Contractor's Entitlement to Suspend Work] of the General Conditions of Contract (GCC) in the Red Book is a crucial element of the contract. And which clearly mentioned that in addition to the contractor's right to for interest payment under Sub-Clause 60.10, it allows the Contractor to suspend work or reduce the rate of progress of the work when the Employer fails to pay the amount due to the Contractor certified by Engineer within 28 days after the payment period specified in Sub-Clause 60.10. This is subject to any deductions the Employer is entitled to make under the Contract. The Contractor must give the Employer 28 days' prior notice, with a copy sent to the Engineer. If the Contractor suspends work or reduces the work rate in accordance with this Sub-Clause and subsequently faces delays or incurs additional costs, the Engineer will, after consulting both the Employer and the Contractor, determine:

(a) any extension of time the Contractor is entitled to under Clause 44, and

(b) the amount of such costs, which will be added to the Contract Price, and will inform the Contractor accordingly, with a copy to the Employer."

This provision clearly indicates that the Contractor has the right to either suspend work or slow down progress, with the latter indicating a decrease in work speed. Additionally, it is noted that projects frequently do not finish within the specified contract timeline and budget due to various reasons, including the Employer's delays in making timely payments to the Contractor, delays in

site possession and clearance, additional work directives, ongoing security issues, and delays in design approvals, all of which are the Employer's responsibility.

In relation to the contractor's assertion regarding the Employer's delay, it is highly likely that the employer will counter the contractor's claim by arguing that a concurrent delay, for which the contractor is accountable, coincides with the alleged delay caused by the Employer. Upon hearing the Employer's defense of concurrent delay, the contractor often retorts by asserting that their work pace was influenced by the Employer's delay. The concept of pacing suggests that the contractor could have mitigated what appears to be a concurrent delay if it had been deemed necessary, particularly if the delay had impacted the critical path (Daniel & Kenneth, 2021)**.**

1.2 Statement of the Problem

Many construction projects around the globe face significant challenges, with delays being one of the most common issues. Delays in construction projects can vary significantly across different countries and individual projects, influenced by factors such as construction type, costs, and the specific conditions surrounding each project. Road construction, an essential component of the construction sector, frequently encounters delays that necessitate prompt resolution (Senoucia, Ismailb, & Eldina, 2016).

Generally, construction contracts stipulate that the party responsible for a delay must bear the consequences. In practice, Employers are not liable for delay costs if concurrent delays are attributed to the contractor. Nevertheless, they are typically required to grant a time extension, either in accordance with standard contractual provisions or prevailing industry norms. To counter the Employer's assertion that concurrent delays are non-compensable, the notion of pacing delays becomes significant. If a contractor can establish that their delay was essential to maintain the project schedule within a specific timeframe due to actions taken by the Employer, the impacts of the Employer's delay can be distinguished from those of the contractor's, thereby enabling the contractor to seek compensation for the delay delays (Rider & Long, 2023).

However, due to absence of pacing delay provision in the contract document, the contractors working with ERA are encounter difficulties in convincingly demonstrating that their pacing was the exclusive cause of the intentional concurrent delays resulting from the Employer's critical path and the Employer is also facing difficulties to entertain the contractors claim in relation with pacing delay.

As a result, demonstrating the existence of pacing delay provision in the international Contract is essential, along with guidance for the contractors on how to implement the pacing and protect their rights to seek compensation beyond simply receiving a time extension for delays attributable to Employer and for the employer to handle such issues smoothly.

1.3 Scope of the research

This research is limited to road construction contracts managed by the Ethiopian Roads Administration, which involve both local and international contractors using both DBB and DB delivery methods. The study specifically examines contracts that have faced delays in completion due to factors related to the Employer under Central Construction Projects Management Directorate. Data has been collected from ERA, Central Construction Projects Management Directorate, ensuring that the results, conclusions, and recommendations are primarily applicable to stakeholders working in federal road projects under Ethiopian Roads Administration.

1.4 Research Questions

i. In construction contracts, how are professionals familier with pacing delay clause and its relation with cocurrent delay?

ii. What is the significance of having pacing delays clauses for Contracting Parties?

iii. What are the requirments and procedures involved in applying pacing delay?

iv. What the contractors to follow to reserve their contractual rights in obtaining payment compensation in addition to extension of time for complition?

1.5 Research Objectives

In general, this study aims to assess the practical effect of pacing delay in construction projects and in particular this study has the following objectives:

1. To assess existance of pacing delay in construction contracts and its relation with concurrent delay
2. To highligh the practice of pacing delay provisions in the International contracts
3. To identify the required procedures during implementation of pacing delay
4. To draw a possible recommendations for the provision of pacing delay clauses in the construction contract.

1.6 Research Significance

The research helps the employer and contractor:

- To understand the existance of pacing delay in the international contracts and its difference with concurrent delays.
- To understand requirements for practical application of pacing delays in contract provisions and their notice requirement.
- To carefully assess the importance of having pacing delay clauses in the Contract provision and required procedures while applying the pacing delay clauses.

1.7 Research Ethical Consideration

This research was conducted taking ethical considerations in to account. Therefore, the majority of individuals comunicated for informal interviews and questionnaires has accepted and cooperated with me. prior consent from all participants was obtained before conducting interviews and administering questionnaires. Informants who preferred to remain anonymous were identified as such in the research. The names of participating institutions and professionals were kept confidential. The survey results were solely intended to academic purposes.

1.8 Structure of the Study

This study, which evaluates the pacing delay in construction contracts, is divided into five Chapters. The study's context, the nature of the problem, its scope, and its targeted outcomes are all explained in Chapter 1. Chapter 2 which covers review of relevant literature, comes next. The study's procedures, including sampling, data collection and analysis techniques are covered in Chapter 3. Chapter 4 presents the study's findings along with a detailed discussion of the findings. finally chapter 5 attempts to conclude and draw recommendations based on the research findings.

CHAPTER 2: REVIEW OF RELATED LITERATURE

2.1 Definition of key Terms

Project: according to the six editions of Project management body of knowledge (PMBOK, 2017) guideline, a project is a defined task undertaken to deliver a specific good, service, or result. While projects characterized by a temporary nature have a distinct beginning and end, this does not necessarily indicate that they are of short duration. According to the PMBOK, a project concludes when its objectives have been achieved, when it is terminated due to the unlikelihood of meeting its goals, or when it is no longer deemed necessary.

Delay: as defined by the Merriam-Webster Dictionary, refers to "the state of being delayed" or "the act of postponing, hindering, or causing something to occur more slowly than usual. Further based on the delay and disruption protocol of Society of Construction Law (SCL, 2002), a delay event is any occurrence or reason for a delay that may be classified as either an Employer risk or a contractor risk event.

Project Delay: in the context of construction, project delay can be described as the extension of time beyond the completion date specified in a contract or beyond the date mutually agreed upon for project delivery. It represents a situation where a project exceeds its planned schedule and is recognized as a prevalent issue in construction endeavors, (Siraw, 2014).

According to the Snowy Mountains Engineering Corporation (SMEC, 2018) Manual, the concepts of Extension of Time and Delays are closely interconnected. Delays can be categorized into Delays to Completion and Delays to Progress.

Pacing Delay: refers to the intentional reduction of work speed in response to an existing delay and by slowing down other activities, the Contractor can take advantage of the float created by delays caused by the Employer, (Spinelli & Zack, 2014)

According to the American Association of Cost Engineers (AACE, 2011) recommended practice document (29R-03) pacing delay is defined as: The outcome of a **deliberate**, **intentional,** and **simultaneous choice** to measure advancement in relation to the **other delay**

Delay to Completion: refers to the postponement or delayed execution of critical activities within the project, resulting in the inability to meet the planned or agreed-upon Completion Date or Period.

Delay to Progress, on the other hand, pertains to the delayed execution of non-critical activities that fall within the available float and do not impact the overall Completion Time.

Consequently, an Extension of Time will be granted for delays that affect completion.

2.2 Construction Projects Delay Causes

A variety of articles and studies have explored the reasons behind delays in construction projects, which will be analyzed in this research. Siraw (2014) found that 80% of road projects in Addis Ababa faced time overruns, primarily due to factors such as slow clearance of site, financial challenges encountered by contractors, inflation, delays in payments from Employers, inaccurate cost estimates, and late project commencement. Similarly, Habtemariam (2016) reported that 34.78% of Employers recognized that projects were completed with time extensions ranging from 200% to 300% beyond the original contract period, highlighting that project delays significantly contribute to claims for time extensions and related cost overruns. Furthermore, Gizachew (2017) investigated the effects of contractor payment delays on road project management, revealing that poor budget allocation and utilization are key factors leading to delays in contractor payments, which in turn impede the progress of physical work.

In addition to the aforementioned national studies, several international researches also been reviewed. Rivera, Baguec, and Yeom (2020) investigated the causes of delays in road construction projects across 25 developing countries. Their findings indicate that factors such as the construction manager's lack of experience, insufficient planning and scheduling, and the impact of land expropriation for the project are more significant contributors to delays than the frequent changes in design, which was previously identified as the most common cause of delay.

Furthermore, Dayi conducted a study on schedule delay analysis in construction projects, identifying key factors that contribute to construction delays. These include organizational deficiencies on the part of the Employer, bureaucratic hurdles within the provincial municipality, the absence of detailed drawings during the municipal application process, the contractor's lack of experience, challenges in material procurement, unpredictable weather conditions, and a shortage of qualified subcontractor employees, Dayi (2010).

2.3 Types of Construction Delays

Delays in construction can be classified in various ways according to different scholars and literature. Dayi has identified four primary groups of construction delays:

1. Critical or non-critical
2. Excusable or non-excusable
3. Compensable or non-compensable
4. Concurrent or non-concurrent

In analyzing the impact of delays on projects, it is very important to identify whether the delays are critical or non-critical delays, as well as concurrent or non-concurrent. All construction delays fall into two main categories: excusable, which are attributed to the Employer or their agents, and non-excusable, which are attributed to the contractor or their agents. Further excusable delays can be divided into compensable and none compensable delays, Dayi ((2010)

According to Kartam, as cited by Oklobia (2022), project delays can be categorized into three fundamental types based on their origin, timing, and compensability:

1. By origin: delays are classified as being caused by the employer, the contractor, or a third party.

2. By timing: delays are distinguished as concurrent or non-concurrent.

3. By compensability: delays are categorized as excusable or non-excusable, with excusable delays further divided into compensable and non-compensable.

In general, a consensus among researchers indicates that delays can be categorized into three or four distinct types, as outlined below:

1. **Non-excusable Delays**: These delays arise from foreseeable events that fall entirely under the contractor's responsibility. Such delays may be resulted from the actions, inactions, or errors by contractor, subcontractors, or suppliers. Potential causes of delays can encompass lower productivity, suboptimal scheduling or management practices, construction errors, adverse weather, equipment failures, staffing difficulties, or simply bad luck. Such delays are fundamentally the contractor's responsibility, with no allowance for relief; thus, the contractor is liable for Liquidated and/or Ascertained Damages as specified in the contract.

2. **Excusable Delays**: Delays of this nature arise from unforeseen circumstances that are outside the control of the contractor or their representatives. This type of delay can be classified into two distinct subcategories:

   i. Excusable - Non-Compensable Delays: These delays result from unexpected occurrences that neither party to the contract can influence, including natural disasters, atypical weather conditions, labor disputes or strikes, and occasionally, government regulations. In these instances, the contractor is eligible for an extension of time to complete the project only.

   ii. Excusable - Compensable Delays: These delays are attributable to actions taken by the Employer, granting the contractor the right to both an extension of time and financial compensation for any damages or expenses incurred. Such situations may involve the Employer's defective design, incomplete drawings and specifications, alterations in project scope, differing site conditions, or delays in the delivery of materials or resources provided by the Employer

3. **Concurrent Delays**: This type of delay is particularly intricate, as it involves the simultaneous occurrence of multiple delay events. These delays can occur at the same time or at different intervals, but their effects are felt concurrently. True concurrent delay is characterized by the simultaneous occurrence of various delay events, with one identified as an Employer Risk Event and the other as a Contractor Risk Event, both producing effects at the same time. For concurrent delay to be recognized, it is crucial that both the Employer Risk Event and the Contractor Risk Event significantly contribute to the Delay to Completion, meaning that both

delays must impact the critical path. In instances where Contractor Delay to Completion coincides with Employer Delay to Completion, the Contractor's concurrent delay should not reduce any justified Extension of Time (EOT). When concurrent delay is established, the Contractor is entitled to an EOT for the Employer Delay to Completion, and the Contractor Delay should not affect the EOT due to the Contractor as a result of the Employer's Delay. SCL (2017)

2.4 Delay Analysis Techniques

According to the findings of Meena and Babu (2015) delay analysis is a systematic approach that must be utilized in conjunction with project documentation and data gathered from the project site. The choice of delay analysis technique is influenced by various factors and the records that are accessible. There are five prevalent methods for conducting delay analysis:

1. **Impacted As Planned Method:** In this method, the analyst outlines the initially planned schedule while incorporating the modifications that led to project delays. These modifications represent the sole recorded delays recognized throughout the construction phase that could have influenced the overall project timeline. A significant limitation of this method is its failure to consider the evolving characteristics of construction projects and the critical path.
   This method is mainly applicable for projects having predefined and valid schedules.
2. **Time Impact Method of Analysis:** this method allows for the assessment of how each delaying activity affects project timelines by calculating the variation between the project completion date in the schedule after the addition of each delay and the date prior to their incorporation.
3. **Collapsed As-Built (But-For) Method of Analysis:** In this methodology, rather than relying on a pre-established schedule as utilized in the what-if analysis, a comprehensive review of all pertinent contemporaneous project documentation is conducted to create a detailed as-built schedule. The ultimate outcome is achieved by eliminating or excluding activities that had an impact on the project from the as-built schedule. This method of delay analysis is in the absence of predefined schedule/program and when the only option is as-built data.
4. **Windows Method of Analysis:** This technique, often referred to as contemporaneous period analysis or the snapshot method, segments the overall duration of a project as outlined by the Critical Path Method (CPM) schedule into defined time intervals, which may be weekly, monthly, or yearly. Delays occurring within each interval are examined in a sequential manner concerning the critical paths. Mainly used for small scale projects to sequentially follow within specific period of time.
5. **As-Planned Versus As-Built (Total Time) Method of Analysis:** This approach involves analyzing the planned and actual schedules, operating under the premise that any delays are entirely attributable to the Employer, without any concurrent delays resulting from the

Contractor's actions,(Meena & Babu, 2015). Most commonly used method of delay analysis, with modifications on concurrency of the delays particularly for time related over head costs.

2.4.1 Delay Analysis Trends in Ethiopian Construction industry

According to the research conducted by Habtemariam (2016), a significant number of consultants within the Ethiopian construction sector lack familiarity with the delay analysis techniques previously mentioned. Consequently, many of them assess time extension requests in a subjective and unrealistic manner. He further contends that these consultants often lack adequate justification for either approving or rejecting time claims. Additionally, his findings indicate that some consultants evaluate contractors' requests solely based on the submission date, primarily due to a deficiency of specially trained personnel in the industry who are capable of utilizing, interpreting, and communicating scheduling techniques effectively. Furthermore, most consultants tend to approve time claims for variations and additional work based on the overall project cost rather than the actual impact of these variations or additional tasks on the contractor's schedule. In this context, the absence of specific guidelines for the preparation and evaluation of time extensions results in contractors' schedules lacking clear activity relationships, which complicates delay analysis. Moreover, both consultants and contractors often do not grasp the concept of concurrency (Habtemariam, 2016). In this case, the author has concurred with the challenges in relation with lack of activity relation ships of the contractor’s schedule and not agreed on other gaps particularly, the consultant firms working with ERA have adequate experience and knowledge in recording and handling claims and disputes in road constructions projects.

2.5 Pacing Delay

In the context of a project, pacing delay can be clearly defined. When a contractor recognizes that a delay caused by the Employer will affect the critical path, they may opt to slow down certain work activities to align with the Employer's delay. The contractor's reasoning is “Why should hurry and then wait?” (Spinelli & Zack, 2014)

American Association of Cost Engineers (AACE, 2011) has issued a recommended practice document (29R-03) that defines pacing as: The outcome of a deliberate, intentional, and simultaneous choice to measure advancement in relation to the other delay. According to the manual as cited by Nair & Skaik (2014), the distinguishing factor between pacing delays and concurrent delays is that pacing arises from a deliberate choice by either the contractor or the Employer to proceed at a slower pace. This decision is often made with the awareness that a simultaneous delay by the other party is already impacting the project completion date, leading them to prefer not to finish their work ahead of the delayed tasks. In contrast, concurrent delays occur independently, without any intentional effort from either party to slow down progress.

Further as per the manual pacing delays can be categorized into two types:

1. Direct Pacing – This type of pacing arises when the length of time required for a successor activity is extended due to a delay in a predecessor activity that has a direct impact on the advancement of the successor. For example, if the wire pulling process is postponed because the conduit installation is taking longer than anticipated due to a lack of conduit materials available on-site, this situation exemplifies a pacing delay rather than a concurrent delay, as the delay in one task directly leads to the delay in the subsequent task.

2. Indirect Pacing – In this type of pacing, the scheduled activity operates independently of the other tasks. For instance, a contractor might deliberately reduce the speed of piping installation in one area of the project as a result of a delay instigated by the Employer in another area. The delay from the Employer creates float, which is then utilized by the contractor's choice to slow down the piping installation, AACE (2011).

The Second Edition of Delay and Disruption Protocol, published by the Society of Construction Law (SCL, 2017), focuses on the management of delays and associated losses. It suggests that contractors may opt to pace activities that do not fall on the critical path. This strategy entails intentionally reducing the speed of non-critical tasks to synchronize their advancement with that of delayed critical path activities. The Protocol recommends that contractors notify both the Employer and the Contract Administrator (CA) of their plans to pace non-critical activities, along with the reasoning for this approach.

According to Daniel and Kenneth (2021) concurrent delay is characterized by a situation in which both the Employer and the contractor significantly contribute to the delay period through distinct actions that independently impact the project's critical path. This scenario arises when two or more parties, which may include a force majeure event, cause separate and independent delays to the critical path within the same timeframe. In contrast, pacing encompasses three distinct actions:

> (1) the deliberate slowing of work progress on a task or group of tasks, or the decision not to take measures to mitigate or accelerate progress in response to an unrelated delay;
>
> (2) the contractor's strategic choice to utilize time from delays caused by the Employer, which affects project completion, to enhance efficiency or reduce costs for their benefit; and
>
> (3) the contractor's decision to maintain existing plans without modification, as such changes would not improve the completion date, (Daniel & Kenneth, 2021)

Furthermore, the authors Daniel and Kenneth define critical path in three distinct manners:

The first definition describes it as one or more continuous chains of activities and relationships with the lowest float value extending from the start event to the finish event in the schedule. The second definition indicates that the critical path consists of activities that, if not completed within the scheduled timeframe, will delay the project's completion. The third definition characterizes the critical path as the longest sequence of activities and relationships from the project's initiation (or

the current progress point) to the completion of the work. While each definition holds validity and exhibits some overlap, the advent of software algorithms, such as intermediate completion milestones and imposed dates, necessitates the use of all three definitions, (Daniel & Kenneth, 2021).

Further other Scholars Rider and Long (2023) conducted research on the analysis of concurrent and pacing delays. They aimed to define the concept of pacing in relation to delays caused by employers and to explain the essential steps required to effectively demonstrate that pacing does not constitute a concurrent delay caused by the contractor.

Nuhu Braimah, a scholar from the UK, Braimah (2013), conducted research on Construction Delay Analysis Techniques and identified several often-overlooked issues that can significantly impact the results of delay analysis. These issues include the functionality of the software used for analysis, the requirements for resource loading and leveling, the resolution of concurrent delays, and the strategy for pacing delays. Braimah also provided a definition of pacing and recognized the challenges associated with the right to pace delays, which can influence the delay analysis process. For example, the concept of float ownership plays a crucial role in determining whether a delay caused by a contractor could serve as a potential defense for the Employer in cases of concurrent delay. He emphasized the necessity for further research to provide guidance on addressing these challenges.

other researchers Nair and Skaik (2014) emphasized that identifying and quantifying concurrent and pacing delays are essential components in effectively resolving disputes through an appropriate delay analysis methodology. They provided a definition of pacing and demonstrated the efficacy of the windows impact/update method for quantifying both concurrent and pacing delays. Similarly, Maclean (2022) sought to define pacing and its connection to concurrency, underscoring the necessity of contemporaneous records. She noted that proving intentional pacing delays can be quite challenging without contemporaneous documentation that supports the decision to implement

2.5.1 Principles of Pacing Delay

The fundamental concept of Pacing delay is based on the idea that gas naturally expands to occupy any available space. In the realm of construction, this principle has evolved into the notion that the duration of work expands to fill the time allotted for its completion, (Rider & Long, 2023). This means that the time required for tasks can be extended, temporarily halted, or executed intermittently. Regardless of the approach taken, the essential factor is that it stems from a deliberate choice by the executing party to synchronize with another activity. By pacing their work, the executing party is strategically reallocating resources in a more economical manner in response to schedule alterations caused by the primary delay, thus alleviating or circumventing the costs associated with resource demands that would arise from an approach of rushing and then waiting. In essence, this practice involves utilizing the float generated by the occurrence of the primary delay, (Kenji, 2006).

2.5.2 Identification of pacing delay

As stated by Rider and Long (2023), when a contractor's progress is affected by a delay instigated by the Employer, this delay is considered excusable and compensable for the contractor. In contrast, if the Employer's progress is a reaction to a delay caused by the contractor, the delay is compensable for the Employer but is neither excusable nor compensable for the contractor. Thus, it is essential to correctly determine pacing in the realm of construction delay disputes.

To assess a pacing delay scenario within a typical construction delay dispute, AACE (2011) provides several guidelines to consider when there is an absence of clear legal or contractual language:

1. Existence of Parent Delay

A pacing delay can only manifest as a reaction to another delay that is equally or more critical than the activity being paced. In situations where multiple activities are executed concurrently, it can be difficult to determine the direction of pacing. However, the identification of a parent delay is crucial for substantiating a pacing delay.

2. Ability to Demonstrate Simultaneous Resumption of Normal Pace

A pacing claim is only valid if the party making the assertion can prove that it has the ability to revert to the original pace of the paced activity once the parent delay is resolved.

3. Evidence of Intent to Pace

There must be clear evidence showing a purposeful decision to pace the work, indicating that the pacing was a deliberate choice made at the time it occurred. To manage the associated risks, the party accountable for the parent delay should communicate its intent to pace its performance. If these criteria are not met, a pacing delay will not be acknowledged in a dispute, (AACE, 2011).

Further other authors Keane and Caletka (2008) emphasizes that when evaluating pacing delays retrospectively, it is essential to approach such assessments with caution and skepticism, particularly in the absence of contemporaneous documentation to support the claims. Consequently, if no relevant records are provided to substantiate the pacing delay, the concurrent delays attributed to the contractors should not be classified as pacing delays, and they must bear the repercussions of the resulting concurrent delays for which they are responsible.

2.5.3 Guideline for application of Pacing Delay

Based on Rider and Long (2023) the contractor's choice to pace their work in response to a delay caused by the Employer on the critical path can be a wise business strategy. Nevertheless, Employers frequently resist this justification, particularly when pacing delay may be interpreted as a concurrent delay. Therefore, contractors must take into account several factors when applying pacing and responding to the Employer's concerns.

1. **Understand the Contract**: It is crucial for contractors to thoroughly comprehend their contractual obligations and the terms related to compensable, non-compensable and excusable delays. The contract agreement may include specific conditions that affect the contractor's right to reclaim extended overhead expenses. When the contract language is unclear or ambiguous, seeking legal advice for interpretation is advisable.

2. **Request clarification**: In the absence of a clear definition of concurrent delay within the contract, it is advisable for the contractor to promptly request clarification from the Employer. Achieving a mutual understanding of what is meant by concurrent delay and pacing will aid in minimizing confusion and mitigating the risk of disputes throughout the execution of the project.

3. **Initiate communication**: clear communication is crucial for successfully resolving conflicts. At the beginning of the project, the contractor should inform the Employer of any situations that might necessitate changes to the work schedule.

4. **Inform the Employer**: Construction contracts generally require contractors to provide timely written notifications when they encounter any impacts or delays. If a contractor decides to pace other tasks, it is crucial to promptly notify the Employer about this pacing delay. Delayed communication can severely undermine the contractor's credibility and reliability. Additionally, failing to inform the Employer in a timely manner may endanger the contractor's right to make claims under the contract.

5. **Ensure the team members well-informed**: It is essential that key members of a contractor's staff, such as the foreman, general foreman, superintendent, field engineer, construction manager, site manager, cost engineer, scheduler, and project manager, receive comprehensive updates regarding any delays and the decision of management to adopt a pacing strategy. These individuals are responsible for clearly conveying the consequences of these developments to the field.

6. **Document all actions**. contractors must diligently maintain project records that truthfully represent delays instigated by the Employer that influence critical path of the Contractor’s schedule, as well as the contractor's choices to modify the pace of other tasks. Essential contractor documentation, including monthly reports, meeting notes, letters, schedule updates, emails, and daily reports, constitutes important factual evidence. Furthermore, these documents provide verification of notifications to the Employer. It is the responsibility of core team leaders within the organization contractor to ensure that all significant events are documented accurately and uniformly.

7. **Acknowledge responsibilities**. Contractors must acknowledge their responsibility and work to eliminate any impacts they have caused in the context of the pacing discussion. If the Employer is able to demonstrate that issues related to independent delays caused by contractors

are influencing the critical paths, the contractor's justification for pacing may be questioned. In cases where the issues are interconnected and difficult to ascertain the precise impact, the contractor would be obliged to provide a reasonable estimate that divides the delays between the Employer and themselves.

8. **Validate Agreements**. Informal sideways agreements and unrecorded concerns can ambiguous the project's record, leading to a loss of clarity regarding the actual circumstances surrounding the issues. When the Employer and contractor reach a resolution on these matters, it is imperative to promptly validate the agreement with official change request process outlined in the contracts.

By adhering to the aforementioned steps, a contractor can reduce confusion and disputes, thereby enhancing the likelihood of substantiating a pacing delay. Furthermore, it is essential for a contractor to prioritize effective contract management, which includes scheduling, maintaining accurate records, facilitating understandings, and overseeing the overall performance of sub-contractors to ensure success of projects (Rider & Long, 2023).

2.5.4 Pacing Delay Practice

2.5.4.1 Pacing delay practice in USA

According to the 2006 AACE International Transactions CDR.14, Kenji and Hoshino (2006), the contractor's ability to adjust the pace of work in response to a critical path delay is a widely accepted principle in the United States. Nevertheless, the question of whether such adjustments are compensable remains unresolved in the courts. The existing contractual language has not sufficiently addressed this matter, and pacing delays are often viewed as a collaborative use of float to alleviate delay damages, with the benefits contributing to the reduction of potential damages. Consequently, by concentrating on cost offsets rather than employing intricate formulas for distributing float, this method facilitates a more straightforward path toward resolving this complex issue.

Based on another UK author Forgarty, in the United States, the concept of pacing is becoming more widely recognized as a defense to Employer-identified claims of concurrent culpable delay, with the Contractor stating they were pacing the works. In relation the author has asserted that, In US caselaw, pacing arguments have gained some juridical endorsement. For instance, the company called MCI Constructors, for example, in a case involving MCI Constructors, the District of Columbia Contract Appeals Board determined that the delays attributed to MCI by the District were not critical path delays, categorizing them as instances of "hurry up and wait." The ruling stated that when the government causes delays to the critical path, it is permissible for the contractor to ease its work pace, provided that it does not affect the overall project completion (Forgarty, 2022).

2.5.4.2 Pacing delay practice in UK

Based on the author Forgarty, the concept of pacing has gained recognition in the United Kingdom. In the first edition of the Society of Construction Law's Delay and Disruption Protocol, published in 2002, there was no mention of pacing. However, the most recent edition, released in 2017, acknowledges pacing as a strategy whereby a contractor may choose to adjust the pace of non-critical activities to align with the delayed activities on the critical path. Furthermore, the protocol stipulates that if a contractor intends to pace non-critical activities, it must inform the Employer and the Contract Administrator of this intention, along with the rationale behind it (Forgarty, 2022).

In accordance with finding of the author Forgarty, practical terms, pacing may be an entirely reasonable and sensible strategy, as deliberately slowing down the work (or decelerating) could improve cashflow. If it is clear that there is an overriding parent delay, the notion “why run to stand still later” comes to mind. There may be many common-sense advantages from a delivery perspective, for example: to smooth or level resources, delay purchasing items to reduce reliance on onsite storage (and the risk of damage when stored), or even to perform certain works in more favorable weather conditions, (Forgarty, 2022).

2.5.5 Pacing Delay in Contract Provisions

As noted in the Project Management (PM) World Journal, most of the construction contracts allow contractors to request time extensions for delays that are beyond their control and not due to their own fault or negligence, which are termed excusable delays. Typically, these contracts limit a contractor's right to additional project costs to only those delays that impact the critical path and are caused by the Employer, referred to as compensable delays. On the other hand, if the contractor is responsible for delays that affect the critical path, they are not eligible for time extensions or compensation, which are classified as non-compensable delays. In such instances, the contractor may be liable for liquidated damages or actual delay damages. Additionally, it is the contractor's duty to prove that the delays, whether excusable or compensable, are indeed influencing the project's completion date. Employer contracts generally require contractors to utilize contemporaneous project schedule updates to validate delays and to determine the number of days needed for an extension to the required completion date (PM World, 2017).

The Journal outlines that for a contractor to recover extended project costs resulting from delays to the critical path caused by the Employer, it is essential to demonstrate that the work was either delayed or obstructed, that the contractor incurred damages due to this delay or obstruction, and that the delay or obstruction was attributable to the Employer, its agents, or other contractors. It is typical for construction contracts to lack definitions or provisions regarding concurrent delays, let alone pacing. Most contracts include specific clauses such as "time is of the essence" or stipulate that a contractor must diligently execute the work, thereby obligating the contractor to expedite project completion. As a result, these contracts generally do not authorize a contractor to adjust

the pace of work in response to delays caused by the Employer affecting the critical path. Nevertheless, nearly all construction contracts carry an implied warranty that obligates the parties to refrain from delaying, hindering, or interfering with each other's performance. This implied warranty allows a contractor to pursue a least-cost performance approach. When the Employer causes a delay to the critical path, the contractor is entitled to take measures to mitigate costs, which supports the rationale for pacing. Judicial decisions have recognized that project schedules can fluctuate monthly, and delays can generate float within the schedule. Under specific circumstances, a contractor is not obligated to expedite their work unnecessarily. Generally, courts and boards have regarded float as a time-based resource that should be utilized in good faith by all parties involved. Furthermore, many contracts explicitly include provisions that address this concept. Construction contracts typically impose stringent notice requirements that contractors must adhere to when facing an impact or delay. These notice provisions are designed to afford the Employer the opportunity to alleviate potential negative consequences arising from an impacting event. If contractors do not deliver timely written notice to the Employer, it is probable that the courts and boards will issue unfavorable rulings.

The journal further illustrated that legitimate and substantiated claims made by contractors have been rendered ineffective due to their failure to provide timely notice to the Employer. Consequently, it is crucial for both the Employer and the contractor to fully understand the specific requirements outlined in the contract prior to assuming the risk associated with the potential responsibility for delays in relation to pacing arguments. Judicial decisions have indicated that the contractor's claims for delay damages are contingent upon the precise language of the contract. Moreover, the outcome of a contractor's claim for delay damages is significantly influenced by the factual circumstances surrounding the different causes of delay (PM World, 2017).

2.5.6 Notice requirement for pacing delay

Construction contracts typically include stringent notice requirements that contractors must adhere to when facing an impact or delay. These stipulations are designed to provide the Employer with a chance to mitigate any potential adverse effects stemming from such occurrences. If contractors do not deliver timely written notice to the Employer, it is probable that courts and administrative bodies will side against them. Even valid and well-supported claims from contractors can become ineffective if timely notice is not provided. Moreover, the author emphasizes the necessity for both the Employer and contractor to thoroughly understand their specific contractual obligations before assuming the risks associated with delays, particularly in relation to a "pacing" argument. Judicial decisions have demonstrated that the legitimacy of a contractor's claims for delay damages hinges on the precise language of the contract. Additionally, the success of a contractor's claim for delay damages is significantly affected by the factual circumstances surrounding the various causes of delay (Rider & Long, 2023).

2.6 Research Gaps

Almost all researchers who have investigated project delays have clearly defined the concept of delay, its primary causes, types, and analysis techniques/methods. In this context, a consensus among researchers indicates that there are three categories of delay based on the accountability of the contracting parties: Non-excusable delays (attributable to the contractor), Excusable delays (Excusable-Compensable or Excusable-None Compensable, attributed to the Employer or special circumstances), and Concurrent delays (where both parties share responsibility). However, the concept of pacing delay, as discussed in USA and UK, is not reviewed in Ethiopia and broad African constructions. Thus, the existence of pacing delay has not been fully understood in Ethiopian construction.

Consequently, it can be concluded that there exists a research gap concerning the examination of pacing delay. This study aims to initiate exploration into this area by highlighting the existence of pacing delay in the international construction contracts, evaluating its practical applications, outlining the required steps to effectively demonstrate that pacing is not concurrent contractors delay, and inspiring provision of pacing delay clause in construction contract documents according to the research findings.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The third chapter of the thesis outlines the methodology employed to achieve the study's objectives, focusing on the research strategy, design, and data collection to identify the causes and factors contributing to pacing delays in construction projects. This structured approach is essential for effectively analyzing the relevant data and drawing meaningful conclusions regarding the challenges faced by ERA.

To get detailed knowledge about the subject research title, i.e. pacing delay in construction Contracts, particularly on projects under Ethiopian Roads Administration, this research starts with unstructured review of related literatures since preparation of the proposal. In doing so, the literatures are searched systematically and the main reference were scientific journals, previous studies, international condition of Contracts, and Web searches to get supportive evidences.

3.2 Research Design and Approach

The research highlights the importance of selecting an appropriate research design to address the pacing delay in construction Contracts, particularly on projects under Ethiopian Roads Administration. A descriptive research design is employed to explore the perceptions and experiences of various stakeholders in the construction projects under ERA, facilitating systematic data collection to get detailed knowledge about the subject research title.

In due course both quantitative and qualitative methods data collection were adopted. The quantitative aspect involves collecting numerical data on project timelines, budgets, and delay frequencies for statistical analysis, while the qualitative component gathers in-depth insights from stakeholders through interviews and surveys.

3.3 Source and Type of data

The study effectively combines primary and secondary data sources to assess the pacing delay in road construction projects, utilizing surveys, interviews, and literature reviews to enhance understanding and support its findings. This comprehensive approach underscores the importance of both qualitative and quantitative data in addressing pacing delay in construction projects.

3.4 Instruments for the data collection

The study uses a survey methodology to gather and analyze stakeholder opinions on pacing delay in construction project under ERA. It targets a diverse group, including professionals representing the employer, contractor and consultant to ensure a comprehensive perspective. By collecting quantitative data through structured questionnaires, the study aims to assess the existence of pacing delay in construction projects, familiarity of the professional with the concept of pacing delay and its relation with concurrent delay, identify major contributing factors for delay in road projects,

highlight the importance and challenges of having pacing delay clause in the contract. Additionally, the research includes detailed case studies of Six road construction projects that faced delays beyond their original completion date (three severely delayed and three less delayed projects), examining the number of EoTs given and contributing factors/ claim heads. This combination of quantitative survey data and qualitative case study insights provides a thorough understanding of the subject pacing delay in construction projects.

3.5 Target population

The target population of the study were employer, contractors and consultants who are directly involved in road construction projects under ERA irrespective of their experience in road construction projects. Though there are more than 200 ongoing projects administered by Ethiopian roads administration under different directorate and districts, this research only considers project administered under Central Construction Projects Management Program Directorate, dominantly the projects are located in the nearby to capital city of the country, Addis Ababa. Further, to meet research objectives only 24 number of projects subjected for extension of time beyond the original completion period are considered.

3.6 Sampling Techniques

As the target population of the sampling contains different team, it would be better to select groups who have related job on the subject matter. Therefore, in order to minimize representation that might occur, the researcher obliged to be undertaken considering purposive sampling technique, which may best represent roads in the program directorate. Purposive sampling, or judgmental sampling, is a strategic method where researchers intentionally select participants with specific characteristics relevant to the research topic, enhancing data quality. This approach is particularly effective in small sample sizes or specialized groups, as it avoids including less knowledgeable participants. By choosing individuals with relevant expertise, researchers enrich the data collection process (Walliman, 2016).

Additionally, purposive sampling allows for informed judgment, leading to nuanced findings, especially in qualitative research. It is especially useful in exploratory studies aimed at gaining deeper insights rather than generalizing to a larger population. In summary, purposive sampling effectively gathers high-quality, relevant data by strategically selecting participants based on their expertise, making it beneficial in small or specialized groups, (Saunders, Lewis, & Thornhill, 2009).

3.6.1 Case studies/ review of selected projects with additional time for completion/

Representative samples were identified using the collected approved EoT documents from the Employer together with the requests submitted by Contractor and recommendation of the Engineer

using nonrandom Sampling method and analysis was done based on the knowledge gained from the review of related literature.

3.6.2 Questionnaire

To get the primary data, parallel with the daily interviews with concerned contracting parties' representatives related with the subject topic, the questionnaires were prepared and released to respondents contact address (telegram and email) to get the respondents thought towards the subject inquiry. And secondary data was collected from the Employer office. Accordingly, to analyze the gathered data relevant literatures, i.e. related books, journals, articles, conditions of contracts, were reviewed. Finally, by integrating the primary data with the secondary source the research becomes comprehensive enough to display the expected finding under this study.

3.7 Data analysis

The information gathered from multiple sources was analyzed using a mixed-methods approach. Data from documents and questionnaires were organized into themes and assessed in relation to the contract stipulations and pertinent literature. The data collected from various sources has been integrated and compared to enable a thorough evaluation of the different claims, with tables and charts included to illustrate the study findings.

CHAPTER 4: RESULTS AND DISCUSSION

This section presents, interprets, and analyzes the results obtained from the questionnaire survey and case study. Consequently, the conclusions and recommendations derived from the discussion of the research findings will be provided in the subsequent section of this study.

4.1 Analysis of Questionnaire data

4.1.1 Rating of questionnaire responses

closed-ended questionnaires were created using Google Forms and distributed to key stakeholders engaged in construction projects under Ethiopian Roads Administration through their email and Telegram accounts.

The questionnaire was forwarded for 70 experienced construction professionals working on road construction projects representing the Employer, Consultant and Contractor, to get their feedback on the subject matter and 44 questionnaires were responded through the google form, out of which 28 by Employer, 10 by consultant and 6 by Contractor with percentage distribution of 63.6, 22.7 and 13.6 respectively and origin of the organization of 41 (93.2%) local and 3 (6.8%) foreign as shown in the following figure 4.1-1 and figure 4.1-2 .

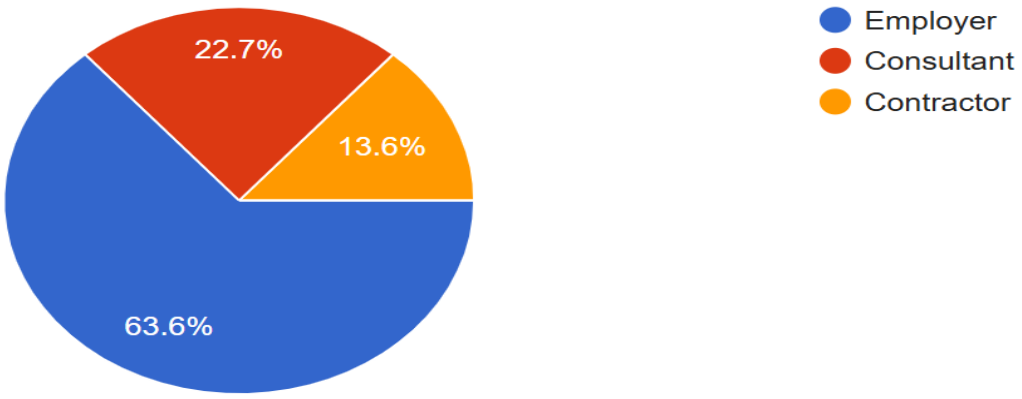

Figure 4.1-1 Categories of respondents Organization

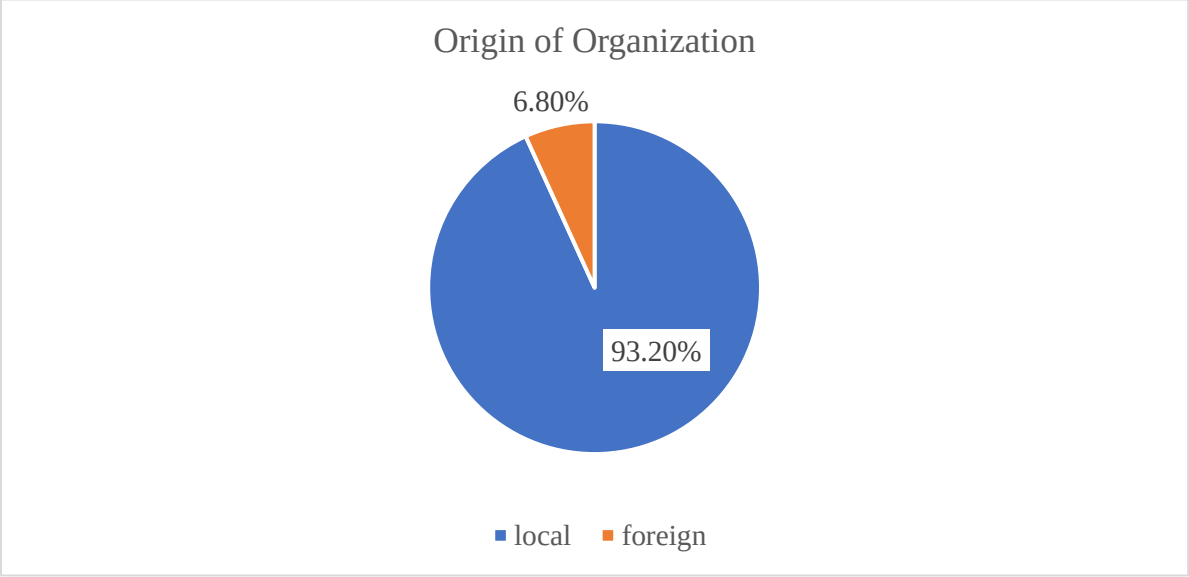

Figure 4.1-2 origin of the organization of respondents

Thus, according to Burgess, as cited by Miressa (2019) in questionnaire survey research, a responses rate of 60% +/-20% is acceptable for data analysis and as a result, the collected data were analyzed to get the most contributing factors for delay in construction projects.

4.1.2 Respondents Quality

Experts involved in the construction industry representing the three parties (i.e. Employer, Consultant and Contractor) were invited to fill the questionnaire survey data. From the total of 44 respondent 41 (93.2%) respondent are working with organizations having greater than 10 years of experience in highway construction projects and only 3 (6.8%) respondents were working with the organization having 5-10 years' experience as shown in the figure 4.1-3 below.

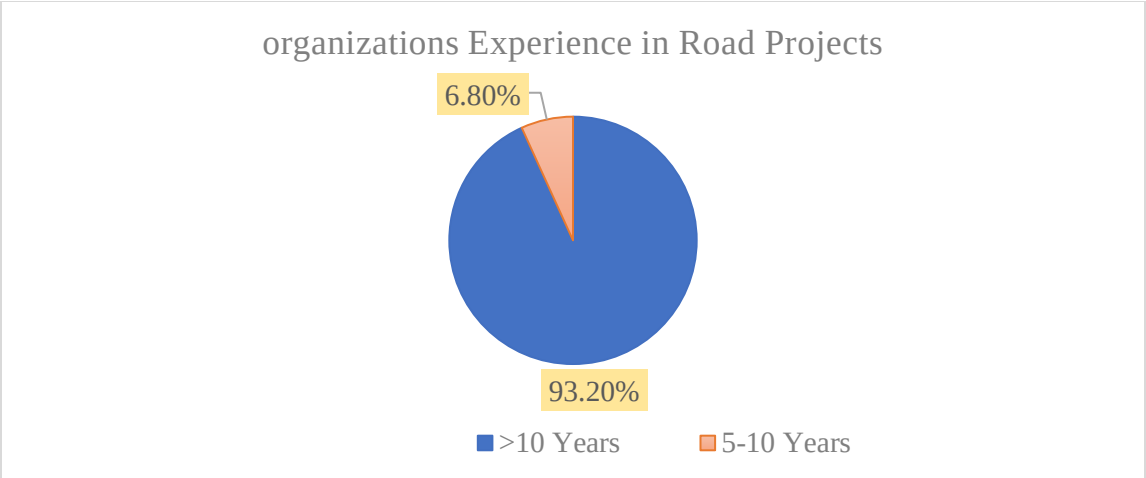

Figure 4.1-3 organizations Experience in Road Projects

Related with specific experience of professionals, 25 (56.8%) professionals have experience of greater than 10 years, 17 (38.6%) professionals have experience from 5 to 10 years and the remaining 2 (4.5%) professionals have experience of less than 5 years in road construction as shown in figure 4.1-4 below.

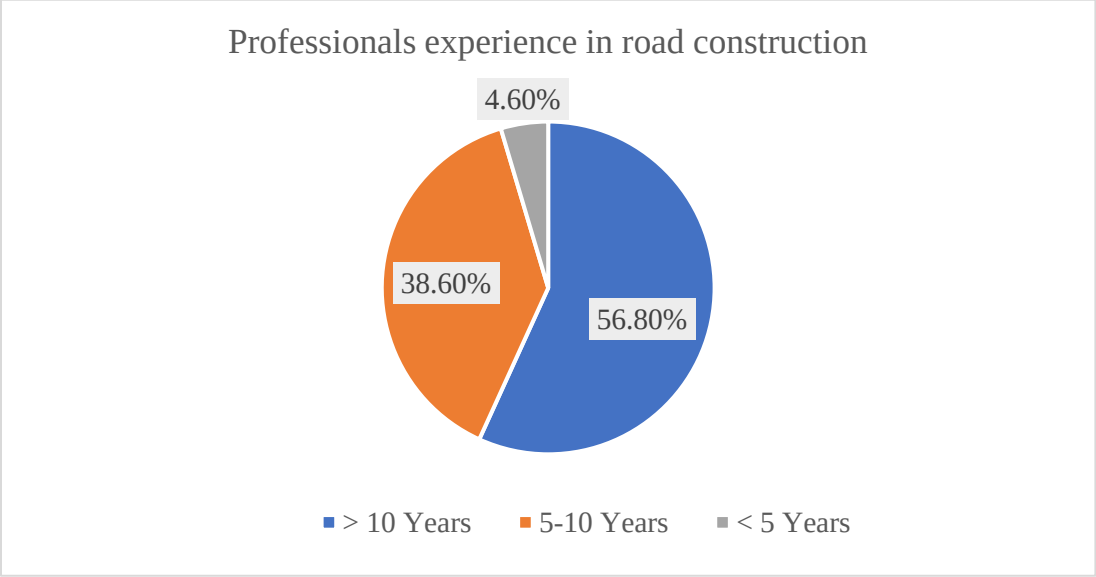

Figure 4.1-4 experience of professionals/respondents in road construction

In relation with the commonly used Condition of contracts Fidic Red Book (1987/92) contributes 84.1%, Orange book (1995) 40.9% and the remaining covers each 9.1% as shown in the figure 4.1-5 below.

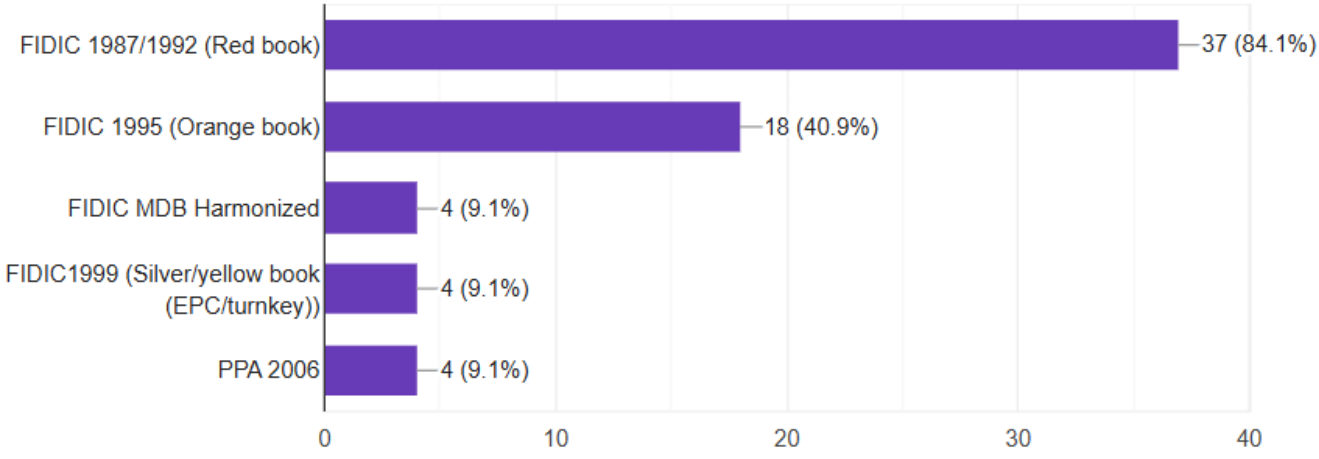

Figure 4.1-5 Commonly used Condition of contract under ERA projects

From the above figure, it is noted that the most commonly used condition of contract is the old version of FIDIC conditions of contract, i.e. FIDIC 1987(Red book) reprinted in 1992.

The details of the professional and respective organizations experience is tabulated herein under as Table 4.1-1 and Table 4.1-2

Table 4.1-1 Professionals Experience in road construction projects

Years of Experience	**Employer**		**Engineer/ Employer's Representative**		**Contractor/Design Builder**	
	Number	%	Number	%	Number	%
>10	3	10.7	8	80	6	100
5 to 10	24	85.7	1	10		
<5	1	3.6	1	10		

Source: Questionnaire Survey response

Table 4.1-2 Experience of the Company in road construction projects

Companies' year of experience	**Employer**		**Engineer/ Employer's Representative**		**Contractor/Design Builder**	
	No.	%	No.	%	No.	%
>10	1	100	9	90	6	100
5 to 10	0	0	1	10	0	0
<5	0	0	0	0	0	0

Source: Questionnaire Survey response

In relation with the familiarity of the respondents for the Concept of pacing delay provisions in the Construction, 23 (52.3%) of respondents are familiar, 13 (29.5% have limited knowledge about it, 3 (6.8%) have heard about it but not familiar and 5 (11.4%) not aware of it. Detail of the responses are tabulated in Table 4.1-3 below:

Table 4.1-3 Familiarity of professionals with the Concept of pacing Delay

Familiarity with pacing delay provision	Employer		Consultant		Contractor	
	No.	%	No.	%	No.	%
familiar with it	15	54	4	40	4	66.67
have limited knowledge about it	9	32	3	30	1	16.67
heard of it but not familiar	2	7	0	0	1	16.66
not aware of it	2	7	3	30	0	0

Source: Questionnaire Survey response

The following Table shows the major causes of pacing delay in construction projects

Table 4.1-4 Major Cause of pacing delay

Major Factors	Significance/frequency				
	V. Low	Low	Medium	High	V. High
Delay in commencement	4	11	14	8	7
Delay in removal of obstruction and possession of site			2	9	33
Delay in design approval	2	2	12	21	7
Additional works (Variation Orders)	1	1	15	19	8
Security problem		2	2	17	23
Payment delay by Employer		4	11	17	12
Change in Legislation	3	7	19	8	6
Inflation	1	1	8	15	19
Shortage of foreign currency or Letter of Credit (LC)	1	2	11	15	15
Scarcity of vital Constriction Material such as:					
a. Cement			10	20	14
b. Bitumen	1	2	16	17	8
c. Reinforcement bar	1	4	15	17	7
d. Explosive	1	2	21	13	7
e. Fuel	0	4	5	19	16

Source: Questionnaire Survey response

In relation with the necessity of implementing pacing delay provisions for successful Contract, 41(93.2%) of respondents have agreed and the remaining 3 (6.8%) have reservations as shown in figure 4.1-6 below.

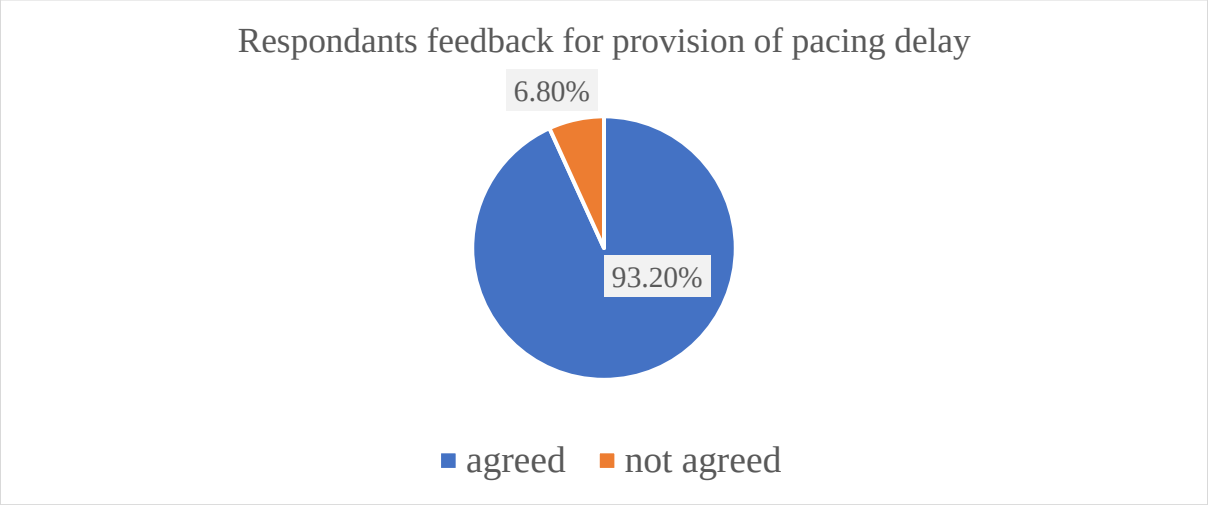

Figure 4.1-6 Respondents feedback on provision of pacing delay

regarding the required procedures the contractor should take to preserve his right in obtaining compensation as a result of pacing delay, with rating of high and very high

- Keep detailed records of all delays and their impact on the project timeline (81.82%)
- Review and understand the contract terms and clauses related to delays (79.55%)
- Keep proper documentation and evidence to support any claims for additional compensation or time extensions (79.55%)
- Communicate delays with the project Employer and document any agreements made (77.27%)
- Follow the notice and claims procedure outlined in the contract (75%)
- Explore options for alternative solutions to minimize or avoid delays (70.45%)
- Maintain open and transparent communication with all parties involved (68.18%)

The main challenges that may arise from pacing delay provisions in construction contracts, with higher rating range of medium to high,

- Strained relationships between contractors and Employers (79.55%)
- Disagreements between parties on the validity of delay claims (77.27%)
- Increased administrative burden and paperwork (77.27%))
- Delay in completion of the project and potential financial penalties (75%))
- Difficulty in meeting project milestones and deadlines (75%)
- Difficulty in accurately determining the cause of delays (70.45%)
- Potential for disputes and legal battles (70.45%)
- Inadequate compensation for delayed work (68.18%)
- can be easily abused by contractors (68.18%)
- Lack of clarity in defining the scope of a pacing delay clause (65.91%)
- Unforeseen time and cost impacts on the project (63.64%)

In relation with the minimum requirements for including a pacing delay clause in a construction contract to protect the contracting parties' interest, with higher rating range of high to very high

- Mutual agreement on triggering events for the delay clause (81.82%)
- A clearly defined timeline for project completion (79.55%)
- Clear definition of responsibility for delays caused by external factors (72.73%)
- Clearly outlined consequences for non-compliance with the delay clause (72.73%)
- Requirement for regular updates and communication on project progress (70.45%)
- Compensation for additional costs incurred during delay (65.91%)
- Provisions for dispute resolution in case of delay (65.91%)
- extensions of time provisions for unforeseen delays (65.91%)
- Ability to terminate the contract by either party after a certain duration of delay (43.18%)

Generally, the detail questionnaire surveys are attached as Annex 1 of this research document.

4.2 Case Studies

4.2.1 Assessment of approved extension of time for the projects under Central Construction Projects Management Program Directorate.

In this sub-section, projects which have been extended beyond the original completion period due to different delaying events emanated from the Employer or natural factors were identified. based on the collected data from Central Program Directorate; 24 projects which have been identified as running with additional time beyond the original Contract period. Accordingly, for the projects running with an extension of time, the total added time from the original Contract duration was computed until end of June 2024 for active projects, latest date of suspension for projects suspended due to different reasons and completion date for projects which are already completed. Details of the projects are shown as Appendix 2 of this research document.

Using 24 delayed projects, the average added time beyond the original duration was computed as 88.4% (*908 calendar days*) and identified the top three (3) and bottom three (3) projects which are highly delayed and less delayed against the average computed delay time respectively, using the total project slippage (i.e. actual project progress vs Contract duration)

Thus, for the identified six delayed projects, the case study was conducted to assess the major factors contributing for the projects delay and the result of the study is summarized with tables, Table 4.2-1 to Table 4.2-6 and discussed following each table. Besides the case was analyzed for the existence or possibilities of pacing delay during extension of time claim submissions.

4.2.2 Top Three Delayed Projects (highly delayed projects)

4.2.2.1 Case study No. 1 Construction Works of Muketuri – Kokebmesk

Table 4.2-1 Case study No. 1 Project information

Project Signing date	30th March 2017
Commencement Date	23rd May 2017
Contract Duration	990 Cal. Days +1 Years of DLP
Original Completion date	6th February 2020
Number of EoTs Granted	Six Times - 1706 (424, 325, 275, 196, 174, 312 days)
Revised Completion Date	8th October 2024
Project Time Overrun	162% until end of June 2024
Current Status of the Project	86.74% as of End of June 2024

Time Claim	**Number of Days (Cal. Day)**			**Major Claim Heads**	**Remark**
	Requested by Contractor	**Recommended by Engineer**	**Approved by Employer**		
EoT No. 1	814	403	407	Delay due to Increase in Quantity	
	98	17	17	Delay in assignment of the Engineer to the project site	
	912	420	**424**	***Subtotal of EOT No. 1***	
EoT No. 2	407	Nil	Nil	Delay Due to Increase in Quantity	
	390	338	**325**	Delay Due to Late Provision of Design and Belated Rights-of-Way Obstruction removal at Town Sections	The Contractor has considered concurrency
	407	338	**325**	***Subtotal of EOT No. 2***	
EoT No. 3	82	Nil	Nil	Delay due to Increase in Quantity	subsumed by claim head No. 2
	334	289	275	Delay due to late provision of design and belated removal of right of way obstruction at Town sections	
	416	289	**275**	***Subtotal of EOT No. 3***	
EoT No. 4	270	243	Nil	Delay Due to Shortage of Cement	
	103	103	102	Delay Due to Belated Removal of Obstruction at the Town Sections	Lag time of 94 Cal. Days Considered (cut of date

					February 28, 2023)
	68	68	68	Variation Order	Concurrency considered
	270	243	**196**	***Subtotal of EOT No. 4***	
EoT No. 5	74	Nil	Nil	Rebutal of the Engineer's Determination on Delay Due to Unforeseen Shortage of Cement and Delivery Time:	
	196	132	174	Delay Due to Delay in Removal of Obstruction:	
	37	Nil	Nil	Delay Due to Suspension of the Project due to Blockage of Bank Account	
	196	132	**174**	***Subtotal of EOT No. 5***	
EoT No. 6	316	312	312	Delay Due to right of way Obstruction problems at Town sections	Lag time of 163 Cal. Days (from December 1, 2023 to May 12, 2024) is considered
	191	191	60	Delay due to suspension of project works as a result of Security problem	Concurrency considered
	316	312	**312**	***Subtotal of EOT No. 6***	
			1706	***Total Approved EoTs to date***	

Source: EoT claim assessments

As summarized on Table 4.2-1 above and from the site records, the Construction works of the project was commenced on May 23, 2017 almost after two months of the Contract signing date, i.e. March 30, 2017 due to delay in assignment of the supervision Consultant which was finally assigned on May 31, 2017 and the project duration was for 990 calendar days (2.7 years) which mean the project was expected to be completed and handed over to the Employer as of February 06, 2020. However, apart from the Contractor's poor performance and delay in commencement of the project due to late assignment of the supervision consultant, the project works were also delayed by different Employer caused and external factors which includes but not limited to: Delay due to Increase in Quantity, Delay Due to Late Provision of Design and Belated Removal of Rights-of-Way Obstruction majorly at Town Sections, Delay due to Additional/Varied works, Delay due to suspension of works because of Security problems, Delay due to shortage of Construction materials such as cement, fuel…, as a result, the Contractor was granted with an additional time of 1706 calendar days in Six EOT claims and the original project duration has been

revised from February 06, 2020 to October 08, 2024 (*i.e. the project was delayed by 162% until end of June 2024 and even will be further shifted as the project is not completed until this days).*

4.2.2.2 Case Study No. 2 Construction Works of Debre Birhan – Ankober

Table 4.2-2 Case study No. 2 Project information and granted EoTs

Project Signing date			29th June 2018		
Commencement Date			23rd October 2018		
Contract Duration			730 Cal. Days +1 Years of DLP		
Original Completion date			22nd October 2020		
Number of EoTs Granted			Three Times - 1189 (387, 571, 231 days) and EoT No. 4 under Employer's Review		
Revised Completion Date			24th January 2024		
Project Time Overrun			175.21% until April 23, 2024		
Current Status of the Project			99.57% as of April 23, 2024 (substantial Completion date		
Time Claim	**Number of Days (Cal. Day)**			**Major Claim Heads**	**Remark**
	Requested by Contractor	**Recommended by Engineer**	**Approved by Employer**		
EoT No. 1	721	387	387	Delay due to Additional work at Debrebrhan Town	
	12	Nil	Nil	Delay due to occurrence of unforeseeable event/ adverse weather	Subsumed in claim head No. 1
	223(no concurrency)	160	**211**	Delay due to delay in removal of Right of way obstructions in town section	Subsumed in Claim head No. 1
	368	228	**107**	Delay due to delay in removal of Right of way obstructions in rural section	Subsumed in Claim head No. 1
	944	387	**387**	***Subtotal of EOT No. 1***	

EoT No. 2	795	678	571	Additional time in connection with variation instruction for realignment and design of Ankober Town	
	795	678	**571**	***Subtotal of EOT No. 2***	
EoT No. 3	572	275	231	Delay due to delay in removal of Right of way obstructions	As of June 07, 2023
		Concurrent with claim head No. 1	Concurrent with claim head No. 1	Delay due to Variation Instruction for the Extension of Ankober Town Section	
	572	275	**231**	***Subtotal of EOT No. 3***	
			1189	***Total Approved EoTs to date***	

Source: EoT claim assessments

From the above table, Table 4.2-2 and the site records, the Construction works of the project was commenced on October 23, 2018 almost after 4 months from the signing date of the Contract, i.e. June 29, 2018 and the project duration was for 730 calendar days (2 years) which mean the project was expected to be completed and handed over to the Employer as of October 22, 2020. However, apart from Contractor's poor performance, project works were also delayed by different Employer caused and external factors and the major delaying factors were: Delay due to Increase in Quantity, Delay Due to Late Provision of Design and Belated Removal of Rights-of-Way Obstruction majorly at Town Sections, Delay due to Additional/Varied works, Delay due to suspension of works because of Security problems, delays due to shortage of Construction materials such as cement, fuel…, as a result, the contractor was granted with an additional time of 1189 calendar days in three EOT claims and the original project duration has been revised from October 22, 2020 to January 24, 2024 and the project was actually completed and handed over to the Employer as of April 23, 2024 (*i.e. the project was delayed by 175.21%).*

4.2.2.3 Case Study No. 3 Construction Works of Ankober - Awash Arba Road Project, Contract 2: Dulecha - Awash Arba

Table 4.2-3 Case study No. 3 Project information and granted EoTs

Project Signing date	16th June 2016
Commencement Date	12th September 2016
Contract Duration	913 Cal. Days +1 Years of DLP

Original Completion date			14th March 2019		
Number of EoTs Granted			Three Times - 1848 (271, 8, 1263, 306 days) and EoT No. 5 under Employer's Review		
Revised Completion Date			4th April 2024		
Project Time Overrun			211.94% until June 30, 2024		
Current Status of the Project			83.4% as of June 30, 2024		
Time Claim	**Number of Days (Cal. Day)**			**Major Claim Heads**	**Remark**
	Requested by Contractor	**Recommended by Engineer**	**Approved by Employer**		
EoT No. 1	227	93	86	Delay due to Variation Order No.1 upgrading from rural to Zonal Standard	
	217	185	185	Delays due delay in removal of Right of Way Obstructions	
	75	Nil	Nil	Delay as a result of late assignment of the Engineer	
	519	278	**271**	***Subtotal of EOT No. 1***	
EoT No. 2	329	186	Nil	Delays due to Right of Way obstruction	
	81	8 (concurrency considered)	8	Delays due to disruption of work activities	
	410	373	**8**	***Subtotal of EOT No. 2***	
EoT No. 3	836	328	154	Delays due to Right of Way Problem	December 31, 2022 as cut of date
	64	Nil	Nil	Delay due to Variation Order No. 2	Concurrent with Claim Head 01
	422	Nil	Nil	Delay due to Quantity increment by design review	Concurrent with Claim Head 01
	71	Nil	Nil	Delay due to flood by Awash river over flow	Concurrent with Claim Head 01
	22	Nil	Nil	Delay due to disruption of work activities	Concurrent with Claim Head 01

	53	Nil	Nil	Delay due to provision of equipment for support of the national defense forces	Concurrent with Claim Head 01
	1024	328	**1263**	***Subtotal of EOT No. 3***	
EoT No. 4	393	313	306	Delay due in Removal of obstruction and possession of Melka Werer Town, Ambesh Towns and Bolhamo Area	
	393	313	**306**	***Subtotal of EOT No. 4***	
			1848	***Total Approved EoTs to date***	

Source: EoT claim assessments

As shown in table 4.2-3 above and from the site records, the Construction works of the project was commenced on September 12, 2016 almost after three months from the signing date of the Contract, i.e. June 16, 2016 due to delay in assignment of the supervision Consultant which was finally assigned on November 04, 2016 and the project duration was for 913 calendar days (2.5 years) which mean the project was expected to be completed and handed over to the Employer as of March 14, 2019. However, apart from very poor performance of the Contractor and late assignment of the supervision consultant, the project works were also delayed by different Employer caused and external factors which includes but not limited to: Delay Due to Rights of Way problems majorly at Town Sections, Delay due to Increase in Quantity, Delay due to Additional/Varied works, Delay due to occurrence of unforeseen events(flood, disruption and assignment of equipment out of project scope to support defense force) etc., as a result, the Contractor was granted with an additional time of 1848 calendar days in four EOT claims and the original contract duration has been revised from March 14, 2019 to April 04, 2024 (*i.e. the project was delayed by 211.94% until end of June 2024 and even will be further shifted as the project is not completed until this days and* EoT No. 5 is under Employer's Review*).*

4.2.3 Bottom Three delayed Projects (less delayed projects)

4.2.3.1 Case Study No. 5 Construction Works of Bilalo - Kersa - Arsi Negele

Table 4.2-4 Case study No. 4 Project information and granted EoTs

Project Signing date	28th March 2019
Commencement Date	16th August 2019
Contract Duration	1095 Cal. Days +1 Years of DLP
Original Completion date	15th August 2022

Number of EoTs Granted	Three Times - 470 (308 (EoT No.1 &2), 162) calendar days and EoT claim No. 4 under Employer's Review
Revised Completion Date	28th November 2023
Project Time Overrun	60.91% until June 12, 2024
Current Status of the Project	99.49% as of June 12, 2024 (substantial Completion date)

Time Claim	**Number of Days (Cal. Day)**			**Major Claim Heads**	**Remark**
	Requested by Contractor	**Recommended by Engineer**	**Approved by Employer**		
EoT No. 1& 2	21	-	-	Delays due to Security problem	
	166	-	-	Delays due to force majeure events COVID-19	
	397	96	128	Delays due to quantity increase of earthworks	
	341	168	200	Delays due to Right of Way Possession of the Site and access thereto	
	172	-	-	Delays due to geotechnical investigation of bridges	
	208	-	-	Delays due to late provision of design data	
	-	118	164	Variation Order for widening in Ego town	
	1285	382	**308**	***Subtotal of EOT No. 1 & 2***	
EoT No. 3	296	137	162	Delay due to late possession of site and delay in removal of obstructions	Cut of date for removal of RoW obstruction to be October 16, 2023
	95	Nil	Nil	Delay Due to disruption and stoppage of works due to Delayed RoW compensation	
	150	35	Nil	Delay Due to Late Provision of Design delay due to issuance of Variation Order in Bulchana Town section	The Contractor has considered concurrency
	541	172	**162**	***Subtotal of EOT No. 3***	
			470	***Total Approved EoTs to date***	

Source: EoT claim assessments

Based on the above table 4.2-4 and from the site records, the Construction works of the project was commenced on August 16, 2019 almost after 4.5 months from the signing date of the Contract, i.e. March 28, 2018 and the project duration was for 1095 calendar days (3 years) which means the project was expected to be completed and handed over to the Employer as of August 15, 2022. However, apart from the delay in commencement, the project works were also delayed by different Employer caused and external factors which includes but not limited to: Delay due to late possession of site and removal of obstructions and Delay due to Late Provision of Design/issuance of Variation Order, as a result, the Contractor was granted with an additional time of 470 calendar days in Three EOT claims and the original contract duration has been revised from August 15, 2022 to November 28, 2023 and the project was actually completed and handed over to the Employer as of June 12, 2024 (*i.e. the project was delayed by 60.91%). Compared with other projects including the above top three delayed,* this project was completed with least additional time of 470 cal. Days in three No. of EoTs.

4.2.3.2 Case Study No. 5 Construction Works of Ali town - Agarfa - Wabe River

Table 4.2-5 Case study No. 5 Project information and granted EoTs

Project Signing date	31st October 2018
Commencement Date	1st February 2019
Contract Duration	1095 Cal. Days +1 Years of DLP
Original Completion date	31st January 2022
Number of EoTs Granted	One Time - 270 Calendar days
Revised Completion Date	28th October 2022
Project Time Overrun	24.66% until October 28, 2022
Current Status of the Project	99.10% as of October 28, 2022 (substantial Completion date)

Time Claim	**Number of Days (Cal. Day)**			**Major Claim Heads**	**Remark**
	Requested by Contractor	**Recommended by Engineer**	**Approved by Employer**		
EoT No. 1			270	Delays due delay in removal of Right of Way obstructions & disruption of works due to security problem	
			270	***Subtotal of EOT No. 1***	
			270	***Total Approved EoTs to date***	

Source: EoT claim assessment

The above table, Table 4.2-5, show that, the Construction works of the project was commenced on February 01, 2019 almost after three months from the signing date of the Contract, i.e. October 31, 2018 and the project duration was for 1095 calendar days (3 years) which mean the project was expected to be completed and handed over to the Employer as of January 31, 2022. However, apart

from the delay in commencement, project works were also delayed by different Employer caused and external factors which includes but not limited to: Delay due to Rights-of-Way Obstruction problems majorly at Town Sections and interruption of works due to security problem, consequently, the Contractor was granted with an additional time of 270 calendar days in One EOT claims and the original contract completion was shifted from January 31, 2022 to October 28, 2022 (*i.e. the project was delayed by 24.66%).* Compared with other projects including the above top three delayed, this project was completed with the least additional time of 270 cal. Days with only one EoT.

4.2.3.3 Case Study No. 6 Construction Works of Bulbula Alage Design and Build Road Project

Table 4.2-6 Case Study No. 6 Project information and granted EoTs

Project Signing date	9th July 2020				
Commencement Date	12th November 2020				
Contract Duration	1095 Cal. Days +1 Years of DLP				
Original Completion date	11th November 2023				
Number of EoTs Granted	One Times – 143 Cal. Days and EoT No. 2 under Engineer's Review				
Revised Completion Date	1st April 2024				
Project Time Overrun	21.10% until end of June 2024				
Current Status of the Project	71.89% as of end of June 2024				
Time Claim	**Number of Days (Cal. Day)**			**Major Claim Heads**	**Remark**
	Requested by Contractor	**Recommended by Engineer**	**Approved by Employer**		
EoT No. 1	58	Nil	Nil	Delay as a result of Exceptional Adverse weather Condition	
	643	145	143	Delay due to delay in removal of Right of Way obstructions	
	643	145	**143**	***Subtotal of EOT No. 1***	
			143	***Total Approved EoTs to date***	

Source: EoT claim assessments

As summarized on the above table and from the site records, the project was commenced on November 12, 2020 almost after 4 months from the Contract signing date, i.e. July 09, 2020 and the project duration was for 1095 calendar days (3 years) which means the project was expected to be completed and handed over to the Employer as of November 11, 2023. However, apart from the delay in project commencement, the works were also delayed by different Employer caused and external factors which includes but not limited to: Delay due to late possession of site and

removal of obstructions and exceptional Adverse weather conditions, as a result, the Contractor was granted with an additional time of 143 calendar days in One EOT claim and project completion date has been shifted from November 11, 2023 to April 01, 2024he project was actually completed and handed over to the Employer as of June 12, 2024 (*i.e. the project was delayed by 21.1% until end of June 2024 and even will be further shifted as the project is not completed until this days and the Contractor has submitted EoT No. 2 of 234 days due to delay in removal of right of way obstruction and the same is under Engineer's review).* Though the project is not completed and additional EoT No. 2 is under Engineers review this project is being executed with the least additional time of 143 cal. Days until end of June 2024

4.3 Summary of Case Studies and its correlation with Questionnaire survey result:

from the above discussed case studies, it has to be noted that, the first three highly delayed projects had a total time overrun of 262%, 275.21% and 311.94% (i.e. an additional time of 162%, 175.21% and 211.94%) while the second three less delayed projects had a total time overrun of 160.91%, 124.66% and 121.10% (i.e. an additional time of 60.91%, 24.66% and 21.10% beyond the original duration) as shown in the aforementioned tables. The major identified factors for delay of the projects are: delay in Right of way obstructions, project Quantity increments, Addition work order/Variation Orders, disruption of works due to Security problem, late issuance of Design approval, late assignment of the Engineer, unforeseen events such as weather, flood, land sliding, shortage of construction materials such as cement, fuel, rebar, explosive, bitumen …, change in legislation. Those problems are similarity with the finding from the survey result that has revealed popularity of significant delay problem in road construction projects due to Delay in commencement of projects, Delay in right of way obstruction removal and possession of site, Delay in design approval, Additional works (Variation Orders), Security problem, Payment delay by Employer, Change in Legislation, Inflation , Shortage of foreign currency or Letter of Credit (LC), Scarcity of vital Constriction Material such as: Cement, Bitumen, Reinforcement bar, Explosive, Fuel. Further, from the case studies, it is noted that, though delayed payment, change in legislation, shortage of construction materials has been raised as issues for claiming additional project time, there is no granted extension of time in relation with those delaying events from the Employer's side. In this case, the following sample claim could be taken as an illustration to support the research finding related with Contractor's claim for additional time owing to shortage of Construction materials particularly cement:

- **Statement of the claim: Delay Due to Shortage of Cement**

  a) Contractor's Request

  The Contractor has mentioned that shortage in supply of cement has occurred on the prevailing market which could not be foreseen in early tender stage of the project, which has an impact on performance of structure and drainage works.

In connection the Contractor contended that the works were scheduled to be completed within the intended time with the anticipation that Contractor would not be affected by the event which is beyond his control.

Further, he has also contended that this severe cement shortage in the market has upset the balance of the Contract leading to a circumstance that could not be foreseen at the tendering stage and as such he shall be granted for additional time for the delays suffered in line with the contract provisions and applicable laws.

- GCC Sub-Clause 44.1 (e) addresses events that arise from circumstances beyond the Contractor's control, excluding any defaults or breaches of the Contract for which the Contractor is accountable.
- According to Article 3184 of the Ethiopian Civil Code, a contract is considered disrupted when new circumstances impose additional obligations on the party dealing with administrative authorities, obligations that significantly exceed what the parties could have reasonably anticipated at the time of contract formation.
- Article 3185 (1) of the Ethiopian Civil Code defines an event as unforeseeable if it could not have been reasonably anticipated by the parties at the time the contract was established.
- Article 3183 (1) of the Ethiopian Civil Code states that if unforeseen circumstances disrupt the balance of the contract, the parties involved with the administrative authorities are still required to fulfill their obligations, provided that such performance is not materially impossible.
- Article 3183 (2) of the Ethiopian Civil Code allows a party to request assistance from the administrative authorities with whom they have contracted, in order to mitigate the challenges posed by unforeseen circumstances, including sharing the losses incurred

The Contractor has asserted that, as part of his Contractual obligation he had timely notified the Engineer and the Employer, regarding shortage of cement and its subsequent effect on the performance of the project vide his numerous letters.

For determination of the effect of cement shortage on the project performance, the contractor has equated the cement demand versus the available at the project site as tabulated herein under.

Table 4.3-1 Effect of Shortage of Cement on Progress of Drainage Works

Period	Required Quantity (Qtl)	Available Quantity (Qtl)	Deficit (Qtl)	Deficit (%)
September 2021	2770.28		2,770.28	100
October 2021	12,488.01	1,300.00	11,188.01	90
November 2021	13,200.44	2,500.00	10,700.44	81
December 2021	12,045.45	1,700.00	10,345.45	86
January 2022	10,639.13	1,840.00	8,799.13	83

Period	Required Quantity (Qtl)	Available Quantity (Qtl)	Deficit (Qtl)	Deficit (%)
February 2022	2,911.73	1,780.00	1,131.73	39
March 2022	3,500.00	1,200.00	2,300.00	66
April 2022	3,865.16	362.50	3,502.66	91
May 2022	13,037.10	502.00	12,535.10	96
June 2022	7,669.72	872.00	6,797.72	89
Total	**82,127.02**	**12,056.50**	**70,070.52**	**82**

Accordingly, the Contractor has computed the impact of shortage of cement on execution of culvert, drainage and protection works in comparison with revised work program and action plan as shown in the table below;

Table 4.3-2 Cement Shortage Impact Analysis by the Contractor

Assumption	Month	Plan (%)	Actual (%)	Actual/Plan (%)	Impact (%)	Available calendar days	Impact (Days)
Based on Revised work programme	Sep. 2021	0.61		0.00	100.00	30	30.00
	Oct. 2021	3.12	0.10	0.03	99.97	31	30.99
	Nov.2021	3.21	0.19	0.06	99.94	30	29.98
	Dec.2021	2.78	0.14	0.05	99.95	31	30.98
	Jan. 2022	1.84	0.36	0.20	99.80	30	29.94
	Feb.2022	0.55	1.00	1.82	99.18	28	27.49
Based on Action Plan	Mar.2022		0.46			31	
	April 2022	0.98	0.53	0.54	99.46	30	29.84
	May 2022	3.17	0.74	0.23	99.77	31	30.93
	June 2022	1.33	0.61	0.46	99.54	30	29.86
	Total	**17.59**	**4.13**	**0.23**	**99.77**	**302**	**270.02**

Based on the foregoing, the Contractor has requested 270 Calendar Days of extension of time to be entitled in accordance with Sub-Clause 44.1 (a) [Extension of Time] of the GCC for thedelay encountered due to cement shortage.

b) Engineer's Determination

The Engineer has indicated that the Contractor submitted a notice to claim through letters Ref. No. CRTG/MK/CM/220332 dated March 22, 2022, and Ref. No. CRTG/MK/CM/220613 dated June 14, 2022, after becoming aware of the effects of the cement shortage on the project's performance.

The Engineer has confirmed that the Contractor has adhered to the requirements of Sub-Clause 44.2 [Contractor to Provide Notification and Detailed Particulars] of the Works Contract, which mandates that the Contractor notify the Engineer of a claim no later than 28 days after becoming aware, or being expected to be aware, of the relevant event or circumstance.

However, the Engineer contends that the Contractor's claim for the period from September 2021 to June 2022 does not comply with the aforementioned contractual provision, as the Contractor did not provide notice within the 28-day timeframe following the occurrence of the event.

Nonetheless, the Engineer noted that he became aware of the cement shortage affecting the project as early as September 2021 and observed that the structural work was impacted as a result.

In light of this information, the Engineer has reviewed the Contractor's eligibility for an extension of time related to this claim, despite the Contractor's failure to submit a notice within the required timeframe stipulated in the Contract.

Consequently, the Engineer has determined that the Contractor is entitled to an extension of time for project completion due to delays caused by the cement shortage in the current market, which constitutes a special circumstance beyond the Contractor's control or responsibility.

The Engineer reported that he has reviewed the Contractor's assessment of the additional time needed for the execution of the Culvert, Drainage, and Protection works. He found that the planned and actual progress percentages for the structural works align with his data, with the exception of February 2022 and March 2022, during which the executed works exceeded the planned quantities

Having said the above, the Engineer similar to the Contractor has computed the impact of shortage of cement for execution of culvert, drainage and protection works in comparison with revised work program and action plan as shown in the table below;

Table 4.3-3 Cement Shortage Impact Analysis by the Engineer

Assumption	Month	Plan (%)	Actual (%)	Actual/Plan (%)	Impact (%)	Available calendar days	Impact (Days)
Based on Revised work programme	Sep. 2021	0.61		0.00	100.00	30	30.00
	Oct. 2021	3.12	0.10	0.03	99.97	31	30.99
	Nov.2021	3.21	0.19	0.06	99.94	30	29.98
	Dec.2021	2.78	0.14	0.05	99.95	31	30.98
	Jan. 2022	1.84	0.36	0.20	99.80	30	29.94
	Feb.2022	0.55	1.00	1.82	99.18	28	
Based on Action Plan	Mar.2022		0.46			31	
	April 2022	0.98	0.53	0.54	99.46	30	29.84
	May 2022	3.17	0.74	0.23	99.77	31	30.93
	June 2022	1.33	0.61	0.46	99.54	30	29.86
	Total	**17.59**	**4.13**	**0.23**	**99.77**	**302**	**242.52**

The Engineer advises that the Contractor be granted an Extension of Time amounting to 243 calendar days due to delays experienced from a nationwide cement shortage, in accordance with Sub-Clause 44.1 of the General Conditions of Contract.

c) Employer's Approval

The Employer has observed that the Contractor has adhered to the requirements set forth in Sub-Clause 44.2 [Contractor to Provide Notification and Detailed Particulars] of the Works Contract, which mandates that the Contractor notify the Engineer of any claims within 28 days of becoming aware, or being expected to be aware, of the relevant event or circumstance.

However, the Employer has indicated that the Contractor's submission of detailed particulars does not conform to the stipulations of Sub-Clause 44.2, which requires the Contractor to present a comprehensive claim to the Engineer, inclusive of all supporting details regarding the basis of the claim and the request for an extension of time, within 42 days of becoming aware (or being expected to be aware) of the event or circumstance that prompted the claim.

Consequently, the Employer has concluded that neither the Contractor's claim nor the Engineer's determination is supported by sufficient evidence to substantiate the occurrence of the event or the extent of the delay suffered by the Contractor specifically due to a shortage of cement.

Furthermore, both submissions failed to account for the influence of other factors, including the overall inadequate performance of the Contractor in executing project works, attributed to poor project management capabilities. This is evidenced by the consistent correspondence from the Engineer and Employer, as well as the minutes from various meetings, highlighting the Contractor's notably slow progress on structural and drainage works during a period when cement supply in the local market was plentiful.

In light of these considerations, the Employer maintains that the Contractor is not entitled to any extension of time and has entirely rejected both the Contractor's claim and the Engineer's determination regarding this matter.

Case analysis and conclusion:

The researcher observed in the aforementioned case study that a significant delay, specifically a shortage of cement, occurred during the project. This event was unforeseen by the experienced Contractor at the tendering stage. Consequently, the Contractor has been consistently notifying the relevant parties of this incident in compliance with the notice requirements outlined in the Contract agreement, which has been acknowledged by both the Engineer and the Employer. In this context, the Engineer assessed the Contractor's entitlement to an extension of time related to this claim, despite the Contractor's failure to submit a notice within the designated timeframe stipulated in the Contract.

Upon reviewing the submitted supporting evidence, the Engineer noted that the planned and actual progress percentages of the structural works aligned with the Engineer's records, with the exception of February and March 2022, during which the executed work exceeded the planned quantities. The Engineer subsequently determined that the Contractor was entitled to additional time for the corrections pertaining to these months. However, the Employer rejected this

determination, citing that both the Contractor's request and the Engineer's assessment overlooked the influence of other factors, including the Contractor's overall inadequate performance in managing the project.

In conclusion, while the inclusion of a pacing delay clause in the Construction Contract could allow the Contractor to argue that the delay was intentional due to the cement shortage in the local market, the current Contract does not contain such provisions. Therefore, the Contractor lacks a contractual basis to assert that the delay was intentional, despite it being an external factor beyond his control.

In addition to the Questionnaire Survey and Case Studies, an interview focused on the implications of pacing delays in assessing the Contractor's claims for extensions of time was conducted. This interview included staff from the Contractor, Engineer, and Employer involved in the sample project impacted by the cement delay (Mukuturi - Kokebmesk road Project). The Employer's representatives argued that, apart from payment delays, the contract documents do not address pacing delays related to other delay events. As a result, the Employer will not consider the concept of pacing delays when reviewing the Contractor's extension of time claim. However, there is a provision for pacing delays in the case of payment delays. If the Contractor's payment is delayed, they are entitled to slow down the work progress or suspend the project, as outlined in Sub-Clause 69.4 [Entitlement to Suspend Works] of the FIDIC 4 (1987) Conditions of Contract. This clause specifies that, without affecting the Contractor's right to interest under Sub-Clause 60.10 and the right to terminate under Sub-Clause 69.1, the Contractor may suspend work or reduce the work rate if the Employer fails to pay the amount due under any Engineer's certificate within 28 days after the specified payment period in Sub-Clause 60.10, subject to any deductions the Employer is entitled to make under the Contract. The Contractor must give the Employer 28 days' prior notice, with a copy sent to the Engineer. If the Contractor suspends work or reduces the work rate in accordance with this Sub-Clause and subsequently faces delays or incurs costs, the Engineer will, after consulting both the Employer and the Contractor, determine: (a) any extension of time the Contractor is entitled to under Clause 44, and (b) the amount of such costs, which will be added to the Contract Price, and will notify the Contractor accordingly, with a copy to the Employer.

For the same question, The Contractor has indicated that the delay in question was attributable to an unforeseen external factor, which is classified as an Employer's risk event under Sub-Clause 20.4 [Employer's Risk] of the Contract agreement. The Contractor has been in communication with both the Engineer and the Employer to facilitate the procurement of the necessary quantities of cement from the local market, adhering to the notice requirements stipulated in the Contract. Furthermore, the price of cement has seen a significant increase, rising from the Contractor's initial estimate of 185 to 270 birr per quintal to a current range of 1800 to 2200 birr per quintal, inclusive of all associated costs. However, the Contractor has not explicitly stated whether the concept of pacing delay has been taken into account. The Engineer has stated that the assessment was conducted in accordance with the provisions of the Contract and concluded that additional time is warranted due to the cement shortage, which has particularly impacted structural works. This

shortage has hindered the Contractor's ability to proceed with subsequent activities, compounded by transportation difficulties arising from security issues frequently encountered near to the project site. Nevertheless, concerning the notion of pacing delay and its consideration during the assessment of the Contractor's Extension of Time (EoT) claim, the Engineer has acknowledged his familiarity with the concept but confirmed that it was not factored into his evaluation of the Contractor's EoT claims.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATION

5.1 Conclusions

After thoughtful review of related literatures and with the findings from the aforementioned questionnaire surveys and case studies, this chapter has concluded the major outcomes in correlation with the research objectives and followed by the recommendations.

1. understanding the distinction between pacing delays and concurrent delays is vital for effective delay analysis and dispute resolution within construction contracts. Pacing delays are characterized by the proactive decision of Contractor to adjust schedule of works in response to delays caused by the Employer or external factor, while concurrent delays involve multiple delays occurring simultaneously, with one potentially attributable to the contractor and the other to the Employer or external factors. In the international contract, particularly in USA and UK pacing delay is a recognized business for the contractor to get a benefit from the floats create by the Employers delay and such strategy has not been researched in Ethiopian context.
2. The finding of the study shows that Delay in commencement, Delay in removal of obstruction and possession of site, Delay in design approval, Additional works (Variation Orders), Security problem, Payment delay by Employer, Change in Legislation, Inflation, Shortage of foreign currency or Letter of Credit (LC), Scarcity of vital Constriction Material such as: Cement, Bitumen, Reinforcement bar, Explosive, Fuel etc. were identified as the major delay events which hinder the Contractors performance in planning and execution of the project works.
3. Further the study comprehended that 93.2% of respondents have agreed on the importance of pacing delay provisions in effectively managing delays in construction projects and during the provision of the pacing delay in the contract document, clearly defined timeline for project completion, Mutual agreement on triggering events for the delay clause, Requirement for regular updates and communication on project progress, Clear definition of responsibility for delays caused by external factors, clearly outlined consequences for non-compliance with the delay clause, provisions of extensions of time for unforeseen delays clauses, etc., shall be considered as must meet criteria.
4. Finally, the study shows contractors should properly record particulars related with delays and their impact on project timeline, Review and understand the contract terms and clauses related to delays, Communicate delays with the project Employer and documented any agreements made, Follow the notice and claims procedure outlined in the contract, Maintain open and transparent communication with all parties involved, Explore options for alternative solutions to minimize or avoid delays, Keep proper documentation and evidence to support any claims for additional compensation or time extensions to preserve their rights in obtaining compensation apar from simple time extensions due to the aforementioned causes of pacing delays attributed to the Employer or external factors.

5.2 Recommendation

Based on the conclusions derived from the data analysis, the following constructive recommendations are proposed as potential actions to facilitate the successful completion of construction projects.

- In consideration of the research findings, incorporating pacing delay clauses within the contract documents, alongside improving communication, maintaining thorough records, and reaching a consensus on delay criteria, can substantially reduce the risks associated with project delays. This approach ensures timely project completion and provides benefits to construction stakeholders and the broader community.
- Drawing from the literature reviews and research outcomes, it is advisable for a contractor seeking to recover extended project costs due to critical path delays caused by the employer to demonstrate that the work was delayed or obstructed, that the contractor incurred damages as a result of the delay or obstruction, and that the employer, its agents, or other contractors were accountable for the actions or omissions leading to the delay or obstruction.
- Contractors who choose to pace an employer-caused delay to mitigate damages should issue a written notice of pacing, clearly informing the employer of their intended approach to address the delay. Additionally, they should prepare and submit a detailed pacing plan and seek to reach an agreement with the employer regarding the implications of impact costs.
- During analysis of pacing delay claims, it is recommended that professionals employ clear communication, adhere to appropriate notification practices, and engage in meticulous record-keeping to substantiate delay analyses.
- Further research should be undertaken on pacing delays to gain a more profound understanding that can guide best practices in construction project management.

References

AACE. (2011). *AACE® International Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS* . AACE International.

Braimah, N. (2013). Construction Delay Analysis Techniques—A Review of Application Issues and Improvement Needs . *buildings* , 22 -23.

Daniel & Kenneth, G. Q. (2021). *Concurrent Delays and Pacing in Construction Contractor Delay Claims.* American Bar Association of the Construction Lawyer, Volume 41, Issue 3.

Dayi, S. (2010). *Schedule Delay Analysis in Construction Projects: A Case Study Using Time Impact Analysis Method.* M.Sc., in Building Science, Department of Architecture. MIDDLE EAST TECHNICAL UNIVERSITY.

Forgarty, D. (2022). *Pacing Delay – A Dispute Resolution Perspective.* UK: DGA GROUP EBRIEFING.

Gizachew, T. (2017). *Contractor's Payment Delay and its Impact on Road Projects Administered Under Ethiopian Roads Authority.* Addis Ababa, Ethiopia: ddis Ababa University, Addis Ababa Institute of Technology, School of Civil and Environmental Engineering, MSc Thesis.

Habtemariam, T. (2016). *Review of Time Extension Delay Analysis Techniques andTrend with Selected Construction and Consulting Firms in Addis Ababa.* Addis Ababa, Ethiopia: Addis Ababa University, Addis Ababa Institute of Technology, School of Civil and Environmental Engineering, MSc Thesis.

Keane, P. J., & Caletka, A. F. (2008). *Delay Analysis in Costruction Contracts.* WILEY Blackwell.

Kenji, P. H. (2006). *Proposed Specification Language Regarding Pacing.* US: AACE International Transactions.

Maclean, M. (2022). *Do Losses Really Lie Where They Fall When It Comes to Concurrent Delays?* Melanie Maclean, P.Eng., Consultant the Revay Report Volume 36 • Number 4 .

Meena, V., & Babu, K. S. (2015). Study on Time Delay Analysis for Construction Project Delay Analysis. *International Journal of Engineering Research & Technology (IJERT), Chennai, India, 4*(03).

Miressa, S. (2019). *Assessment of Road Project Delay Factors (Case Study of Addis Ababa Road Authority).* Addis Ababa, Ethiopia: Addis Ababa, Ethiopia: Addis Ababa University, Addis Ababa Institute of Technology, School of Civil and Environmental Engineering, MSc Thesis.

Mishra, A. K. (2019). Comparative Study of Prospective Delay Analysis Techniques (DATs). *Saudi Journal of Civil Engineering, Scholars Middle East Publishers, Dubai, United Arab Emirates*, 15.

Oklobia, O., & Prof Tsado, T. (2022). *CAUSES OF DELAY IN CONSTRUCTION PROJECTS.* lagos, Nigeria: Dangote OIl Refining Company.

PM World, J. (2017). Guidelines for Delay Control in Construction Projects by Kolb, Dr. Mostafa H.A.; Dief, Dr Moustafa I.A.; El Beheiry, Dr. Hatem S. and Kafifi ,Eng Ahmed Saad M. *PM World, Journal, VI*(II), 15.

PMBOK. (2017). *A guide to the project management body of knowledge (PMBOK guide) Sixth edition.* 14 Campus Boulevard Newtown Square, Pennsylvania 19073-3299 USA: Project Management Institute, Inc.

Rider, R. J., & Long, R. J. (2023). *Analysis of Concurrent and Pacing Delays.* Colorado USA: Long International.

Rivera, L., Baguec, H., & Yeom, C. (2020). A Study on Causes of Delay in Road Construction Projects across 25 Developing Countries. *Infrastructures*, 16.

Saunders, M., Lewis, P., & Thornhill, A. (2009). Research Methods for Business Students. *Scientific Research An Academic Publisher*.

SCL. (2002). *Society of Contruction Law Delay and Disruption Protocol.* 67 Newbury Street, Wantage, Oxfordshire, England: Society of Construction Law, Administration Office.

SCL. (2017). *SOCIETY OF CONSTRUCTION LAW delay and disruption Protocole second Edition.* Society of Construction Law (UK), 234 Ashby Road, Hinckley, Leicestershire, LE10 1SW.

Senoucia, A., Ismailb, A., & Eldina, N. (2016). Time Delay and Cost Overrun in Qatari Public Construction Projects. *Creative construction conference* (p. 16). Procedia Engineering.

Siraw, Y. (2014). *Analysis of Factors Contributing To time overruns on Road Construction.* Addis Ababa, Ethiopia: Addis Ababa University, College of Business and Economics, Department of Management, MBA thesis.

Skai, S., & Nair, K. P. (2014). Examining the Viability of Windows Impact/Update Method for Delay Analysis in Construction Disputes. *School of Built Environment, Heriot Watt University, Dubai Campus;.* United Kingdom.

SMEC. (2018). *ERA Modernization-Claims and Disputes Management Manual.* Addis Ababa, Ethiopia: SMEC Group.

Spinelli, P. M., & Zack, a. J. (2014). *Pacing Delays – The Practical Effect on Construction Projects & Delay Claims.* New York, NY: Navigant Consulting, Inc.

Walliman, N. (2016). *Social Research Methods The Essentials.* Arts University Bournemouth, England.

APPENDIXES

Appendix 1: Research Questionnaire Surveys

Appendix 2: Projects running with extension of time under Central Construction Projects Management Program Directorate, ERA