Addis Ababa University

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Determinants of Time Overrun in Road Construction Projects in Ethiopia: In the case of Morka-Gircha-Chencha Road Project

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In Partial Fulfillment of the Requirement for the Award of Master of Arts Degree in Project Management

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Addis Ababa,Ethiopia

DECLARATION

I, Bethel Daniel the undersigned, declare that this thesis entitled “Determinants of Time Overrun in RoadConstruction Projects in Ethiopia: In the case of Morka-Gircha-Chencha Road Project” is my original work, prepared under the guidance of Dr. Teklegiorgis Assefa. All reference of resources used for the thesis have been appropriately acknowledged. I confirm that this thesis has not been submitted to any other learning institution.

Bethel Daniel _____

Name Signature

Addis Ababa University School of Commerce June, 2024

CERTEFICATION

SCHOOL OF COMMERCE, GRADUATE STUDIES PROGRAM

M.A IN PROJECT MANAGEMENT

"Determinants of Time Overrun in Road Construction Projects in Ethiopia: In the case of Morka-Gircha-Chencha Road Project"

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ABSTRACT

This research paper investigates the determinants of time overrun in road construction projects, focusing on the Morka-Gircha-Chencha Road Project in Ethiopia. Employing a quantitative approach, data was collected via questionnaires distributed to stakeholders involved in the project, with 65 out of 74 returned. Using the Relative Importance Index (RII), the study evaluates factors contributing to delays, categorized into client-related issues (e.g., right-of-way problems, slow decision-making), contractor-related challenges (e.g., inadequate risk management, material delays), consultant-related aspects (e.g., design changes, poor contract management), and external influences (e.g., cost fluctuations, political instability). Recommendations include enhancing project planning, improving stakeholder coordination, implementing effective project management practices, and investing in professional capacity building to mitigate delays and enhance project efficiency in Ethiopian road construction.

Key words: Road construction project, Contractor, Consultant, Client, Time overrun

Chapter One-Introduction

1.1 Background of the study

Understanding project management begins with defining what constitutes a project. According to (Kerzner, 2009), a project is characterized by a set of tasks and activities that span multiple functions. It has a specific start and end date, faces financial limitations, and aims to fulfill a specific purpose. Additionally, it requires the allocation and coordination of both human and nonhuman resources to achieve its objectives. This definition underscores the multifaceted and structured nature of projects, highlighting the importance of clear goals, timelines, and resource management in successful project execution.

A project's temporary nature signifies that it has a clear beginning and end, distinguishing it from ongoing operational activities. It consists of a series of well-defined tasks, each contributing to the overall goal, culminating in one or more deliverables. These tasks are performed in a specific sequence, referred to as the project timetable, which dictates the preferred order of execution to ensure optimal efficiency and coherence (Heerkens, 2006). This structured approach is crucial in managing the complexities and interdependencies inherent in project activities, ultimately leading to the successful completion of the project within its defined scope.

The primary objective of any project is to deliver a high-quality product that is completed on time, within budget, and in a safe working environment. In the construction industry, effective project control mechanisms are essential to ensure that projects adhere to these criteria. According to (Ahmad et al.,2009), project control aims to guarantee that all construction activities are completed according to the planned schedule. This involves continuous monitoring and adjustment of project activities to address any deviations from the plan, ensuring that the project's goals are met efficiently and effectively.

From a project management perspective, a successful project must meet several key requirements: it should be completed within predetermined and agreed-upon boundaries, achieve a specific level of performance, and be finished within the planned time and budget. This necessitates careful project planning and a robust monitoring system. However, many infrastructure projects, particularly in the construction sector, face significant challenges related

to time and cost overruns. These projects often exceed their budgetary constraints and fail to meet their initial objectives. Cost overruns are a common issue in construction, affecting nearly all projects to some extent. For both clients and project owners, the success of a project is measured not only by its completion but also by its adherence to budget, schedule, and quality standards, while maintaining a safe working environment (Kerzner,2009).

In project management, any delay in critical activities directly impacts the critical path, thereby extending the overall project duration. The critical path is determined by the sequence of crucial tasks that dictate the project's timeline. Delays in completing any of these tasks will inevitably prolong the project. Consequently, identifying critical activities is vital for effective job scheduling, as it highlights the areas that require close and continuous monitoring to keep the project on track. Ensuring that these critical tasks are completed as planned is essential to avoid delays and maintain the project's schedule (Glenn & Clough,2008).

Road infrastructure encompasses all elements of roadways, including supporting structures and equipment designed for traffic, regardless of whether they are situated on, above, or below the ground or water surface. This definition excludes railroads, lorry roads, and cable roads. Roads play a crucial role in various sectors such as the economy, socio-cultural activities, the environment, politics, defense, and security. They are instrumental in promoting equitable development and improving the overall prosperity of the population by facilitating efficient transportation and access to essential services (Anonim, 2004).

The construction industry is vast, complex, and demands significant capital investment. Delays in construction projects can lead to costly disputes and strained relationships among stakeholders, making them a major issue in the industry. According to a KPMG analysis, only 25% of construction projects are completed within 10% of their original timelines. Larger projects, in particular, are more susceptible to significant delays due to their complexity and scale (Werku & Jha,2016). These delays can result in financial losses, increased project costs, and diminished trust among project participants, highlighting the need for effective project management practices to mitigate such risks.

A study on Nigeria's transport infrastructure projects reported an average cost escalation of 14% and a time schedule delay of 188% (Omoregie & Radford, 2006). Similarly, in Ghana, 75% of groundwater drilling projects have been reported to exceed their cost and time budgets (Frimpong, Oluwoye, & Crawford, 2003). These findings indicate that cost and time overruns are prevalent issues in infrastructure projects across different regions, underscoring the need for improved project planning and management practices to address these challenges and enhance project outcomes.

Delays in road construction projects are common, with actual completion times averaging 160% of the scheduled duration (Battaineh, 1999). Such delays have negative consequences for all project participants, including the development of confrontational relationships, mistrust, legal disputes, arbitration, cash-flow problems, and a general sense of anxiety (Ahmed et al., 2003). These issues are not limited to developed countries; developing countries also experience similar challenges (Kaliba, Muya, & Mumba, 2009). The pervasive nature of these problems highlights the importance of addressing the root causes of delays to improve project performance and stakeholder satisfaction.

Ethiopia, an agriculture-led economy with over eighty percent of its population residing in rural areas, heavily relies on transport infrastructure to access both domestic and international markets. This infrastructure is crucial for connecting agricultural communities to markets, healthcare, education, and other public services. As a landlocked country, Ethiopia depends on land freight transport for most imports, which arrive through neighboring countries' ports. This reliance underscores the critical importance of a robust and efficient road infrastructure to support the country's economic development and improve the quality of life for its population (Atfraw, 2016).Ethiopian Road Authority is a public transport authority based in Addis Ababa, Ethiopia set out to ensure that Ethiopians are provided with an adequate, reliable, high quality, and standard road network and to open up all potential development areas that will contribute to rapid social and economic development throughout the country. The company’s mission is to develop and manage sustainable roads through institutional competency and Optimal Utilization of Resources. In order to achieve this mission, the office takes on so many road projects, among

the many projects is Morka –Gircha-Chencha road project. Morka –Gircha-Chencha road project is located in the Southern part of Ethiopia, in SNNPR. The project is to solve connectivity problems between five administrative woredas, the length of the project is about 72.66km total.

1.2 Problem Statement

Delays in construction projects often do not stem from a single catastrophic event. Instead, they typically accumulate gradually over the course of the work. Minor delays tend to be overlooked until their collective impact becomes financially significant. By the time a contractor realizes there is a problem, various parties and natural forces have usually contributed to the situation. This insight underscores the complexity of project delays, which often result from a combination of factors rather than a single cause (Atfraw, 2016).

In many construction projects, particularly those involving road construction, seemingly minor factors are often neglected, leading to significant issues during the project. These oversights can result in delays in project completion. It is common for the contractor to be blamed when delays occur, but the impact on the client is substantial as they must adjust their plans and deal with increased costs. To prevent delays, a thorough understanding and awareness of the problems that can arise during the construction process are essential. Identifying and addressing the factors that cause delays can help ensure that road construction projects are completed on time (Wafa and Singh, 2016).

Despite substantial government investment in road construction projects, timely completion remains a serious issue in Ethiopia, mirroring challenges faced globally. These projects often suffer from prolonged delays, hindering the country's road development program aimed at improving the road network. Various studies have shown that nearly all recent projects have experienced delays beyond their expected completion times. This pervasive issue highlights the need for effective project management strategies to mitigate delays and ensure the successful implementation of infrastructure projects (Tolera, 2018).

A study conducted by (Shambel and Patel, 2018) on ten completed road construction projects in Addis Ababa revealed that all projects experienced time overruns, ranging from a minimum of

25% to a maximum of 264.38%. Similarly, (Werku and Jha, 2016) found that only 8% of Ethiopian public building construction projects were completed on their original target dates, with 92% experiencing delays beyond the planned completion dates. (Merid, 2016) also reported that 100% of projects under the Defense Construction Enterprise suffered from time and cost overruns, with actual time overruns ranging from 13% to 181% of the contract completion time. (Robel, 2015) examined 15 completed projects across different regions of Ethiopia, finding delays ranging from 20.66% to 500% of the original contract time. These findings illustrate the significant gap between planned and actual completion times in road construction projects.

Research by (Saraf, 2013), (Van et al. 2015), and (Babu ,2015) identifies several major factors that affect project performance. These include insufficient implementation capacity, inappropriate project management selection, improper design, poor planning, site waste, adverse weather conditions, and incompetent supervision consultants. Additionally, delays in project completion and poor performance in the construction industry have led to failures in achieving effective time, quality, and cost performances. Many sectors of the construction industry face chronic issues such as poor safety standards, inadequate working conditions, and subpar quality.

In developing countries like Ethiopia, the cost of road construction consumes a significant portion of the budget, leading to frequent time delays, cost overruns, and quality issues in many projects. The problem statement for this study is that road construction projects are prone to time overruns that promote problems in the road construction project. The Morka-Gircha-Chencha Road Project's original completion date was on September 12, 2022 however, according to February 2024 monthly report the project is currently 69.08% complete showing a 95.47%-time elapse. This project work addresses the problem by identifying the leading cause of the time overrun from the client, contractor, consulting side and external cause.

1.3 Research Question

1.What are the internal (consultant, contractor and client) determinants contributing to time overrun?

2. What are the external determinants contributing to time overrun?
3. What are the relative degree of importance of each factors in causing time overrun?

1.4 Research Objectives

1.4.1 General Objective

To identify the Determinants of Time Overrun in Road Construction Projects in Ethiopia: In the case of Morka-Gircha-Chencha Road Project

1.4.2 Specific objectives

1. To identify the internal (consultant, contractor and client) determinants contributing to time overrun.
2. To identify the external determinants contributing to time overrun.
3. To identify level of importance of the causes of time overrun.

1.5 Significance of the Study

This study holds significant importance within the realm of construction project management, as time stands as one of the fundamental pillars alongside cost and quality. Recognizing this, the primary objective of this research is to methodically identify and prioritize the factors contributing to delays specifically within road construction projects under the case of the Morka-Gircha-Chencha Road Project, as perceived by contractors, owners, and consultants. By exploring into the details of project time overrun, the aim is to cultivate a deeper understanding of the inefficiencies that trouble road construction activities. Through a thorough study of the perspectives of various stakeholders involved in these project, ranging from contractors to owners, consultants and so on the study tries to shed light on the complex nature of delays in road construction. This understanding is vital for planning effective strategies aimed at mitigating delays, thereby enhancing the overall efficiency and efficacy of road construction projects.

1.6 Scope of the Study

The scope of this project is restricted to road construction projects. Even though, there are different projects to focus on for the study due to various reasons the research only takes as a case to navigate the causes of delay. There are several causes of delays in road construction projects but the research focuses on causes related to different stakeholders in construction projects, such as contractors, client, consultant and external related factors.

The methodological scope of the study takes on a quantitative study and is descriptive and the geographical scope of the study is limited to the site location of Morka-Gircha-Chencha road project which is located in the Southern part of Ethiopia, in SNNPR. Regarding to time scope the research is a cross-sectional study since it takes a short period of time to conduct.

1.7 Limitation

One limitation of this paper is the restricted scope of participant inclusion, as only the client, contractor and consultant were the ones who participated in the research. This limited representation of stakeholders may overlook valuable perspectives from other key actors involved in the road construction project, potentially missing out on comprehensive insights into the determinants of time overrun. Furthermore, conducting the study solely in Morka-Gircha-Chencha, where the road construction projects had been implemented, may constrain the generalizability of the findings to a broader geographical context.

1.8 Definition of Terms

1. **Determinants:** Factors or variables that influence or contribute to a particular outcome or result. In this context, determinants refer to the various factors that influence the occurrence of time overrun in road construction projects.

2. **Time Overrun**: Also known as project delay or time overrun, it refers to the situation where the completion of a project exceeds the planned or scheduled duration. In the context of road

construction projects, time overrun indicates a delay in the completion of the Road Project beyond the initially estimated time frame.

3. **Road Construction Projects:** Projects involving the planning, design, and construction of roads or highways. These projects typically aim to improve transportation infrastructure and facilitate movement of goods and people.

Road construction is the process of installing soil stabilizers', asphalt, concrete, and other materials on a defined path to create a smoothed or paved surface that vehicles can move on between two destinations (Mwangasha ,2021)

4. Client- in this research is referred as the owner and project initiator who establishes the scope and quality of works and plays a major role in their project from the beginning until the project is completed.

5. Consultant- in this research is referred as the owner/client representative usually consist of an architect, designers, specialist engineers, project managers, and cost and time consultants.

6. Contractor- in this research is referred as the one who is responsible for the construction of physical infrastructure (road construction).

1.9 Organization of the Study

This study comprises five distinct chapters. The first chapter introduces the study, including its background, statement of the problem, research questions, objectives, significance, scope, limitations, definition of terms, and organization. Chapter two delves into a broad review of relevant literature, exploring the topic among various authors' perspectives on time overruns, their likely causes, types of delays, and the effects of time overruns. The third chapter outlines the research methodology, including the approach, design, population, sampling, data sources, and collection tools. Chapter four analyzes the gathered survey data, discussing the findings in relation to the research objectives. Finally, chapter five presents the conclusions and recommendations derived from the data analysis, aligning them with the study's objectives.

Chapter Two-Review of Related Literature

2.1 Theoretical Review

The construction industry is very large, complex, and requires huge capital investments. Delay in the completion of a construction project are one of the biggest problems facing by the construction industry and can be a major problem for construction's project participant leading to costly disputes and adverse relationships amongst project participants. (Werku and Jha. ,2016)

2.1.1Project

A project is defined as a temporary endeavor with the purpose of creating a unique product, service, or result. Projects are initiated to achieve specific objectives, which are accomplished through the production of deliverables. An objective can be understood as an intended outcome, such as a strategic goal to be reached, a specific purpose to be fulfilled, a particular result to be achieved, a unique product to be developed, or a service to be delivered. This definition highlights the focused and goal-oriented nature of project work (PMBOK, 2017).

According to (PMI ,2021), the temporary nature of a project is characterized by having a clear beginning and an end. However, "temporary" does not necessarily imply that the project has a short duration. A project concludes when its objectives have been accomplished, when it is terminated because it can no longer meet its objectives, or when it is no longer needed. This understanding underscores that the lifecycle of a project is defined by its objectives and their fulfillment, rather than by the length of time it takes to complete the project.

The success of a construction project is heavily dependent on its performance, which is evaluated based on several key criteria: completion within the scheduled timeframe, adherence to the budget, meeting the required quality standards, and achieving customer satisfaction. These factors collectively determine whether a project is deemed successful. Ensuring that a construction project meets these performance metrics is crucial for its overall success and for fulfilling the expectations of stakeholders (Omran, 2012).

2.1.2 Project schedule

Project scheduling is the process of planning the timelines for completing the identified work and establishing the dates when project resources were required to perform this work. The project schedule is fundamental to project operations, acting as a vital tool for planning, executing, monitoring, and controlling the project. By developing a project schedule, the project manager addresses the time element of the project. When work is authorized according to the tasks within the schedule, the project execution is initiated. Comparing actual task execution dates with scheduled dates allows the project manager to monitor progress. If performance deviates significantly from the schedule, the project manager must use the schedule to implement corrective actions (Martinelli and Milosevic,2017).

A project schedule is essentially a forecasted timetable of construction operations, serving as the primary guideline for project execution. Creating an effective and practical job schedule involves several steps. It requires careful planning and coordination to ensure that all tasks are completed within the projected timelines, thereby facilitating smooth project execution (Keoki, Glenn, and Richard, 2007).

In construction projects where production conditions can be volatile, costs and time can quickly spiral out of control. Effective job monitoring must detect such deviations promptly. For cost and time control information to be useful, it must be timely, with minimal delay between the actual fieldwork and management’s review of performance. This timely information allows the project manager to evaluate alternatives and implement corrective actions while there is still an opportunity to address problem areas (Keoki, Glenn, and Richard, 2007).

Construction planning and scheduling should be performed by individuals experienced in and thoroughly familiar with the type of fieldwork involved. Significant learning occurs during the planning phase of a project, making those who plan the work the most suitable to manage it. The project network and the management data derived from it were realistic and valuable only if the job plan is created and updated by those who understand the job requirements, methods of execution, and job site conditions.

At this stage of project scheduling, it is crucial to consider contingencies for general project delays caused by various issues, oversights, difficulties, and unexpected events. Many contractors plan for a time overrun of 5 to 10 percent, adding this to the overall projected time requirement. The percentage added is based on the contractor's judgment and experience.

Project time management involves the effective and efficient use of time to enable project execution, starting with project planning, scheduling, and deadline monitoring. The processes required to ensure the project is completed on time fall under project time management (Jemal, 2015).

Project time refers to the duration needed to complete a project. Effective time management is essential for completing a project on schedule. Time is an intangible and finite resource, and the availability of project time is defined as the amount of time required to complete the tasks. Managing this time well is crucial for the successful and timely completion of the project (Anuar & Kia, 2014).

2.1.3 Time overrun

(Naveenkumar and Prabhu, 2016) define time overrun as a delay in the completion of a project, typically attributable to the contractors. Delay is further described as any act or event that prolongs the time required to perform or complete the work outlined in the contract, ultimately resulting in additional days of work (Zack, 2003).

(Kariungi, 2014) asserts that completing projects within the scheduled time frame is crucial for maintaining a competitive edge in organizations. This is because the ability to achieve targeted

objectives hinges on delivering the expected output within the set deadlines. However, adhering to the implementation schedule and ensuring timely project completion remains one of the most daunting challenges in the project management process.

2.1.4 Construction delay

According to (Mohamed et al., 2014), construction delay refers to a time overrun that occurs either beyond the contractually specified date or beyond the agreed-upon date for project delivery. This means the project completion extends past the original schedule set by the contract.

(Assaf 1995) defines construction delay as a time overrun that goes beyond the completion date specified in a contract or the date mutually agreed upon by the parties for project delivery. This phenomenon is characterized by the project extending past its planned schedule and is a prevalent issue in construction projects. For owners, delays translate to a loss of revenue due to the lack of production facilities and rentable space, or a reliance on existing facilities. For contractors, delays often mean increased overhead costs due to extended work periods, rising material costs due to inflation, and higher labor costs.

(Fung,2006) define delay as the slowing down of work progress without completely halting construction, which can lead to a time overrun either beyond the contract date or the agreed-upon delivery date. This slowing down results in an extended timeline for project completion.

Time overruns in construction projects are influenced by both contractor and client-related issues, such as a lack of sufficient contractor expertise and inadequate owner involvement. Factors contributing to schedule delays include financial problems, late payments for completed and ongoing work, change orders, organizational changes, and other similar issues (Sunjka and Jacob, 2013).

2.1.5 Types of Construction Time overrun

(Trauner, 2009) stated that delays in construction projects can be categorized in various ways to better comprehend their nature and impact. A common classification distinguishes between

critical and noncritical delays, highlighting their significance in affecting project timelines. Furthermore, delays can be classified as excusable or non-excusable, based on whether they are caused by factors beyond the control of the involved parties. Another distinction is made between compensable and non-compensable delays, where compensable delays may entitle the affected party to reimbursement for additional costs incurred. Finally, delays can be categorized as concurrent or non-concurrent, depending on whether multiple delays occur simultaneously or independently. These classifications provide a structured approach to analysing delays in construction projects and determining suitable responses and mitigation strategies.

Critical Versus Noncritical

When analyzing project delays, the primary focus is on those that impact the overall progress of the project, specifically the end date or key milestone dates. However, many delays occur that do not influence the project completion date or milestone dates. Delays that do impact the project completion or milestone dates are classified as critical delays, while those that do not are considered noncritical delays. The idea of "critical" delays originates from the critical path method (CPM) scheduling, as explained by (Trauner ,2009).

According to Harsh Vaghela, Moon Nayak, Govind Tivadi, and Manish Babariya, delays that affect the project completion date as specified in the contract are known as critical delays, whereas those that do not affect the completion date are termed noncritical delays. An excusable delay refers to delays beyond the control of the contractor or subcontractors, typically due to unforeseeable events. Excusable delays do not warrant compensation and are caused by factors neither the client nor the contractor can control.

Excusable Versus Non-Excusable

All delays are either excusable or non-excusable

Excusable

An excusable delay typically refers to a delay caused by unforeseeable events that are beyond the control of the contractor or subcontractor. Common examples of such delays include general labor strikes, fires, floods, acts of God, owner-directed changes, errors and omissions in the plans and specifications, differing site conditions or concealed conditions, unusually severe weather,

intervention by external agencies, and inaction by government bodies, such as delays in building inspections. These conditions are generally unforeseeable and not within the contractor's control, as discussed by (Trauner , 2009).

Decisions regarding delays must be evaluated within the framework of the specific contract. The contract should clearly outline the factors considered as legitimate delays that justify extensions to the contract completion date. This ensures that there is a clear understanding of what constitutes an excusable delay and provides a basis for extending project timelines when such delays occur, according to (Trauner, 2009).

Non-excusable

Non-excusable delays refer to events that are within the contractor's control or are foreseeable. Examples of such delays include late performance by subcontractors, untimely performance by suppliers, faulty workmanship by the contractor or subcontractors, and labor strikes resulting from the contractor's unwillingness to meet with labor representatives or unfair labor practices. The determination of whether a delay is considered non-excusable is governed by the terms outlined in the contract, as highlighted by (Trauner, 2009).

According to (Akhund et al., 2017), contractors or their suppliers are held responsible for non-excusable delays, and they may be required to accelerate their work or compensate the owner. Compensation can be based on either liquidated damages or actual damages, depending on the provisions outlined in the contract. Liquidated damages are calculated based on the daily rate of estimated costs incurred due to the delay in construction projects, and they serve as a means for the contractor to compensate the owner in the absence of specific provisions for liquidated damages in the contract.

Compensable Versus Non-Compensable

A compensable delay is one for which the contractor is eligible to receive both a time extension and additional compensation. This type of delay is typically associated with excusable delays, as outlined by (Trauner, 2009). On the other hand, a non-compensable delay occurs when an excusable delay has transpired, but the contractor is not entitled to any additional compensation as a result of the delay. The distinction between compensable and non-compensable delays is crucial in determining the contractor's entitlements and obligations, with compensable delays

potentially leading to schedule extensions and financial damages claimed by the contractor, as described by (Meaza, 2015).

The determination of whether a delay is compensable is primarily dictated by the terms stipulated in the contract. Contracts often delineate the types of delays that are non-compensable, wherein the contractor does not receive supplementary compensation but may be granted a time extension. Various factors differentiate compensable and non-compensable delays, as elucidated by (Trauner, 2009). For instance, federal government contracts typically classify certain events like strikes, floods, fires, and severe weather as excusable but non-compensable delays, while other excusable delays may be compensable, such as differing site conditions or owner-directed changes.

Non-compensable delays, as emphasized by (Waʺel and Saleh Al Hadi Tumi,2009) cited in (Hamzah et al. 2011), are typically attributed to third parties or unforeseen incidents beyond the control of both the owner and the contractor. These delays, often referred to as "acts of God," encompass events like unusual weather, strikes, fires, and government actions. Despite their impact on project timelines, the contractor is generally entitled to claim an extension of time for non-compensable delays without receiving additional compensation for delay damages.

Concurrent

Concurrent delay refers to the occurrence of two or more delays simultaneously, each of which individually has the potential to cause project delay, as defined by (William et al.,2011). This concept has become increasingly prevalent in the analysis of construction delays, not only for identifying critical delays within a project but also for assigning responsibility for the resulting damages. Owners may attribute concurrent delays by the contractor as grounds for granting a time extension without additional compensation, while contractors may argue that concurrent delays by the owner should preclude the assessment of liquidated damages for their own delays. Essentially, concurrent delays represent distinct delays to the critical path that happen concurrently, as explained by (Trauner, 2009).

According to (Lepage,2020), this type of schedule delay arises when multiple parties are responsible for delays. The challenge lies in determining the extent of each party's contribution to the delay. Technical methodologies for evaluating schedules can aid in this process. Analyzing overlapping delays is complex, requiring careful examination of factors such as delay duration, timing of occurrence, and ownership of float in the technical assessment.

2.1.6 Causes of Time overrun

The repercussions of construction time overrun in building construction projects impact all project stakeholders, leading to issues such as additional costs. The significant challenges faced by the development sector in developing nations can be classified into three main categories, as outlined by (Ogulana and Promkuntong, 1996). These include infrastructure shortages, issues arising from clients and consultants, and ultimately, the involvement of incompetent contractors.

(Ahmed and Salman ,2010) identify two primary reasons for delays in building projects: internal and external factors. Among the internal factors contributing to delays are the actions of key stakeholders such as owners, contractors, and consultants. External factors, on the other hand, encompass delays caused by entities outside the direct control of these stakeholders, such as government bodies, material suppliers, and adverse weather conditions.

2.1.6.1 Time overrun Caused by the Contractor

According to (Christopher, 2017), there exist numerous ways in which a contractor's performance can contribute to delays in a construction project. Among the typical examples cited, main contractors frequently encounter disputes with subcontractors and materials suppliers, often resulting in significant project delays. Such disputes are widely recognized as a major cause of project delays. Additionally, factors such as the contractor's inadequate financial resources, errors in decision-making regarding progress control, and overall inefficiencies in management functions can also lead to project delays.

(Atout, 2021) highlights several factors that are associated with the contractor's responsibility for project delays. It is emphasized that delays attributed to the contractor's mistakes may not entitle

them to time extensions or compensation for lost time. Factors contributing to contractor-related delays include insufficient experience, poor site management practices, issues with subcontractors and suppliers, shortages of materials, labor, and financial resources, as well as shortcomings in project planning and errors during construction.

2.1.6.2 Time overrun caused by the consultant

In construction projects, the consultant's role is crucial, with several factors directly influencing project progress and outcomes. One significant aspect pertains to the presence or absence of site staff, which can significantly impact communication, coordination, and decision-making processes. When site staff are lacking, it often leads to gaps in communication, coordination issues, and delays in making critical decisions. Additionally, the level of experience among the consultant's team members is paramount, as inadequate experience can impede their ability to address project challenges effectively and make well-informed decisions. Another critical factor linked to the consultant's responsibility is the timely approval of major changes in the scope of work. Delays in approving significant scope changes can further prolong project timelines, hindering the resolution of issues and the implementation of necessary modifications. Moreover, mistakes and discrepancies in design documents pose significant challenges, potentially resulting in rework, disruptions to the schedule, and increased project costs. Therefore, it is imperative for consultants to address these factors effectively to fulfil their responsibilities and contribute to the successful execution of construction projects.

2.1.6.3 Time overrun Caused by the Client (owner)

Delays in construction projects often stem from actions or decisions made by the principal that deviate from the stipulations outlined in the contract. These actions may include delayed payments to the contractor, issuance of change orders, encountering unforeseen site conditions, external interference, tardy decision-making processes, and other similar factors. In such instances, the contractor is typically entitled to request an extension of the project timeline along with corresponding financial compensation, as highlighted by (Saeed ,2012).

The client's role in causing delays in construction projects encompasses various factors, as identified by (Ahmed et al.,2003). These factors may include delays in furnishing or delivering the project site, limited understanding of project requirements, and frequent change orders during construction necessitating additional work, financial constraints leading to delayed payments,

sluggish decision-making processes, and ineffective communication channels. These factors collectively contribute to project delays and underscore the importance of proactive client management to ensure project timelines are met effectively.

2.1.6.4 External factors

(Takele, 2021) emphasized that time ovrrrun stemming from unforeseen circumstances, commonly known as Force Majeure events, are not attributable to any specific party involved in the project, including the client, consultant, and contractor. While these delays may necessitate an extension of the project timeline, contractors typically do not receive monetary compensation for such occurrences. Examples of Force Majeure events encompass severe weather conditions, civil unrest or acts of terrorism, activities by statutory undertakers, and other external factors such as natural disasters like floods and earthquakes, nationwide strikes, changes in legal requirements, delays in obtaining necessary permissions despite the contractor's reasonable efforts, major accidents, or unexpected serious illnesses affecting the contractor.

External factors contributing to project delays encompass a range of issues, as described by (Ahmed et al., 2003). These factors may include delays in obtaining permits from municipal authorities, shortages of labour, materials, equipment, and tools in the market, adverse weather conditions, inflation, changes in laws and regulations, high transportation costs, and challenges related to utility accessibility. These external influences can significantly impact project timelines and necessitate proactive management strategies to mitigate their effects and ensure successful project delivery.

2.2 Empirical review of literature

2.2.1 Practice around the world

A study by (Melat, 2022) highlights the critical factors contributing to schedule overrun in road construction projects, specifically focusing on the East Region projects in Ethiopia. A comprehensive analysis of 27 variables identified five key contributors to schedule overrun: financial difficulties of the client, delay in progress payment, failure to implement design review during the planning stage, delay in delivering the site or right of way, and financial problems faced by the contractor. The Relative Importance Index ranks financial difficulties of the client and delay in progress payment as the most significant causes of schedule overrun. Addressing these issues is anticipated to alleviate delays in Ethiopian road construction projects**.**

(BERSABEl, 2022) Identified in their study the factors affecting schedule performance. Through extensive literature reviews, 27 factors influencing time performance were delineated, with respondents ranking them based on significance. The top ten factors identified include financial incapability, fluctuation in material prices, inexperienced consultants, late procurement and delivery of materials, difficulty in financing projects by contractors, ineffective planning and scheduling, delays in approving major scope changes, incomplete design, poor site management, and late payments to subcontractors. Further analysis categorized these factors into contractor-related, consultant-related, client-related, and external factors. Notably, contractor-related issues emerged as the primary contributors to project completion delays, followed by consultant, client, and external factors, respectively.

(Omer, 2022) conducted a survey at AAU College of Commerce to explore the causes of project delays and cost overruns. The analysis revealed cost overruns ranging from 12% to 60% of contracted amounts and time overruns from 50% to 170% of contracted durations. The primary causes identified included delayed decision-making, poor coordination, communication issues, slow reactions and inspections, and price increases in supplies. These delays occurred at various project stages such as planning, design, and construction, often due to underestimation of time requirements, frequent design changes, and currency exchange fluctuations.

In another study, (Tolera, 2018) examined the causes of delays in road construction projects managed by the Ethiopian Road Authority. The research indicated that the most significant delays were due to contractor-related issues such as poor adherence to work schedules, financial difficulties, shortages of materials on-site, inadequate project management skills, and poor planning and scheduling. Consultant-related delays included delays in preparing design documents, while client-related delays were attributed to slow decision-making processes and unrealistic contract durations and requirements, although these were not ranked among the top ten causes.

(Sandeep and Soham, 2020) identified multiple parties responsible for delays in construction projects, including legal disputes, unavailable utilities, traffic control and restrictions, subsurface

conditions, accidents during construction, and issues related to owners, consultants, contractors, design, materials, equipment, labor, and external factors. Key owner-related delays included slow decision-making, delayed progress payments, late delivery of sites, poor communication and coordination, and late approval of critical documents. Consultant-related delays involved late approvals of significant changes and delayed submission of inspection and testing results. Contractor-related delays included financial difficulties, poor site management, ineffective planning, rework, subcontractor issues, and lack of experience. Design-related delays were due to vague, insufficient, and erroneous drawings, late submission of design documents, and misunderstandings of client requirements. Material-related delays were due to storage issues, delivery delays, and specification changes. Equipment and labor-related delays included shortages, unavailability of workforce, equipment failure, and labor fatigue. External factors causing delays included environmental restrictions, corruption, government policies, regulations, and delays in performing final inspections.

(Kikwasi,2013) identified various factors causing delays and interruptions in Tanzanian construction projects, which put them at risk and affected performance. These factors included design modifications, contractor payment delays, information delays, finance issues, subpar project management, pay discrepancies, and disagreements regarding the estimated value of completed work.

(Zidane and Andersen, 2018), in a comprehensive study covering 103 previously published studies from 46 countries, identified 33 critical universal delay factors in construction projects. These included design changes during construction, delays in contractor payments, inadequate planning and scheduling, incompetent site management and oversight, inadequate contractor experience and building techniques, contractor financial difficulties, lack of sponsorship, resource shortages (manpower, machinery, and equipment), low labor productivity, and lack of skilled labor.

(Gebrehiwet, 2017) investigated the common causes of construction delays in Ethiopian projects, using a questionnaire to collect data from 77 participants. The study identified corruption,

unavailability of utilities on-site, inflation/price increases in materials, lack of quality materials, late design and design documents, slow delivery of materials, delays in approving and receiving completed project work, poor site management, late budget releases, and ineffective project planning and scheduling as significant causes of delays.

(Kang, 2010) identified factors contributing to delays in construction projects due to different stakeholders. Consultant-related delays were due to delays in approving major changes, design document errors, inadequate use of advanced engineering software, unclear drawings, and poor communication. Contractor-related delays stemmed from subcontractor issues, ineffective planning, poor communication, schedule conflicts, improper construction methods, and financing difficulties. Client/owner-related delays were linked to late revisions and approvals of design documents, change demands, delays in approving drawings, slow decision-making, poor communication, joint-ownership conflicts, site delivery delays, work suspensions, and delays in progress payments.

(Natasha, 2004) examined delays in Ghanaian construction projects, identifying improper planning during bidding, low cash flow, and lack of financial capacity on the part of contractors as significant causes. These delays could be attributed to single parties, multiple parties, or systemic faults and deficiencies.

(Rauzana,2016) concluded that societal factors were a major constraint in the completion of construction projects in Aceh Besar, Indonesia. The social and cultural life, influenced by tribal customs and traditions, affected the behavior and character of the people, impacting the road construction project completion.

(Gebrehiwet and Luo, 2017) identified the prevalent consequences of project delays in Ethiopia as using more resources than budgeted, falling behind schedule, and not completing projects, sometimes leading to legal cases. Construction projects experienced cost overruns of 70% and time overruns of 10% to 30%, causing significant adverse effects on projects and stakeholders.

(Mahamid, 2013) identified the top three factors of delay in Palestinian construction projects from the contractor's perspective as labor, materials, and equipment, and owner-related factors. Ibrahim noted that the least important factors were consultant, design, and project-related issues.

(Owolabi, 2014) found that delays in Nigerian construction projects were due to various reasons, including lack of funding, drawing changes, poor communication, inadequate consultant information, slow decision-making, contractor insolvency, variations, project management issues, construction stage errors, bad weather, material cost fluctuations, and inappropriate organizational structures.

(Abdelrasak,2008) discovered that delays in Egyptian construction projects were primarily due to the failure to use professional construction management services and owner payment delays, as well as contractor financing issues.

(Rivera et al., 2020) investigated causes of delay in road construction projects across 25 developing countries, identifying weak construction management, incorrect planning and scheduling, land influence issues, poor communication, frequent design changes, equipment shortages, force majeure, contract modifications, execution delays, material shortages, delayed payments, and poor labor productivity as significant causes.

(Othman et al.,2017) assessed the causes of time overruns in Malaysian construction projects, finding that poor design and documentation, lack of project management skills, improper contract administration, poor site management, poor planning and scheduling, and contractor financial incapability were the top causes.

(Kikwasi, 2012) identified design changes, payment delays to contractors, information delays, funding problems, poor project management, compensation issues, and disagreements on work valuation as top causes of delays in Tanzanian construction projects. Medium-ranked factors

included conflicts among parties, schedule changes, procurement problems, bureaucracy, multiple contractor projects, and incompetent contractors.

(Hasan et al., 2014) identified and ranked 47 causes of delay in Bahraini road projects, classifying them into categories related to contractors, owners, consultants, services and utilities, government regulations, and external environments. The study found that service and utility-related causes were the most critical. Significant causes from other categories included lack of planning, manpower and material shortages, work suspension, budget availability, and decision-making delays from owners, and consultant inexperience.

(Frimpong and Oluwoye, 2003) identified project financing, economic and natural conditions, and material issues as major causes of delays and cost overruns in Ghanaian groundwater projects. The study showed substantial agreement among consultants, owners, and contractors on these factors, ranking project financing as the highest cause and labor as the lowest.

(Sungmin et al.,2009) identified five categories of delay causes in Korean mega projects: insufficient planning, right-of-way acquisition difficulties, project management inefficiency, organizational conflicts, and strong public resistance. The complexity and size of these projects often led to inefficiency and low productivity.

(Ghasemzadech, 2014) identified the top causes of delays in Iranian construction projects. The study categorized 36 delay factors into six main groups: client, contractor, consultant, public authorities, contractual relationships, and external parties. Client-related factors, followed by contractor-related factors, were found to contribute the most to construction delays in Iran.

(Takele, 2020) examined the Addis Ababa 40/60 housing project and major delay factors included client-delivered material delays, financing challenges faced by contractors, inappropriate contractor selection, and slow client decision-making, and outdated technology used by contractors. The study also revealed that these top 20 delay factors had various underlying causes contributing to their occurrence. Collectively, these delay factors significantly

impacted the project's timely completion, leading to delays exceeding 150%. Both client-related and contractor-related delays emerged as primary obstacles to project progress. The study highlighted the adverse effects of these delays, such as cost overruns, time overruns, increased unemployment rates, loss of time value of money for clients, decreased public trust in the government, and compromised construction quality. (David, 2020) identified 32 potential causes for the failure of Ghanaian government projects. Among these factors, poor monitoring, political interference, price fluctuations, management practices, procurement processes, project funding, commitment to the project, selection of project managers, project management techniques, and scope changes were highlighted as significant determinants of project failure.

(Christopher, 2017) examined the causes of time overruns in road construction projects in Tanzania, categorizing them by stakeholders: contractors, clients, and consultants. Financial issues were identified as a predominant cause across all categories. For contractors, the primary concerns were cash flow problems and financial difficulties stemming from delayed payments. Clients pinpointed financial problems as the leading cause, especially when government agencies, as major clients, approved projects without ensuring adequate funding availability. Consultants underscored poor contract management as a significant issue, suggesting that effectively managing the relationships between the involved parties is crucial for achieving value for money in projects. Other notable causes identified across all stakeholders included poor site management, improper planning, payment delays, poor communication, and delays in resource mobilization. These findings emphasize the necessity for improved financial planning, contract management, communication, and coordination to mitigate time overruns in Tanzanian road construction projects.

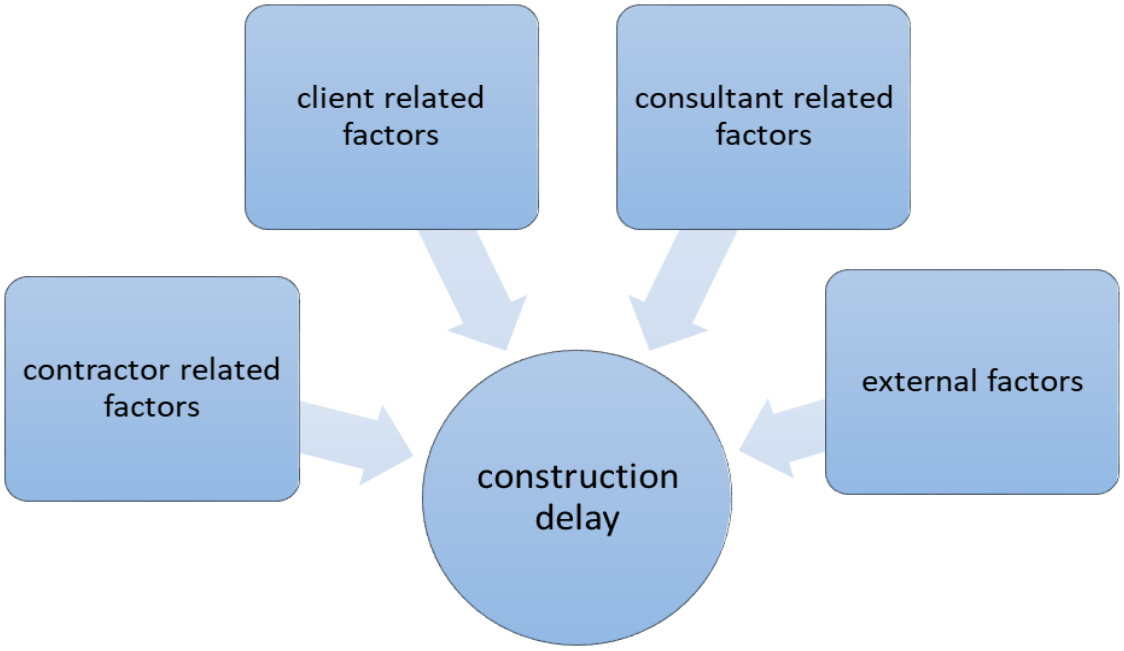
2.3 Literature gap

Though, a lot of studies were conducted locally and internationally to identify determinants of delay, due to the distinctive nature of construction projects there is lack of comprehensive studies examining the influence of external factors, such as political condition and geographical features, socio economic areas on project delays. These variables can significantly impact construction schedules but may not have been extensively studied in the context of road projects. Conducting research in this area could provide valuable insights for project planning and risk management in the construction industry.

2.4 Conceptual framework

In this study the researcher explores the determinants of time overrun in road construction projects by synthesizing existing literature and expert insights. Following the conceptual model proposed by (Alfakhri et al.,2017), we classify these determinants into client, consultant, contractor, and external environment-related factors contributing to delay in the road construction projects. This classification aids in visualizing and offering a structured framework to understand the causes of project delays.

Figure 2.4 Conceptual framework



Alfakhri et al. (2017)

Chapter Three-Research Methodology

3.1 Introduction

Research methodology is the approach in which research troubles are solved thoroughly. It is a science of studying how research is conducted systematically**.** Mishra and Alok (2017)

This research methodology section outlines the approach and techniques employed to achieve the objectives of the study. This section discusses the research design, sample sizes, sampling procedures, data collection methods, data analysis techniques, and ethical considerations.

3.2 Research Design and Approach

The research design for this study were descriptive. A descriptive approach was used to examine the determinants of time overrun in road construction projects because it is best suitable to describe the situation.

Research approaches are plans and the procedures for research that span the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation (Creswell, 2014). Research can use quantitative, qualitative, or hybrid methodologies depending on the type of data used. Quantitative research is employed in studies. The method entails the collection of quantitative data that may be submitted to formal and stringent quantitative analysis (Kothari, 2004). In this regard the research took on a quantitative approach.

3.3 Population

The target population of the study were client (4), contractors (56) and consultants (14) who are involved directly in the construction of the road project of Morka-Gircha-Chencha road project.

The study targeted a population consisting of 74 respondents directly involved in the construction of the Morka-Gircha-Chencha road project, comprising 4 clients, 56 contractors, and 14 consultants. Census technique was employed to select this specific case study due to its relevance and significance. This approach involves including the entire population of interest, ensuring that all elements falling within the categories of clients, contractors, and consultants were considered. The decision to use a census approach was based on the practicality and

adequacy of including all 74 individuals to provide a comprehensive basis regarding the causes contributing to time overrun in the road construction project.

3.4 Data Collection Methods

Both primary and secondary data sources were utilized to comprehensively analyze the Morka-Gircha-Chencha Road Project. Primary data collection involved the distribution of structured questionnaires to various stakeholders directly involved in the project, including the client, contractor and consultant side. These questionnaires enable gathering firsthand insights and perceptions regarding the project's progress and causes contributing to delays. In addition to primary data, secondary sources such as progress reports, and documents related to road construction projects were reviewed. This secondary data provides valuable contextual background information and serve as a foundation for understanding the project's dynamics, historical context, and best practices in similar endeavors. By combining primary and secondary data, a comprehensive analysis can be conducted to identify key issues, trends, and potential solutions for optimizing the Morka-Gircha-Chencha Road Project's outcomes.

3.5 Data Analysis Techniques

The data obtained from the sample organization were analysed in alignment with the study's objectives. The collected questionnaires were analysed using a quantitative data collection method with the assistance of the Statistical Package for Social Sciences (SPSS). To ensure logical completeness and consistency in the responses, the researcher performed data coding. Following the coding process, quantitative analysis was conducted on the data obtained from various collection instruments.

The quantitative data collected from the questionnaires were primarily utilized to determine the relative importance of various causes contributing to time overrun in road construction projects. For quantitative data analysis. In this study, a 5-point Likert scale were used to analyse and rank the causes of delays. The data analysis involves calculating the Relative Importance Index (RII) and ranking the factors in each category based on the RII.

$RII= \sum W/A*N$, $RII=1\ n1+ 2n2 +3n3+4n4+5n5/ A*N$

Where, w = weight given for each cause

A = highest weight ranging from 1 to 5, (i.e. 5 in this case),

N = total number of respondents

3.6 Reliability and Validity

In the realm of research, reliability and validity analyses are of paramount importance as they underpin the credibility and precision of the study's findings. Reliability pertains to the consistency and stability of the research instrument or measurement tool used throughout the study. It examines whether the tool yields consistent results upon repeated applications, thereby ensuring confidence in the reliability of the data gathered. Validity, on the other hand, concerns the extent to which the instrument accurately measures what it is intended to measure. It seeks to determine whether the tool effectively captures the intended variables or constructs under investigation, thus bolstering the validity of the research outcomes. The reliability and validity, play complementary roles in fortifying the strength and trustworthiness of the research, preventing potential biases and ensuring the integrity of the findings (Golafshani, 2015).

Reliability refers to the consistence, stability, or dependability of the data. Whenever an investigator wants to measures reliability of a variable to be sure that the measurement provides dependable and consistent results (Cooper & Schindler, 2003).

To ensure this the researcher the reliability or internal consistency of the data collected through questionnaires was assessed using Cronbach's alpha (α) coefficient. This measure evaluates how consistently respondents answer questions on a questionnaire, with values ranging from 0 to 1.0. A Cronbach's alpha of 1.0 indicates perfect consistency, where all respondents provide similar answers to all questions. According to Fellows and Liu (2007), a minimum acceptable reliability level for Cronbach's alpha is 0.7. Values below 0.7 suggest that the variables lack consistency and are considered unreliable.

Table 3.6 Reliability Test

Reliability Statistics		
	Cronbach's Alpha	N of Items
client related causes	0.708	12
contractor related causes	0.888	16
consultant related causes	0.855	14
external causes	0.719	19

Source: owns research, 2024

The reliability analysis for different groups within the study shows varying levels of internal consistency. For clients, the Cronbach's Alpha is .708, indicating acceptable reliability for the 12 items measured. Contractors show a high reliability with a Cronbach's Alpha of .888 for their 16 items, suggesting very consistent responses. Consultants also exhibit high reliability with a Cronbach's Alpha of .855 for their 14 items. The external group, with a Cronbach's Alpha of .719 for 19 items, indicates good reliability. Overall, the contractors and consultants have the highest internal consistency, while clients and the external group also show acceptable reliability levels for their respective items

3.7 Ethical Considerations

The research process prioritized ethical considerations and standards to uphold the rights and well-being of participants. Informed consent were diligently obtained from all participants prior to the commencement of data collection, ensuring they are fully aware of the study's objectives, procedures, and any potential risks involved. Furthermore, strict measures were implemented to safeguard the confidentiality of participants' responses, thereby fostering an environment of trust and confidentiality. Adherence to ethical guidelines and principles were paramount throughout the research process, underscoring the commitment to integrity and transparency. By upholding these ethical standards, the research endeavors to maintain the validity and credibility of its findings while respecting the dignity and privacy of all participants involved.

3.8 Summary

The research methodology outlined above provides a systematic and comprehensive approach to achieve the objectives of the study. By employing a quantitative method, this research aims to contribute valuable insights into the determinants of time overrun in road construction projects, with a focus on the Morka-Gircha-Chencha Road Project.

CHAPTER FOUR-ANALYSIS AND INTERPRETATION OF DATA

4.1 Introduction

This research investigated the causes of time overruns in the Morka-Gircha-Chencha road construction project in Ethiopia. This chapter presents the analysis results and discusses the major findings. The collected data were analyzed using the Statistical Package for Social Science (SPSS) version 20. The analysis and discussion are organized according to the research objectives and presented in the form of figures and tables. Major findings are discussed, and the results are compared with the literature review.

4.2. Questionnaire Response Rate

The questionnaire was prepared and distributed to three contractual parties i.e. client, consultants and contractors currently working on the Morka-Gircha-Chencha road construction project. A total of 74 questionnaires were distributed, 4 for client, 14 for consultant and 56 for contractors. The response rate is as shown below. Table below shows that the total questionnaire response given by each party. Clients responses was 25%, consultant's responses were 100% and contractor's responses was 89.28%. This brings the total response rate to 87.83%.

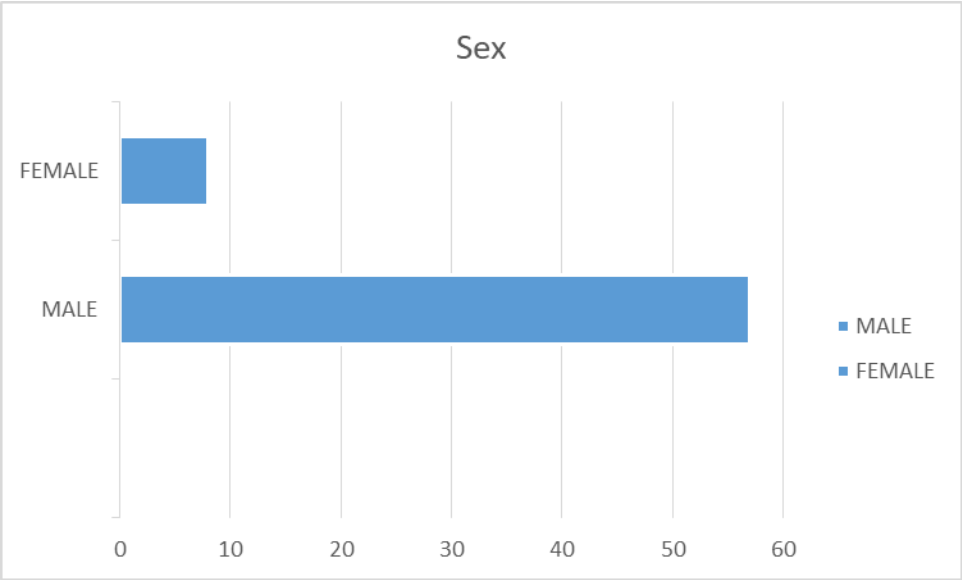
Table 4.1 Questionnaire Response

s.no	Company /organization	questionnaires distributed	questionnaires returned
1	**Client**	4	1
2	**Consultant**	14	14
3	**Contractor**	56	50

Source: owns research, 2024

4.3 Respondents information

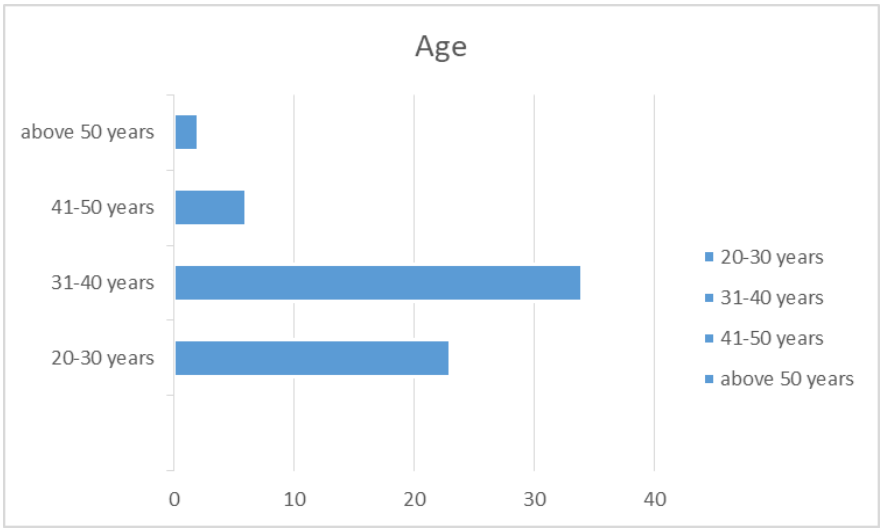
Figure 4.3 Gender distribution figure



Source: owns research, 2024

The gender distribution of the respondents shows a noticeable difference it is predominantly male, with 87.7% (57 participants) being male and only 12.3% (8 participants) being female. This gender disparity likely reflects the typical gender distribution within the construction industry, indicating a male-dominated workforce.

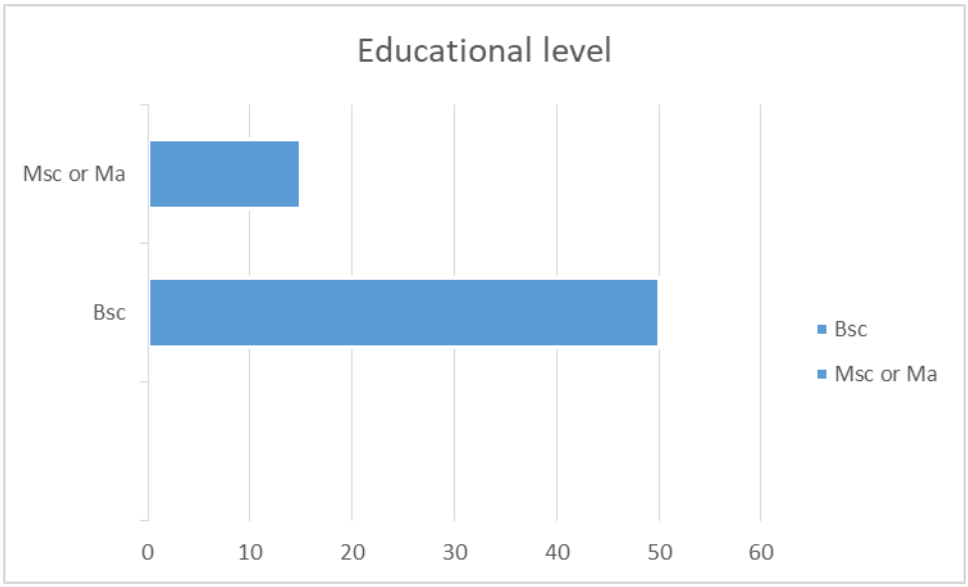
Figure 4.3.2 Age distribution



Source: owns research, 2024

The majority of the respondents are young, with 52.3% (34 participants) aged between 31-40 years and 35.4% (23 participants) aged between 20-30 years. Smaller proportions of the sample fall into the 41-50 years (9.2%) and above 50 years (3.1%) age groups, indicating a younger demographic overall.

Figure 4.1.3 Education level of respondents

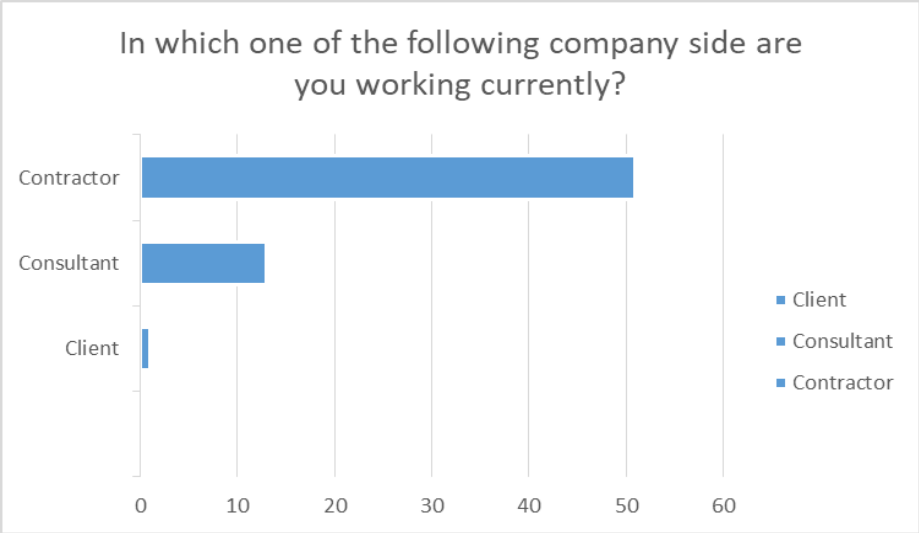


Source: owns research, 2024

Most participants hold a bachelor's degree (76.9%, 50 participants), while a smaller group has attained a master's degree (23.1%, 15 participants). This suggests that the sample groups are

well-educated, with a majority having a good academic foundation necessary for their roles in the road construction industry.

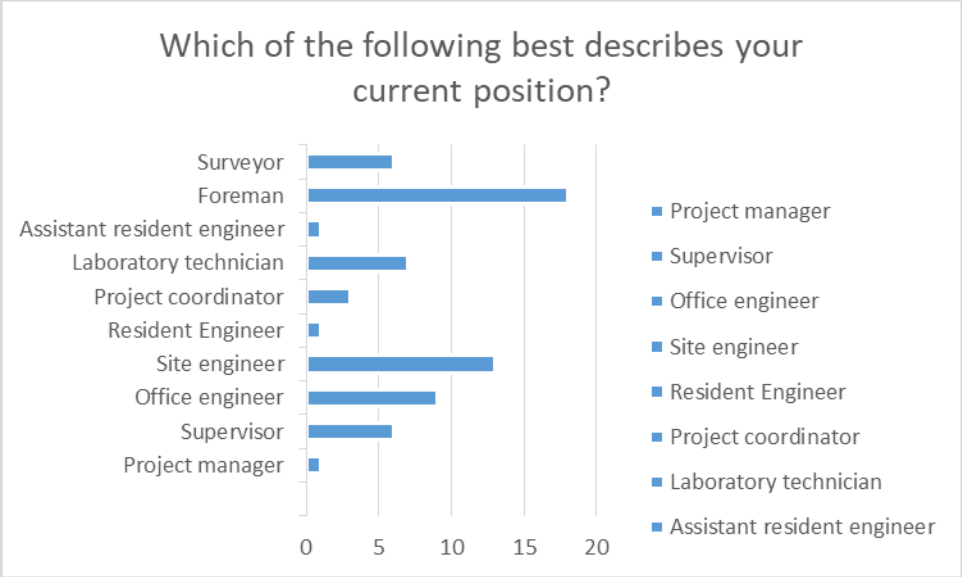
Figure 4.3.2 company side of the respondent



Source: owns research, 2024

The majority of the participants work on the contractor side (78.5%, 51 participants), with few working as consultants (20.0%, 13 participants) and only one participant (1.5%) on the client side. This distribution indicates that the study mainly captures the perspectives of those directly involved in the execution of construction projects.

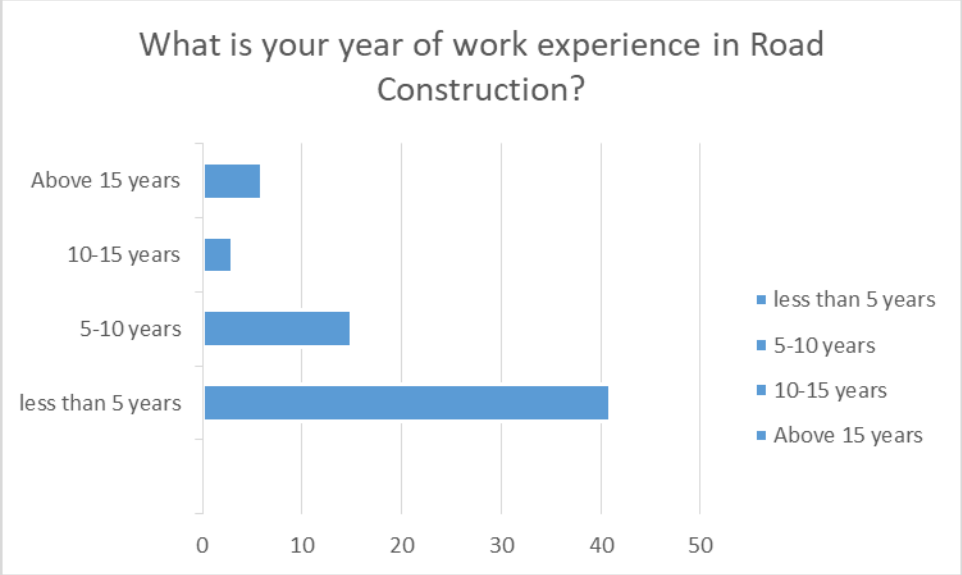
Figure 4.3.3 Position of the respondents



Source: owns research, 2024

The positions held by participants are varied, with the largest group being foremen (27.7%, 18 participants) and site engineers (20.0%, 13 participants). Other notable roles include office engineers (13.8%, 9 participants), supervisors (9.2%, 6 participants), and laboratory technicians (10.8%, 7 participants). Higher-level positions such as project managers and resident engineers are less represented, indicating a focus on operational and field roles within the sample.

Figure 4.3.4 work experience



Source: owns research, 2024

The participants mostly have less than 5 years of work experience in road construction specifically (63.1%, 41 participants), followed by those with 5-10 years of experience (23.1%, 15 participants). Fewer participants have 10-15 years (4.6%, 3 participants) and above 15 years (9.2%, 6 participants) of experience, indicating a sample with relatively less experience in the field.

4.5 Analysis of determinants of time overrun

4.5.1 Analysis of Client related causes

Table 4.5.1 Analysis of Client related causes

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Late delivery of materials by client	65	1	4	2.66	.940
Delay in testing and approving materials	65	1	5	2.66	.923
Slow decision-making	65	1	5	3.66	.871
Late approval of design documents by the client	65	1	5	3.38	.842
Delay in interim payments of completed work by the client	65	1	5	3.63	1.054
Frequent change orders by the client during construction	65	1	5	3.00	1.090
Site handover delay	65	1	5	2.72	1.083
Right of way problem	65	1	5	4.17	.977
Inaccurate or incomplete project requirements provided by the client	65	1	5	2.68	1.017

Inadequate communication between the client and project stakeholders	65	1	5	2.57	.883
Changes in project scope or objectives initiated by the client	65	1	5	2.83	.993
Client-initiated delays in obtaining necessary permits or approvals	65	1	5	2.45	1.104
Client	65	1.50	4.25	3.0346	.48005
Valid N (list wise)	65				

Source: owns research, 2024

To show the analysis of the top three causes by mean, the first cause is right of way issues by the client, the respondents' responses out of 65 respondents are, only 1.5% strongly disagree and 4.6% disagree with the perception of encountering right of way problems, indicating that a very small minority of respondents do not view this as a significant issue. However, a significant proportion of respondents, 16.9% moderately agree and 29.2% agree, while 47.7% strongly agree that right of way problems occur, demonstrating that the majority perceive it as a prevalent problem. Overall, the responses indicate widespread acknowledgment of encountering right of way problems within the context surveyed. With a mean value 4.17 and a standard deviation of 0.977, the right of way problem is the most frequently cited issue, with relatively high agreement among respondents, indicating it as a critical delay factor

The second top cause is slow decision-making as the client related cause of time overrun the responses reveal from 65 respondents, only 3.1% strongly disagree and 6.2% disagree with the perception of slow decision-making, indicating that a minority of respondents do not view this as a significant issue. However, a substantial proportion of respondents, 23.1% moderately agree and 56.9% agree, while 10.8% strongly agree that slow decision-making occurs, demonstrating that the majority perceive it as a prevalent problem. Overall, the responses indicate widespread acknowledgment of slow decision-making as a recurring issue within the context surveyed. The mean value 3.66 suggests that slow decision-making is a more frequent issue, and the standard deviation of 0.871 indicates a fair level of agreement among respondents. Overall, slow decision-making by clients is perceived as a significant problem by the majority of respondents.

The third top cause as the survey data indicates delays in interim payments of completed work by the client, collected from 65 respondents, highlights that only 4.6% strongly disagree and 7.7% disagree with the notion of such delays not being significant. This indicates a minority viewpoint. Conversely, a substantial majority of respondents, comprising 29.2% who moderately agree, 36.9% who agree, and 21.5% who strongly agree, collectively demonstrate a consensus on the prevalence of delays in interim payments. Overall, the responses underscore widespread acknowledgment of this issue as a recurring challenge within the surveyed context. The mean score of 3.63 suggests a considerable frequency of delays in interim payments, reflecting a consistent perception among respondents.

The survey reveals varying perceptions of client-related causes of time overruns besides the top three mentioned, ranked by their mean scores. The fourth with a mean score of 3.38, is the late approval of design documents by the client, indicating a frequent occurrence acknowledged by a majority of respondents. Frequent change orders by the client during construction follow with a mean score of 3.00, reflecting a significant frequency and consensus on its prevalence. Site handover delays by the client rank next with a mean score of 2.72, showing it as a moderately common issue. Inaccurate or incomplete project requirements provided by the client hold a mean score of 2.68, indicating moderate frequency. The delay in testing and approving materials and late delivery of materials both have a mean score of 2.66, highlighting moderate frequency for these issues. Inadequate communication between the client and project stakeholders, with a mean score of 2.60, suggests significant challenges identified by respondents. Changes in project scope or objectives initiated by the client show moderate agreement with a mean score of 2.52. Finally, client-initiated delays in obtaining necessary permits or approvals are seen less frequently with a mean score of 2.45, indicating it as a relatively minor issue compared to others.

4.5.2 Analysis of Contractor related causes

Table 4.5.2 Analysis of Contractor related causes

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Difficulties in financing the project by the contractor	65	1	5	3.18	1.088

Inadequate contractor experience	65	1	5	2.58	.950
Inappropriate construction methods by the contractor	65	1	5	2.94	1.059
Poor site management and supervision	65	1	5	3.11	1.033
Improper project planning and scheduling	65	1	5	3.05	1.082
Poor cash flow management by the contractor	65	1	5	2.98	.976
Delay in delivery of material on site	65	1	5	3.35	.943
Equipment availability problem in the market	65	1	5	3.31	1.131
Low productivity and inefficient level of equipment	65	1	5	3.17	1.069
Unqualified workforce (shortage of skilled labor)	65	1	5	2.15	.972
Lack of contingency planning for unforeseen events or circumstances by the contractor	65	2	5	3.26	.973
Inefficient resource allocation by the contractor	65	1	5	2.95	1.096
Inadequate risk management practices by the contractor	65	1	5	3.40	.965
Construction mistakes and defective works	65	2	5	2.97	.829
Insufficient contingency funds or financial reserves held by the contractor	65	1	5	3.20	1.019
Shortage of materials on site	65	1	5	3.28	1.038
Contractor	65	1.44	4.63	3.0558	.62129
Valid N (listwise)	65				

Source: owns research, 2024

Inadequate risk management practices by the contractor are perceived as the most important determinants by respondents, with 43.1% moderately agreeing and 29.2% agreeing on this aspect. Additionally, 13.8% strongly agree, collectively indicating a large proportion of respondents expressing concerns about risk management practices. Conversely, only 3.1% strongly disagree and 10.8% disagree, suggesting a minority viewpoint regarding the adequacy

of risk management measures implemented by contractors. Inadequate risk management is a significant issue in this project telling from its mean score of 3.40.

The second highest cause indicates that delay in the delivery of materials on-site is a significant concern among respondents. While only a small percentage (3.1%) strongly disagree with this issue, the majority either agree or strongly agree, comprising 46.1% of the responses. Specifically, 36.9% moderately agree, and another 36.9% agree with delays in material delivery. This shows 90.8% of respondents expressing some level of agreement. Material delivery delays are a significant concern, as indicated by the mean score of 3.35, suggesting they occur relatively frequently and the low standard deviation of 0.943 indicates less variability in respondents' perceptions.

The data indicates that equipment availability problems in the market are the third prevalent causes, with 40.0% of respondents agreeing and 29.2% moderately agreeing with this statement. This reflects a significant challenge, as a total of 69.2% of respondents either agree or strongly agree with the issue. Conversely, only 20.0% of respondents disagreed or strongly disagreed, suggesting a widespread acknowledgment of the problem. Equipment availability presents a notable challenge, with a mean score of 3.31.

The mean value base to put the rest of the contractor-related causes of time overruns from the fourth to sixteenth place. Shortage of materials on site emerges as a major issue with a mean score of 3.28, indicating its frequent occurrence. Following closely is the lack of contingency planning for unforeseen events, with a mean score of 3.26, highlighting significant concern among respondents. Financial difficulties faced by contractors rank next with a mean score of 3.18, suggesting moderate commonality. Low productivity and inefficient equipment usage, with a mean score of 3.17, are also recognized as prevalent issues. Poor site management and supervision have a mean score of 3.11, indicating it as a notable problem. Improper project planning and scheduling show a significant occurrence with a mean score of 3.05. Inappropriate construction methods rank next, with a mean score of 2.94, reflecting occasional issues. Inefficient resource allocation follows closely with a mean score of 2.95. Construction mistakes

and defective works have a mean score of 2.97, indicating moderate frequency. Poor cash flow management by contractors is perceived with a mean score of 2.98. Inadequate contractor experience is seen less frequently, with a mean score of 2.58, yet remains notable. Finally, the issue of an unqualified workforce ranks lowest, with a mean score of 2.15, indicating it is perceived as a less frequent problem.

4.5.3 Analysis of Consultant related causes

Table 4.2.3 Analysis of Consultant related causes

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Delay in providing design documents by the designer	65	1	5	3.11	.937
Inadequate experience of the designer	65	1	5	2.37	.858
Frequent design changes	65	2	5	3.60	.806
Lack of experience of managerial and supervisory personnel	65	1	5	2.46	1.076
Poor contract management by the consultant	65	1	5	2.65	1.007
Weak supervision by the consultant	65	1	4	2.32	.752
Delay in approving payment certificates	65	1	5	2.57	1.172
Lack of experience on the part of the consultant (as a company)	65	1	4	2.23	.825
Malpractice (unethical practices) by the consultant	65	1	5	2.43	1.224
Insufficient collaboration and coordination between the consultant and other project stakeholders	65	1	5	2.55	1.031
Absence of consultant's site staff	65	1	5	2.29	1.100
Failure to anticipate and address potential design conflicts or inconsistencies early in the project	65	1	4	3.14	.864

Absence of effective communication channels and protocols within the consultant organization	65	1	5	2.71	.879
Limited use of modern technology or tools for design and documentation by the consultant	65	1	5	2.69	1.014
consultant	65	1	4	2.65	.584
Valid N (list wise)	65				

Source: owns research, 2024

The most pressing consultant related cause is frequent design changes as a cause, the data shows that 7.7% of respondents disagree, 36.9% moderately agree, 43.1% agree, and 12.3% strongly agree that frequent design changes are a concern. This suggests that a significant portion of respondents, totaling 92.3%, perceive frequent design changes as an issue to varying degrees, with the majority either agreeing or strongly agreeing with this sentiment. With a mean of 3.60 and a standard deviation of 0.806, the data reveals that frequent design changes are issues occurring frequently.

The second highest Failure to anticipate and address potential design conflicts or inconsistencies early in the project is being a significant cause of time overrun for this project is portrayed by the data collected as followed. 7.7% strongly disagree and another 7.7% disagree, 47.7%, moderately agree and 36.9% agree, indicating a substantial proportion of respondents acknowledging this issue. With a mean of 3.14 and a standard deviation of 0.864, failure to anticipate and address potential design conflicts or inconsistencies early in the project emerges as an important problem, showing a moderate level of agreement among respondents.

Delay in providing design documents by the designer is perceived as the third prevalent issue, with 49.2% of respondents moderately agreeing that it occurs. Additionally, 21.5% agree with this statement, while 7.7% strongly agree. Conversely, only 4.6% strongly disagree and 16.9% disagree with this assertion. Delays in providing design documents are relatively frequent as indicated by a mean score of 3.11 and a standard deviation of 0.937.

The survey data on consultant-related causes of time overruns reveals varied perceptions ranked from fourth to fourteenth place based on mean scores. The absence of effective communication channels and protocols within the consultant organization is a moderately common issue, with a

mean score of 2.71, indicating significant acknowledgment of communication challenges. The limited use of modern technology or tools for design and documentation by the consultant follows with a mean score of 2.69, suggesting moderate concern. Poor contract management by the consultant, with a mean score of 2.65, indicates that some respondents recognize this as an issue, albeit less frequently. Insufficient collaboration and coordination between consultants and other project stakeholders are less common, reflected by a mean of 2.55. Delays in approving payment certificates have a mean score of 2.57, indicating moderate commonality. The lack of experience among managerial and supervisory personnel has a mean score of 2.46, suggesting it is a less frequent issue. Malpractice or unethical practices by consultants is another infrequent issue, with a mean score of 2.43. Inadequate experience of the designer, with a mean score of 2.37, is perceived as less prevalent. Weak supervision by the consultant, reflected by a mean score of 2.32, is also infrequent. The absence of consultant's site staff, with a mean score of 2.29, shows variability in experiences among respondents. Lastly, the lack of experience among consulting companies is perceived as relatively infrequent, with a mean score of 2.23, indicating a consistent perception that consulting companies are generally experienced.

4.5.4 Analysis of External causes

Table 4.3 Analysis of External causes

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Shortage of construction material in the market	65	2	5	4.18	.808
Change in material types and specifications during construction	65	1	5	2.69	.934
Delay in importing materials	65	1	5	2.97	1.030
Bureaucracy of government authorities	65	1	5	3.26	.923
Escalation of material prices	65	1	5	3.66	.940
Changes in government regulations and laws	65	1	5	2.52	1.062
Slow permit by government/municipality	65	1	4	2.34	.923
Fluctuations in cost/currency	65	2	5	4.38	.995
Natural disasters (floods, hurricanes, earthquakes)	65	1	5	2.45	1.132

Local political instability	65	1	5	3.34	1.372
Lack of infrastructure (roads, water, electric supply, etc.)	65	1	5	3.34	1.203
Unforeseen ground and geological conditions	65	1	5	3.22	1.023
Environmental regulations or restrictions causing delays in project planning or execution	65	1	5	2.89	1.062
Community opposition or protests against the project leading to legal challenges or delays	65	1	5	2.57	1.075
Changes in market demand or industry trends affecting material availability or pricing	65	1	5	3.65	1.096
Natural resource scarcity or depletion impacting project resource procurement and utilization	65	1	5	2.80	.939
Technological disruptions or failures affecting project operations or delivery	65	1	5	2.91	.931
Health and safety emergencies or pandemics affecting workforce availability and project continuity	65	1	5	3.60	1.129
Adverse weather conditions	65	1	5	3.03	.790
external	65	2	4	3.15	.418
Valid N (listwise)	65				

Source: owns research, 2024

Taking Fluctuations in Cost/Currency the data collected indicates that it is the most significant cause and the majority, 67.7%, strongly agree that fluctuations in cost/currency are a great concern and a major cause of time overrun in this project. Additionally, 10.8% agree, while 13.8% moderately agree, suggesting a consensus among respondents that this issue has a substantial impact on projects. Only a small portion, 7.7%, disagree with this assessment. With a mean of 4.38 and a standard deviation of 0.995, fluctuations in cost/currency emerge as the most prevalent and significant concern.

Among 65 respondents, 3.1% disagreed, indicating n shortage of construction material in the market. 15.4% moderately agreed, suggesting a slight shortage. 41.5% agreed, signifying a notable shortage, while 40% strongly agreed, highlighting a significant scarcity. With a mean of 4.18 and a standard deviation of 0.808, the interpretation suggests that the issue of shortage of

construction material in the market is highly frequent and significant. This indicates a substantial impact on the road construction projects.

Escalation of material prices are reported as the ranked by mean value, 1.5% strongly disagree, 1.5% disagree, 52.3% moderately agree, 18.5% agree, and 26.2% strongly agree. These results indicate that escalation of material prices are predominantly perceived to have a moderate to strong impact on the project. With a mean of 3.66 and a standard deviation of 0.940, it is identified as a pressing issue, consistently affecting project timelines.

The survey data reveals external causes of time overruns based on mean scores from fourth to nineteenth place. Health and safety emergencies or pandemics, with a mean score of 3.60, significantly impact workforce availability and project continuity. Changes in market demand or industry trends, indicated by a mean of 3.65, also emerge as substantial concerns. Local political instability and lack of essential infrastructure are critical issues, each with a mean score of 3.34. Bureaucratic delays by government authorities pose a notable challenge with a mean of 3.26. Unforeseen ground and geological conditions are frequent and impactful, as reflected by a mean of 3.22. Delays in importing materials (mean score of 2.97) and technological disruptions (mean score of 2.91) are moderately common. Environmental regulations or restrictions causing delays, with a mean of 2.89, and natural resource scarcity (mean score of 2.80) are recognized challenges. Changes in material types and specifications during construction, with a mean score of 2.69, are moderately prevalent. Community opposition or protests leading to legal challenges have a mean score of 2.57, indicating less frequent but notable impacts. Regulatory changes and laws, perceived as less frequent but impactful, have a mean of 2.57. Delays in obtaining permits are relatively infrequent, and adverse weather conditions, indicated by a mean of 3.03, show significant concern. The infrequency of natural disasters, with a mean of 2.45, reflects a range of opinions among respondents. Overall, fluctuations in cost/currency, with a mean of 4.38, are identified as the most prevalent and significant issue impacting project timelines.

4.6 Relative Importance Index (RII)

The findings from the descriptive analysis of respondents' views on the determinants of time overruns and their relative importance are presented in this section. Descriptive statistics were used to evaluate and rank the most relevant causes of time overruns. The Relative Importance Index (RII), which ranges from 0 to 1, was calculated using a five-point Likert scale (ranging

from 1 to 5). This scale was transformed into the Relative Importance Index using the following equation:

$RII=\sum W/A\times N$

Where W represents the weight given to each factor by respondents, ranging from 1 to 5, A is the highest weight, which is 5 in this case, and N is the total number of respondents.

4.6.1 RII of Client Related causes

Table4.6.1 RII of Client Related causes

	N	Mean	Std. Deviation	RII	Rank
Late delivery of materials by client	65	2.66	0.94	0.665	5
Delay in testing and approving materials	65	2.66	0.923	0.532	10
Slow decision-making	65	3.66	0.871	0.732	2
Late approval of design documents by the client	65	3.38	0.842	0.677	4
Delay in interim payments of completed work by the client	65	3.63	1.054	0.726	3
Frequent change orders by the client during construction	65	3	1.09	0.600	6
Site handover delay	65	2.72	1.083	0.545	8
Right of way problem	65	4.17	0.977	0.834	1
Inaccurate or incomplete project requirements provided by the client	65	2.68	1.017	0.535	9
Inadequate communication between the client and project stakeholders	65	2.57	0.883	0.514	11
Changes in project scope or objectives initiated by the client	65	2.83	0.993	0.566	7

Client-initiated delays in obtaining necessary permits or approvals	65	2.45	1.104	0.489	12

Source: owns research, 2024

The Relative Importance Index (RII) of client related causes is a tool used to gauge the significance of different factors based on respondents' perceptions. Ranging from 0 to 1, a higher RII value suggests greater importance. In the provided data, the right of way problem emerges as the most critical Client Related cause, with an RII of 0.834, followed closely by slow decision-making, which ranks second with an RII of 0.732. Additionally, delays in interim payments of completed work by the client hold substantial importance, indicated by an RII of 0.726. Late approval of design documents by the client and late delivery of materials by the client also feature prominently among the top concerns, with RII values of 0.677 and 0.665, respectively. These RII values help in identifying key areas where attention or improvement is needed within the project management process.

The analysis of the client related causes ranked from 6th to 12th based on the Relative Importance Index RII scores reveals several critical issues that can significantly impact project timelines and efficiency. Ranked 6th, frequent change orders by the client during construction with RII 0.600 indicates a moderate level of importance, as changes can disrupt the workflow and cause delays. Changes in project scope or objectives initiated by the client follows at the 7th position RII value 0.566, highlighting the challenges that arise when project scopes are changed mid-process. The 8th ranked issue, site handover delay with RII 0.545, underscores the complications and setbacks due to late site access. In 9th place, Inaccurate or incomplete project requirements provided by the client RII 0.535 points to the potential for misalignment between client expectations and project deliverables. The 10th ranked factor, Delay in testing and approving materials with RII 0.532, suggests delays due to verification processes that could hold up construction progress. Following closely, inadequate communication between the client and project stakeholders RII value of 0.514 ranked 11th, reflects the critical need for clear and consistent communication to avoid misunderstandings and ensure smooth project execution. Lastly, Client-initiated delays in obtaining necessary permits or approvals ranks 12th with RII 0.489. These factors, while lower in rank, still represent substantial areas of concern that need to be addressed to enhance project efficiency and effectiveness.

4.6.2 RII of Consultant Related causes

Table4.6.2 RII of Consultant Related causes

Consultant	N	Mean	Std. Deviation	RII	Rank
Delay in providing design documents by the designer	65	3.11	0.937	0.6215	3
Inadequate experience of the designer	65	2.37	0.858	0.4738	13
Frequent design changes	65	3.6	0.806	0.7200	2
Lack of experience of managerial and supervisory personnel	65	2.46	1.076	0.4923	11
Poor contract management by the consultant	65	2.65	1.007	0.5292	8
Weak supervision by the consultant	65	2.32	0.752	0.5808	4
Delay in approving payment certificates	65	2.57	1.172	0.5446	6
Lack of experience on the part of the consultant (as a company)	65	2.23	0.825	0.5577	5
Malpractice (unethical practices) by the consultant	65	2.43	1.224	0.4862	12
Insufficient collaboration and coordination between the consultant and other project stakeholders	65	2.55	1.031	0.5108	10
Absence of consultant's site staff	65	2.29	1.1	0.4585	14
Failure to anticipate and address potential design conflicts or inconsistencies early in the project	65	3.14	0.864	0.7846	1
Absence of effective communication channels and protocols within the consultant organization	65	2.71	0.879	0.5415	7
Limited use of modern technology or tools for design and documentation by the	65	2.69	1.014	0.5385	8

consultant					

Source: owns research, 2024

Fig 4.6.2

The Relative Importance Index (RII) provides valuable insights into the significance of consultant-related causes on time overruns in this road construction projects. The most critical cause identified is the failure to anticipate and address potential design conflicts or inconsistencies early in the project, with a high RII of 0.7846. Frequent design changes also emerge as a significant concern, with an RII of 0.7200. Other important factors include the delay in providing design documents having a RII of 0.6215 and Weak supervision by the consultant with an RII 0.5808. And the fifth is Lack of experience on the part of the consultant (as a company) of an RII value 0.5577.

Analysing the consultant-related causes ranked 6th to 14th by Relative Importance Index (RII) reveals various factors impacting project performance. Delay in approving payment certificates, ranked 6th with an RII of 0.5446, underscores the importance of timely financial approvals to maintain project cash flow. Ranked 7th, absence of effective communication channels and protocols within the consultant organization with an RII of 0.5415 highlights the critical need for robust communication strategies. The limited use of modern technology or tools for design and documentation by the consultant, with an RII of 0.5385, ranked 8th, emphasizes the necessity for technological advancement to improve efficiency and accuracy. Poor contract management by the consultant, sharing the 8th rank with an RII of 0.5292, points to the need for enhanced contractual oversight. Ranked 10th, insufficient collaboration and coordination between the consultant and other project stakeholders with an RII of 0.5108 suggests the importance of teamwork and integration among project participants. The lack of experience of managerial and supervisory personnel, ranked 11th with an RII of 0.4923, indicates that experienced leadership is essential for project success. Malpractice (unethical practices) by the consultant, ranked 12th with an RII of 0.4862, raises concerns about ethical standards and their impact on project integrity. Inadequate experience of the designer, ranked 13th with an RII of 0.4738, stresses the need for skilled design professionals. Lastly, the absence of consultant's site staff, ranked 14th with an RII of 0.4585, highlights significant concerns about on-site supervision and presence. Collectively, these issues reflect critical areas where improvements are needed to enhance consultant performance and overall project outcomes.

4.6.3 RII of Contractor Related causes

Table406.3 RII of Contractor Related causes

	N	Mean	Std. Deviation	RII	Rank
Difficulties in financing the project by the contractor	65	3.18	1.088	0.637	7
Inadequate contractor experience	65	2.58	0.95	0.517	15
Inappropriate construction methods by the contractor	65	2.94	1.059	0.588	14
Poor site management and supervision	65	3.11	1.033	0.622	9
Improper project planning and scheduling	65	3.05	1.082	0.609	10
Poor cash flow management by the contractor	65	2.98	0.976	0.597	11
Delay in delivery of material on site	65	3.35	0.943	0.671	2
Equipment availability problem in the market	65	3.31	1.131	0.662	3
Low productivity and inefficient level of equipment	65	3.17	1.069	0.634	8
Unqualified workforce (shortage of skilled labor)	65	2.15	0.972	0.431	16
Lack of contingency planning for unforeseen events or circumstances by the contractor	65	3.26	0.973	0.652	5
Inefficient resource allocation by the contractor	65	2.95	1.096	0.591	13
Inadequate risk management practices by the contractor	65	3.4	0.965	0.68	1
Construction mistakes and defective works	65	2.97	0.829	0.594	12
Insufficient contingency funds or financial reserves held by the contractor	65	3.2	1.019	0.64	6
Shortage of materials on site	65	3.28	1.038	0.655	4

Source: owns research, 2024

Fig 4.6.3

The RII analysis for contractor-related causes shows several major concerns affecting the project's timeline. The biggest issue is poor/inadequate risk management, with an RII of 0.680. Delays in getting materials to the site and problems with equipment availability problem in the market are also significant being the second and third ranked, with RII values of 0.671 and 0.662. Additionally, material shortages on-site and lack of contingency planning for unexpected events are crucial, both with RII values 0.655 and 0.652 respectively. These top issues highlight the need for good risk management, timely material delivery, and contingency planning to keep projects on track and avoid delays.

Analyzing the contractor-related causes, ranked 6th to 16th by Relative Importance Index (RII) highlights several key issues affecting project performance. Insufficient contingency funds or financial reserves held by the contractor, ranked 6th with an RII of 0.64, underscores the importance of financial preparedness for unforeseen expenses. Difficulties in financing the project by the contractor, at 7th with an RII of 0.637, highlights the critical challenge of securing adequate project funding. Ranked 8th, low productivity and inefficient level of equipment with an RII of 0.634 points to the need for better equipment management and productivity improvements. Poor site management and supervision, at 9th with an RII of 0.622, indicates significant concerns about on-site operational efficiency and oversight. Improper project planning and scheduling, ranked 10th with an RII of 0.609, suggests that effective planning and scheduling are crucial for project success. Poor cash flow management by the contractor, ranked 11th with an RII of 0.597, highlights the necessity for robust financial management practices. Construction mistakes and defective works, at 12th with an RII of 0.594, points to the importance of maintaining high-quality standards. Inefficient resource allocation by the contractor, ranked 13th with an RII of 0.591, suggests that optimal resource distribution is essential for project efficiency. Inappropriate construction methods by the contractor, at 14th with an RII of 0.588, highlights the need for proper construction techniques. Inadequate contractor experience, ranked 15th with an RII of 0.517, underscores the importance of experienced contractors for project success. Finally, unqualified workforce (shortage of skilled labor), ranked 16th with an RII of 0.431, points to the critical issue of labor quality and availability. These factors collectively highlight areas for improvement to enhance contractor performance.

4.6.4 RII of External causes

Table4.6.4 RII of External causes

External	N	Mean	Std. Deviation	RII	Ranks
Shortage of construction material in the market	65	4.18	0.808	0.836923	2
Change in material types and specifications during construction	65	2.69	0.934	0.538462	15
Delay in importing materials	65	2.97	1.03	0.593846	11
Bureaucracy of government authorities	65	3.26	0.923	0.652308	8
Escalation of material prices	65	3.66	0.94	0.732308	3
Changes in government regulations and laws	65	2.52	1.062	0.504615	18
Slow permit by government/municipality	65	2.34	0.923	0.513846	16
Fluctuations in cost/currency	65	4.38	0.995	0.876923	1
Natural disasters (floods, hurricanes, earthquakes)	65	2.45	1.132	0.489231	19
Local political instability	65	3.34	1.372	0.667692	7
Lack of infrastructure (roads, water, electric supply, etc.)	65	3.34	1.203	0.667692	6
Unforeseen ground and geological conditions	65	3.22	1.023	0.643077	9
Environmental regulations or restrictions causing delays in project planning or execution	65	2.89	1.062	0.578462	13
Community opposition or protests against the project leading to legal challenges or delays	65	2.57	1.075	0.513846	17
Changes in market demand or industry trends affecting material availability or pricing	65	3.65	1.096	0.729231	4
Natural resource scarcity or depletion impacting project resource procurement and utilization	65	2.8	0.939	0.56	14

Technological disruptions or failures affecting project operations or delivery	65	2.91	0.931	0.581538	12
Health and safety emergencies or pandemics affecting workforce availability and project continuity	65	3.6	1.129	0.72	5
Adverse weather conditions	65	3.03	0.79	0.606154	10

Source: owns research, 2024

Fig 4.6.4

The above data shows the relative significance of various external causes contributing to time overruns in this road construction project. Fluctuations in cost/currency emerge as the most influential cause, with an RII of 0.877 following is the shortage of construction materials in the market, with an RII of 0.837, then Escalation of material prices rank third in importance, with an RII of 0.732, emphasizing their substantial influence on project timelines and activities. Changes in market demand or industry trends affecting material availability or pricing and health and safety emergencies or pandemics affecting workforce availability and project continuity are also highlighted as crucial factors, with RIIs of 0.729 and 0.720, respectively. These top five factors highlight the complex challenges posed by external factors. This ranking informs project managers on prioritizing their mitigation strategies to effectively address time overruns.

The analysis of external causes of time overruns ranked from 6th to 19th by their Relative Importance Index RII reveals the level of the variety of causes. Ranked 6th, both local political instability and lack of infrastructure RII 0.667692 highlight the significant challenges posed by external socio-political and infrastructural environments. Unforeseen ground and geological conditions 9th, RII 0.643077 and bureaucracy of government authorities 8th, RII 0.652308 further underscore the unpredictability and regulatory delays faced in construction. Adverse weather conditions 10th, RII 0.606154 and delay in importing materials 11th, RII 0.593846 illustrate the logistical and environmental hurdles that can disrupt project timelines. Technological disruptions 12th, RII 0.581538 and environmental regulations 13th, RII 0.578462 indicate the impact of technological and regulatory compliance on project schedules. Natural resource scarcity 14th, RII 0.56, change in material types 15th, RII 0.538462, slow government permits 16th, RII 0.513846, and community opposition 17th, RII 0.513846 show how resource

availability, regulatory processes, and local community dynamics can lead to significant delays. Lastly, changes in government regulations 18th, RII 0.504615 and natural disasters 19th, RII 0.489231. Each of these causes, while ranked lower, collectively contribute to the potential for time overruns in this road construction projects.

4.7 Discussion

The research overall reveals critical causes that align closely with existing literature on construction Time overrun discussed in chapter two. Causes that influence the project completion or milestone dates are classified as critical delays, while those that do not are considered noncritical delays.

Client-related delays, such as right of way problems, slow decision-making, interim payment delays, and late approval of design documents, are identified as significant contributors. The findings of this research align with previous studies on delay causes Han Sungmin et al. (2009) right-of-way acquisition difficulties, as significant contributor to delays in Korean mega projects, reflecting similarities with the identified client-related causes in this study, such as right-of-way problems and slow decision-making. Additionally, Melat's study (2022) on schedule overrun in road construction projects in Ethiopia emphasizes the critical impact of financial difficulties faced by clients and delays in progress payments, pointing the importance of addressing interim payment delays highlighted in this research.

Contractor-related problems, including inadequate risk management, equipment availability issues, delays in material delivery, financing difficulties, low productivity, and improper planning, reflect the findings of Akhund et al. (2017), who highlight non-excusable delays as being within the contractor’s control and are foreseeable by the contractor. This connection emphasizes the contractor's role in mitigating delays through better planning and management practices. Also this aligns with the study by (Christopher, 2017), which emphasizes financial issues as a predominant cause of time overruns in construction projects. Furthermore Atout(2021) on factors contributing to contractor-related delays mentioned, shortages of

materials, labor, and financial resources, and shortcomings in project planning and errors during construction as major causes.

Consultant-related causes, such as failure to anticipate and address potential design conflicts or inconsistencies early in the project, frequent design changes and delays in providing design documents, resonate with Atout's (2021) observations on how consultant inefficiencies can severely impact project timelines. The research underscores the importance of effective design management and timely documentation in preventing delays, reflecting Atout's emphasis on the consultant's critical role in project success. Also in Takele's (2021) research, consultant delays were found to stem from challenges such as design flaws and delayed acceptance of tests and drawings.

External factors, including cost fluctuations, currency fluctuation, material shortages and escalation of material prices health and safety emergencies, local political instability, and lack of infrastructure, align with the discussions by Takele (2021) and Ahmed et al. (2003) on force majeure events. These events, often unforeseeable and beyond the control of any project party, necessitate project extensions but do not typically justify additional compensation. Also Owolabi J. (2014) found that delays in Nigerian construction projects were due to various reasons such as slow decision-making, contractor insolvency, variations, project management issues, material cost fluctuations.

Chapter Five-Summary, Conclusion and Recommendations

5.1 Summary of findings

The research identified several causes contributing to time overruns in the Morka-Gircha-Chencha road construction project, categorized into client-related, contractor-related, consultant-related, and external causes. Among client-related issues, the most critical were right of way problems, slow decision-making, delays in interim payments, and late approval of design documents. Frequent change orders during construction significantly obstructed the project timeline. For contractor-related causes, inadequate risk management practices, delays in material delivery, equipment availability problems, financing difficulties, and improper planning and scheduling were identified as major contributors to delays. Consultant-related issues included frequent design changes, delays in providing design documents, and poor contract management, along with insufficient collaboration with stakeholders. External factors, such as fluctuations in cost and currency, shortages of construction materials, escalation of material prices, health and safety emergencies like pandemics and lack of infrastructure, were also significant determinants of time overruns. Overall, addressing these issues through improved planning, communication, and risk management strategies could mitigate delays in future projects.

5.2 Conclusion

In conclusion, this research on the determinants of time overrun in road construction projects, specifically the Morka-Gircha-Chencha Road Project in Ethiopia, has highlighted several critical causes contributing to project time overrun. The study meticulously identified and analyzed various causes of time overrun, categorizing them into client-related, contractor-related, consultant-related, and external Causes. The findings highlight the many-sided nature of project delays, emphasizing the need for project management strategies to address these challenges.

Client-related issues emerged as significant contributors to time overruns, with delays in decision-making, payment processes, and approval of design documents being the major causes. These issues reflect the importance of efficient administrative and financial procedures to ensure

timely project execution. Enhancing communication and coordination between clients and other stakeholders is crucial for mitigating these delays.

Contractor-related causes were also identified as major determinants of time overruns. Issues such as inadequate risk management, delays in material delivery, equipment availability, and financing difficulties were dominant. These findings suggest that contractors need to improve their planning, resource management, and financial stability to enhance project performance. Implementing robust risk management practices.

Consultant-related determinants, including frequent design changes and delays in providing design documents, further contributed to project delays. These issues highlight the need for better design management and clearer communication channels between consultants and other project stakeholders. Ensuring that design documents are accurate, complete, and delivered on time is vital for maintaining project schedules.

External causes, such as cost fluctuations, material shortages, health emergencies, political instability, and lack of infrastructure, also played a significant role in causing time overruns. These factors, often beyond the control of project stakeholders, necessitate the development of contingency plans and adaptive project management strategies. Addressing these external challenges requires a proactive approach, including robust risk assessment and flexible project planning.

5.3 Recommendation

Based on the determinants of time overrun identified in this research, several recommendations can be made to mitigate delays in road construction projects in Ethiopia:

1. The client should resolve any right of way issue by securing the necessary permissions and making settlements.

2. The client should improve decision-making and timely approval processes for documents and design requests, particularly concerning design documents and interim payments. Facilitate regular decision making meetings frequently to speed up the process.

3. The client should ensure timely interim payment by keeping the finance department updated on the project progress and payment schedules.

4. The contractors should incorporate risk management plan that includes risk identification, assessment and mitigation strategies.

5. The contractors should be ensuring timely material delivery by creating a coordinated delivery and supply chain, and optimize equipment availability by modernizing the equipment management by automating it to track inventory. Proper planning and scheduling, and proactive measures to address financing difficulties.

6. Consultants need to minimize design changes by involving stakeholders and experts and timely provide the design documents to avoid unnecessary delays and liabilities. This can be done by using advanced modeling tools as well.

7. Project stakeholders must develop strong risk management strategies to address external factors beyond their control, such as cost fluctuations, material shortages, and health emergencies. Establishing contingency plans, monitoring external influences can help mitigate their impact on project timelines.

8. The consultant should minimize design changes by establishing a clear and detailed project requirement from the beginning.

9. Monitoring and evaluation of project progress are should be conducted for identifying potential delays early on and implementing corrective measures promptly. Adopting modern technology and tools for project management and documentation can facilitate efficient monitoring and enhance decision-making processes.

10. to mitigate cost/currency fluctuations the client should have a protection plan by including a clause in the contract to account for price adjustments due to cost fluctuation.

11. To address shortage of material in the market the contractor should diversify its supply base and make a long term agreement with suppliers for a stable supply.

12.There should be Continuous capacity building and training programs for project stakeholders, including clients, contractors, consultants, and government authorities, can enhance their skills and knowledge in project management, risk assessment, and communication, thereby improving the overall project performance and reducing delays.

5.4 Direction for future research

This research focused on identifying the determinants of time overrun in road construction project specifically in Morka-Gircha-Chencha road project.

Future researches are recommended to expand the research to include a variety of road construction projects across the regions of Ethiopia. And Conduct longitudinal studies to observe the long-term impacts.

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APPENDIX-I: QUESTIONNAIRE SURVEY

Addis Ababa University School of Commerce

Masters of Arts in project management: Study on determinants of time overrun in road construction projects

The aim of this survey is to identify the potential causes of delay in road construction projects. In order to accomplish these objectives, it is fundamental to conduct this questionnaire which is required to be filled with relevant facts as much as possible. I would like to assure you that all the data collected from this questionnaire were used only for academic purpose. Thank you in advance for your co-operation!

Section I: Respondents Profile Mark your answer by ticking the response for the following questions.

1. Project Site – Morka-Gircha-Chencha road project

2. In which one of the following companies working currently?

Client □ Consultant □ Contractor □

3. What is your educational status?

Diploma □ BSc. □ MSc. □ PhD □

4. Which of the following best describes your current position?

Project manager □ Supervisor □ Office engineer □ Site Engineer □
Resident engineer □ Project Coordinator □ Other_____

5. What is your year of work experience in Building Construction?

< 5 □ 5 – 10 □ 10 – 15 □ ≥ 15 □

Section II: different causes of delay

The following are the factors which might be the causes of construction delay. Based on your experience, please indicate the extent to which you agree with the following statements.

THE SCALE OF AGREEMENT

5 = STRONGLY AGREE

4 = AGREE

3 = MODERATELY AGREE

2 = DISAGREE

1 = STRONGLY DISAGREE

	1	2	3	4	5	REMARK
Client-related causes:						
1. Late delivery of materials by client						
2. Delay in testing and approving materials						
3. Slow decision-making						
4. Late approval of design documents by the client						
5. Delay in interim payments of completed work by the client						
6. Frequent change orders by the client during construction						
7. Political assignment of client project managers						
8. site handover						
9. Right of way problem						
10. Inaccurate or incomplete project requirements provided by the client						
11. Inadequate communication between the client and project stakeholders						
12. Changes in project scope or objectives initiated by the client						
13. Inconsistent or unclear feedback from the client during project execution						
14. Client-initiated delays in obtaining necessary permits or approvals						

Contractor-related causes:						
1. Difficulties in financing the project by the contractor						
2. Inadequate contractor experience						
3. Inappropriate construction methods						
4. Poor site management and supervision						
5. Improper project planning and scheduling						
7. Poor cash flow management by the contractor						
8. Delay in delivery of material on site						
9. Equipment availability problem in the market						
10. Low productivity and inefficient level of equipment						
11. Unqualified workforce (shortage of skilled labor)						
13. Lack of contingency planning for unforeseen events or circumstances by the contractor						
14. Inefficient resource allocation by the contractor						
16. Inadequate risk management practices by the contractor						
17. Construction mistakes and defective works						
18. Insufficient contingency funds or financial reserves held by the contractor						
19. Shortage of materials on site						
20. Ineffective project governance and oversight within the contractor organization						
Consultant-related causes:						

1. Delay in providing design documents by the designer						
2. Inadequate experience of the designer						
3. Frequent design changes						
4. Lack of experience of managerial and supervisory personnel						
5. Poor contract management by the consultant						
6. Weak supervision by the consultant						
7. Delay in approving payment certificates						
8. Lack of experience on the part of the consultant (as a company)						
9. Malpractice (unethical practices) by the consultant						
10. Insufficient collaboration and coordination between the consultant and other project stakeholders						
11. Absence of consultant's site staff						
12. Failure to anticipate and address potential design conflicts or inconsistencies early in the project						
13. Absence of effective communication channels and protocols within the consultant organization						
14. Limited use of modern technology or tools for design and documentation by the consultant						
External factors:						
1.Shortage of construction material in the market						
2. Change in material types and specifications						

during construction						
3. Delay in importing materials						
4. Bureaucracy of government authorities						
5. Escalation of material prices						
6. Changes in government regulations and laws						
7. Slow permit by government/municipality						
8. Fluctuations in cost/currency						
9. Natural disasters (floods, hurricanes, earthquakes)						
10. Local political instability						
11. Lack of infrastructure (roads, water, electric supply, etc.)						
12. Unforeseen ground and geological conditions						
13. Environmental regulations or restrictions causing delays in project planning or execution						
14. Community opposition or protests against the project leading to legal challenges or delays						
15. Changes in market demand or industry trends affecting material availability or pricing						
16. Natural resource scarcity or depletion impacting project resource procurement and utilization						
17. Technological disruptions or failures affecting project operations or delivery						
18. Health and safety emergencies or pandemics affecting workforce availability and project continuity						
19. Adverse weather conditions						