ADDIS ABABA UNIVERSITY

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Causes of Project Schedule Overrun in Road Construction Projects: the case of Ethiopian East Region Road Construction

By:

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A Project Work Submitted To The Department Of Project Management In Partial Fulfilment Of The Requirements Of The Degree Of Master Of Arts In Project Management In School Of Commerce, Addis Ababa University

Advisor:

Adane Atara (PhD)

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Signed by The Examining Committee:

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External Examiner	Signature	Date

DECLARATION

I, Melat Tadesse the undersigned, declare that this thesis is my original work, prepared under the guidance of Dr. Adane Atara. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of learning any degree.

Melat Tadesse _____

Name **Signature**

Addis Ababa University School of Commerce **June, 2022**

ENDORSEMENT

This thesis has been submitted to Addis Ababa University, School of Graduate Studies for examination with my approval as a university advisor.

Dr. Adane Atara _____

Advisor Signature

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Abstract

Long delays are causing sever influence in the country economy, impeding the country's road improvement efforts. The purpose of this research was to identify the major causes of schedule overrun from the Client, Contractors' & Consultants' side on the East Region projects of Ethiopian Road Construction. The research was descriptive and the research design was survey design. A quantitative research approach along with primary and secondary data sources was adopted for this paper. A structured close-ended was designed and purposively distributed out to the client (ERA), contractors and consultants working under ERA. Since the target population was small respondents were selected using the census method. Out of 63 questionnaires, 52 were able to be retrieved with a response rate of 82.5%. The data gathered using the questionnaire was analyzed with the help of Statistical Package for Social Sciences (SPSS version 20). This paper studied a list of road construction delay causes (25) factors gathered from literature having different types of construction, different countries, different periods and different numbers of delay causes. Relative Importance Index (RII) was calculated and from the overall relative importance index analysis, most critical factors of road construction delay have been identified as (1) Financial difficulties of the client; (2) Delay in progress payment by owner; (3) not implementing the design review during the planning stage; (4) Delay to deliver the site/Right of way; (5) Financial problems faced by the contractor among the top five factors contributing to road construction project time delay in the East Region. Therefore, conducting research in this field will be of utmost importance in order to lessen the incidence of late delivery (schedule overrun) of road projects and, if at all feasible, to prevent it. The main recommendation made by this study for reducing the likelihood of schedule overruns is the implementation of effective proactive project management by the important Contractual parties, more specifically by the Client and the Consultant, beginning with the planning and design phase and continuing through the project's final completion.

Key words: Construction delay factors, Contractor, Consultant, Client, schedule overrun

List of Acronyms and Abbreviations

ERA	Ethiopian Road Administration
AACRA	Addis Ababa City Road Authority
ORA	Oromia Road Authority
UK	United Kingdom
RTA	Road Transport Authority
SPSS	Statistical Package for Social Sciences
RII	Relative importance index
ROW	Right of way

CHAPTER ONE

INTRODUCTION

This chapter presents an overview of the entire study. The chapter introduces the readers to the background of the stpudy, the statement of the problem, the research questions, and the objective of the study, the significance of the study, the scope and limitation of the study, definition of terms and the entire organization of the study.

1.1. Background of the study

Construction industry is one of the main sectors that provide important constituents for the development of an economy where infrastructure development plays a significant role (Mahamid et al., 2012). Infrastructure developments, particularly road projects, have a significant positive impact on both developed and developing countries in terms of creating direct and indirect job opportunities as well as increasing country standards both locally and internationally (Shiferaw et al., 2017).

Road development generates tremendous economic growth which is a necessity for poverty reduction and socio-economic advancement in developing countries (Amoatey & Okanta, 2017). However, due to various reasons, many road construction projects are prone to delays. This can only be avoided by identifying the factors that cause schedule overrun (Tolera, 2018).

Despite considerable technological advancement in industrialized countries such as the United States, UK, China, Australia, and others, the construction industries in wealthy countries are not immune to the effects of delays. This implies that construction delays are global occurrences (Fakunle & Fashina, 2020).

The inability to complete projects on time and within budget continues to be a chronic problem worldwide and is worsening (Alinaitwe, et al., 2013). According to Ahmed, et al., (2003) delay in construction projects is the most common, expensive, complex and risky issue. Because time is so important to both the owner and the contractor (in terms of performance and money), it is a common source of disagreements and claims that might lead to lawsuits.

Project delays are usually caused either by the failure of the contractual parties to meet their obligations or by external factors that are beyond the control of the parties or force majeure

(Bela, et al., 2021). According to Ahmed et al., (2003) delay in construction projects frequently leads to challenging relationships between stakeholders such as distrust, litigation, arbitration, cash-flow issues, and a general sense of dread towards one another.

An infrastructure with high-quality roads enables markets to trade goods and services in a secure and timely manner (Amoatey & Okanta, 2017). The former Ethiopian Road authority (ERA) which is now been called Ethiopian Road Administration, has been in charge of all Ethiopian road construction projects, all vehicles that utilize them, and all aspects connected to the country's road transportation activity (Serani & Wodaje, 2020).

Ethiopian Road Administration (ERA) was established in 1967 by proclamation No 256/67 but was restructured to become the Road Transport Authority (RTA) in 1976, following proclamation No 107/76. To administer the country's road network, RTA attempts to promote an efficient road service to coordinate and strengthen the road traffic safety and also to develop the transport data base system for the research and development sector (Wikipedia the free encyclopedia, 2018).

Road projects should be completed in accordance with the schedule to serve the immediate needs of stakeholders. In the construction sector, many projects are finished with both time and cost overruns. Due to the unpredictable nature of the construction industry, few projects are completed on schedule and on budget. Ethiopia is one of the developing countries that is majorly facing delays in road construction projects due to various reasons which are majorly impacting the construction industry and the country’s economy (Rivera, et al., 2020).

The existence of numerous interest groups such as project owners, end users, consultants, contractors, financiers, materials, equipment, project funding, environmental circumstances, and political and legislative laws are all aspects to consider during the construction process (Fetene, 2008).

As mentioned on the reviews of the literatures above and other research papers conducted, it shows that schedule overrun is inevitable in construction projects. However, identifying the major factors that cause schedule overrun in depth will assist other projects that have not encountered delay to conduct proper prevention measures. This paper helps in providing an insight on providing recommendations and mitigation measures.

1.2. Statement of the Problem

Construction delay is considered as one of the most recurring problems in the implementation of construction projects (Amare et al., 2017). According to Shahsavand et al., (2018) Delay in construction projects could be defined as "the time overrun either beyond completion date specified in a contract or beyond the date that the parties agreed upon for delivery of a project". Unfortunately, schedule overrun in road construction projects due to various reasons has been found to be a major problem facing in Ethiopia.

Even though the government is substantially investing in road construction projects, Ethiopia, like every other country in the world, has a serious problem of timely completion. The projects are significantly deprived by lengthy delays, which are obstructing the country's road improvement effort. According to various surveys, practically all of the recent projects have been delayed past their planned completion dates. As is well known, the government of Ethiopia is represented by the Ethiopian Roads Administration, which is in charge of a sizable share of the nation's road construction projects. However, the majority of projects are badly plagued by lengthy delays, significant cost overruns, and problematic quality (Fetene, 2008).

Bayissa, (2018) conducted research on causes and effects of delay in Oromia Road construction projects that all ten road projects were found to be behind schedule in the study. Delays varied from 3% to 259% of the agreed-upon contract time. The research found that the most common causes of delays in road building projects in Oromia relevant to ORA were: delay in right of way issues, financial problems, equipment availability and failure, suspension of work by the owner or contractor, and weather conditions. The most significant effects of delays in road building projects in the region had been identified as time and money overrun.

In general, this study attempted to rank the delay variables in terms of relevance and assess the delay variables, as well as look into the delay causes on recently finished sampling road projects managed by ERA. After identifying the causes of schedule overrun, it intends to give recommendations that helps minimize schedule overrun with the use of prevention measures.

1.3. Research Questions

1. What are the factors that causes schedule overrun in Ethiopian road construction in the case of East Region projects?
2. What are the most important factors that causes schedule overrun in Ethiopian road construction in the case of East Region projects?
3. What prevention measures should be used to minimize schedule overrun?

1.4. Objective of the study

1.4.1. General Objectives

The objective of this research is to identify major causes of schedule overrun in Ethiopia road construction in the case of East Region projects.

1.4.2. Specific Objectives

i) To identify the major causes of schedule overrun from the contractors', Consultants' & Owner side of Ethiopia road construction in the case of the East Region.

ii) To identify the prevention measures that should be used to minimize schedule overrun.

1.5. Significance of the Study

One of the primary difficulties in Ethiopia is schedule overrun, which has a significant impact on the country's economy. When a project is delayed, it adds to the expense, the quality of the work suffers as a result of the rush, and claims and disputes arise. Given the current country's inflation and economic downturn, resource efficiency is more important than ever.

Various studies on schedule overrun have been conducted, as is well known. However, the goal of this research is to determine the major causes of schedule overruns in road construction projects specifically in East Region of Ethiopia from the perspectives of contractors, consultants & owner. Thus, by studying current practice of schedule overrun, exhaustively reviewing related literature, and collecting data from professionals on the subject, the findings of this paper identifies and ranks the major causes of schedule overrun.

1.6. Scope of the Study

The goal of this study is to identify the causes of schedule overrun and assess the most important factors that contribute to delays in Ethiopian road construction projects. The study examined the delay causes for recently undergoing road construction projects managed by the Ethiopian Roads Administration (ERA), as well as identified and prioritized the schedule overrun variables. Once the most important schedule overrun causing factors are identified, the parties to the projects shall then be able to channel their energies and resources to the specific factors thereby reducing delays to the projects.

1.7. Limitation of the Study

The major limitations of this study were time, due to that the study scope was limited to identifying only the causes of schedule overrun in Ethiopian East Region Road projects. In addition to that lack of timely response of some of the respondents for the distributed questionnaires was encountered. The study could have used more factors that could be listed out in the questionnaires distributed; however, due to the restriction of time to analyze it, it was narrow.

1.8. Definition of Key Terms

Schedule Overrun/Delay is defined as the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project (Al-Hejii, et al., 2006). It also occurs when a project doesn't meet its expected deadline as some of tasks from its Critical Path have been delayed by the project team (TaskManagementGuide, n.d.).

Claim in the construction context can be defined as a request by either party to the contract, usually the Contractor, for compensation for damages caused by failure of the other party to fulfill his/her part of obligations as specified in the contract (Shah, Bhatt, & Bhavsar, 2014).

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).

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.

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

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

1.9. Organization of the Study

This study consists of five distinct chapters. Chapter one deals with the an introduction to the study comprising the background, statement of the problem, research questions, and objectives of the study, significance of the study, scope and limitations, definition of terms and organization of study. Chapter two focuses on relevant literature review with the topic, differences and similarities as well as arguments of different writers regarding time overruns, their likely causes, types of delay & the effect of time overruns would be dealt under this chapter. Third chapter presents the research methodologies approach, research design, population, sampling, data sources, and data collection tools. Chapter Four analysed the gathered data from the survey using SPSS (Statistical Package for Social Sciences) and the findings are discussed based on research objectives. At last chapter five shows the conclusions and recommendations that were drawn from the data analysis, linking them to the objectives of the study.

CHAPTER TWO

REVIEW OF RELATED LITRATURE

2.1 Introduction

Construction time is a frequently used for measuring project success and project management efficiency. On-time completion is one sign of a successful project. However, because construction projects are notoriously tough, they are prone to delays. (Weber, 2020).

In road construction projects, delay could be defined as time overwhelm, either past or present date agreed upon for consumption or after the date agreed upon by the gatherings for consumption transport of a project. It's a project that's running behind schedule and is being scrutinized as a fundamental concern in construction projects. Frequently, the time necessary to finish projects exceeds the time allowed in the contract.

To better understand the causes of schedule overrun in road construction in the case of East Region of Ethiopia, this section exhaustively reviewed related literature focusing on identifying the major causes of schedule overrun.

2.2 Definition of schedule overrun

A construction schedule is a timeline for every task and event in a construction project. The construction schedule is a fundamental part of the project planning phase, as it also defines the resources needed and the teams responsible for each task in the construction process (Weber, 2020).

Project delays are those that cause the project completion date to be behind schedule. According to Kaming, et al., (1997), Time overrun is defined as the extension of time beyond planned completion dates traceable to the contractors. Thus time overruns can also be defined as the time increased to complete the project after planed date which is caused by internal and external factors surrounded the project (Katre & Ghaitidak, 2016).

Delay, in accordance with Abbas (2006), is defined as the completion of the works taking longer than expected or required under the contract. When a contract's development lags behind its

planned course, a delay has occurred. It could be the direct outcome of one or more events and could be brought on by any party to the contract. A contract delay has negative consequences for both the owner and the contractor (in the form of lost profits or additional expenses) and frequently raises the contentious topic of delay accountability, which may lead to disputes that frequently end up in court.

Aibinu and Jagboro (2002) described delay as to occur when the project is not completed within the initial, defined, or agreed-upon contract period. This has been caused by the contractor and the project owner jointly or severally. However, completing projects on time is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors, which result from many sources (Bayissa, 2018).

In Ethiopia, it is uncommon for road construction projects to be finished within the designated or agreed-upon deadline. There are numerous ERA road construction projects that have been delayed, suspended, or even abandoned (Atfraw, 2016).

2.3 Types of Schedule Overrun in Construction

Several authors have classified schedule delays in construction projects, but the four categories of delays, as stated by various authors, have a lot in common in terms of their principles. These categories of delays includes Excusable delay, Concurrent delay, Compensable delay, and Critical delay Lepage, (2020), Ahmed T., (2015), Trauner, et al., (2009), Hamza, et al., (2011), Ahmed et al. (2003), Gajare, et al., (2015) , Ismaila, et al., (2022), Vidalis & Najafi, (2002) as cited by Al-Najjar, (2008).

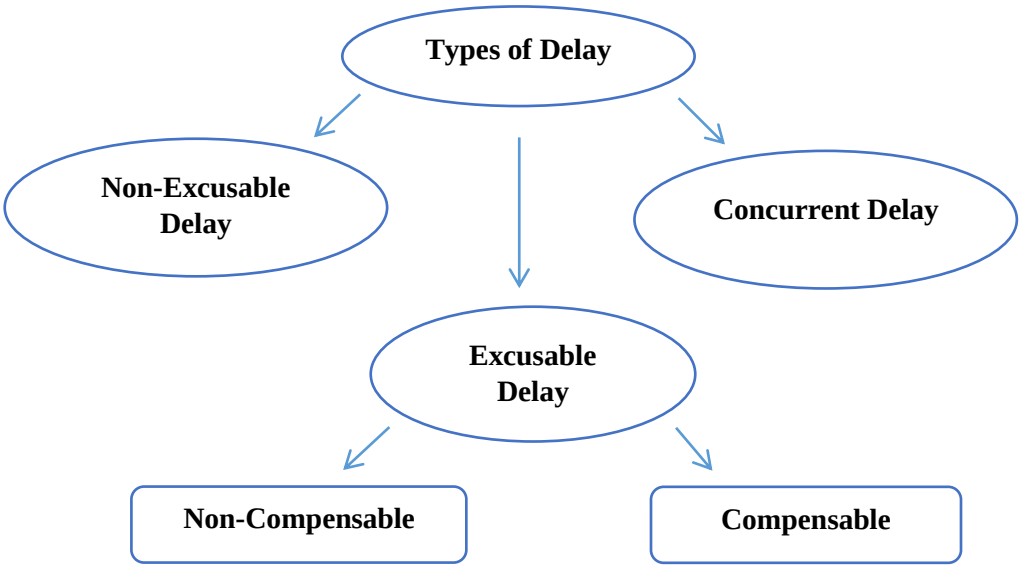


Figure 1: Types of Delay (Hamza, et al., 2011)

Even though the various types of delays have been put in several studies, they are somewhat linked to one another. These classifications have been elaborated hereunder.

2.3.1 Excusable Delays

Excusable delays are caused by conditions that are reasonably unforeseen and not within the contractor's / owner's control (Ahmed T. , 2015). Often the construction contract will outline valid excusable delay causes. According to Lepage, (2020) this kind of delay includes:

- Labor strikes
- Fires, floods, earthquakes and most natural disasters
- Changes initiated by the owner
- Errors and omissions in the plans, design docs and specifications
- Differing site conditions or concealed conditions
- Lack of action by governmental or oversight bodies
- Intervention by outside agencies

Therefore, delays such as excusable are those that are beyond the control of the owner/contractor and leave them without fault or negligence.

2.3.2 Non-Excusable Delays

Non-excusable delays are a result of a delay that was within control of the Owner/Contractor (Lepage, 2020). The Owner/Contractor is fully responsible for the activity delays. Examples of non-excusable delays include:

- Delayed mobilization
- Delayed submission of submittals
- Overall late performance and execution
- Late performance of subcontractors
- Late performance by suppliers
- Faulty workmanship by the contractor or subcontractor

2.3.3 Critical Delays (or non-Critical Delays)

Critical delays are delays which prevent the contractor from finishing the work on the scheduled completion date as agreed upon in the contract (Ahmed T. , 2015). If a delay has no effect to activities on the project's Critical Path, then the delay may not warrant too much attention, unless of course there is some substantial money involved.

2.3.4 Compensable Delays

A compensable delay is one where there's going to be some compensation involved for the delay to the project. This implies that the owner or contractor is liable for a delay, cost compensation, or both. The cost compensation is intended to cover any losses or additional costs incurred as a result of the delay. A compensable delay is still a non-excusable delay, hence the causes listed above apply (Lepage, 2020).

2.3.5 Concurrent Delays

According to Lepage, (2020) this type of schedule delay happens when two or more parties are at fault. The difficulty here is figuring out how much each party contributed to the delay. There are certain technical approaches for assessing timetables that can help with this. The overlapping of delays makes analysis difficult, and parameters such as delay duration, occurrence time, and float ownership must all be carefully examined in the technical analysis.

2.4 Review of Empirical Studies

2.4.1 Causes of delay

Many researches have been done to determine the significant factors that contribute to the widespread global problem of construction delays in roads. And the majority of the studies covered in the literature reviewed below were carried out in various nations and contexts to establish the possibility that delay factors could vary between nations and contexts.

According to Ahmed et al. (2003) there are two kinds of cause for delay in construction projects which are External and Internal causes. Causes resulting from three parties involved in the project are among the internal reasons for the delay. A few of these parties are the owner, the consultants, and the contractors. Other delays, which are not the result of these three parties, are due to outside factors, such as those that concern governments, suppliers of the necessary materials, or weather.

Kamanga, and Steyn, 2013, conducted a survey of the causes of delays in the construction industry in Malawi from the viewpoint of owners, contractors and consulting firms. 72 reasons for delays were found in these studies and were categorized into six groups based on consultants, clients, contractors, projects, resources, and external variables. Among the top ten re asons for delays, five (fuel shortage, insufficient cash flow, foreign currency shortage, slow clien t payment process, and insufficient equipment) are related to resource shortages, while none are c onsultant-related factors, according to this study's collective analysis of the three groups.

Amoatey & Okanta, (2017) on their study mentioned the five most significant causes of road construction delays were, the owner's failure to finance and pay for completed work (client-related), the contractor's lack of experience (contractor-related), the owner's changes in scope during construction (client-related), the delay in furnishing and delivering the site to the contractor (client-related), and inflexible funding allocation for project items (donor-related).

According to (Seppälä , 2005), Construction work delays that occur primarily during the implementation stage are caused by late site handover, late payment certificate approval, changing the scope of the work, low contractor financial and technical capacity, delayed drawings or instructions, unanticipated physical conditions, and work suspension on the engineer's orders.

A research study conducted by Amare, et al., (2017) the top 10 factors causing construction project delays in Addis Ababa City Road Authority were identified and ranked. Poor financial control of the project, difficulties in financing the project by the contractor, type of project bidding and award (lowest bidder), poor site management and supervision of the contractor, selecting inappropriate contractors, lack of high- technology mechanical equipment, inaccurate initial project scope estimate, ineffective project scheduling, weak control of project progress, and the contractor's staff is not adequately trained in professional construction.

Rivera, et al., (2020) conducted a research and accordingly listed the most important causes of delay when drawn to conclusion after analyzing the gathered data. This were lack of an experienced construction manager, Inadequate planning/scheduling, Influence on people's land along with the road construction project, Poor communication between construction parties, frequent changes in design, Shortage of equipment, Force majeure, Contract modification, Delays in execution of progress billing, Shortage of construction materials, Delayed payment to contractors & Poor labor productivity.

According to Mahamid, et al.,(2012) the top five severe delay causes are political situation, segmentation of the West Bank and limited movement between areas, award project to lowest bid price, progress payment delay by owner, and shortage of equipment.

Gebrehiwet & Luo, (2017) stated that the influential causes of delay investigated are corruption, unavailability of utilities at site, inflation/price increases in materials, lack of quality materials, late design and design documents, slow delivery of materials, late in approving and receiving of complete project work, poor site management and performance, late release budget/funds, and ineffective project planning and scheduling successively as unique to the Ethiopian construction project.

Bela, et al., (2021) Stated that in building construction projects, the least, maximum, and average delays are 9 percent, 802 percent, and 143 percent, respectively; in road infrastructure projects, the minimum delay is 3 percent, the largest delay is 312 percent, and the average schedule is 110 percent. Variations, economic conditions, and material price increase are also major risk factors for scheduling delays.

Santoso & Soeng, (2016) conducted a research on delay factors in road construction projects in Cambodia and their effects on project time, cost, and quality. They stated that the top-10 list was dominated by factors related to the contractor and the project. However, two external factors, rain and flood, were the first two factors on the list, which also had a high impact on the three project objectives. The remaining factors on the list were land acquisition, award of project to lowest bidder, equipment breakdowns, poor site arrangement, management and supervision, unexpected ground condition and terrain, low quality of the contractor human resources, late progress payments, and low productivity of labour.

Al Hammadi & Nawab, (2016) in Saudi Arabia, a survey was done to establish the specific causes of project delays. Major delays have been recognized as the importance of the project owner's engagement, contractor-related issues, financing-related difficulties, materials-related issues, and design document-related concerns. Previous research done in Asia and Africa found seven delay factors, which were compared to the causes of time and cost overruns: Design; Market and Estimate; Financial Capacity; Government; and Worker are all examples of incompetence.

Kikwasi, (2012) stated in their findings reveal that the main causes of delays and disruptions are: design changes, delays in payment to contractors, information delays, funding problems, poor project management, compensation issues and disagreement on the valuation of work done.

As per Koshe & Jha, (2016) the most frequent and important causes of construction delay were assessed using data gathered from a survey of construction managers, resident engineers, contractors, and clients as well as interviews with senior professionals in the field. This research first identified 88 key factors causing delay in Ethiopian construction industries. The results indicate that the following are the primary critical factors that contribute to construction delays in Ethiopia: (1) Difficulties in project financing by a contractor; (2) Escalation of material prices; (3) Infectious project planning; (4) Scheduling or resource management; (5) Delay in progress payments for completed works; (6) Lack of skilled professionals in the field of construction management in the organization; and (7) Fluctuating labor availability season to season/SeasonalUllah, et al., (2017) identified the factors that cause delays in to four categorize and listed the details of the causes in the Contractor, Client, Consultant and other external reasons side.

According to Zhang,et al., (2020) the six most severe delay causes are national policy for subway tunnel construction, complicated geological conditions, payment delays by owners, award projects to the lowest bid price, shortage of advanced large equipment, and low productivity of labourers.

Adebaye, et al., (2021) also conducted a research in which delay in honouring payment progressively, underestimation or overestimation of the project cost, and delay in the approval of major changes in the work scope were ranked as the three major causes of delays in construction projects in Hargeisa.

A research conducted by Assefa, (2015) revealed that the ongoing construction project is vulnerable to delay due to issues with right of way and site handover, a lack of coordination with stakeholders, delayed external work because of governmental agencies, and bad economic conditions leading to schedule and expense overruns and many claim demands.

2.4.2 Effects of Schedule overrun

Findings of Mukaka, et al., (2015) study revealed that extension of time, cost overruns, loss of profit, disputes, poor quality of work due to hurrying the project, creates stress to the client, acceleration losses, bad reputation with contraction team, claims and delay in getting profit by

the client were the major effects of construction projects schedule overruns in Gauteng, South Africa.

According to Serani & Wodaje, (2020) the top five effect of delay of Building construction project in importance index were increase in financial cost of project (budget overrun), time overrun of the project, poor quality of completed project, abandonment of building projects, and wastage and underutilization of human resources and materials.

The major outcomes of road construction project schedule overruns in Tripoli, Libya as per the findings of Alfakhri et al., (2018) on the study, include cost overruns, time extensions, disputes, loss of profit, breaches of contract, poor quality of work, and a company's bad reputation.

Nabilla & Yahya, (2016) Stated the most preferred effects of delay are time overrun and cost overrun which will be further explained as follows;

Time overrun: Contractor related, material related, labour equipment related and external related factors have impact on time overrun. Out of the most important causes of delay discussed earlier, the causes are belonging to the contractor factors. Factors such as problem with subcontractor, management in site and delay in payments are most affected causes of delay in construction project and cause time overrun.

Cost overrun: Usually factors that related to cost overrun is the contract that been made early before the construction starts. Client related, contractor related, material related and labour equipment related factors also lead to cost overrun. Mistakes and discrepancies in the contract document may come from the resources available, payment terms and project duration. If there is discrepancies happen, then cost overrun will occur. Time overrun leads to cost overrun.

Litigation: The overall effect of litigation is that it will further delay the project more and increase the cost, including the cost of hiring an arbitrator or an Attorney. If any one of the stakeholders is not satisfied with the project, then he/she will be forced to file a suit against others (Ansari & Ahmad, 2019).

CHAPTER THREE

RESEARCH DESGIN & METHDOLOGY

3.1. Introduction

This chapter outlines the method used to conduct this research. The chapter starts by defining the research approach and research design used for this research. Following that the population, Sample Size for the study are discussed. Furthermore, the data source, data collection method & data analysis procedure along with validity, reliability and ethical consideration are covered.

3.2. Research Approach

A descriptive survey design with a quantitative research methodologies used in this paper's investigation. The quantitative research approach as discussed by Creswell, (2014) is an approach for testing objective theories by testing the relationship between variables. On the hand Quantitative designs aid equip with better tools to address a greater range of research problems, and to fill in blind spots in current schedule overrun practices. The Quantitative data were collected from employees under the client, the contractor and the consultant involved in Ethiopian East Region Road construction Projects using a structured questionnaire.

3.3. Research Design

The research design was developed to identify the major cause of schedule overrun in Ethiopian Road construction in the case of east region. This study employs a descriptive research design as it is a suitable method to identify the features of the subject under the study. It was designed to adapt quantitative research methods, the source of data collection used both primary through review of documents, the survey of the respondents through questionnaires with the participation of key professionals in the study area and secondary data was collected through accessing books, unpublished personal sources, journals, websites and government records (desk study) was found to be relevant.

3.3.1. Population and Sample Size

3.3.1.1 Population

The population for this research includes number of projects and different parties involved in Ethiopian East Region road construction projects, i.e. professionals working for client, consultants' & contractors'. For this study, the target population includes,

1. The number of road projects on the East Region
2. Professionals working for client: The target client for this study is the governmental organization responsible for the construction of new asphalt roads in Ethiopia, which is the Ethiopian Road Administration (ERA).
3. Professionals working for construction companies: The target construction companies for this study are contractors working on new asphalt road projects in the East Region of the Ethiopian Road Administration (ERA).
4. Professionals working for consulting companies: The target consulting companies for this study are design supervision working on new asphalt road projects in the East Region of the Ethiopian Road Administration (ERA).

3.3.1.2 Sample Size

The three parties who participated in this study were the client, road and bridge consultants, and grade one general and road contractors. There were around 35 construction projects in Ethiopia East Region road construction projects. From these sites, one project has been terminated and three other projects have already been completed. Therefore, 31 projects were available for this study out of the 35 projects. Out of the 31 initiatives, 11 of them ran into schedule overrun. As a result, the study used the 11 projects under consideration as a target population, with a total of 9 contractors and 6 consultants participating. The researcher picked the census approach because the target group is small in size and the researcher believes they can supply sufficient information about the study subject by giving accuracy to the data to be gathered.

There is only one target population for the client category in this research paper which is Ethiopia Road Authority. In the case of ERA East Region projects, one specific road project is handled by a maximum of five employees including the director. However, due to several

reasons, the director of ERA is not appointed yet. Therefore, by deducting the director, a total of 4 employees were assigned for a single project. In ERA, one team might be assigned to more than one project. But in this case, there are two teams which have been assigned to two projects. By taking that into consideration, the prepared survey questionnaires were distributed purposively to a total of 18 employees of ERA.

In the case of the consultants and contractors that participated in this project, a total of 18 employees of the consultants' side and a total of 27 employees of the contractors' side were given the survey questionnaires purposively. Therefore, a total of 63 employees were handed out the survey questionnaires to fill out the required information.

3.4 Data Collection Techniques and Procedures

3.4.1 Data Source

To fulfil the purpose of the study, the researcher used both primary and secondary data. In which in the Primary data, preliminary structured questionnaire was developed in a clear and understandable way for the respondents to easily comprehend.

In addition to that the secondary data was gathered through desk study from the client's office records on the previous works and reports to obtain the information on the projects which have been delayed. Furthermore, collected data through accessing books, unpublished personal sources, journals, websites and government records (desk study) was found to be relevant.

3.4.2 Data Collection Instrument

The researcher collected primary data using a structured questionnaire with closed ended questions. The questionnaire had three sections, each having there on specific questions that help answer the research questions.

The primary data is used as a supplementary with an exhaustive literature analysis, and conducting a desk study to assess the current situation to learn about the occurrence of schedule overrun and the effect it has on the projects. The researcher created questionnaires based on a review of the literature and a desk study to get first-hand information on the subject and to

understand the key concerns and attitudes of respondents concerning the causes of schedule overrun.

3.4.2.1 Desk Study

For the selected Ethiopian Road Administration (ERA) projects, a desk study research was done to assess the existence, factors causing of schedule overrun. Project progress reports, contract documents, and other supplementary documents were among the documents evaluated. The entire amount of schedule overrun is compared to the original contract time based on the data.

3.4.2.2 Questionnaire

Based on a review of related literature and the variables identified as causes of schedule overrun and their effects on road construction project performance, a structured questionnaire was created to determine the client's, contractors', and consultants' opinions on the causes and effects of schedule overrun on road construction projects in the ERA's East Region.

The questionnaire begins with a brief covering letter that includes general information about the research as well as the researcher, explains the study's goal, and guarantees the respondents' strict privacy. The questionnaire includes open-ended and closed-ended questions that need an interview with the respondent's perspective, as well as brief responses that can be completed quickly by just checking boxes.

The questionnaire was created using the characteristics identified in the literature research as the causes of schedule overruns and their influence on the performance of road construction projects. To achieve the research's goals, the questionnaire was divided into two sections: Part I & Part II. Part I contains general information (Organization and respondent profiles), Part II contains factors that cause schedule overrun in road construction projects. The sample of the questionnaire survey used in this study is attached in Appendix A.

A 5-point Likert scale is used to rate the items in parts II of the questionnaire. According to Joshi et al. (2015), a Likert scale is a set of statements (items) presented for a real or hypothetical situation under study, and participants are asked to rate their level of agreement (from strongly disagree to strongly agree) with the given statement (items) on a metric scale, revealing the specific dimension of their attitude toward the issue. This study employs a 5-point Likert scale,

in which 5 indicating strongly agree, 4 representing agree, 3 standing for neutral, 2 representing disagree, and 1 indicating strongly disagree.

3.4.3 Data Collection Procedure

Once the questionnaire was designed and written, a pre-testing (Pilot) questionnaire was conducted before distributing the final questionnaire to 10 professionals in the industry. It was taken to ensure that the questionnaire can be administered without variability to the experimental group to determine the reliability and completeness of the questionnaire. Following the return of the questionnaires reliability of the questionnaire were tested by Cronbach's Coefficient Alpha method. Then the final version of the questionnaires was prepared as shown in Appendix A.

The questionnaires for the target governmental organization (referred to here as a client) were hand-delivered and then distributed to the east region department of an employee that work on schedule overrun projects. Then these respondents sent out these questionnaires to their respective projects through E-mail and telegram for both consultants and contractors to fill due to the time limit. The process was time-consuming and that most respondents require the presence of the researcher to return responses quickly.

3.5 Data Analysis Methods

To acquire findings and draw conclusions, the data was processed and examined after it has been collected. To analyse the quantitative data statically Package for Social science (SPSS) version 20.0, was applied accordingly. SPSS is a widely used program for statistical analysis in social science Statistics included in the base software. Hence, descriptive analysis such as frequencies, percentages, mean & standard deviation analysis was used to analyse the data obtained from the questionnaire.

3.6. Validity and reliability

3.6.1. Validity

According to Middleton, (2019) Validity refers to how accurately a method measures what it is intended to measure. If research has high validity that means it produces results that correspond to real properties, characteristics, and variations in the physical or social world. Therefore, a pilot

test was conducted to check the validity of the instrument if it provides adequate coverage of the topic under study, whether the content of the items will be relevant in helping answer the research questions as well as to check the clarity of the questions through discussion with experts.

3.6.2 Reliability

According to Middleton, (2019) Reliability refers to how consistently a method measures something. If the same result can be consistently achieved by using the same methods under the same circumstances, the measurement is considered reliable. In addition to that Kumar, (2011) also in his study said that a research tool is said to be reliable if it is consistent and stable, hence predictable and accurate in which a test is reliable to the extent that if repeated under constant conditions will give the same result. The technique applied to assess the reliability of the data collection instrument in this study is Cronbach's Coefficient Alpha (α) which was calculated by SPSS.

Table 3.6.2: Reliability Test Result

Variables	Cronbach's Alpha	No of Items
Contractor related factor	0.707	8
Consultant related factor	0.738	10
Client related factor	0.711	9
Effect of schedule overrun	0.902	5
Overall reliability	**0.858**	**32**

Source: Own Survey (2022)

The above table shows that the Cronbach's alpha reliability result (internal consistency) for each question is above 0.7 therefore using the rule of thumb, the Cronbach's alpha value of the study is within the acceptable level. This indicates that the variables are reliable. The variables consist of sub variables or responses in the questionnaire that rolled up into the variable.

3.7. Ethical Consideration

Throughout the data collection process, ethical considerations were taken into account. The analysis tool began on the main page with a clear explanation of the study's aims and a statement that the participants' names were kept anonymous. Every chosen responder was informed that their participation in the study is entirely optional, and only those who grant written consent were allowed to take part. Throughout the research process, alternative scholars' contributions were acknowledged, and anybody who assisted the researcher in any way was treated with respect.

CHAPTER FOUR

ANALYSIS AND INTERPRETATION OF DATA

4.1 Introduction

This research studied the major causes of schedule overrun on road construction project along with the effect it has on the project performance in East Region of Ethiopia. This chapter presents the output of the analysis and discusses major findings. The data collected were analyzed using the Statistical Package for Social Science (SPSS) version 20. The data analysis and discussion were carried out and organized according to the objectives of the research. The analysis output is presented in form of figures and tables. The major findings are discussed and the results are compared to the literature review.

4.2 Response Rate

A total of 63 questionnaires were issued to all parties involved in the Ethiopian Road Administration, including the client (ERA), consultants, and contractors. The researcher submitted 45 questionnaires to the contractors and consultants, and 18 to the client, because there are approximately 2- 3 professionals from contractors and consultants at the individual projects and to the professions who work in the office. Only 52 of the questionnaires were correctly completed and returned. As a consequence, the overall response rate was 82.5 percent, which is satisfactory for data analysis and research discussion.

4.3 Respondents' Profile

The target respondents of the questionnaire survey were engineers from different parties involved in the road construction industry in the east region working in projects belonging to the Ethiopian Road Administration. Among the respondents, 23 were contractors, 15 were consultants and the rest 14 were client or representative of the owner as shown below in table 4.3.1.

Table 4.3.1: Respondents Organization & questionnaire

Item no.	Organization	No of distributed questionnaires	No of Returned questionnaire
1	Contractor	27	23
2	Consultant	18	15
3	Client	18	14
	Total	**63**	**52**

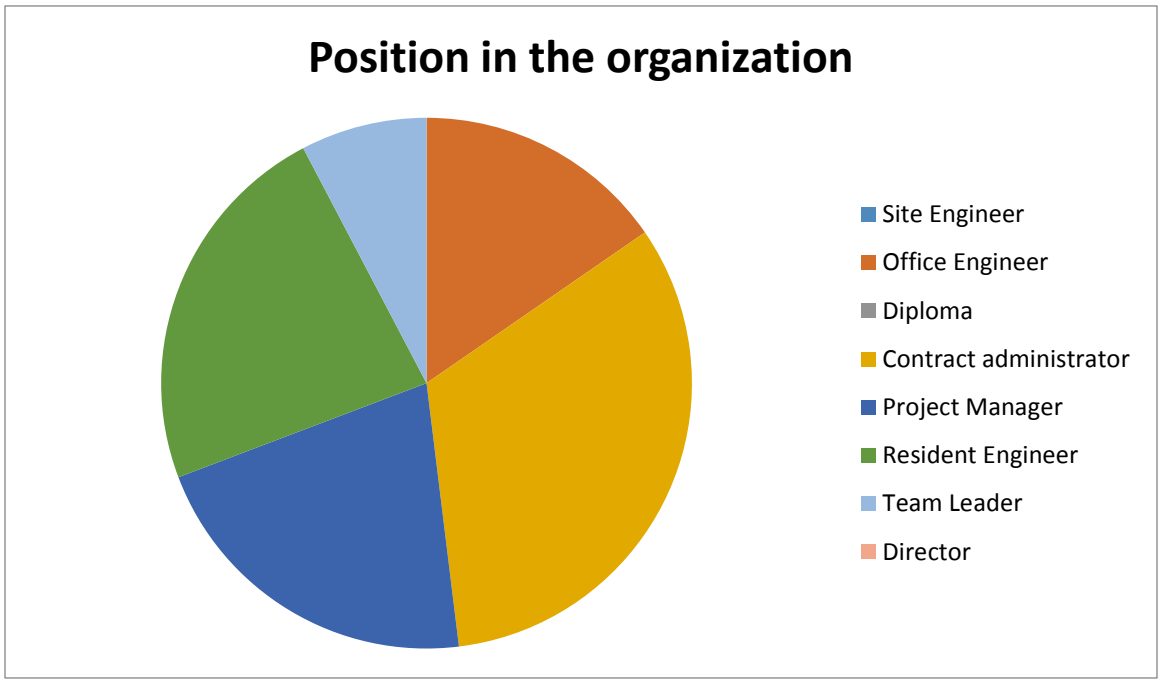
Source: Own survey (2022)

Based on the figure below the researcher gathered information on the years of the organizations since it help understand the organizations exposure and challenges faced in road construction projects.

Source: Own Survey (2022)

Figure 2: Organization experience in road construction

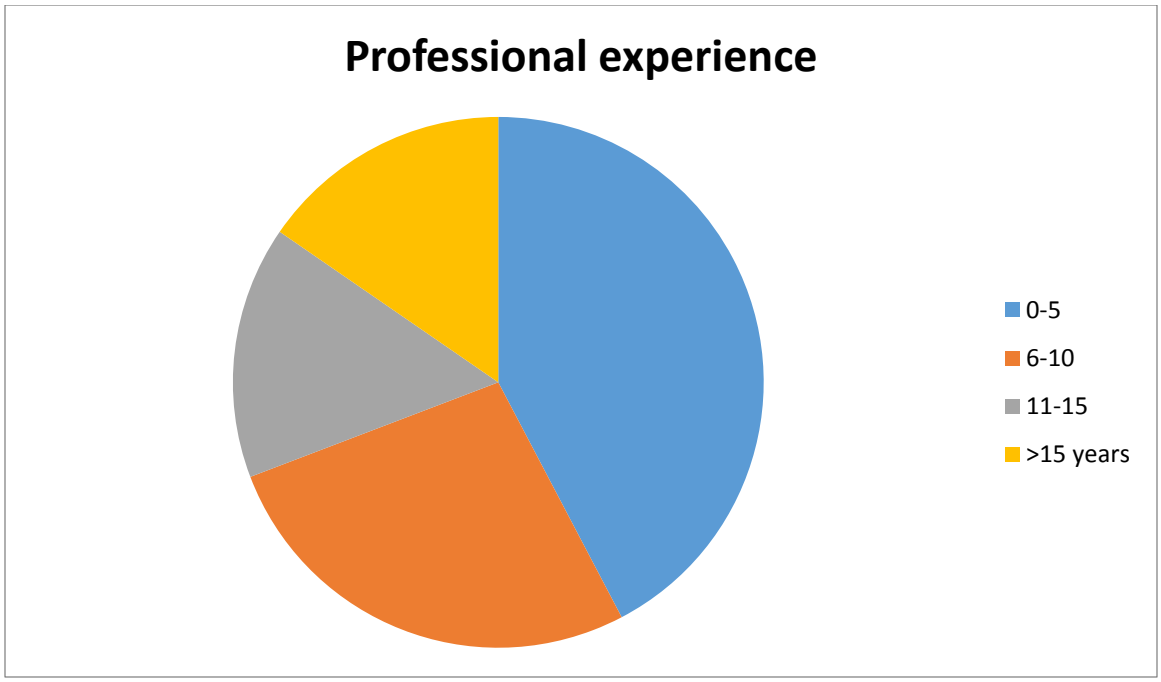
Concerning the organization years of experience in road construction the majority of the organization have five to ten year experience with a 48.1%,following that organizations with more than ten years of experience have a percentage of 38.5% where the rest experience which below 5 year are 13.5 percentage.



Source: Own Survey (2022)

Figure 3: Position of employees in the organization

Regarding the position the respondents' are working on the organization a majority of the respondents were working as contract administrators (32.7%), 23.1% were working as a resident engineer, 21.2% as a project manager, 15.4% were working as an office engineer, 7.7% as a team leader as shown in figure 4.



Source: Own Survey (2022)

Figure 4: Professional Experience

Regarding the Professional experience of the respondents' a majority of the respondents had below 5 year experience (42.3%), whereas the second major respondents of a six to ten year of experience (26.9%), both eleven to fifteen and above fifteen were at a percentage of 15.4% as shown in figure 5.

Based on the professional background and years of experience, it is safe to say that the respondents' for this study have a good understanding of the study matter, and could thus provide reliable answers to the questionnaire.

4.4. Analysis of the Most Important Delay Causes

The findings of the descriptive analysis of the respondent's view on the causes of schedule overrun and their impact on project performance are presented in this section. The most relevant causes and effects of a schedule overrun were evaluated and ranked using descriptive statistics. The relative importance index (RII) ranges from 0-1. The five-point Likert scale ranged from 1-5 was transformed to relative importance index using the following equation,

$$RII = \frac{\sum W}{A*N}$$

Where: w is the weighting given to each factor by respondent ranging from 1t o 5

A is the highest weight meaning 5 in this case

N is the total of respondents

The following tables show descriptive statistics such as the mean and standard deviation along with the ranks set out based on the survey findings of RII. A mean score of 0-1.5 indicates that the respondents strongly disagree with the measurement variable reported in this study, a score of 1.50 to 2.50 indicates that they disagree, and a score of 2.50 to 3.50 indicates that they are neutral or not. Yes, with a mean score of 3.50-4.50, respondents agreed, and for a mean score of over 4.50, respondents strongly agreed.

4.4.1. Factors Related to Contractors

Table 4.4.1 : Descriptive Statistics of Factors Related to Contractors Causing schedule overrun

Item No	Contractor related Factors	Mean	Std. Deviation	RII	Rank
1.	Poor Site Management	4.08	.436	0.838	5
2.	Improper planning and scheduling	4.23	.731	0.861	4
3.	Financial problems faced by the contractor	4.38	.491	0.911	1
4.	Incompetent subcontractors employed by the contractor	3.85	.751	0.761	6
5.	Inadequate contractor experience	3.69	.897	0.738	7
6.	Poor construction work methodology	4.42	.499	0.873	3
7.	Inadequate staffing of the contractor	4.12	.511	0.684	8
8.	Late payment to the subcontractors or suppliers	4.29	.723	0.9	2

Source: Own survey (2022)

The table above shows the means score based on the response of the participants with respect to the factors related to contractors leading to schedule overrun are presented.

In item 1 (Poor Site Management), the mean score is 4.08 which implies most of the respondents lean towards agreeing that schedule overruns are more likely to be caused by Poor Site Management.

In item 2 (Improper planning and scheduling) the mean score is 4.28 which implies most of the respondents tend to agree that schedule overrun may result due to Improper planning and scheduling.

In item 3 (Financial problems faced by the contractor), the mean score is 4.38 which implies most of the respondents agree that Financial problems faced by the contractor is one of the causes for schedule overrun.

In item 4 (Incompetent subcontractors employed by the contractor), the mean score is 3.85 which implies most of the respondents agree that cause of schedule overrun could be caused as a result of Incompetent subcontractors employed by the contractor.

In item 5 (Inadequate contractor experience), the mean score is 3.69 implying that most respondents agree that one of the causes for schedule overrun is the contractor's inadequate experience.

In item 6 (Poor construction work methodology), the mean score is 4.42 implying most of the respondents lean towards agreeing that Poor construction work methodology result in causes of schedule overrun.

In item 7 (Inadequate staffing of the contractor), the mean score is 4.12 which implies most of the respondents stayed agree that the Inadequate staffing of the contractor could be one of the many causes for schedule overrun in construction projects.

In item 8 (Late payment to the subcontractors or suppliers), the mean score (4.29) indicates that most of the respondents tend to agree that Late payment to the subcontractors or suppliers causes schedule overrun.

4.4.2 Factors Related to Consultant

Table 4.4.2 Descriptive Statistics of Factors Related to Consultant Causing schedule overrun

Item no.	Consultant related Factors	Mean	Std. Deviation	RII	Rank
1.	Change in design or scope	4.02	.641	0.838	3
2.	Addition or omission of work due to design review	4.10	.603	0.873	2
3.	Lack of adequate Supervision	4.13	.345	0.781	5
4.	Delay in approval of drawing	4.27	.598	0.773	6
5.	Delay in submittal of design modification	4.12	.646	0.819	4
6.	Being late in making decisions	4.00	.560	0.738	8
7.	Inadequacy of Consultant's Experience	3.56	1.145	0.615	10
8.	Insufficient experience of consultant's site staff	3.63	.991	0.684	9
9.	Delay by the supervision consultant to finalize the design review	4.12	.646	0.765	7
10.	Not implementing the design review during the planning stage	4.44	.725	0.919	1

Source: Own survey (2022)

The table above shows the means score based on the response of the participants with respect to the factors related to consultant leading to schedule overrun are presented.

In item 1 (Change in design or scope), the mean score is 4.02 which implies most of the respondents lean towards agreeing that schedule overrun are more likely to be caused by Change in design or scope.

In item 2 (Addition or omission of work due to design review) the mean score is 4.10 which implies most of the respondents tend to agree that schedule overrun may result due to Addition or omission of work during the design review stage.

In item 3 (Lack of adequate Supervision), the mean score is 4.13 which implies most of the respondents agree that Lack of adequate Supervision faced by the consultant is one of the causes for schedule overrun.

In item 4 (Delay in approval of drawing), the mean score is 4.27 which implies most of the respondents agree that cause of schedule overrun could be caused as a result of Delay in approval of drawing.

In item 5 (Delay in submittal of design modification), the mean score is 4.12 implying that most respondents agree that one of the causes for schedule overrun is the Delay in submittal of design modification by the consultant.

In item 6 (Being late in making decisions), the mean score is 4.00 implying most of the respondents lean towards agreeing that Being late in making decisions result in causes of schedule overrun.

In item 7 (Inadequacy of Consultant's Experience), the mean score is 3.56 which implies most of the respondents agree that the Inadequacy of Consultant's Experience could be one of the many causes for schedule overrun in construction projects.

In item 8 (Insufficient experience of consultant's site staff), the mean score is 3.63 which implies most of the respondents agree that the Insufficient experience of consultant's site staff could be one of the many causes for schedule overrun in construction projects.

In item 9 (Delay by the supervision consultant to finalize the design review), the mean score is 4.12 implying most of the respondents lean towards agreeing that delay by the supervision consultant to finalize the design review result in causes of schedule overrun.

In item 10 (Not implementing the design review during the planning stage), the mean score is 4.44 which implies most of the respondents agree that cause of schedule overrun could be caused as a result of not implementing the design review during the planning stage.

4.4.3 Factors Related to Client

Table 4.4.3 Descriptive Statistics of Factors Related to Client Causing schedule overrun

Item no.	Client related Factors	Mean	Std. Deviation	RII	Rank
1.	Delay in decision making	4.31	.805	0.869	5
2.	Delay in progress payment	4.48	.754	0.927	1
3.	Awarding projects to the lowest bidder	3.83	.944	0.811	8
4.	Short coming with regard to Technical knowledge	3.38	1.032	0.738	9
5.	Change in the scope of the project	4.08	.710	0.842	7
6.	Financial difficulties of the client	4.48	.754	0.927	1
7.	Lack of coordination with contractor	4.06	.958	0.896	4
8.	Change orders by owner during construction	3.87	.971	0.846	6
9.	Delay to deliver the site/Right of way	4.71	.457	0.915	3

Source: Own source (2022)

The table above shows the means score based on the response of the participants with respect to the factors related to client leading to schedule overrun are presented.

In item 1 (Delay in decision making), the mean score is 4.31 which implies most of the respondents lean towards agreeing that schedule overruns are more likely to be caused by delay in decision making).

In item 2 (Delay in progress payment) the mean score is 4.48 which implies most of the respondents tend to agree that schedule overrun may result due to delay in progress payment.

In item 3 (Awarding projects to the lowest bidder), the mean score is 3.8 which implies most of the respondents agree Awarding projects to the lowest bidder by the client is one of the causes for schedule overrun.

In item 4 (Short coming with regard to Technical knowledge), the mean score is 3.38 which implies most of the respondents stayed neutral that cause of schedule overrun could be caused as a result of Short coming with regard to Technical knowledge.

In item 5 (Change in the scope of the project), the mean score is 4.08 implying that most respondents agree that one of the causes for schedule overrun is the Change in the scope of the project by the client.

In item 6 (Financial difficulties of the client), the mean score is 4.48 implying most of the respondents lean towards agreeing that financial difficulties of the client result in causes of schedule overrun.

In item 7 (Lack of coordination with contractor), the mean score is 4.06 which implies most of the respondents agree that the Lack of coordination with contractor could be one of the many causes for schedule overrun in construction projects.

In item 8 (Change orders by owner during construction), the mean score is 3.87 which implies most of the respondents agree that the Change orders by owner during construction could be one of the many causes for schedule overrun in construction projects.

In item 9 (Delay to deliver the site/Right of way), the mean score is 4.77 implying most of the respondents lean towards strongly agreeing that Delay to deliver the site/Right of way result in causes of schedule overrun.

4.4.4 The Five Major factors that causes Schedule overrun

Table 4.4.4: Five Major factors that Causes schedule overrun

Variable	Rank	RII	Contractor related	Consultant related	Client related
Financial difficulties of the client	1	0.927			☆
Delay in progress payment	1	0.927			☆
Not implementing the design review during the planning stage	3	0.919		☆	
Delay to deliver the site/Right of way	4	0.915			☆
Financial problems faced by the contractor	5	0.911	☆		

Source: Own Survey (2022)

As per the gathered information and table 4.4.4, it shows that prevails about the views of respondents from the three parties who were involved on the road construction projects under studied to rank the five most significant factors to contribute for time overrun in road construction projects administered by ERA. And let's see each of the ranked delay factors in detail;

Financial difficulties of the client

According to respondents, "Financial difficulties of the client" is ranked in the first position with the relative importance index value of (RII=0.927), which indicates the high importance of a client having financial difficulties to finish the road project on time. Shortage of cash by the government causes a financial difficulty in the client side. Considering that most of the contractors of the projects are foreigners with the current inflation especially with the shortage of dollar, the respondents informed that it's difficult to pay the contractors and that it has become one of the major issues for schedule overrun to occur.

Delay in progress payment

According to respondents, "Delay in progress payment" has also ranked first given the relative importance index value of (RII=0.927) has become the same as the previously mentioned

variable, which indicates the importance of a client delaying progress payment to contractor. The client experiencing a financial issue is one of the reasons for delay in progress payment.

Not implementing the design review during the planning stage

According to respondents, "Not implementing the design review during the planning stage" is ranked in the third position with the relative importance index value of (RII=0.919), which indicates that it is the third most importance of a consultant not being able to implement the design review earlier on the planning stage. If a review was done on the planning stage of a design process, it helps to clear out the additions and omission of work that needed correction. However, due to not applying that most projects in ERA are prone to schedule overrun.

Delay to deliver the site/Right of way

According to respondents, "Delay to deliver the site/Right of way" is ranked in the four position with the relative importance index value of (RII=0.915), It shows how crucial it is to clear the project site early in order to start and finish the road project on schedule. The stoppage of site clearing will undoubtedly interfere with the project's overall plans and cause a delay in starting and completing road improvements in accordance with the agreement. The primary cause of projects not being finished on time was shown to be the client/owner not clearing off the project site allowing contractors to begin their work for a variety of reasons.

Financial problems faced by the contractor

According to respondents, "Financial problems faced by the contractor" has ranked to be the fifth position with the relative importance index value of (RII=0.911). Due to inflation, improper handling of money, being in charge of too many projects and Poor credit arrangement with creditors and debtors…etc might be found as one of the reasons for causing a financial problem to the contractor.

4.4.5. Desk Study

Data was acquired from ERA through a desk study, as shown in tables 4.5.1 below. Meanwhile, professionals working in the road sector program were asked to comment on whether schedule overrun is a problem or not in road construction projects. Schedule overrun was identified as one

of the biggest concerns in Ethiopian road construction projects, according to the findings received from sources.

Similarly, the data from the desk study of projects with a time elapse of more than 100 percent of project completion time in the east region under Ethiopian Road Administration that showed that schedule overrun is one of the major problems in road construction projects were collected as indicated in the following table (Table 4.5.1).

The table below shows the corresponding approved extension of time (Days) along with the current project status which even after the extension of time have exceeded their completion time. Most of the projects were found to exceed more than 10%.

4.4.6. East Region schedule overrun projects

Table 4.4.6. East Region schedule overrun projects

Item no	Project	Length (km)	Original Contract Time (days)	Revised contract period	Contract commencement date	Original Completion date	Revised completion date	Time elapsed %
1.	Project A	77.61	1095	1265	2-May-17	1-May-20	23-Jul-21	116.27%
2.	Project B	54.806	1095	1290	2-May-17	2-May-20	19-Dec-21	106.03%
3.	Project C	57.5	1095	1803	25-May-15	24-May-18	8-Nov-21	106.06%
4.	Project D	47.84	1095	1610	16-Nov-15	15-Nov-18	20-Jan-22	105.80
5.	Project E	36.00	1095	1330	2-May-17	1-May-20	22-Dec-20	139.47%
6.	Project F	30.00	1095	1145	2-May-17	1-May-20	26-May-21	124.92%
7.	Project G	81.00	1095	Not Revised	2-May-17	1-May-20	29-Jun-21	122.12%
8.	Project H	135.70	1095	Not Revised	8-Nov-18	7-Nov-21	26-Jan-22	110.64%
9.	Project I	84.2	1095	Not Revised	11-Feb-19	10-Feb-22	-	110.05%
10.	Project J	72.389	1095	Not Revised	11-Feb-19	10-Feb-22	-	110.05%
11.	Project K	36.00	300	Not Revised	15-Jul-21	11-May-22	-	106.67%

Source: Desk Study from ERA(2022)

As can be seen in the table above the sixth projects starting from project A to project F have been granted an extension of time. All of these projects have been given an original contract time of 1095 days in which all of the projects are found to exceed their original time by more than hundred days. The remaining projects from Project G to K, does not have a revised contract time, however, the time has elapsed with minimum of six percent and above.

Different Reasons have been pointed out by the employees regarding the delay in which as per the analysis the major once had been mentioned above.

CHAPER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter is the final chapter which is divided into three sections. The first section contains a summary of the major findings of the study, the next section presents conclusions from the findings and in the last section, and recommendations are forwarded based on the established finding and conclusions that could be useful and viable for the construction industry.

5.2 Summary of Major Findings

The major factors that causes schedule overrun variables were identified. Out of twenty seven (27) variables the top five most important factors that contribute for the road construction time overrun were identified, three from owner related factors, one from contractor related factors, one from consultant related factors. These variables are; financial difficulties of the client, Delay in progress payment, not implementing the design review during the planning stage, Delay to deliver the site/Right of way & financial problems faced by the contractor.

According to the descriptive statistical analysis, the majority of respondents agree that the listed out factors as a problem that exists. Schedule overrun is also one of the greatest concerns in road construction projects, according to the data from the desk study also has a significant influence on the country's economy. The most important causes of schedule overrun were ranked using the relative important index (RII) based on the data obtained from the descriptive analysis, with the most rated causes being financial difficulty of the client and Delay in progress payment.

5.3 Conclusion

There are several reasons for causes of Schedule Overrun in road construction projects, and numerous studies have identified a variety of causes dependent on the underlying issues that the particular study is concerned with. A review of the literature was conducted in order to identify the potential factors that might be delaying construction projects as a whole. After that, the factors were examined in accordance with the plans for developing the road sector.

The first and main objective of the research was to identify the major causes of schedule overrun on the contractors', consultants and owners side of Ethiopian Road Construction specifically East Region projects. According to the result obtained from the questionnaire survey, the respondent agreed on schedule overrun as one of the major problems. The result of the desk study also strengthens this finding indicating that the magnitude of schedule overrun in these projects in which most projects time elapsed by more than 10% even after an extension of time have been granted by the client.

The most significant delay factors have previously been identified in Chapter 4, and it is anticipated that addressing these issues would significantly reduce the issues with delays in Ethiopian road construction projects. After circulating the questionnaire to experts with knowledge of Ethiopian road construction projects, the variables were sorted according to their respective significance indexes. Financial difficulties of the client, Delay in progress payment, not implementing the design review during the planning stage, Delay to deliver the site/Right of way & financial problems faced by the contractor have been found to be the top ranked factors that causes schedule overrun.

Therefore, conducting research in this field will be of utmost importance in order to lessen the incidence of late delivery (schedule overrun) of road projects and, if at all feasible, to prevent it.

Prior to minimizing or avoiding schedule overrun to other ongoing road projects, it is necessary to identify the most significant sources of schedule overrun on the project.

5.4 Recommendation

Pursuant to the Study's findings, Schedule overrun is one of the primary challenges in Ethiopian road construction projects, and it has a substantial impact on productivity, quality of the works, budget, ease of management of the project and so much more. In addition, the same has crucial impact on the fulfilment of the Ethiopian Roads Administration's mission which is "*Develop and Manage Sustainable Roads through institutional competency and Optimal Utilization of Resources.*"

Based on the results of the study presented in the preceding chapter, the researcher proposed the following list of action items. These suggestions are a series of solutions for reducing schedule overruns in road construction project and minimizing its impact on the performance road project.

The major solution recommended by this study for minimizing the occurrence of Schedule overrun is the establishment of effective proactive-management of the project by the key Contractual parties, more specifically by the Client and the Consultant, starting from the planning and Design stage to final completion of the project.

The reason this study promotes the focus to be given firstly to management is because as per the findings of the same, the top causes for schedule overrun in the 11 projects under study is due to poor management. The identified potential causes of schedule overrun in this study range from the conceptual/ design stage to the construction stage. Therefore, the researcher recommends the following:

Timely removal of RoW obstructions: as per the finding one of the studies is the major cause for schedule overrun. Hence, the researcher advises the Client to have a Right of Way removal plan and clear the obstructions within the main road during the mobilization of the project before the commencement of the permanent works.

Design Revision: It is known that the time gap between the conceptual design of the road and the commencement of the actual works has an average gap of 2 to 5 years. Accordingly, due to the time gap there are different changes that occur in the design of the road. So, the researcher recommends the Client to minimize the time gap between the Conceptual design of the road and the Construction time, to minimize the different characteristic changes of the road. In addition

the Client is advised to provide sufficient time for the required design revision. In connection Consultant's involved in the Design should mobilize their required resources and timely complete the same.

Allocation of the Budget (Client): shortage of budget from the Client side is one of the reasons that is causing Contractor's cash flow and hence affecting the productivity of the Works. Accordingly, the Client is advised to have proper budget planning for the project inconsideration of the overall costs and contingency.

Early planning (all parties): should have a better initial planning and thorough detailing of design, should allocate sufficient time for design development & involve all the relevant professionals at the initial stages of the project.

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Appendix A

ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

QUESTIONNAIRE SURVEY FOR A MASTERS THESIS

ON

CAUSES OF PROJECT SCHEDULE OVERRUN IN ROAD CONSTRUCTION PROJECTS: THE CASE OF ETHIOPIAN EAST REGION ROAD CONSTRUCTION PROJECT

BY MELAT TADESSE

ADVISOR: DR. ADANE ABERA

FOR THE PARTIAL FULFILLMENT FOR THE DEGREE OF MASTER OF ARTS IN PROJECT MANAGEMENT

MAY, 2022

GENERAL INFORMATION

I am currently conducting a research for partial fulfilment of Master of Arts in Project Management under the supervision of Dr. Adane Abera at Addis Ababa University, College of business and economics school of commerce. This questionnaire is designed to study about Causes of project Schedule Overrun in Road Construction Projects: The case of Ethiopian East Region Road Construction Project. I kindly request your participation and support in my research by responding to this questionnaire. All the information gathered through this questionnaire will be kept strictly confidential and will be used only for academic matter.

Thank you in advance for your time and kind cooperation.

If you have any questions, please contact me through the following address

Email: melattadesse45@gmail.com

PART-I: Respondent and Company information

The questions below are related to your personal Information. Please indicate your response by circling in the number provided in front of each question, and fill the blank spaces as appropriate.

1. Type of your organization

   1. Contractor 2.Consultant 3.Owner/Client

2. Years of your organization experience in the road and bridge construction

   1. < 5years 2.5- 10 years 3. >10years

3. Your Education level

   1. below high school 2. 12 complete 3. University student
   4. Diploma 5. Degree 6.Masters and above

4. Your position in the organization

   1. Site Engineer 2.Office Engineer 3.Contract administrator
   4.Project Manager 5.Resident Engineer If other please specify ……

5. Your professional experience in road construction projects

   1. 0-5 years 2. 6-10 years 3. 10-15 years 4. More than 15

PART II: Causes of Project Schedule overrun

Based on your experience indicate the extent of the following detailed questions regarding schedule overrun causing factors in Ethiopian road construction projects in the case of east region specifically on your project on scale of 1-5 by marking (X) under each preferences: - Where 1=Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5=Strongly Agree

Item No	Parameters of independent Variables	strongly disagree	Disagree	Neutral	Agree	Strongly Agree
	Contractor related Factors					
1.	Poor Site Management					
2.	Improper planning and scheduling					
3.	Financial problems faced by the contractor					

4.	Incompetent subcontractors employed by the contractor					
5.	Inadequate contractor experience					
6.	Poor construction work methodology					
7.	Inadequate staffing of the contractor					
8.	Late payment to the subcontractors or suppliers					
	Consultant related Factors					
9.	Change in design or scope					
10.	Addition or omission of work due to design review					
11.	Lack of adequate Supervision					
12.	Delay in approval of drawing					
13.	Delay in submittal of design modification					
14.	Being late in making decisions					
15.	Inadequacy of Consultant's Experience					
16.	Insufficient experience of consultant's site staff					
17.	Delay by the supervision consultant to finalize the design review					
18.	Not implementing the design review during the planning stage					

	Client related Factors					
19.	Delay in decision making					
20.	Delay in progress payment					
21.	Awarding projects to the lowest bidder					
22.	Short coming with regard to Technical knowledge					
23.	Change in the scope of the project					
24.	Financial difficulties of the client					
25.	Lack of coordination with contractor					
26.	Change orders by owner during construction					
27.	Delay to deliver the site/Right of way					