COLLEGE OF BUSINESS AND ECONOMICS

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FACTOR CONTRIBUTING TO CONSTRUCTION PROJECT DELAYS: THE CASE OF BIZUAYEHU ENGDAWERK APARTMENT BUILDING.

By: Selam Worku

A Project Work Submitted to Addis Ababa University School of Commerce in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Project Management

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Approved by the Board of Examiners:

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STATEMENT OF DECLARATION

I, the undersigned, hereby declare that this research project entitled "**Factor Contributing to construction project delays: The case of Bizuayehu Engedawork Apartment Building**." is carried out by myself with the close guidance and support of my advisor Dr. Wasihun Mohammed. I have followed all ethical standards while conducting the research and have duly and properly acknowledged all references and sources. The study is original and has not been used as a requirement for partial fulfilment for any sort of educational qualification at this university or any other.

Selam Worku _____ _____

Signature **Date**

STATEMENT OF APPROVAL

This is to certify that, Selam Worku has carried out this research project on the topic of "**Factor Contributing to construction project delays: The case of Bizuayehu Engedawork Apartment Building**" under my supervision. This work is original in nature and is sufficient for submission for the partial fulfilment for the Degree of Master of Arts in Project Management.

Name _____

Signature _____

Date _____

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Table of Contents

ACRONYMS

MoWUD- Ministry of Works and Urban Development

FIDIC- International Federation of Consulting Engineers

RII - Relative Importance Index

SPSS - Statistic Package for Social Science

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Construction projects delays are one common problem that can negatively affect a project's budget, schedule, and performance is delay. This study aims to identify and assess the main causes of delays in a specific building project in Addis Ababa, Ethiopia. Descriptive research methodology was used to determine the causes objectively and provide a priority to each factors. Data were collected by document scanning and a questionnaire survey from primary and secondary sources. 46 construction industry professionals—including the owner, contractor, and consultant—were surveyed using a structured questionnaire as part of a quantitative research approach. Data on the perceived significance of 79 potential delay factors—which were divided into four categories: project-related, client-related, contractor-related, and external—was gathered through the questionnaire. To rank the factors, the data was analyzed using the Relative Importance Index (RII) method. The findings indicate that the project's financial challenges, material delivery delays, inadequate project planning and scheduling, and a lack of funding were the top five factors contributing to the delay. In addition, a correlation test was conducted to see whether the stakeholders and the total respondents significantly agreed on the order of the causes of the delay. The recommendations were suggested to stakeholders to must ensure they have sufficient financial resources, to effectively manage material procurement, to have a detailed project planning and scheduling, to have regular monitoring and updating of schedules and to take corrective actions promptly is crucial to ensuring timely project completion and achieving successful outcomes.

Key words*: Delay, Delay factor, Client, Contractor, Consultant, Construction project*

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

A project is a temporary endeavor undertaken to create a unique product, service, or result (PMI, 2017). Projects are present in various fields such as manufacturing, healthcare, information technology, and construction. Each project is executed by a team of individuals with specific roles and responsibilities, and it has defined parameters like scope, budget, and schedule. According to PMI (2017), Project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. It encompasses coordinating, leading, guiding, and organizing the different aspects of a project to ensure its successful completion. Effective project management is crucial for project success as it minimizes risks, optimizes resource utilization, and ensures the achievement of project goals.

Construction projects commonly encounter delays, posing significant challenges on a global scale. In countries like Ethiopia, it is highly uncommon for construction projects to be completed within the planned time frame. Research by Shewaferahu (2016) in educational project development demonstrated that no case study project was completed on time. Hailemeskel (2013) highlighted numerous obstacles faced by the Ethiopian construction industry, leading to poor performance marked by delays, cost overruns, and substandard outcomes. Werku & Jha (2016) conducted a study to investigate the causes of delays in Ethiopia's construction sector, pointing out that delays are major contributors to project failures. Therefore, the primary focus of their study was to identify and address the reasons behind construction project delays.

Delays in construction are a common issue in the construction sector and can significantly impact project costs, timelines, and overall performance (Assaf & Al-Hejji, 2006). A variety of factors such as design changes, material shortages, contractor performance, and adverse weather conditions can lead to project delays. It is highly uncommon for construction projects to be completed within the scheduled timeframe in a country like Ethiopia. Shewaferahu's (2016) research on educational project development revealed that no case study project was able to meet the deadlines. Hailemeskel (2013) pointed out various challenges and limitations affecting the construction sector in Ethiopia, leading to its poor performance characterized by delays, excessive expenditures, and substandard outcomes.

Furthermore, Werku & Jha (2016) conducted a study to investigate the factors contributing to project delays in Ethiopia's construction industry. Their findings emphasized that delays in construction projects are the primary reasons for project failures. Hence, the objective of this research is to identify and analyze the causes behind construction project delays.

1.2 Background of the organization

The Bole Apartment Building project in Addis Ababa, Ethiopia, is under development for ATO BIZUAYEHU ENGIDAWORK, with ACUTE ENGINEERING PLC as the consultant and BAM GENERAL CONSTRUCTION PLC as the contractor. This 3B+G+15 Apartment Building spans 21,704 square meters and is estimated to cost 756,899,125.11 Ethiopian Birr (approximately $14.7 million USD). It includes three underground levels for parking, a general store, car wash, maintenance and transformer rooms, while the ground floor features amenities like a mini supermarket, multipurpose gymnasium, daycare, and building management offices. Fifteen stories above ground will house residential units, serviced by two elevator shafts, stairs, a garbage chute, and utility ducts. BAM General Construction PLC secured the construction contract valued at 218,375,282.01 Birr (around $4.2 million USD), inclusive of VAT, with a 720-day timeline starting from August 28, 2021. As of August 2023, But the project is just 71.73% of the way through, indicating unfavorable progress under BAM's management.

1.3 Statement of the Problem

One of the important economic areas that drives a country's economic development is the building industry (Mehamid, 2013). A construction project is generally seen as successful when it is finished on schedule, within budget, in compliance with specifications, and to the satisfaction of stakeholders, according to Majid (2006).

According to Sadi et al. (2006), finishing projects on schedule is a sign of efficiency, however there are a lot of unknown and variable circumstances that might arise during the construction process. These factors include the way in which parties perform, the availability of resources, the state of the environment, the participation of other parties, and contractual relationships. It is challenging to see a project through to completion within the allotted time, though.

Construction project completion delays are a global issue (Haseeb, 2011). This comment illustrates once more how delays in building projects are typical, even on a worldwide scale. Delays negatively affect a project's success in terms of schedule, budget, quality, and safety, claim Faridi et al. (2006).

Regarding Ethiopia, the construction industry is the most significant source of employment generation and one of the most vital for the nation's progress. But because of a number of internal and external issues, it has declined recently. The most important one is overspending on time and materials, which impairs the building project's efficiency (Netsanet Berhanu, 2018).

It is extremely uncommon for construction projects in Ethiopia to be finished on schedule or within the predetermined budget. Molaye Takele (2020) on the Addis Ababa 40/60 housing project, one of Ethiopia's most delayed development projects, from a list of 70 potential causes of delay that were provided to the customer, contractors, and other stakeholders, 20 key causes of delay were identified using a Relative Importance Index Consultant’s participants. His research's conclusions showed that some of the most common causes of delays were the client's material delivery, contractors' financial troubles, poor contractor selection, the client's sluggish decision-making, and the usage of antiquated technologies by contractors. In another research Abdurezak and Neway (2019) have studied on the main causes of delay in public building construction projects in Addis Ababa Administration and listed 42 factors arranged in five categories and presented to three parties‟ the client, contractor and consultant. Their survey findings revealed the top ten factors that cause construction delays in the public building construction projects in Addis Ababa were: (1) Difficulty in project financing (poor financial system); (2) Poor Project management system;(3) Delay in issuance of designs and working drawings; (4) Shortage of availability of imported construction materials and goods on market; (5) Design errors and complexity of designs;(6)Delay in progress payments for completed works; (7) Late start & resource mobilization to site; (8) Financing problems; (9) Inaccurate Site investigation Report;(10) Price Inflation

The case project is one of postponed projects in Addis Ababa Even though it should have been finished by now, the project is just 71.73% of the way through construction as mentioned in this annual report. The contractor and the client did not agree on the key elements that contributed to the project's delay.

While many studies have examined the factors for construction project delays, this research focuses on a specific project rather than general trends in an attempt to explore deeper into this complex issue. The researcher believes that by concentrating on a specific construction project, we might identify nuances

and details that larger studies could overlook, resulting in a deeper understanding of the relevant components by figuring out and looking into the variables.

1.4 Research Questions

This Research intends to answer to the following research questions:

Q1: What are the key factors that contribute to construction project delays?

Q2: What is the relative significance and impact of different categories of delay factors such as project-related, client-related, contractor-related, and external factors, on construction project delays?

Q3: How do the perceived critical delay factors for this project compare to those reported in prior empirical studies?

1.5 Objective of the research

1.5.1 General objective

The general aim of the study is to investigate major factors that contribute to the construction project delay in Addis Ababa.

1.5.2 Specific Objective

The specific objectives of this study are:

1. Identify the main delay factors for the construction building project through a survey of construction professionals.
2. To assess the relative significance and impact of different categories of delay factors, such as project- related, client-related, contractor-related, and external factors, on construction project delay.
3. Compare the critical delay factors for this project to those reported in previous empirical literature on construction delays.
4. Provide recommendations to mitigate delays for construction building projects.

1.6 Significance of the study

The construction industry would greatly benefit from this research since it will enable project managers to more effectively identify and control the variables that cause delays in their projects. Proactively resolving these concerns can lead to more efficient and effective project completion, lower costs, and more stakeholder satisfaction. In The case of Bezuayehu Engedawork Apartment building this study is here to help project managers figure out how to spot and handle factors that cause projects delay in the construction. By getting to the bottom of project delays and improving project outcomes, this study gives some insights that could lead to better project planning and execution. The findings of this study could help stakeholders involved in similar projects to analyze and address issues based on the study's results. For future researchers interested in this area, this study could serve as a foundation for new discoveries and insights.

1.7 Scope of the study

The study focused on identifying the factors that contribute to delays specifically to single Construction Project which is Bezuahyehu Engedawork Apartment Building Geographically confined to the city of Addis Ababa Bole Sub city. The survey will involve construction professionals directly associated in the project including the owner, contractor and consultant of the building. A total of 46 professionals will participate in the data collection process. The methodology pursued for the study is by collecting and adopting quantitative data by questioner method and literature reviews.

Relative Importance Index method was applied to analyze the data. This method, by its nature, doesn't reveals the exact amount of time that each cause contributed in the total delay time of the project. In this regard the study is limited to ranking of the causes of the delay by comparing their contribution with one another.

Generally, the study has both geographical and conceptual scope. Geographically, this study is limited to Bezuahyehu Engedawork Apartment Building construction project which is situated in Addis Ababa. Conceptually, this study focuses on the factors contributing to the delay of this construction

1.8 Limitations of the Study

Based on respondents' own experiences and opinions regarding delay factors and stakeholder organizations' duration, the questionnaire findings may contain some bias. Due to a variety of circumstances, including social desirability bias, in which respondents give answers they feel are pleasant or socially acceptable, respondents may give false or distorted information.

1.9 Organization of the study

The research is organized into five chapters. Chapter one is about introduction, Statement of the problem, research objectives and research questions, significance of the study, scope of the study and limitations of the study. Chapter Two is about literature reviews on topic of the study. Chapter Three is about research design and methodology, sources of data, and sampling technique, tools of data collection and data analysis. Chapter four is about discussion of the research. Chapter five is about summary of findings, conclusions and recommendations. The last pages of the paper contain appendixes of questionnaires, references and other annexed attachments of documents.

CHAPTER TWO: LITERATURE REVIEW

2.1 Theoretical Review

2.2 Project and Project Management

Project is a sequence of unique, complex, and connected activities that have one goal or purpose and that must be completed by a specific time, within budget, and according to specification. (Wysocki,.2014). Within a temporary team, collaboration between human and non-human resources is necessary to achieve a specific goal (PMI, 2017). Project consists of the following typical characteristics of a defined beginning and end. a specific, predefined goal or set of goals, a series of complex or interrelated activities and a limited budget. Implementation of a project is the step where all the proper planned activities are put into action (Kerzner,2009).

The success of a project is measured in terms of three main criteria-cost, time and scope. Scope is defined as what a project is trying to achieve and accomplish. The whole amount of funds allocated for the project, including all funds allotted and project-related charges, is known as the cost. Time or schedule refers a period of time that a project must be completed within; it is also known as a deadline. Time is an interesting resource in that it can't be inventoried. It is consumed whether it is used or not. Therefore, the objective of the project manager is to maximize the remaining time allocated to the project in order to maximize its effectiveness and productivity. Once a project has begun, the prime resource available to the project manager to keep the project on schedule or get it back on schedule is time (Wysocki, 2014).

2.3 Project Management Knowledge Areas

According to PMI (2017), project management is the process of applying tools, techniques, knowledge, and skills to project activities in order to meet project requirements. The proper application and integration of the project management processes results in the successful completion of the project. It makes it possible for businesses to carry out projects successfully and economically. When work is completed later than anticipated, it is referred to as a project implementation delay (Bentator & Thorn, 2003). Accordingly, of the ten knowledge domains listed by PMI (2017), the knowledge area of schedule management is pertinent to the subject of the procedures needed to complete projects on time. Project management knowledge area is defined by its knowledge requirements and is defined by PMI (2017) as an identified area of project management that is explained in terms of its component processes, practices, inputs, tools, and techniques. The following are the main ideas of project schedule management as

covered by PMI (2017): project scheduling offers a thorough plan that outlines how and when the project will deliver the goods, services, and outcomes outlined in the project scope. It also acts as a communication tool, controlling stakeholder expectations, and a foundation for performance reporting. According to PMI (2017), there are ten areas of knowledge that make up project management, and a project's life cycle is managed through the execution of a number of tasks known as project management processes. Using the proper project management tools and techniques, every project management process generates one or more outputs from one or more inputs. An outcome or a deliverable can be the output. A process's outcome is its final product. Project management procedures are universal in all sectors of the economy. The results that project management procedures generate logically connect them. Activities that overlap throughout a project may be found in processes. A process's output usually becomes a project's or project phase's deliverable or an input to another process. According to PMI (2017), the knowledge area of project schedule management includes the following five process groups:

a. Plan Schedule Management–The process of establishing the policies, procedures and documentations.
b. Define Activities: This refers to the process of determining and recording the precise steps that must be taken to complete the project deliverables.

c. Estimate Activity Duration: This method involves calculating how many work periods will be required to finish each activity using the estimated resources.

d. Develop Schedule: To create a project schedule model for monitoring and controlling project execution, a process of analyzing activity sequences, durations, resource requirements, and schedule constraints is carried out.

e. Control Schedule: This refers to the procedure of keeping an eye on the project's progress in order to update the schedule and handle adjustments to the baseline schedule.

2.4 Construction Projects

Construction projects present challenges in management and achieving success criteria due to the intricate and distinct characteristics of the industry. Factors such as a mobile workforce, deeply ingrained culture, diverse subcontractors and suppliers, and project-based structures contribute to this complexity (Okoye et al., 2015). Bentator Thumann (2003) states the necessity of thorough planning for timely

project completion in the construction sector, given its rapidly changing environmental conditions and substantial investments. Technical skill construction project managers may tend to drive them toward tasks like design, coordination, negotiation, and troubleshooting, planning demands a more reflective, long-term perspective. Planning, on the other hand, requires a more contemplative, long-term view of the project, and may encompass planning for activities that are not at hand in terms of when they will occur. Project management revolves around planning, organizing, directing, and controlling company resources to reach specific objectives within a short-term framework, as highlighted by Kerzner (2009). Businesses frequently employ project management to achieve unique objectives under tight time constraints with limited resources.

Although the focus on project-oriented assignments facilitates transparent authority allocation and accountability, project managers may still face difficulties in coordinating all activities to achieve project objectives in the absence of hierarchical authority. As Meredith & Mantel (2009) highlight, this organizational structure allows for responsiveness to clients and the environment, early issue identification and resolution, decision-making about competing project goals, and integrated task management for overall project success. Resource disputes between project managers and functional managers are common in the construction industry, as projects are contracted for by outside parties. The project sponsor is responsible for both functional and project managers and is a key player in conflict resolution. Projects run the risk of failing if the sponsor doesn't provide strong support According to Kerzner (2009), successful planning, organization, and control of projects to satisfy requirements depend on effective project management. On the other hand, Othman (2015) notes that poor project management on the part of owners or contractors may result in higher expenses and construction delays.

2.5 Delay and Delay Factors

In a construction industry, delay could be defined as a period of time that exceeds the specified completion date indicated in a contract or beyond the date that the parties agreed upon for delivery of a project. It is a project slipping over its planned schedule. According to (Meena. &Suresh, 2015) the delay in the project has a bad influence on project success in terms of time, money and quality. Hence by definition a delay factor in construction is anything that has a potential to create a construction delay. Sanders and Eagle (2001) define delay as an incident that causes extra time to accomplish all or

part of a project. (Faradi and El-Sayegh, 2006) states that Delay in building is a global phenomenon not only in construction industry but also the broader economy of the country as well. Delay entails numerous complex issues all of which are typically of crucial importance to the parties to construction contract. These concerns address entitlement to recover cost of delay or the necessity to extend the project with the consequence right to recovery expenses for adjustment to the contract schedules. Questions arise as to the causes of delay and the attribution of fault often evolves in to conflicts and litigation (Bolton, 1990). Braimah (2008) claimed that delayed completion of any project is often caused by the actions or inactions of the project participants including the contractors, consultants, owner or other (example the act of God).

2.6 Types of Delays

Trauner (2009) in his book of "Construction delays: documenting causes, winning claims, and recovering costs" briefly outlines forms of construction delays and the significance of having a knowledge of these delay types to delay analysts. According to him before any discussion of delay analysis can begin, a comprehensive understanding of the main forms of delays is important. There are four primary ways to characterize delays:

- Critical or noncritical
- Excusable or non-excusable
- Compensable or non-compensable
- Concurrent

2.6.1 Critical Versus Noncritical Delays

Any study of project delays should primarily concentrate on delays that have an impact on the project's overall progress (the project end date, also known as the milestone date) or that are essential to the project's completion. Nonetheless, a lot of delays happen but don't affect a milestone or the project's

completion date. Delays that have an impact on the project's completion or, in certain situations, a milestone date are classified as critical delays; noncritical delays are those that have no such impact. The following factors determine which activities actually control the project completion date:

- The Project itself
- The Contractor’s plan and schedule (particularly the critical path)
- The requirements of the Contract for sequence and phasing.
- The physical constraints of the Project.

2.6.1 Excusable Versus Non-Excusable Delays

2.6.1.1 Excusable Delays

Every delay can be justified or justified not to be. Generally speaking, a delay that results from an unforeseen circumstance outside of the Contractor's or Subcontractor's control is excused. Under standard general clauses found in public agency specifications, the following types of delays would often be excused:

1. General labor strikes
2. Fires
3. Flooding
4. Acts of God
5. Owner-directed changes
6. Errors and omissions in the plans and specifications
7. Differing site conditions or concealed conditions
8. Unusually severe weather
9. Lack of action by government bodies, such as building inspection

These conditions may be reasonably unforeseeable and not within the Contractor's control. Before the analyst concludes that a delay is excusable based solely on the preceding definitions, he or she must refer to the construction Contract documents. Decisions concerning delays must be made within the context of the specific Contract. The Contract should clearly define the factors that are considered valid delays to the Project that justify time extensions to the Contract completion date. For example, some contracts may not allow for any time extensions caused by weather conditions, regardless of how unusual, unexpected, or severe.

2.1.1.1 Non-Excusable Delays

Non-excusable delays are events that are within the Contractor's control or that are foreseeable. These are some examples of non-excusable delays:

1. Late performance of Subcontractors
2. Untimely performance by suppliers
3. Faulty workmanship by the Contractor or Subcontractors
4. A Project-specific labor strike caused by either the Contractor's unwillingness to meet with labor representatives or by unfair labor practices.

Once more, the Contract is the governing document that establishes whether or not a delay is deemed unjustifiable. Certain contracts, for instance, excuse supplier delays if the contractor can demonstrate that items were ordered or requisitioned on time, but delivery of the materials was impeded by events outside the contractor's control. Such delays may not be permitted under other contracts. It is imperative that the Owner and the Designer/drafter of the contract requirements ensure that the contract documents are explicit and straightforward. In a similar vein, the Contractor should be completely aware of what constitutes an excused and non-excusable delay before signing the Contract.

2.7 Construction Project Delay Factors and Their Classification

Factors contributing to construction project delays are those that make a project take longer than expected. Construction project delays can be attributed to a number of issues. These include elements arising from the physical, social, and economic surroundings as well as those inherent in the technology

and its administration. The classification scheme for these factors is primarily determined by the analysts' research goals. The analyst arranges these factors in a way that, in his or her opinion, will best explain the study's conclusions (Ghasemzadeh, 2014). As per Assaf and Hejji construction project delay factors can be classified based on the cause groups of the delay factors. Assaf and Hejji has classified delay factors in to nine cause groups or categories (Assaf and Hejji, 2005). Some of them are outlined here below:

2.7.1 Consultant Related Delay Factors

Numerous research studies have found that consultant-related delays are significantly impacted by incomplete drawings, delayed instructions, and insufficient supervision. According to Al- Khalil and Al-Ghafly (1999), the main reason for the delay was the consultant's insufficient site supervision. According to Al-Kharashi and Skitmore (2009), it is crucial that significant modifications in the scope of work be approved slowly, that the consultant has insufficient expertise, and that design documents be reviewed promptly. In a different study, Arditi (1985) determined that insufficient site inspection and design work delays were the primary reasons for consultant-related delays. Assaf and Hejji (2005) determined the following consultant-related delay factors: delay in the consultant's inspection and testing; delay in the consultant's approval of significant changes to the scope of work, the rigidity and inflexibility of the consultant, the poor coordination and communication between the consultant and other parties, the lack of expertise of the consultant, the disagreements that arise between the consultant and the design engineer, and the late assessment and approval of the design documents by the consultant. According to Assaf (2006), key design flaws include changes in types and specifications during construction, inadequate communication between the owner and consultant during the design stage, and mistakes made by designers. Chan and Kumaraswamy (1997) noted errors and inconsistencies in design papers, insufficient experience for the design team, and delays in the delivery of design information. ElRazek (2008) came to the conclusion in a different study that delays were caused by changes in design during construction, modifications in material types and standards throughout construction, and mistakes made by designers as a consultant related factors. Faridi and El-Sayegh (2006) noted that incomplete drawings, specifications, and delayed drawing preparation and approval or paperwork and modifications to the drawings as causes of delays linked to the consultant. Gündüz (2013) noted insufficient communication and cooperation with other parties, as well as a delay in carrying out

inspection and testing conflicts between consultant and design engineer as the most significant in causing delays. Hemanta (2012) came to the conclusion that architects' resistance to change and their lack of commitment were two reasons contributing to delays in Indian construction projects. According to Iyer and Jha (2005), the main reasons for delays were the consultant's resistance to making timely decisions and the project's poor initial conception. Unexpected ground conditions, delays in design information, and required construction modifications were recognized by Kumaraswamy and Chan (1998) as major consultant-related delays. Ling and Hoi (2006) examined the causal factors in terms of technological hazards, such as failures in new technologies, estimating errors, and design failures. According to Olawale and Sun (2010), under consultant-related delays, reasons such as insufficient project length evaluation, differences in contract paperwork, and disagreements in contract and specification interpretation were highlighted. Under the consultant-related categories, Sambasivan and Soon (2007) cited contract management, drawing preparation and approval, quality assurance and control, and waiting for test and inspection approval as factors causing delays under the consultant related categories

2.7.2 Contractor Related Delay Factors

According to the research that is now available, effective project planning, the availability of supplies, machinery, and sufficient labor are essential success criteria for the construction of building. To evaluate their respective contributions to schedule delays in the construction sector, several studies have been conducted in those major important parameters. Financial challenges, equipment failure and maintenance issues, scheduling and planning issues, shortages of materials and equipment, slow mobilization, and a workforce shortfall were recognized by Aibinu and Odeyinka (2006) as the primary contributors to this group of delay factors. Al-Kharashi and Skitmore (2009) argue that inadequate technical staff qualification from the contractor, subpar site management and supervision, and challenges with project funding were crucial. Assaf and Al-Hejji (2006) listed the following as contractor-related delay factors: disagreements in the subcontractors' schedules, challenges in the contractor's ability to finance the project execution of project, rework due to errors during construction, conflicts between contractor and other parties (consultant and owner), poor site management and supervision by contractor, Poor contractor-to-party coordination and communication, inefficient project planning and scheduling, inappropriate construction techniques, inadequate contractor work, frequent subcontractor replacements due to subcontractors' inefficiency, inadequate technical staff

qualification, and delayed site mobilization are all examples of the contractor's shortcomings El-Razek (2008) noted that the main reasons for delays were the contractor's insufficient financial resources and the supplies' sluggish delivery under the contractor-related category, Faridi and El-Sayegh (2006) cited manpower shortages, subpar site supervision and management, and delayed material availability as the main reasons of delays. In a different study, Gündüz (2013) came to the conclusion that the following factors were highly ranked: insufficient contractor experience, inefficient project planning and scheduling, and subpar site administration and monitoring. Hemanta (2012) used factor analysis to determine that the use of outdated or inappropriate building methods, 18 delays in the supply of immaterial, and a lack of safety precautions had the greatest impact on construction site accidents. The peculiarities of the project activities requiring a high level of technical expertise, resource management, and labor strikes are factors that can create delays in the construction process. Poor site management and oversight, insufficient contractor expertise, and delays in the subcontractor's work were cited by Kumaraswamy and Chan (1998) as the main causes of delay. The vulnerability of Singaporean companies doing construction projects in India was evaluated by Ling and Hoi (2006) in a different study. They looked at economic risks, such as labor, material, and equipment availability; financial risks, such as credit rating, capital supply, and cash flow; managerial risks, such as productivity, quality assurance, cost control, and human resource management; and technical risks, such as equipment and system failure, collision, and accidents. According to numerous studies, one of the main components of contractor-related delays that has greatly contributed to the causes of schedule delays in construction projects is material-related delay factors. Assaf and Al-Hejji (2006) determined the following materialrelated delay factors: market scarcity of building supplies, Changes in material types and specifications during construction, material delivery delays, damaged sorted materials when they were urgently needed, manufacturing delays for unusual building materials, delayed material procurement, and delayed finishing material choices because there were so many options available on the market. Other researchers evaluated the impact of equipment-related characteristics in contributing to contractor delay factors and the way in which they cause schedule delays in construction projects. Assaf & AlHejji (2006) listed the following as causes of delays: low productivity and efficiency of equipment, absence of high-tech mechanical equipment, equipment breakdowns, shortage of equipment, and low level of equipment operator's skill as a contractor related delay factors.

2.7.4. Client Related Delay Factors

Owner-related delay factors have been found in several studies to be the cause of timetable delays. Aibinu and Odeyinka (2006) came to the conclusion that clients' sluggish decision-making, variation orders, and cash flow issues were crucial. Hemanta (2012) noted in a different study that owners' delayed decision-making and the absence of incentives for contractors to finish early were crucial. According to Al-Kharashi and Skitmore (2009) that the two factors contributing most to delays were the owner's sluggish decision-making and a lack of funding to finish the task. The biggest effects, according to Arditi (1985), were frequent change orders and delays in contractor payments. Delays in progress payments were one of the owner-related delay factors that Assaf and Al-Hejji (2006) highlighted. Assaf and Al-Hejji (2006) identified the following as owner-related delay factors: slow decision-making by the owner, conflicts between joint ownership of the project, lack of incentives for contractor to finish ahead of schedule, owner-issued change orders during construction, late revision and approval of design documents, poor communication and coordination by the owner and other parties, slowness in decision-making by the owner, and suspension of work by the owner. Assaf (1995) determined that the primary causes of intermittent halt of work in this category were difficulties with cash flow and delays in paying the contractor for progress. In 1997, the three main factors that Chan and Kumaraswamy (1997) identified were slow decision-making, client-imposed unrealistic contract durations, and client-initiated modifications. El-Razek (2008) found that sluggish decision-making and delays in collecting payments to contractors were the main sources of delays. Slowness in the owner's decision-making process and modifications to the materials type and specification made by the owner during construction have been recognized by Faridi and El-Sayegh (2006) as contributing factors to causes of delay under this class. According to Gündüz et al. (2013), the three most important variables in this category were sluggish decision-making, change orders, and site delivery delays. Hemanta (2012) found that unrealistic time schedules imposed in contracts and the owner's sluggish decisionmaking were the main reasons of delays in a different study. The factors that Iyer and Jha (2005) determined to be the client's hurry while releasing tenders, the vested interest of the client's representative in not completing the project on time, and the project completion date that was mentioned but not yet planned are the main causes under this category. Client-initiated modifications were found by Kumaraswamy and Chan (1998) to be a significant cause of delay in a different investigation. Under the client-related category, Lo (2006) found that the primary cause of delay was

the element of unrealistic contract duration. Mansfield (1994) determined that the primary reasons of delays were the client's design modifications, financial considerations, and payment for finished work. According to Nkado (1995), the primary causes include the predetermined order of completion, the importance of construction schedule, financial capability, and potential modifications to the original plan as the primary reasons for the delays in this category. Olawale and Sun (2010) determined that the primary reasons of delays were client-initiated design modifications, as well as funding and payment for finished work. Under the customer-related category, Sambasivan and Soon (2007) cited owner interference, sluggish decision-making, and inadequate client financing and payments for completed activities as major client related causes of delays.

2.7.5. External Related Delay Factors

Numerous research works have recognized the category of externally connected delay factors as one of the primary reasons of schedule delays in building projects. Aibinu and Odeyinka (2006) noted that a number of key factors included price increases, bad weather, labor conflicts and strikes, government rules, government delays in granting permits, civil unrest, and acts of God. In a different study, Aibinu and Odeyinka (2006) identified the most important reason for delay as the inability to secure work permits from the appropriate authorities. Unfavorable weather conditions were found by Arditi (1985) to be the main reason for delays connected to external factors. The effects of subsurface conditions (such as soil, high water table, etc.), the time it takes to get permits from the municipality, the impact of hot weather on building activities, and the influence of rain were noted by Assaf and Al-Hejji (2006) as the external associated delay factors.

Assaf and Al-Hejji (2006) listed the following as external related delay factors: variances in site (ground) conditions, changes in government regulations and laws, effects of subsurface conditions (e.g., soil, high water table, etc.), delays in obtaining permits from municipalities, the effect of hot weather and rain on construction activities, the unavailability of utilities in the site (e.g., water, electricity, telephone, etc.), the effect of social and cultural factors, traffic control and restriction at the job site, accidents during construction, and variations in site (ground) conditions. Moreover, Assaf & Al-Hejji (2006) also noted that delays were caused by legal battles, ineffective delay fines, a lack of building materials on the market, and a delay in the production of unique building materials. Unexpected ground conditions and a protracted waiting period for drawing approval were noted by

Chan & Kumaraswamy (1997) as crucial issues. El-Razek (2008) pointed to bad weather as a major factor. Unfavorable weather and subsurface soil conditions were found to be contributing reasons to delays by Faridi and El-Sayegh (2006). According to a study by Hemanta (2012), delays were mostly caused by severe weather and securing approval from local authorities. Iyer and Jha (2005) found in a different study that the site's severe climate, the unfavorable political and economic climate, and the unfavorable social climate were the main causes of delays. Unfavorable weather conditions were noted by Kumaraswamy and Chan (1998) as a factor contributing to delays. Ling and Hoi (2006) evaluated the risks associated with external delays, taking into account both natural (weather and geological systems) and political (war, civil unrest, and labor relations acts that impede project advancement).

2.8. Empirical Review

Numerous studies have looked into what might be holding up construction projects delay. Shambel and Patel (2018) conducted a study recently to evaluate the time and cost overrun system currently in place and to determine the variables influencing time and cost overruns during Addis Ababa Road development. The study was conducted using historical data on Ethiopian road projects that have been completed as well as a thorough assessment of the literature. The study's conclusions showed that none of the projects were finished on schedule or within the estimated cost and no appreciable progress has been made over time to address issues with project delay concerns. The study also found that financial issues, poor planning, delayed site acquisition and construction, design modifications, insufficient material and equipment delivery from contractors, and incomplete design are the primary causes of delay and expense overruns in road projects.

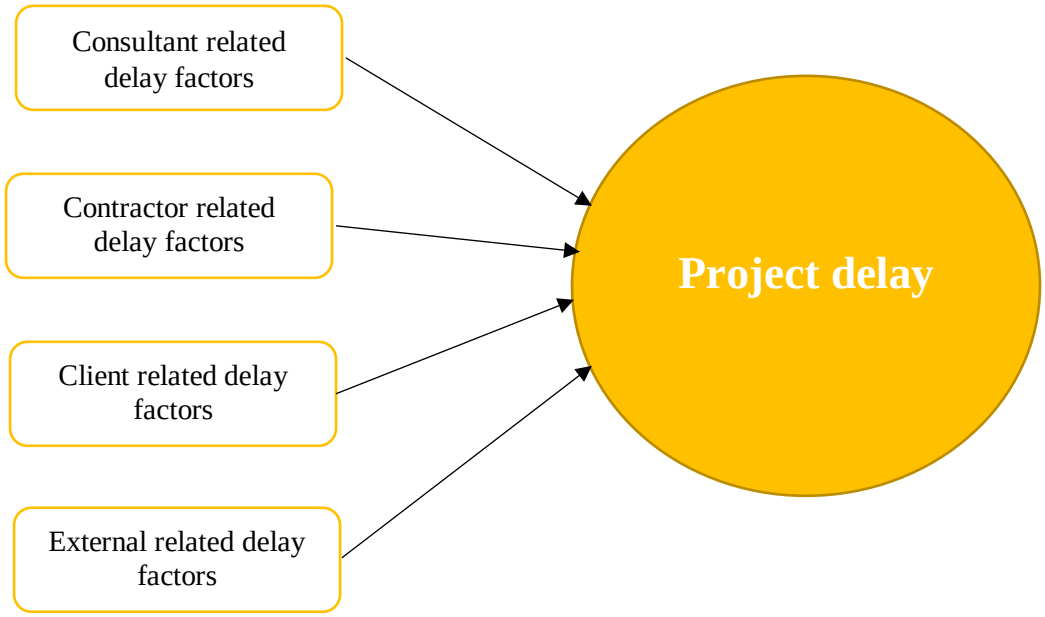
Tadesse, Dakhli, and Lafha (2016) conducted research to evaluate the effectiveness and difficulties of Ethiopian construction delay through the use of questionnaires and literature reviews in the construction sector. The study also showed that the majority of emerging nations face comparable delays in development projects. The study showed that these national levels of construction project management practice were inadequate in terms of implementing generic project management procedures, functions, tools, and techniques. It was discovered that there was notably very little practice when it came to safety, risk, and time management. In terms of difficulties, the study found that professionals face the most difficulties in managing their daily operations when it comes to time, expense, and risk management. Additionally, Werku & Jha (2016) conducted study to examine the reasons behind delays in Ethiopia's construction sectors. Their findings indicate that construction project delays are the primary causes of

project failure. The study's findings indicate that the following are the primary critical factors that contribute to construction delays in Ethiopia: (1) Contractor financing difficulties; (2) material price escalation; (3) inadequate project planning; (4) scheduling or resource management issues; and (5) Late progress payments for finished work, (6) Insufficiently qualified personnel in the construction management field Hailemeskel (2013) did a study on the fluctuating labor availability from season to season. The study aimed to discover management project control challenges in Ethiopia's construction industry.

The study identified a number of significant issues facing the industry, such as a lack of both skilled and unskilled labor, inadequate equipment and tools, a lack of suitable regulations and guidelines, a weak institutional capacity to regulate the sector, and inadequate project management and control in the construction industry. Due to these difficulties, the industry has performed poorly, which has caused delays, cost overruns, and deliveries of subpar quality. Furthermore, unethical behavior and corruption among corporate players have made growth even more difficult because of to a lack in execution ability. In conclusion, inadequate implementation capability in terms of labor, supplies of materials and equipment, as well as organizational and systemic problems, are the primary challenges found.

The study advises policy makers to concentrate on strengthening the capabilities of regional construction contractors and consulting firms, boosting performance in the public and private sectors by putting management controls in place, and encouraging the use of innovative and cost-effective technologies and practices to support socioeconomic development initiatives. The report recommends creating an organization in charge of capacity building in the construction sector in order to boost industry performance to a level consistent with export standards creating and executing a national framework for the construction sector. Construction project delays have significant consequences and effects on all parties involved as well as society at large. Mukuka, Aigbavboa, and Thwala (2015) conducted a study to determine the effects of project schedule overrun in South Africa. The study found that the top ten effects of construction projects were: delays in receiving client profit; poor quality work resulting from rushing the project; client stress; acceleration losses; negative reputation with the contract team; and disputes.

2.9. Conceptual Framework



Source Elhaniash and Stević (2016)

Figure 1 Project Delay Factors

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design and Approach

This study used a cross-sectional, a Descriptive research design methodology by using both primary and secondary data. The Goal of Descriptive research design is to gather data in order to systematically describe an object, situation, or a population. A quantitative research approach was used in collecting information and data from the study population through field sources by using questionnaire survey method. A quantitative research enables a researcher to establish the characteristics of individual, situation or group by analyzing a data generated from samples of a population (Leedy. et al. 2005). As explained by Leedy et al. a quantitative approach involves the generation of data in quantitative form which could be subjected to accurate quantitative analysis in a proper and rigorous manner and in the form of a data base from which to realize characteristics or relationships.

The quantitative survey data was analyzed using statistical techniques like factor analysis and relative important index to determine the most significant factors of construction project delays.

3.2 Population and Sampling

3.2.1 Target Population

This research looked at the delay factors of building construction projects in Addis Ababa. As a result, the study focuses on Bizuayehu Engedawork Apartment Building project that is currently being built in Addis Ababa Bole sub city.

The population of this study was determined to be those workers of the three stakeholders whose job has a close tie with the construction of the project. Hence, those workers of the stakeholders who are working on or attending the works on the project were targeted as the population of the survey which Consists of 61 respondents that include 45 contractors, 9 consultants, 4 clients in the construction industry.

3.2.2 Sampling Techniques

The researcher selected a probability sampling technique which is a stratified sampling method was applied to divide the population in to three main participant stakeholders; the client, contractor and consultant and to determine the sample respondents from each group randomly for the survey.

In stratified sampling, a random sample is drawn from each subgroup after the population is split into strata, also known as subgroups. Natural groups of items are called subgroups. To mention a few, subgroups may be based on occupation, gender, or the size of the firm which in this case it's based on the stakeholder's participation on the project. When there is a lot of variance within a population, stratified sampling is frequently employed. Making ensuring that each stratum is fairly represented is its goal (Taherdoost, 2016).

3.2.3 Sample Size

The sample size was set by examining the stakeholder with the least number of representative in the population, the client in this case. As a result, 46 respondents in all were chosen at random from the expert community, with a representative sample from each stakeholder—the client, the contractor, and the consultant. The sample was checked using the sample size determination equation (Yamane, 1967) to see if it fell within the allowable error magnitude.

The following is Yamane's formula for estimating sample size:

$$\boldsymbol{n = \frac{N}{1+N(e)^2}}$$ _____ eq. 3.1

Where, N= Population

n= estimated sample size

e=level of precision (0.05)

3.3 Types of Data

3.3.1 Data Type

Quantitative data were collected from the questionnaire survey and from review of literatures to identify delay factors in construction projects. The quantitative data were used to describe prevalence of delay problem in construction projects. The data identified major factors from review of literatures contributing to delay of construction projects and to assess the contribution of main stake holder organizations to the identified delay factors.

3.3.2 Data Sources

Both primary and secondary data collecting devices were utilized to acquire information from relevant sources. Primary data are data generated by the researcher specifically for the goal of solving the study objectives. It is the information gathered by the researcher from the sample population. The primary data was collected from contractors, and consultants and client.

The primary data for this research survey were collected through self-administration using structured questionnaires to get direct, first-hand information from the respondents. Based on their judgment and work experiences, the respondents were given questionnaires to complete in order to get their thoughts and learn more about delays in building projects.

Secondary sources of data were gathered from journal reviews, publications, previous research efforts, and books official websites and other search engines.

3.4 Data Collection Method and Tools

The study used procedures of data collection instruments collected by survey of structured questionnaires from sample respondents. Respondents were given a questionnaire with closed-ended questions about the research problem. This is because the questionnaire is the most effective tool for reaching everyone in the sample.

3.4.1. Questionnaire

Based on a research of the literature, common delay causes were considered when designing the questionnaire survey. In total, 79 factors were examined in this study, which were categorized into four primary categories that have been linked to building delays. Delays resulting from external sources, contractors, consultants, and clients fall under these categories.

There are two sections in the questionnaire. The respondent's personal profile is covered in the first section, and a list of probable delay factors is presented in the second. The respondents were asked to rate the extent to which each delay issue has contributed to the project's delay. The listed factors was scaled using the 5-point Likert scale.

3.5 Data Analysis Methods

Prior to analysis, Responses were edited and filtered. Technical information was found through the use of descriptive statistics in the analysis of the data. The results of the data were presented using tables. The respondents' ratings for each component were input into the Statistic Package for Social Science (SPSS) software, which served as the work's guide. For more insight, the statistical analysis of the 39 questionnaire replies was conducted.

In an attempt to fulfill the study's goal, a Relative Importance Index (RII) was selected as an appropriate analytical method. This was carried out in order to assess the questionnaire ratings and ascertain the mean score point that corresponds to each group member's assessment. The RII formula in the equation below was used for each computation (Doloi et al., 2012).

$$RII = \frac{\sum W}{AN} \quad , (0 \leq \text{RII} \leq 1) \qquad \text{eq. 3.2}$$

Where:

- W – is the weight given to each factor by the respondents and ranges from 1 to 5, (where "1" is "strongly disagree" and "5" is "strongly agree");
- A – is the highest weight (i.e. 5 in this case) and;
- N – is the total number of respondents.

The RII value is 0< RII < 1.

Table 1 RII value interpretation

RII value	Importance level
From 0.8 to 1	High
From 0.6 to 0.8	High-Medium
From 0.4 to 0.6	Medium
From 0.2 to 0.4	Medium-Low
From 0 to 0.2	Low

The Spearman's correlation coefficient approach, which measures the strength of correlations, was used in the study to calculate the degree of agreement among the stakeholders on the delay factor rankings.

$$r_s = \frac{1-6\Sigma\, di^2}{n(n^2-1)}$$ _____ eq. 3.3

Where:

- rs= Spearman rank correlation coefficient
- di= Difference in ranking between two parties n = The number of variables

The spearman's correlation coefficient is by design constrained as follows -1 ≤ rs≤ 1 And its interpretation is that the closer the absolute value of rs to 1 the stronger the monotonic relationship. Correlation is an effect size and so we can verbally describe the strength of the correlation using the following guide for the absolute value of rs:

Table 2The spearman rank correlation coefficient value vs Strength of Relationship

Coefficient value	Strength of Relationship
0.00 - 0.19	"very weak"
0.20 - 0.39	"weak"
0.40 - 0.59	"moderate"
0.60 - 0.79	"strong"
0.80-1.0	"very strong"

In this study after respondents were regrouped according to the stakeholder they represent, the RII value given by representatives of each stakeholder for each delay factor was compared with one another in a one-tailed spearman's correlation on SPSS.

3.7 Validity and Reliability

To assess a scale's internal consistency reliability, three approaches can be utilized simultaneously: inter item correlations, Cronbach's alpha, and corrected item-total correlations. The Cronbach's Alpha method of checking reliability of data was used to test the reliability of the data collected through the questionnaire survey. Cronbach's alpha (α) must be at least 0.70 for all things found under the same construct to maintain internal consistency (Nunnal & Bernstei, 1994). According to Lance, Butts, and Michels (2006), however, this often quoted criterion may be misleading, and basic research should rely on scales that generate scores with a minimum reliability of 0.80.

Cronbach's alpha is calculated using the following formula:

$$\boldsymbol{\alpha} = K / (K -1) [1- (\sum \sigma k\ 2 / \sigma\ total2)])] \quad \text{eq. 3.4}$$

Where:

- K is the number of items
- $\sum \sigma k\ 2$ is the sum of the k item score variances, and

- σtotal 2 is the variance of scores on the total measurement

Table 3The Cronbach's alpha value vs Internal Consistency

Cronbach's alpha	Internal Consistency
α ≥0.9	Excellent
0.9>α ≥0.8	Good
0.8>α≥0.7	Acceptable
0.7>α≥0.6	Questionable
0.6>α≥0.5	Poor
0.5>α	Unacceptable

3.8 Ethical Considerations

The researcher guaranteed that the respondents and the stakeholders' client, consultant, and contractors understood the purpose and objective of the research. Regarding the raised awareness and the main purpose of the study which was for academics, there was no misunderstanding among the participants or responders. Additionally, they have received a guarantee about the privacy of their response. With this information in hand, the respondents gave their consent to participate in the study.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS INTERPRETATION

This chapter presents an analysis of the questionnaire survey data in order to address the research objectives. Microsoft Excel and SPSS were utilized for the data analysis. There are three main sections to the analysis. The respondent profiles and Data Reliability are covered in the first part. By organizing all of the data into several categories, the second section discusses delay factor rankings. The employers of the respondents, that is stakeholders were used to categorize the data (client, contractor or consultant). Each stakeholder's ranking of the 79 delay factors according to their weight or importance in relation to the project's delay has been presented.

4.2 Response Rate

A total of 46 questionnaires were distributed to potential respondents. Of which 3 questionnaires were not returned and 4 questionnaires were not properly answered. Hence response rate was:

$$RR = 39/46 * 100\%$$

$$= 84.78\%$$

Table 4 Questionnaires Response

Questionnaires Distributed	**Questionnaires Collected**	**Valid responses**	**Invalid responses**	**Rate of Responses**
46	43	39	4	84.78%

Source: survey data

4.3 Respondent's Profile

The background information of respondents has been assessed for both their professional back ground and their years of experiences as indicated in

Table 5Demographic information of the respondent in terms of job category, job position and work experience

			Educational background		**Work experience**			
organizations	No of respondents	Deploma	Bachelor's degree	Master's degree	0-5 yrs	5-10 yrs	10-15 yrs	>15 yrs
Client	4	2	2	-	1	-	3	-
contractor	34	11	18	5	19	4	5	6
consultant	8	-	4	4	-	6		2
total	39	13	24	9	20	10	8	8

Source: questionnaire

As can be seen in Table 5, the respondents possess the professional and educational backgrounds necessary to identify and explain the reasons behind construction project delays, which is necessary in order to address the study questions. Additionally, it shows that the respondents had a considerable amount of work experience in the construction industry, spanning up to 15 years. They are therefore thought to be knowledgeable on project-related concerns and variables that contribute to delays in the construction industry. Furthermore, the rankings of the 79 delay factors were revealed by displaying the entire set of data.

4.4. Reliability Check for Stakeholders and Overall

Data found from the questionnaire were checked for reliability using the Cronbach's correlation coefficient (Alpha) method. To assess the validity or applicability of the construction sector survey questionnaire, it was crucial to this study to use Cronbach's Alpha method to assess the validity of the data obtained (Cronbach, 1951). To do this, the following equation, Eq. 3.4, was used to determine Cronbach's Alpha (Cronbach, 1951):

$$\boldsymbol{\alpha} = K / (K-1)[1- (\sum \sigma k\, 2 / \sigma \text{ total}2)])]$$

The Cronbach's Alpha was calculated using SPSS Statistics Software, and the reliability coefficient was calculated to confirm the data's internal consistency.

Table 6 Cronbach's Alpha Values Chart

Reliability Statistics	
Cronbach's Alpha	Result
Cronbach's Alpha for Client	0.875
Cronbach's Alpha for Contractor	0.981
Cronbach's Alpha for Consultant	0.917
Cronbach's Alpha Overall	0.925

Source: survey data and SPSS output

Table 6. showed the SPSS result of the Cronbach's alpha calculated for the overall sample. Accordingly, the Cronbach's alpha of the data found from the overall were found to be 0.925. The alphas of the overall sample have already passed the minimum criteria of 0.7 alpha value. Hence in terms of reliability the data collected could be considered as reliable and were convenient for further analysis.

4.5 Data Analysis and Presentation

Delay Factors Affecting Building Construction Project Contractor-related variables, consultant-related factors, client-related factors, and external factors are the four basic kinds of factors that impact building projects. The Relative Importance Index (RII) was used to rank several elements that impact project timeline depending on their category.

4.5.1. Analysis of delay factors related to consultants

In Table 7, the results of survey analysis of factors of consultant- related delays are presented. From the point views of the respondents, Complexity of the project (RII 0.784), Insufficient data collection and survey before design (RII 0.764), Delay in assessing/evaluating major changes in the scope of work (RII 0.73) are the three most influential delay factors related to consultants, based on RII ranking.

The two factors with the least significant causes of delay under the consultant-related category has average level of contribution to construction delays. These include: Insufficient estimation of original contract duration (RII 0.452), and Unfavorable contract clauses (RII 0.446), respectively.

Table 7consultant related delay factors rank

\	Consultant related delay factors	Mean	RII	RANK
1	Complexity of the project	3.92	0.784	**1**
2	Insufficient data collection and survey before design	3.82	0.764	**2**
3	Delay in assessing/evaluating major changes in the scope of work	3.65	0.73	**3**
4	Inadequate project management assistance	3.49	0.698	**4**
5	Conflicts between consultants	3.46	0.692	**5**
6	Misunderstanding of owner's requirements	3.41	0.682	**6**
7	Delay in performing inspection and testing	3.39	0.678	**7**
8	Poor use of advanced design software	3.15	0.63	**8**
9	Delay in preparing interim payment certificates	2.95	0.59	**9**
10	Inadequate site investigation	2.90	0.58	**10**
11	Poor communication and coordination with other parties	2.90	0.58	**11**
12	Inadequate definition of substantial completion	2.52	0.504	**12**
13	Design errors made by designers	2.49	0.498	**13**
14	Unclear and inadequate details in drawings	2.46	0.492	**14**
15	Lack of experience of consultant in construction projects	2.46	0.492	**15**
16	Delay in reviewing and approving design changes	2.29	0.458	**16**
17	Insufficient estimation of original contract duration	2.26	0.452	**17**
18	Unfavorable contract clauses	2.23	0.446	**18**

Source: survey data

4.5.2 Analysis of delay factors related to Contractors

As shown in Table 8, Ineffective project planning and scheduling (RII 0.898), late delivery of materials (RII 0.868), and Slow mobilization of labor (RII 0.866) are the three most influential factors agreed upon by the respondents as the major causes of project delays related to contractors.

Similar to the consultant-related delay category, the level of contribution of the following factors to construction delays is rated to be Average; Inappropriate construction methods (RII 0.482), Poor procurement of construction materials (RII 0.448), and Shortage of equipment (RII 0.432), the three factors are the least significant causes of delay related to contractor, respectively

Table 8contractor related delay factors rank

	Contractor related delay factors	Mean	RII	RANK
1	Ineffective project planning and scheduling	4.49	0.898	1
2	Late delivery of materials	4.34	0.868	2
3	Slow mobilization of labor	4.33	0.866	3
4	Unqualified / inadequate experienced labor	4.31	0.862	4
5	Contractors Poor communication and coordination with other parties	4.16	0.832	5
6	Poor quality of construction materials	3.95	0.79	6
7	Absenteeism	3.92	0.784	7
8	Improper equipment	3.90	0.78	8
9	Frequent equipment breakdowns	3.90	0.78	9
10	Personal conflicts among labor	3.72	0.744	10
11	Shortage of labor	3.60	0.72	11
12	Incompetent project team	3.36	0.672	12
13	Financial indiscipline/dishonesty	3.36	0.672	13
14	Low motivation and morale of labor	3.31	0.662	14
15	Low efficiency of equipment	3.31	0.662	15
16	Damage of materials	3.31	0.662	16

17	Slow mobilization of equipment	3.18	0.636	17
18	Strike	3.05	0.61	18
19	Poor site management and supervision	3.03	0.606	19
20	Obsolete technology	2.93	0.586	20
21	Rework due to errors	2.83	0.566	21
22	Inadequate contractor experience	2.80	0.56	22
23	Low productivity of labor	2.77	0.554	23
24	Subcontractor turn-over	2.69	0.538	24
25	Unreliable subcontractors	2.44	0.488	25
26	Inappropriate construction methods	2.41	0.482	26
27	Poor procurement of construction materials	2.24	0.448	27
28	Shortage of equipment	2.16	0.432	28

Source: survey data

4.5.3 Analysis of delay factors related to Client

Table 9 presents the results of the survey analysis of delay factors related to clients/owners. Regarding the most significant client-related factor, Table 4.7 shows that delay in Delay in payments (RII 0.908) is the most preferred causes in terms of the level of contribution to project delay, as perceived by the respondents. Besides that, intermittent stoppage of work due to cash flow constraints (RII 0.872) is ranked second in this category while Lack of experience of owner in construction projects (RII 0.826) is ranked third.

Respondents ranked, Delay in payments (RII 0.908) as the first most significant client-related cause of delay in construction projects with a very high level of contribution to construction delay

Table 9 Client related delay factors rank

	Client related delay factors	Mean	RII	RANK
1	Delay in payments	4.54	0.908	**1**
2	Intermittent stoppage of work due to cash flow constraints	4.36	0.872	**2**
3	Lack of experience of owner in construction projects	4.13	0.826	**3**
4	Slowness in decision making	4.03	0.806	**4**

5	Change orders	4.00	0.8	**5**
6	Changes in material types and specifications during construction	3.90	0.78	**6**
7	Client Poor communication and coordination with other parties	3.90	0.78	**7**
8	Lack of incentives for contractor to finish ahead of schedule	3.67	0.734	**8**
9	Lack of capable representative	3.44	0.688	**9**
10	Delay in approving design documents	3.13	0.626	**10**
11	Delay in site delivery	3.08	0.616	**11**
12	Design changes by owner or his agent during construction	3.05	0.61	**12**
13	Corruption tendencies	3.05	0.61	**13**
14	Inadequate information during project feasibility study	2.67	0.534	**14**
15	Conflicts between joint-owners	2.51	0.502	**15**

Source: survey data

4.5.4 Analysis of delay factors related to External factors

As depicted in Table 10, Unfavorable weather conditions (RII 0.784), and Delay in obtaining permits from local authority Ineffective delay penalties (RII 0.764) are the two most influential delay factors related to external factor, based on the point views of the respondents. Similar to the other delay categories, Unreliable suppliers (RII 0.446) as the least contributing factor among the external factors-related delay factors has average level of contribution to construction delays.

Table 10 External delay factors rank

	External delay factors	Mean	RII	RANK
1	Unfavorable weather conditions	3.92	0.784	1
2	Delay in obtaining permits from local authority	3.82	0.764	2
3	Conflict, war, and public enemy	3.65	0.73	3

4	Geopolitical and regional stability	3.49	0.698	4
5	Changes in government regulations and laws	3.46	0.692	5
6	Natural disasters (flood, hurricane, earthquake)	3.41	0.682	6
7	Delay in manufacturing materials	3.39	0.678	7
8	Problem with neighbors	3.15	0.63	8
9	Ineffective delay penalties	2.95	0.59	9
10	Global financial crisis	2.90	0.58	10
11	Price fluctuations on the international market	2.90	0.58	11
12	Escalation of local material prices	2.52	0.504	12
13	Environmental and social factors	2.49	0.498	13
14	Accidents during construction	2.46	0.492	14
15	Loss of time by traffic control and restriction at project site	2.46	0.492	15
16	Delay in providing services from utilities (such as water, electricity)	2.29	0.458	16
17	Legal disputes between project participants	2.26	0.452	17
18	Unreliable suppliers	2.23	0.446	18

Source: survey data

4.6 Ranking of the top 10 major factors contributing to construction delays

Based on the RII ranking of the 79 identified delay factors, it was possible to assess the most significant factors that influence construction project delays in the study case. It can be noticed from the table that among the factors that made the top ten list of factors causing delays in construction projects in Ethiopia, five factors are related to contractors, also five are related to clients. Consultants factor delay and external factor-related delay all shared the remaining factors.

Table 11 Overall delay factors rank

NO	OVERALL DELAY FACTORS	Mean	RII	RANK	Category
1.	Delay in payments	4.54	0.908	**1**	**Client**
2.	Ineffective project planning and scheduling	4.49	0.898	**2**	**Contractor**
3.	Intermittent stoppage of work due to cash flow constraints	4.36	0.872	**3**	**Client**
4.	Late delivery of materials	4.34	0.868	**4**	**Contractor**
5.	Slow mobilization of labor	4.33	0.866	**5**	**Contractor**
6.	Unqualified / inadequate experienced labor	4.31	0.862	**6**	**Contractor**
7.	Contractor Poor communication and coordination with other parties	4.16	0.832	**7**	**Contractor**
8.	Lack of experience of owner in construction projects	4.13	0.826	**8**	**Client**
9.	Slowness in decision making	4.03	0.806	**9**	**Client**
10.	Change orders	4.00	0.8	**10**	**Client**

Source: survey data

The researcher has deducted that the respondents result obtained from the client, contractor, consultant and the overall, which was processed through RII method using a 5 point Likert Scale rating. The following are some areas where other researcher's findings and this study are similar According to the empirical data the main reasons for delays were client-related issues such as modifications to the scope of work and late payments. This confirms that, in this context, clients have a considerable role in delays. Also studies highlighted recurring difficulties for local contractors by identifying contractor issues such insufficient planning, material shortages, and labor issues as significant causes. Even though the weather was given a higher ranking in this study, external variables like delays in approvals and weather-related damages were considered less important than other researches.

4.7 Measuring Correlations among Stakeholders' and Combined Delay Factors Ranking

Based on a Spearman's correlation analysis carried out with SPSS, Table 12 displays the correlation values and overall strength of link between each of the delay factor categories. The contractor-consultant factors (r=0.481) and client-contractor factors (r=0.491) showed moderately positive correlations, suggesting some association but not a very strong linear relationship. The client-consultant factors showed a strong positive correlation (r=0.731), indicating a close relationship between their delays. The client factors were most strongly correlated (r=0.745, $p<0.01$) with the total combined value of all categories, followed by the extremely strongly correlated contractor-combined (r=0.852, $p<0.01$) and consultant-combined (r=0.824, $p<0.01$) factors. In summary, the correlation study revealed that, although all categories showed significant interrelationships, contractor performance seemed to have the largest impact with overall project delays. This reaffirms the significance of good contractor performance and management, as indicated by the earlier findings.

Table 12 Correlation between Stakeholders in Delay Factors Ranking

NO	**CORRELATION VARIABLES**	**CORRELATION VALUE**	**STRENGTH OF RELATIONSHIP**
1	Client Vs contractor	0.491	moderate
2	Client Vs Consultant	0.731	Strong
3	Contractor Vs Consultant	0.481	moderate
4	Client Vs Combined	0.745	strong
5	Contractor Vs Combined	0.852	Very strong

Source: SPSS Output

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary Findings

In this study report, the causes of the construction delays of the Apartment building "Bizuayehu Engdawerk 3B+G+16" in Addis Ababa are examined. The purpose of this study was to examine the contribution of delay factors on building construction project in Addis Ababa, so that suitable mitigation strategies may be implemented to mitigate the consequences of delay factors.

Literatures show that a number of factors cause delay to a project. The delay factors are not common for all projects in all countries. In this study all possible delay factors identified in the literature are listed and 79 factors expected to be related to the project under study are incorporated in questionnaire. The survey questionnaire was scaled using the 5-point Likert scale. Out of distributed 46 questionnaires, 39(84.78%) questionnaires were filled and returned. The internal consistency of the scale was tested and validated via Cronbach's alpha, which is found to be 0.925; confirmed that the internal consistency of the research design and the findings are reliable.

The computed RIIs served as a standard for evaluating all of the groups of delays, forming the foundation for defining the most relevant and inconsequential aspects in this context. According to the findings of the survey, the following are the top crucial delay factors in each category that were assessed to have the most significance influencing construction project delays in the study case. The study identified top factors contributing to construction delays, including consultant-related factors such as project complexity and insufficient data collection before design, contractor-related factors like ineffective project planning and scheduling, late delivery of materials, and slow labor mobilization, and client-related factors like delay in payments, intermittent stoppage of work due to cash flow constraints, and lack of owner's experience. External factors like unfavorable weather conditions and delay in obtaining permits were highlighted.

The study analyzed. Client-related issues, such as late payments and scope modifications, were identified as significant causes. Contractor issues, such as insufficient planning, material shortages, and labor issues, were also identified as significant causes. Weather was given a higher ranking, but external variables like delays in approvals and weather-related damages were considered less

important. A Spearman's correlation analysis showed moderately positive correlations between contractor-consultant and client-contractor factors, while client factors were most strongly correlated.

5.2 Conclusion

The purpose of this study was to determine and prioritize the primary contributing factors of construction project delays in case of Bizuayehu Engedawork Apartment Building from the viewpoints of consultants, contractors, and clients. Data on 79 potential delay factors in four categories (consultant, contractor, client, and external) were gathered through the administration of a standardized questionnaire survey. The Relative Importance Index technique was used to examine the outcomes.

The findings showed that Bizuayehu Engedawork Apartment Building project delay is originated from delayed payments from clients and problems with inadequate planning, material management, and labor performance from contractors accounted for the majority of the top ten delay factors. This highlights how important it is to have efficient client and contractor processes in place in order to reduce delays. The overall ranking of external factors was lower, but the effects of weather were still considered significant. When compared to earlier empirical research conducted in Ethiopia and around the world, the findings consistently pointed to the performance of the contractors and clients as the main causes of delay. Nonetheless, differences in particular factor rankings were noted, potentially as a result of contextual or temporal variances.

Stakeholders can gain insightful knowledge on important areas for reform from this research. To cut down on delays, clients and contractors should concentrate on improving financial management, planning, collaboration, and communication. Governments could provide assistance by enacting laws encouraging prompt payments and conflict resolution procedures.

The findings provide a strong basis and frame of reference for the Ethiopian construction industry's attempts to mitigate delays. Projects can be completed more quickly and economically for the benefit of the nation if all parties work hard to solve the main causes of delays.

5.3 Recommendation

In agreement with the research findings and in an effort to ensure that the management of delays in construction projects is appropriately improved, the following recommendations has been made.

- The clients should establish a mechanism to ensure timely payments to contractors in order to prevent delays brought on by financial problems.
- Clients should collaborate closely with other stakeholders to improve project site delivery timeliness
- Clients should ensure that proper planning and costing of the works is done during the pre-contract period to avoid intermittent stoppage of works due to funding proper project planning and scheduling is critical to timely project completion
- The Contractors must ensure adequate financial resources are available for timely completion of projects Contractors need to effectively manage material procurement by placing orders well in advance, maintaining buffer stocks, and exploring alternative sourcing in case of delays.
- Contractors must ensure that they have appropriate competence for the required assignment, that they deploy a competent project team, and that they apply suitable construction methods for the required work
- Contractors should ensure outstanding site management and supervision of the works in order to keep an eye on key activities, save costs by constantly working on reducing non-value adding processes, and execute projects on time and within.
- Contractors should develop detailed work schedules considering all project activities and dependencies.
- The consultants should ensure that proper site investigations are carried out both during the feasibility study and the conceptual design to guarantee that necessary procedures are taken during the detailed design to avoid work suspension during the construction phase to resolve design difficulties.
- Consultants should ensure that all design changes made throughout the course of the project are handled transparently.
- The stakeholders should improve client-contractor communication and cooperation to enable more seamless project execution and reduce delays. Regular monitoring and updating of schedules can help identify delays at an early stage and take corrective actions.
- Establishing a high-level project steering committee comprising client, consultant, and contractor representatives can help address issues collaboratively and expedite decision making.

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ANNEX -1

Addis Ababa University

School of Commerce

A questionnaire prepared to be filled by respondents from Bizuayehu Engedawork Apartment Building stakeholders.

Dear research participant;

My name is selam worku and I am carrying out a project work **Titled Factors contributing to construction project delays.** The information you provide is used for Academic research purpose only, and will be kept confidential at all levels. Considering your experience in project works, your participation in this survey will significantly contribute to the accuracy and usefulness of the research outcome. I appreciate taking your time to complete the survey. I kindly request you to remember that the quality of this work is completely dependent up on your frank opinions. Please consider each statement carefully before you give it an evaluation. If you have any query, please do not hesitate to contact me. I am available at your convenience through Tel. +251937886654.

Instruction: -

No need to mention your name (anonymous)

Part I: Demographic data/ Respondent Profile/

Please put tick mark (√) on your choice(s).

1. Please indicate your gender: ☐ Male ☐ Female
2. Age of respondents (year): ☐ 20-29 ☐ 30-39 ☐ 40-☐ 49 50 and above

3. Level of education: Certificate Diploma: ☐ BA/BSC ☐ MA/MSC
4. Job title..... ....
5. Work Experience: ☐ Less than 5 ☐ 6-10 years ☐ 11-15 years ☐ Over 15 years
6. Would you specify the project currently you worked on ----------?
7. Which organization do you represent?
   - ☐ Consultant
   - ☐ Contractor
   - Others (specify)

Part-II: Factors contributing to project Delay:

Instructions

The following are possible contributing delay factors for construction project gap taken from literature. From your experience, please express your opinion on the importance of the following delay factors in causing delay on your project. Please putting a tick (√) mark parallel to a number from 1 to 5 using the scale below. 1 = strongly disagree

2 = disagree

3 = undecided

4 = agree

5 = strongly agree

NO	ITEM	DEGREE OF RANK				
1	**CONSULTANT RELATED DELAY FACTORS**	**1**	**2**	**3**	**4**	**5**
1.01	Complexity of the project					
1.02	Conflicts between consultants					
1.03	Delay in assessing/evaluating major changes in the scope of work					
1.04	Delay in performing inspection and testing					
1.05	Delay in preparing interim payment certificates					
1.06	Delay in reviewing and approving design changes					

1.07	Design errors made by designers					
1.08	Inadequate definition of substantial completion					
1.09	Inadequate project management assistance					
1.1	Inadequate site investigation					
1.11	Insufficient estimation of original contract duration					
1.12	Lack of experience of consultant in construction projects					
1.13	Misunderstanding of owner's requirements					
1.14	Poor communication and coordination with other parties					
1.15	Poor use of advanced design software					
1.16	Unclear and inadequate details in drawings					
1.17	Unfavorable contract clauses					
1.18	Insufficient estimation of original contract duration					
NO	**ITEM**	**EGREE OF RANK**				
2	**CONTRACTOR RELATED DELAY FACTORS**	**1**	**2**	**3**	**4**	**5**
2.01	Absenteeism					
2.02	Damage of materials					
2.03	Financial indiscipline/dishonesty					
2.04	Frequent equipment breakdowns					
2.05	Improper equipment					
2.06	Inadequate contractor experience					
2.07	Inappropriate construction methods					
2.08	Incompetent project team					
2.09	Ineffective project planning and scheduling					
2.1	Late delivery of materials					
2.11	Low efficiency of equipment					
2.12	Low motivation and morale of labor					
2.13	Low productivity of labor					
2.14	Obsolete technology					
2.15	Personal conflicts among labor					

2.16	Poor communication and coordination with other parties					
2.17	Poor procurement of construction materials					
2.18	Poor quality of construction materials					
2.19	Poor site management and supervision					
2.2	Rework due to errors					
2.21	Shortage of equipment					

2.22	Shortage of labor					
2.23	Slow mobilization of equipment					
2.24	Slow mobilization of labor					
2.25	Strike					
2.26	Subcontractor turn-over					
2.27	Unqualified / inadequate experienced labor					
2.28	Unreliable subcontractors					
NO	**ITEM**	**DEGREE OF RANK**				
3	**CLIENT RELATED DELAY FACTORS**	**1**	**2**	**3**	**4**	**5**
3.01	Poor communication and coordination with other parties					
3.02	Changes in material types and specifications during construction					
3.03	Conflicts between joint-owners					
3.04	Corruption tendencies					
3.05	Delay in approving design documents					
3.06	Delay in payments					
3.07	Delay in site delivery					
3.08	Design changes by owner or his agent during construction					
3.09	Inadequate information during project feasibility study					
3.1	Intermittent stoppage of work due to cash flow constraints					
3.11	Lack of capable representative					
3.12	Lack of experience of owner in construction projects					
3.13	Lack of incentives for contractor to finish ahead of schedule					
3.14	Change orders					
3.15	Slowness in decision making					

NO	ITEM	DEGREE OF RANK				
4	**EXTERNAL RELATED DELAY FACTORS**	**1**	**2**	**3**	**4**	**5**
4.01	Unfavorable weather conditions					
4.02	Changes in government regulations and laws					
4.03	Conflict, war, and public enemy					
4.04	Delay in manufacturing materials					
4.05	Ineffective delay penalties					
4.06	Delay in providing services from utilities (such as water, electricity)					
4.07	Environmental and social factors					
4.08	Escalation of local material prices					
4.09	Geopolitical and regional stability					
4.1	Global financial crisis					
4.11	Delay in obtaining permits from local authority					
4.12	Legal disputes between project participants					
4.13	Loss of time by traffic control and restriction at project site					
4.14	Natural disasters (flood, hurricane, earthquake)					
4.15	Price fluctuations on the international market					
4.16	Problem with neighbors					
4.17	Accidents during construction					
4.18	Unreliable suppliers					
4.19	Unfavorable weather conditions					
4.2	Changes in government regulations and laws					

ANNEX 2

Elevation of Bizuayehu Engedawork 3B+G+15 Apartment Building