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CAUSES AND EFFECTS OF PROJECT DELAY ON BUILDING CONSTRUCTION PROJECTS: THE CASE OF ETHIOPIAN AIRLINE

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THE CAUSES AND EFFECTS OF PROJECT DELAY ON BUILDING CONSTRUCTION PROJECT: THE CASE OF ETHIOPIAN AIRLINE.

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A Thesis Submitted to The Department of Business Administration and Information Systems Presented in Partial Fulfillment of The Requirements for The Degree of Master of Arts in Project Management

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May 2026

DECLARATION

I certify that the thesis/dissertation titled “The causes and effects of project delay in building construction projects on the case of Ethiopian Airlines”, presented in partial fulfillment of the requirements for the degree of Master of Arts in (PM) Project Management, Addis Ababa University, is my own original work and has not been submitted to any other institution for the award of any degree or certificate. Any sources of assistance and support that may have been received during the process of this study have been properly credited.

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This is to certify that the thesis entitled The Causes and Effects of Project Delay in building construction projects on the case of Ethiopian Airlines, prepared by Melaku Tefera submitted for partial fulfilment of the requirements for the Degree of Master of Arts in Project management complies with the regulations of the University and meets the accepted standards with respect to Originality and quality.

Signed By Board of Examiners:

External Examiners Name	Signature	Date
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ABBREVIATION AND ACRONYMS

AFRAA	African Airlines Association
ANOVA	Analysis of Variance
CPI	Cost Performance Index
CPM	Critical Path Method
EAL	Ethiopian Airlines
EOT	Extension of Time
ETAG	Ethiopian Airlines Group
EV	Earned Value
IATA	International Air Transport Association
MRO	Maintenance, Repair and Overhaul
PMI	Project Management Institute
PV	Planned Value
SPSS	Statistical Package for Social Sciences
SPI	Schedule Performance Index
VIF	Variance Inflation Factor

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ABSTRACT

The construction sector plays a vital role in the development of the country's economy and infrastructure. But a construction project delay is a significant problem for project success. The main objective of this paper was to analyze the cause and effect of construction project delay with particular reference to Ethiopian Airlines. This study adopted a descriptive research design with a quantitative approach. The data were gathered from primary sources using structured questionnaires administered to Ethiopian Airlines employees, contractors, consultants, and other stakeholders in Ethiopian Airlines construction projects. The responses of 73 participants were examined using Statistical Package for Social Sciences (SPSS) to execute descriptive analysis, correlation analysis, and regression analysis. The analysis shows most common causes of project delays were contractor-related causes, client-related causes, consultant-related causes, shortage of materials, shortage of labor, and external causes such as inflation and regulatory delays. Contractor inefficiency, delayed decision-making, poor planning, shortage of materials, and financial constraints were the major causes of delay. The study further revealed that project delays lead to time overruns, cost overruns, disputes between stakeholders, productivity loss, and hinder organizational growth. It concluded that project delays in Ethiopian Airlines construction projects were affected by several interrelated factors that need to be managed holistically. This suggests that improving project planning, collaboration among stakeholders, timely payment of funds, and improving contractor performance are key factors to reduce delays and increase the success of projects.

Keywords: Project Delay, Construction Management, Ethiopian Airlines

CHAPTER ONE

1. INTRODUCTION

1.1. Background of Study

One of the most important factors of project success to clients, contractors, consultants and all stakeholders is the successful completion of construction projects within the planned time and budget. The success of achieving these objectives shows the effectiveness of project management practices and the satisfaction of all parties involved in the project (Luka and Muhammad, 2014; Nabil and Ibrahim, 2013; Abadir, 2011; Chabota et al., 2008).

But there are several restrictions that need to be surmounted to deliver the project as desired. Of these constraints, time and cost are regarded as the most important factors since they affect the quality and performance of the project. Projects can be completed efficiently and to the expected standard (ECIDP, 2014; Warszawski, 1996) if these factors can be effectively controlled.

This study was motivated by the fact that majority of existing studies on construction project delays in Ethiopia are dated, most of which were conducted over five years ago. Considering the ever-increasing growth of construction sector, more updated and current investigations are needed to reflect the current condition and problems of the sector (Ali and Kamaruzzaman, 2010; Azhar et al., 2008; Chabota et al., 2008; Nega, 2008).

Furthermore, most of the earlier research were performed out of the Ethiopian context, and mostly on parts of construction like road or building projects. This restricts their use to wider construction usage. In addition, certain studies have limited sample sizes, potentially limiting the results' reliability and generalizability. Other studies focus only on one stakeholder's point of view, e.g., contractor or consultant, and exclude the other stakeholders. Moreover, the existing work does not fully discuss the intensity of delay factors or a full analysis of the appropriate mitigation strategies. Thus, there is a lack of knowledge regarding the extent of the damage and possible solutions that can be implemented to deal with construction delays effectively (Luka and Muhammad, 2014; Ibrahim and Nabil, 2013; Mahamid and Amund, 2012; Abadir, 2011; Kamaruzzaman and Ali, 2010; Sun and Olawale, 2010; Chabota et al., 2008; Azhar et al., 2008).

Ethiopian Airlines (EAL) or simply Ethiopian is the national carrier of Ethiopia, with 100 percent government ownership. The airline was founded on 21 December 1945 and began operations on 8 April 1946 from Addis Ababa to Cairo via Asmara. Ethiopian Airlines has grown considerably over

the years, joining International Air Transport Association (IATA) in 1959 and the African Airlines Association (AFRAA) in 1968. In addition, the airline became a member of the Star Alliance network in December 2011, expanding its network's global reach and strategic alliances (Ethiopian Airlines, 2024).

Ethiopian Airlines is currently one of the largest airlines in Africa (Ethiopian Airlines, 2024) and operates from its hub at Bole International Airport, Addis Ababa, with an extensive network of routes to many passenger and cargo destinations around the world.

The Ethiopian Airlines (Ethiopian) has finished an 80-year journey of successful operation. Throughout the decades, the airline has been a leader in terms of technology, leadership, network expansion, and aviation mentoring in all aspects of the aviation business. Ethiopian is the most popular aviation group in Africa at the moment (Ethiopian Airlines, 2026).

The Ethiopian Airlines (EAL) has set itself on the path to become a top quality, safe, and customer-centric aviation group in Africa through its drive for growth and ambition to become one of the best in the continent. The airline also offers a variety of ancillary services such as aviation training, in-flight catering, maintenance, repair and overhaul (MRO) and ground handling services. The range of operations helps it achieve its strategic goal of growing its operations in the aviation business (Ethiopian Airlines, 2024).

Approximately 17,591 employees have been employed in the Ethiopian Airlines Group of which about 40% are female and 60% male (Ethiopian Airlines, 2024). The organization has been involved in the development, conversion and upkeep of different infrastructural facilities to sustain its operations and continuous growth in operation. In the last ten years, Ethiopian Airlines has completed over 42 projects, ranging in size and scope to improve its operational capacity (Ethiopian Airlines, 2024).

Ethiopian Airlines shows great potential in the aviation sector, with a strong focus on expansion and development. Despite the company's swift expansion, however, infrastructure development has become a growing need, causing management challenges and operational and managerial problems (Ethiopian Airlines, 2024).

The researcher observed and gathered information through organizational reports, and delays in the construction project completion were noted as one of the major constraints impacting the organization. The delays have hindered the timely delivery of the projects, and the immediate attention is required to help the airline's project development (Ethiopian Airlines, 2024).

Based on this, this research is designed to examine the factors causing the delays in Ethiopian Airlines construction projects from the client, contractor, consultant and other stakeholders' point of view. Moreover, the research aims to determine the mitigation measures for reducing these delays and enhancing the overall performance of the project.

1.2. Statement of the problem

Construction sector is widely recognized as critical determinant for country economic and infrastructure improvement. However, the successful delivery of construction projects remains a major challenge, particularly in achieving completion within the planned time and budget. Delays in construction projects are a persistent and global problem, often resulting in time overruns, cost escalation, and reduced project performance (Aziz & Abdel-Hakam, 2016; Gurumayum, 2025).

In many construction projects, the planned schedule does not match the actual completion time due to various interrelated factors. These factors may arise from contractors, clients, consultants, material supply systems, labor issues, and external conditions such as economic instability and regulatory changes (Zhasmukhambetova et al., 2025). When such challenges are not effectively managed, they negatively affect project performance and may lead to disputes, productivity loss, and financial inefficiency (Assaf & Al-Hejji, 2006).

Previous studies indicate that construction delays are influenced by several factors, including poor planning, financial constraints, material shortages, and weak coordination among stakeholders (Gurumayum, 2025). The results of empirical studies show that there are several interrelated factors affecting the delays in construction projects. Many of the problems that delay the construction work are identified and the delays are found to be complex as there are many parties involved in the construction process (Assaf and Al-Hejji, 2006).

In the Ethiopian context, construction delays are also widely observed and have become a major obstacle to project success. Studies show that delays occur at different stages of construction projects and significantly increase project duration and cost (Koshe & Jha, 2016). Key factors identified include financial problems, fluctuation in material prices, ineffective planning, and delays in payment (Koshe & Jha, 2016). Similarly, recent findings indicate that poor project management, shortage of construction inputs, and economic instability are major contributors to project delays in Ethiopia (Shedaga et al., 2024).

Though there has been a lot of research conducted on construction delays, the causes and consequences of the delays can differ depending on the project setting and organizational setting. This points to the need for exploring context-specific conditions on the project to account for unique project conditions (Assaf and Al-Hejji, 2006; Sambasivan and Soon, 2007).

In the case of Ethiopian Airlines Group, which has experienced rapid expansion and undertaken numerous construction projects, delays in project completion have become a critical concern that may affect organizational construction performance. Empirical evidence on project delays in the context of construction projects in Ethiopian Airlines is limited. This leaves stakeholders lacking a solid basis for determining which delays are the most significant and what measures they can take to alleviate them. This gap highlights the need for a context-specific investigation. Thus, the objectives of this study are to investigate the causes and effects of construction delays in Ethiopian Airlines Group projects to give practical suggestions and aiding to enhance the performance of the projects.

1.3. Research Questions

The study addressed the following research questions:

- What are the major factors that are contributing for delay of Ethiopian Airlines projects?
- What are the effects of construction Project delay in Ethiopian Airlines?
- What mitigation measures can be applied to address the cause of project delay?

1.4. Objectives of the study

1.4.1. General objectives

The general objective of this research is to analyze the cause and effects of construction project delays of Ethiopian Airlines.

1.4.2. Specific objectives

Specific objectives of the study will be:

- Examining the factors of Construction delays in Ethiopian Airlines.
- Determine the effects of delay in Ethiopian Airlines.
- Propose mitigation measures that can be minimize or eliminate construction delays for Ethiopian Airlines projects.

1.5. Significance of Study

This research aims to explore the reasons and consequences of delay in construction projects for Ethiopian Airlines Group to complete the work. The results will provide practical information which could be incorporated to enhance the planning and implementation of future projects. In addition, the study will ensure stakeholders, including clients, consultants and contractors, are provided with relevant information about delay factors and impacts.

This study also adds to the existing literature by providing information that can help researchers to make changes and redirect future studies, thus developing new insights to solve the problem and enhance the performance of construction projects within Ethiopian Airlines (EAL)group infrastructure planning and development.

The final aim of this paper lies in offering the construction industry practitioners the most important delay factors and helping them undertake right preventive or corrective measures to reduce delays. Despite the many studies that have been conducted with regards to time overruns in Ethiopia, there is need to study the factors that cause delays specifically in the context of Ethiopian Airlines, since delay factors vary depending on place, time and situation.

Thus, the specific study will identify the delay factors that exist in the study area by determining the greatest and most used delay factors in the study area. The research will also enable construction industry stakeholders to become aware of the causative factors and take preventive action to keep projects from delay. Lastly, the study will aim at bringing knowledge to the construction industry, in this instance, in the case of the Ethiopian Airlines.

1.6. Scope of the study

This study focused on selected building construction projects of Ethiopian Airlines Group in Addis Ababa, Ethiopia. For geographical reasons, other internal projects of the organization were not included. Being an experienced Airline with over 79 years of service, Ethiopian Airlines has a long history of construction projects, however, to ensure the relevance and accuracy of data, the study focused on construction projects that have taken place in the last ten years. The analysis does not include construction projects that were finished before 2015 because of time separation and/or differences in project conditions. In addition, while Ethiopian Airports Enterprise (EAE) was merged with Ethiopian Airlines, the present investigation does not include any construction project that was under EAE to ensure consistency in the scope of the investigation.

1.7. Study Limitations

During the period of this study time and budget constraints as regards how to carry out field observation. Some of the respondents in the data collection process may fail to give proper information and Some of the respondents who were employed in construction projects in the last five years may fail to give proper information and Some of the respondents who worked in construction projects in the past five years might not be available due to transfers, resignations, retirements or change in the organizational structure. Consequently, it may be difficult to get all the past personnel to provide full information.

1.8. Organizations of the study

This research paper comprises five (5) chapters. The introduction statement of the problem, explanation of the need for and importance of the study, research questions and research objectives, scope of the study and limitations of the research project are included in Chapter one. In the next chapter, published literature was reviewed to determine if there was any conceptual and empirical literature pertaining to the causes and effects of construction delays. The research design/approach, sources of data, target population, sampling technique and size of sample for the study, data collection and validation and reliability will be discussed in chapter three. Chapter four will analyze and interpret the data that was collected based on the results of the study on the causes and effects of the delay in the construction process.

Lastly, the findings of the study will be summarized in chapter five, conclusions and recommendations from the research study will be drawn, and recommendations will be made which will contribute to building construction projects' performance improvement in Ethiopian Airlines.

CHAPTER TWO
2. LITERATURE REVIEW

The construction industry plays a significant role in supporting economic growth and infrastructure development in both developed and developing countries. It contributes to employment creation, industrial expansion, and the provision of essential facilities such as buildings, transportation networks, and other public services. Despite its importance, the industry continues to face various challenges that affect project performance, among which construction delay is one of the most critical issues (Assaf & Al-Hejji, 2006).

Construction delays are widely recognized as a major problem that affects project efficiency and success, particularly in developing countries where resource limitations and management challenges are more pronounced. Delays in project completion often lead to increased project costs, reduced quality of outputs, and dissatisfaction among stakeholders (Koshe & Jha, 2016). These problems make delay management a key concern in construction project implementation.

In Ethiopia, the construction sector has experienced rapid growth due to increasing demand for infrastructure and development projects. However, timely completion of construction projects remains a major challenge. Previous studies in the Ethiopian context have identified factors such as inflation, delayed payments, weak site management practices, shortage of materials, and inefficient scheduling as significant contributors to project delays (Koshe & Jha, 2016; Shedaga et al., 2024). These delays negatively affect project cost, time performance, and stakeholder satisfaction.

Various theoretical perspectives have been used to explain construction delays and their impacts. The Iron Triangle concept highlights the interdependence of time, cost, and quality in project management, indicating that a change in one element affects the others. The Critical Path Method (CPM) is used to identify activities that directly influence project completion time, while Risk Management Theory emphasizes the need to manage uncertainties during project implementation. In addition, Stakeholder Theory underscores the importance of coordination and communication among project participants for achieving project objectives.

This chapter therefore reviews relevant concepts and theories related to construction delays. It focuses on definitions, types, causes, and effects of delays, as well as mitigation strategies,

supporting theories, empirical findings from previous studies, and the conceptual framework of the study.

2.1. Conceptual Review

The construction sector plays an important role in supporting national development through the provision of infrastructure and services required for economic and social activities. It contributes to employment opportunities and facilitates the development of facilities such as transportation systems, buildings, and public utilities. Despite its importance, the performance of construction projects is often affected by several challenges that limit the efficiency of project delivery, among which delay is considered one of the most critical issues (Assaf & Al-Hejji, 2006).

A construction project delay can be understood as a situation where project activities are not completed within the originally agreed schedule, resulting in an extension of the project completion time. Such delays can arise at any stage of the project and may disrupt the overall workflow of construction activities. As noted in previous studies, delays are associated with negative consequences, including increased project cost, reduced productivity, and dissatisfaction among stakeholders, which may eventually lead to disputes or financial losses (Koshe & Jha, 2016).

The occurrence of delays in construction projects is influenced by a combination of factors related to project management, resources, and the external environment. These factors may vary depending on the project context, but commonly include weaknesses in planning and scheduling, financial constraints, shortage of construction materials, labor-related challenges, and ineffective coordination among project participants (Shedaga et al., 2024). In addition, external conditions such as economic instability and market fluctuations may further affect project performance.

Understanding the key concepts of construction delays, including their causes, effects, and possible mitigation measures, is essential for improving project outcomes. A clear conceptual understanding enables project stakeholders to identify potential risks, apply appropriate management strategies, and enhance the likelihood of completing projects within the planned schedule and budget.

2.1.1. Definition of Construction Delay

All projects experience delays for a variety of reasons, including issues related to stakeholders in the project (e.g. owner, contractor, subcontractor, etc.) and/or events that occur outside of the control of the stakeholders involved in the project. Moreover, delay is regarded as one of the most important

factors impacting the performance of a construction project (PMI, 2017). Construction delay is when the actual construction of a project is slower than planned due to internal factors related to the stakeholders or due to external factors that cannot be controlled (Assaf and Al-Hejji 2006).

According to PMI (2017), the project schedule extension arises when an activity that is on a project critical path does not get completed in its scheduled time, which then leads to an overall project extended duration. Construction delay is also defined by Sambasivan and Soon (2007) as an extension of the time (time overrun) needed to finish the project either after the contract completion date or after the original schedule completion date. Construction delays can occur because of improvements by the contractor, changes by the owner, lack of materials, or unexpected events that are outside of one or more of the stakeholders' controls.

Finally, Construction delays are frequently complicated because they involve several stakeholders, so it is difficult to identify which party is responsible. Such delays are usually attributed to the dynamics between various stakeholders and a mix of internal and external factors impacting project performance (Assaf & Al-Hejji, 2006).

2.1.2. Types of Delay in Construction Projects

Construction delays may be classified according to the following: Nature of delays, Delay causes, and Delay effects on the project completion. Project stakeholders will find it beneficial to have insight into these classifications, since this will make it easier to identify responsibility and choose the corrective action. Assaf and Al-Hejji (2006) identified a number of types of construction delays: critical or non-critical delays, excusable or non-excusable delays, compensable or non-compensable delays, and concurrent or non-concurrent delays. These categories offer different angles on the impact of delays on projects and the roles of stakeholders.

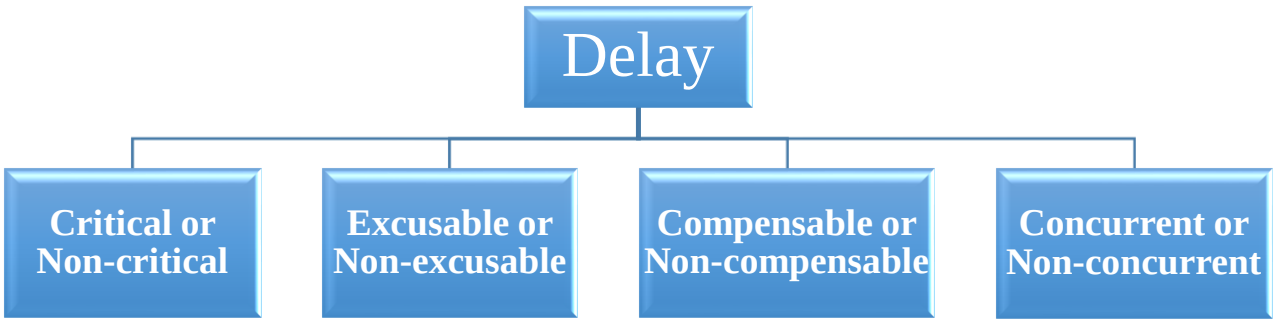


Figure 1： Types of Construction Project Delay

2.1.2.1. Critical or noncritical

Critical delays are those that directly affect the overall project completion time because they occur along the critical path of the project schedule. Any delay in these activities will result in an extension of the project duration. In contrast, non-critical delays occur in activities that have some scheduling flexibility and therefore do not immediately influence the final completion date (Assaf & Al-Hejji, 2006).

2.1.2.2.Excusable or non-excusable

Excusable delays refer to delays that arise from factors beyond the control of the contractor, such as adverse weather conditions, government actions, or unforeseen site conditions. In such cases, the contractor is typically granted additional time to complete the project. On the other hand, non-excusable delays are caused by the contractor due to issues such as poor planning, weak coordination, or inadequate resource management, and these may result in penalties or contractual consequences (Gurumayum, 2025).

2.1.2.3. Compensable or non-compensable

Delays can also be classified as compensable and non-compensable. Compensable delays occur when the delay is caused by the client or project owner, for example due to late payments or changes in project design, and the contractor is entitled to both time extension and financial compensation.

In contrast, non-compensable delays are caused by external factors beyond the control of both the contractor and the client, where only time extension is granted without financial compensation (Assaf & Al-Hejji, 2006).

2.1.2.4. Concurrent or non-concurrent

Another important classification is concurrent and non-concurrent delays. Concurrent delays occur when multiple delay events happen simultaneously, often involving different parties, making it difficult to assign responsibility. Non-concurrent delays occur independently and can be traced back to a specific cause or responsible party (Assaf & Al-Hejji, 2006).

2.1.3. Causes of Project Delays

Construction project delays are widely recognized as a common challenge affecting project delivery across the world. These delays often result in time overruns and increased project costs, which negatively affect the overall efficiency and financial performance of construction projects (IPMA, 2013).

The causes of construction delays are complex and usually arise from multiple sources. Several studies indicate that delays are associated with different project participants, including clients, contractors, and consultants. For example, Assaf and Al-Hejji (2006) identified numerous delay factors and highlighted that construction delays are influenced by managerial, financial, and technical issues among project stakeholders.

Poor coordination, unclear procedures, and slow decision-making processes are also important contributors to delays. Wateno (2015) found that ineffective communication among stakeholders, unnecessary work interruptions, and delays in decision-making significantly affect project progress.

Construction delays also involve financial risks. According to Ndekugri (2007), delays can reduce expected returns and negatively affect project profitability, especially when project income depends on timely completion. Delays may increase operational costs and reduce the financial benefits expected from the project.

Studies conducted in different regions further confirm that delay is a global issue. Shaikh (2009) reported that many construction projects in the Middle East experience delays due to unrealistic planning, lack of risk management, shortage of skilled labor, and inaccurate cost and time estimation.

In the Ethiopian context, construction delays are particularly significant. Koshe and Jha (2016) identified major causes such as financial constraints, fluctuation in material prices, ineffective planning, shortage of skilled labor, and delays in payments. Similarly, Gebrehiwet and Luo (2017)

found that delays are influenced by inflation, corruption, poor site management, late material delivery, and weak project planning practices.

Overall, construction delays are caused by a combination of managerial, financial, technical, and external factors. These factors are often interrelated and can significantly affect project performance if not effectively managed. Therefore, understanding the causes of delays is essential for improving project planning and achieving timely completion of construction projects.

2.1.4. Effects of project delays

Project delay has significant impacts on the overall performance of projects, particularly in relation to time and cost. One of the most common consequences of delays is the occurrence of time overruns and cost escalation, which reduces the efficiency and effectiveness of project delivery. In the African construction industry, delays are associated with several adverse outcomes, including material wastage, underutilization of manpower, reduced profitability, and increased operational expenses (Khair et al., 2016; Nyoni, 2018).

Empirical evidence from the Nigerian construction industry also supports these findings. Aibinu and Jagboro (2002) identified several key effects of construction delays, including time overruns, cost overruns, disputes, negotiation issues, project abandonment, and litigation. These effects highlight the serious implications of delays on project delivery and stakeholder relationships.

Numerous research papers have analyzed how construction delays affect projects; one example that proves how significant these effects can be is the research conducted by Aibinu & Jagboro (2002) to determine some of the major effects of construction delay within the Nigerian construction industry. Among others, they found that construction delays caused the following negative consequences: time overrun, cost overrun, dispute, Negotiation, total abandonment and Litigation all about construction related activities.

Construction delays can have other impacts on project results, in addition to the time and cost impacts. Sunjka and Jacob (2013) noted that delays can cause a decrease in construction standards and impacting the organization's reputation. This is evidence to show that delay impacts more than just financial and scheduling performance.

A. Time overruns

Time overrun is considered one of the most direct and visible consequences of construction delays. It occurs when a construction project exceeds its planned or contractual completion time. Delays in project activities lead to the extension of the overall project schedule, which negatively affects project performance. Aibinu and Jagboro (2002) emphasize that delays have a direct impact on prolonging project completion beyond the agreed contractual deadline, making time overrun one of the most critical effects of delays.

Similarly, Assaf and Al-Hejji (2006) highlight that schedule slippage is one of the most significant challenges faced in construction projects worldwide. Their study indicates that most projects experience delays due to various internal and external factors, leading to extended completion times. In addition, Sambasivan and Soon (2007) note that time overruns are often interconnected with other problems such as cost escalation and contractual disputes, further complicating project management.

To measure project schedule performance, the Project Management Body of Knowledge (PMBOK, 2013) introduces the Schedule Performance Index (SPI), which evaluates time efficiency in project execution. SPI is calculated using the ratio of earned value to planned value as shown below:

Equation: $SPI = \frac{EV}{PV}$

Where

- Earned Value (EV) – the value of work that is actually completed within a given time.
- Planned Value (PV) – the value of work that is planned to be completed by the same time.

If SPI < 1.0, less work was completed than planned

If SPI > 1.0, more work was completed than planned

If SPI = 1.0, project completed on schedule (Roger, 2008)

B. Cost Overrun

Another significant impact closely related to the time delays is cost overrun. Aibinu and Jagboro (2002) pointed out that the longer a project takes the more the labor, material and overhead expenses incurred. It is also confirmed by Flyvbjerg, Holm, and Buhl (2003) who state that the cost escalation problem is a structural problem in construction projects, which can be attributed to the long duration of the projects and inaccurate forecasting of the projects cost. This trade-off time/cost is thus a well-known fact in the theory of project management.

Cost Performance Index (CPI) is a commonly used project management tool to assess cost efficiency. It is the ratio of earned value to actual cost, which is a measure of how well the project's resources are being used compared to the budget (PMI, 2013).

Equation: $CPI = \frac{EV}{AC}$

Where

- Earned Value (EV) the value of work that is completed within a given time.
- Actual cost (AC) the actual amount of cost that incurred for the completion of the work.

If $CPI < 1.0$, then there has been cost overrun for the finished job.

If $CPI > 1.0$, cost under run of performance to date.

If $CPI = 1.0$, the project is finished within the allocated budget.

Cost overrun is one of the biggest challenges in construction projects and is a key element of the project management 'iron triangle' along with time and scope. When the cost is overspent, it can adversely affect project balance and impact project scope and quality performance (PMI, 2013).

C. Disputes

Disputes appear as a natural consequence of conflicting interpretations of responsibility for delay. Aibinu and Jagboro (2002) reported that one of the major consequences in Nigerian construction industry is disputes especially when accountability is not distinguishable. This aligns with Fugar and Agyakwah-Baah (2010) who found that inadequate communication and contractual ambiguity are some of the triggers in delayed projects. Therefore, conflicts can not only be attributed to delay, but to also signify poor contractual governance.

D. Negotiation

Resolving emerging conflicts through negotiation is often a means of control. Often, disagreements are dealt with by stakeholders through negotiation to prevent escalation (Aibinu and Jagboro 2002). El-Sayegh (2008) also indicates that negotiation is an important dispute resolution mechanism in the construction industry, especially when the parties want to keep their relationship with each other alive and do not want to endure litigation. But the success of negotiation is largely dependent on the readiness of the parties to make compromises and the clearness of the contractual terms.

E. Litigation

The most formal and antagonistic result of project delay is litigation. The unresolved conflicts can turn to litigation as noted by Aibinu and Jagboro (2002). Cheung and Yiu (2006) believe that litigation tends to follow when negotiations and other alternative dispute resolution methods have

failed. But litigation is known for being time consuming, expensive and destructive to long term professional relationships, and is heavily decried in construction management literature.

F. Total abandonment

If the delay is more substantial, projects may be abandoned entirely or the contractors may pull out of the project. Aibinu and Jagboro (2002) refer to this as the loss of project continuity when it is not financially and/or operationally sustainable. This result corresponds with the findings of Odeck (2004) that project abandonment is a high risk consequence of continued delays and increased costs, related to inadequate risk management and unrealistic schedules.

2.1.5. Mitigation Strategies for the effects of delay

Mitigating action plans should be developed and applied to reduce the impact construction delays have on the project if one is to manage them effectively. Mitigation delays typically involve the adoption of corrective actions that minimize disruption, but do not add much to the project budget or the amount of resources used. The most common approaches are re-sequencing of project activities to improve the flow of work and to get the time-back into the project. Moreover, by learning from past projects and incorporating project execution processes with knowledge management, organizations may minimize the number and impact of delays. These practices will improve organizational learning, aid in informed decision-making and aid in the delay prevention and control process during project implementation.

2.1.5.1. Extensive and robust project management plan

A detailed comprehensive project planning is well known as an effective measure to reduce delays during the project. While empirical studies on delay mitigation are relatively scarce, Abdelnaser et al. (2005) suggest that projects with well-structured planning systems are better able to manage uncertainties and to coordinate activities. Good planning improves communication, allocation of resources, scheduling, monitoring and risk management throughout the project.

In the same way, Nguyen et al. (2004) list some crucial factors which help to minimize the delay in the projects: availability of sufficient resources, the initial costing of the project, and the team of competent professionals. Combined, these have a positive effect on project coordination and minimize disruption during construction.

2.1.5.2. Managing poor qualifications, skills and experience of the contractors' staff

Contractors' employees' competency is a major contributor to the overall project performance. Often poor decision making and inefficient project execution of projects is due to lack of technical knowledge, weak managerial skills and limited practical experience of project staff. Therefore, the knowledge and skills of the staff must be evaluated with great care before assigning to construction works.

The assessment of competency has been stated as an essential component for proper team member competency in his/her assigned roles by Cronbach (1951). In addition, PMI (2013) suggests that ongoing training and professional development be provided to improve the technical and interpersonal competence of project teams. Al-Kharashi and Skitmore (2009) believe that the construction industry is growing rapidly and especially on large and complex projects and has created an urgent need for skilled employees, which has led to a shortage of qualified workers.

Furthermore, it has been found that the low professional capacity in the construction industry is associated with the lack of good professional capacity in the national education and training system (Baki, 2004; Cordesman, 2003). Given the above, policy makers are urged to develop enabling educational policies and incentives to enhance training in engineering and construction skills, as well as to make available skilled personnel in the construction industry.

2.1.5.3. Managing delay in progress payment by the client

Delayed progress payments by clients are a major cause of financial difficulties and project slowdowns in construction projects. Applying good cost management can help to reduce delays in payments and enhance cash flow. The PMI (2013) states that a comprehensive cost management plan provides clear guidelines for how to plan, monitor, and control project costs during the project life cycle.

The effective cost planning can lead to better stakeholder understanding of the timing, the amount and the distribution of progress payments, which can help to minimise financial uncertainty and disruption in operations (Umar, 2018). In addition, good cash flow forecasting allows for adequate funds to be available during different phases of project implementation. Understanding and communication between clients and contractors regarding financial planning can help to mitigate payment delays and its impact on project performance, according to Ulusoy and Cebelli (2000).

2.1.5.4. Managing change order during construction

Delayed progress payments by clients are a major cause of financial difficulties and project slowdowns in construction projects. Applying good cost management can help to reduce delays in payments and enhance cash flow. The PMI (2013) states that a comprehensive cost management plan provides clear guidelines for how to plan, monitor, and control project costs during the project life cycle.

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2.1.5.5. Proper cash flow forecasting

To ensure financial stability during the entire construction process, it is crucial to have effective cash flow forecasting. Cash flow forecasting helps project managers to anticipate future cash needs, address possible cash shortfalls and enhance financial planning and control. The knowledge of projected inflows and outflows enables the organization to put strategies in place that will ensure uninterrupted project operations and avoid financial disruptions.

The Project Management Institute (PMI) explains that project management involves coordinating human and material resources to achieve project objectives related to cost, quality, scope, and time. Therefore, the efficient financial management is one of the crucial factors for the success of a project. Effective cash flow management within a project improves efficiency and minimizes the likelihood of cash flow problems that could cause delays.

2.2. Theoretical Background of the Study

This study is grounded in several foundational theories that explain the causes and effects of delays in construction projects. These theories provide a conceptual framework for understanding how different factors influence project performance. The key theories considered include the Iron Triangle Theory, Critical Path Method (CPM), Risk Management Theory, Stakeholder Theory, Principal–Agent Theory, and Resource-Based View (RBV).

Iron Triangle Theory of Project Management

The Iron Triangle theory emphasizes the interrelationship between time, cost, and quality in project management. According to this theory, a change in one aspect will inevitably affect the other two (Atkinson, 1999). Delays in time often lead to increased cost and may negatively impact project quality.

In this study, the findings revealed that construction delays result in cost overrun, time overrun, and reduced profit, which supports the Iron Triangle framework. This indicates that delays in Ethiopian Airlines construction projects disrupt the balance between project time and cost. The observed effects of delay confirm that project performance is affected when time constraints are not met, consistent with the Iron Triangle theory (Atkinson, 1999).

Critical Path Method (CPM)

CPM (Critical Path Method) is a way of looking at the relationship between delays and the completion of projects. Activities on the critical path are the activities that determine the overall length of the project, and if one of them is delayed the entire project will be delayed. Thus, the management of critical path activities is very important in terms of timely delivery of the project (PMI, 2013; Kerzner, 2017). It has been widely used in the analysis of constructions delays in determining liabilities and entitlements to extensions of time (Zack, 2003).

In this study, factors such as late material delivery and delays in approval processes are likely to affect critical activities, thereby extending project duration. The presence of schedule disruptions confirms that delays in key activities directly influence project completion time, supporting CPM theory (Kerzner, 2017).

Risk Management Theory

Construction projects are faced with various uncertainties as far as finance, design, and other factors are concerned. According to risk management theory, failure to properly handle uncertainties usually leads to delays (PMI, 2013). In this aspect, when the uncertainties occur, there will be a decline in the execution of the project.

Risk Management Theory emphasizes the importance of identifying and managing uncertainties that may negatively impact project outcomes (PMI, 2017). Construction projects face risks related to finance, materials, labor, and external conditions.

The study findings indicate that material shortages, price fluctuations, and external uncertainties contribute to delays, demonstrating the role of unmanaged risks. Material and external factors identified in this study represent project risks that, if not managed effectively, lead to delays (PMI, 2017).

Stakeholder Theory

The role of stakeholder theory is to highlight that the achievement of project success is usually a product of effective coordination between clients, contractors, consultants, regulatory bodies, and other role players. Ineffective communication and conflicts between stakeholders also delay project construction (Olander & Landin, 2005).

This study identified client-related and consultant-related factors, such as delayed decision-making and poor supervision, as contributors to project delays. The findings confirm that poor stakeholder coordination leads to delays in construction projects, supporting Stakeholder Theory (Freeman, 1984).

Principal Agent Theory

The principal–agent theory is used to explain the relationship between the owner and the contractor or consultant. There may also be a disconnect between their goals, poor supervision, and information asymmetry, which may affect their poor performance (Turner & Müller, 2004).

In this study, contractor-related issues such as financial constraints and poor coordination suggest problems in the principal–agent relationship.

Contractor inefficiencies reflect misalignment between the client and contractor, consistent with Principal–Agent Theory (Turner & Müller, 2004).

Resource Based View

The resource-based approach postulates that success in project execution relies on the availability of resources such as funding, equipment, materials, and skilled resources. Their underutilization or inadequate availability affects project rates of production as well as execution speed (Frimpong, Oluwoye, & Crawford, 2003).

This study found that material-related factors are the most significant causes of delay, particularly issues such as late delivery and price fluctuation. These findings strongly support RBV, indicating that resource deficiencies directly lead to project delays (Barney, 1991).

2.3. Review of Empirical Studies

Numerous empirical research articles investigate construction industry project delays throughout different countries to identify the primary factors affecting construction project performance. Research results provide reliable evidence about the reasons causing deliberation of construction projects, plus their implications (in terms of project or construction schedule delays, cost overruns, and project success) (Sambasivan & Soon, 2007; Assaf & Al-Hejji, 2006).

Several international studies indicate that construction delays are influenced by multiple factors related to project stakeholders and management practices. For example, Assaf and Al-Hejji (2006) conducted a study in Saudi Arabia and identified more than seventy different causes of delay. Their findings revealed that the most significant factors include change orders, poor planning, delays in payments, and lack of coordination among stakeholders. The study also concluded that a large number of projects experienced time overruns, highlighting the severity of delay problems in construction projects.

Similarly, Sambasivan and Soon (2007) studied construction delays in Malaysia and identified key factors such as contractor-related issues, lack of communication, and inadequate planning. Their findings emphasized that delays not only affect project timelines but also lead to cost overruns, disputes, and reduced project efficiency. This study further confirmed the interrelationship between delay causes and their impacts on project success.

In addition, studies conducted in other regions also support these findings. Flyvbjerg, Holm, and Buhl (2003) examined infrastructure projects and found that cost overruns are a common and persistent issue due to inaccurate forecasting and poor planning. Their study demonstrated that delays significantly increase project costs, making cost overrun a major consequence of project delays.

In the African context, construction delays have been reported to be more severe due to economic and institutional challenges. Nyoni (2018) highlighted that delays in African construction projects often result from financial constraints, poor project management, and inadequate resource allocation.

The study further indicated that these delays lead to outcomes such as cost overrun, project abandonment and reduced economic growth.

Empirical studies in Ethiopia also show similar findings. Koshe and Jha (2016) investigated delays in Ethiopian construction projects and identified key factors such as financial problem, shortage of material, poor and ineffective schedule planning. Similarly, Gebrehiwet and Luo (2017) found that delays are influenced by factors such as inflation, poor site management, delayed material delivery, and weak project planning. Their study concluded that delays lead to time and cost overruns and negatively affect project outcomes.

Overall, from the various studies conducted, it is advisable to conclude that the causes of construction delays are managerial, financial, technical and external. The findings of such studies are always consistent and relate to time overrun, escalating costs, conflicts among stakeholders and loss of project effectiveness. Hence, it is crucial to gain a good understanding of these empirical findings to formulate efficient strategies to reduce delays and improve project delivery in the construction industry (Assaf & Al-Hejji, 2006; Sambasivan & Soon, 2007).

2.4. Conceptual Framework

The conceptual framework as shown in this study represents the relationship of the key variables that affect construction project delays and the subsequent impact on the construction project performance. It is prepared using the knowledge gained from literature review and is used as a reference to investigate the root causes and effects of delays in the Ethiopian Airlines Group construction projects. In research, conceptual frameworks are commonly used to represent the relationship between variables and to give a structured foundation for the analysis of the data (Creswell and Creswell, 2018; Saunders et al., 2019).

Construction delay is considered the central dependent variable for this study, while the independent variables are grouped into major categories of delay factors. These include contractor-related factors, client-related factors, consultant-related factors, material-related factors, labor-related factors, and external factors. Previous studies have shown that delays in construction projects are the result of multiple interacting factors rather than a single cause (Assaf and Al-Hejji, 2006).

Contractor-related factors include issues such as poor planning, financial difficulties, weak coordination, and inadequate site management. Client-related factors involve delays in decision-making, changes in project scope, and late payments. Consultant-related factors include errors in design, inadequate supervision, and unrealistic scheduling. Material-related factors are

associated with shortage of materials, late delivery, and price fluctuations. Labor-related factors refer to lack of skilled workers and low productivity, while external factors may include economic instability, regulatory changes, and unforeseen environmental conditions (Koshe and Jha, 2016; Gebrehiwet and Luo, 2017).

These independent variables influence the occurrence of construction delays, which in turn affect project performance. The effects of delays are reflected in time overrun, cost overrun, disputes, reduced productivity, poor quality of work, and stakeholder dissatisfaction (Aibinu and Jagboro, 2002; Flyvbjerg et al., 2003).

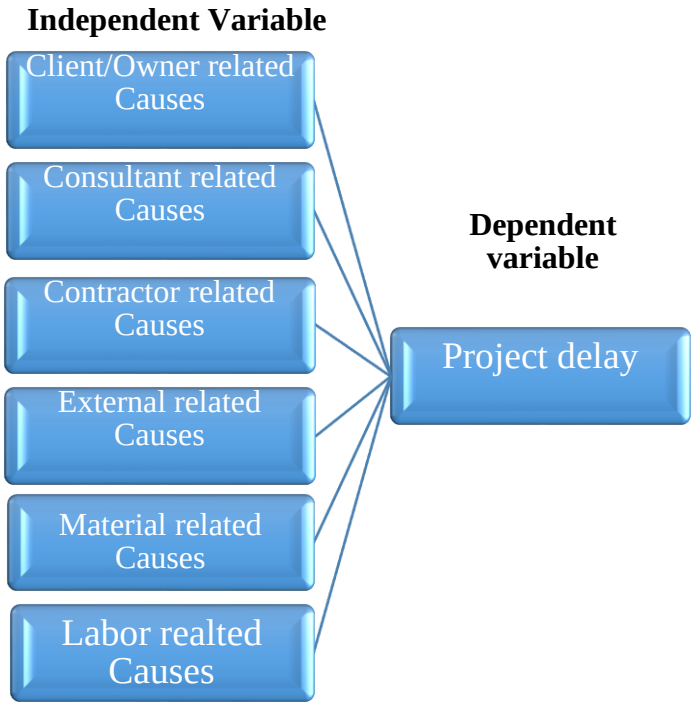


Figure 2: Conceptual Framework

2.5. Hypothesis of the study

This study draws on both theoretical and empirical literature and draws out theories and hypotheses concerning the relationship between the independent variables (Delay factors) and the dependent variable (Construction project delay). All the hypotheses are based on relevant theories and supported by previous studies.

There are a few factors related to the contractor which are recognized to cause project delays, including lack of coordination, experience, financial constraints and poor planning. The Critical Path Method states that delays to activities on the critical path will directly impact the duration of the

project (Kerzner, 2017; PMI, 2017). Since contractors are responsible for executing most construction activities, their inefficiencies are likely to result in delays.

Moreover, the Principal Agent Theory states that management problems between the Principal and Agent, due to differences in goals and ineffective monitoring of the contractor, may result in sub-optimality and delays (Turner & Müller, 2004). Hence, the factors related to contractors are likely to play a significant role in project delays.

H1: Contractor related factors have a significant positive effect on construction project delays in Ethiopian Airlines project.

Delayed decision making, changes and delayed payments are the major reasons for delays in construction project (CP) operations. Stakeholder Theory suggests that to be successful, projects require good coordination between stakeholders (Freeman, 1984). When the client takes no action at the right time, project timelines are thrown off.

Further, according to Risk Management Theory, the higher the uncertainty because of lack of planning or delayed response actions, the more adverse the impact will be on project performance (PMI, 2017). So, it is expected that the client-related factors will have a significant impact on delays in projects.

H2: Client related factors have a significant positive effect on construction project delays in Ethiopian Airlines project.

Issues like design mistakes, approval delays, and poor oversight by the consultant can cause disruptions in the efficient running of building initiatives. Construction project delays due to design flaws, lack of project approvals, poor supervision by the consultant can disrupt the smooth running of construction projects. Delays in the planning and design phases can impact on the overall project schedule, particularly in light of the Critical Path Method (Kerzner, 2017).

Furthermore, when project actors are using Stakeholder Theory, they need to know communication and coordination between the project actors is essential, and if the consultants don't perform well, this can be affected (Freeman, 1984). Therefore, it would be assumed that consultant-related issues would lead to project delays.

H3: Consultant related factors have a significant positive effect on construction project delays in Ethiopian Airlines project.

Due to material related issues, shortage of materials, late delivery of materials and change in their price is regarded as one of the main causes of delay in construction work. The Resource Based View

(RBV) suggests that project performance is related to the resources available and how well they are used (Barney, 1991).

When lack or delay in material supply, it impacts the execution of construction activities directly. In addition, these types of problems are classified as risks in accordance with Risk Management Theory (PMI, 2017). Thus, factors related to materials are likely to have a great impact on project delays.

H4: Material related factors have a significant positive effect on construction project delays in Ethiopian Airlines project.

Labor-related issues such as a shortage of skilled workers, low productivity, and too many people missing work are having a tremendously negative impact on the construction industry. The Resource-Based View's (Barney, 1991) emphasis on how human resources in each project affect its performance proves how inefficient human resources can negatively impact a project's completion date. The Risk Management Theory identifies a labor shortage as well as an inefficient workforce as two forms of operational risk associated with a project's completion (PMI, 2017). Thus, it can reasonably be said that labor-related problems are impacting the project's completion time.

H5: Labor related factors have a significant positive effect on construction project delays in Ethiopian Airlines project.

Project stakeholders cannot control many outside factors, including regulatory changes, inflation, and economic unreliability. However, these can seriously impede successful construction activity. External Uncertainty is one of the main project risk factors according to Risk Management Theory (PMI, 2017).

Using the Iron Triangle Theory, external variables can also potentially affect the performance of a project in terms of its cost and schedule (Atkinson, 1999). As a result, external factors will likely have a substantial effect on construction project delays.

H6: External related factors have a significant positive effect on construction project delays in Ethiopian Airlines project.

Project stakeholders cannot control many outside factors, including regulatory changes, inflation, and economic unreliability. However, these can seriously impede successful construction activity. External Uncertainty is one of the main project risk factors according to Risk Management Theory (PMI, 2017).

Using the Iron Triangle Theory, external variables can also potentially affect the performance of a project in terms of its cost and schedule (Atkinson, 1999). As a result, external factors will likely have a substantial effect on construction project delays.

CHAPTER THREE

3. RESEARCH METHODOLOGY

In this chapter, the research methodology used in carrying out the study will be presented. It starts with a description of the research approach and design adopted. It subsequently explains the population to be studied, the sample size, and sampling methods. Moreover, the chapter describes the source of data, the way data is collected and the processes of analyzing data. There are also issues related to validity, reliability and ethical considerations of the research.

3.1. Research Design and Approach

Research design is a systematic plan to direct the researcher to accomplish the goals of the study and solve the research problems. It sets out the method for gathering data, analyzing and interpreting it in an orderly manner. A robust research design makes the research fully effective by identifying the most appropriate data sources, using the most suitable data collection techniques and by considering time and costs (Creswell and Creswell, 2018; Saunders et al., 2019).

The type of study used in this research is descriptive research, because it is suitable for the study that examines and describes the characteristics of a phenomenon. Descriptive research aims to give an accurate picture of situations and relationships between the variables presented without being manipulated (Saunders et al., 2019). For the current study, this research design method is appropriate since helps the researcher to study the causes and effects of construction project delays in Ethiopian Airlines construction projects.

The study adopted quantitative research approach this research method will have data that is collected and analyzed numerically for patterns, relationships, and trends between variables. It allows for objective measurement and enables statistical analysis leading to greater reliability and validity of the findings (Creswell and Creswell, 2018). The type of research used in this study was quantitative research with data collection techniques in the form of structured questionnaires given to respondents. The data gathered were then analyzed using suitable statistical methods to identify the significance and effect of different factors that affect construction project delays. Quantitative methods enable a systematic analysis of relationships between variables and provide objective measurement of the relationships (Creswell & Creswell, 2018; Saunders et al., 2019).

Thus, the application of descriptive research design is integrated with quantitative approach helps to give a clear and reliable analysis of construction project delay problem and suggestions for improving the construction project performance.

3.2. Description of the study Variables

This research analyzes the elements that lead to delays in construction projects. The research variables were divided into two categories according to the conceptual framework and research objectives as follows: independent variables (the factors that cause delays) and a single dependent variable (the overall delay of the construction project). In investigating the relationship between variables, variable classifications as either independent or dependent are common in quantitative research (Creswell & Creswell, 2018; Saunders et al., 2019).

3.2.1. Independent Variables

The main factors that are responsible for delays in construction projects are considered as the independent variables in this study. These factors have been categorized in a number of broad categories such as contractor related, client related, consultant related, material related, labour related, and external factors (Muhwezi et al., 2014).

i. Contractor-Related Factors

Contractor-related factors include problems that stem from the performance, management and capabilities of the contractor when carrying out construction projects. These factors are often due to poor project planning and scheduling, lack of technical experience, poor site supervision, financial constraints, and inefficient use of available resources.

These restrictions can have a major impact on the construction process and can lead to delays in the project's completion. When contractors are not performing well, it can make workflow more difficult, decrease productivity, and add to time overruns. Contractor related problems are also one of the major causes of delay in construction projects, as revealed in previous studies (Assaf & Al-Hejji, 2006; Sambasivan & Soon, 2007).

ii. Client (Owner)-Related Factors

They include activities or lack of activities by the project owner, which affect the progress of the project. Delays in decision-making, delays in payments, numerous design changes, and the absence

of coordination are common problems. Factors that are related to clients may interfere with the workflow and introduce some uncertainty in the implementation of the project.

iii. Consultant-Related Factors

The factors relate to the performance of consultants, such as architects and engineers. They involve delays in preparing design, design drawing errors, delays in approval, and poor supervision. These problems may result in re-working and inefficiencies during implementation of project.

iv. Material-Related Factors

These include issues to do with the supply, quality and delivery of construction materials. Shortages, procurement, price fluctuation, and logistic issues may lead to delays. Constraints associated with materials may greatly impact on the project schedules.

v. Labor-Related Factors

These are those issues that relate to the workforce that is involved in construction activities. They are shortage of labor, low productivity, shortage of skilled labor, absenteeism and labor conflicts. Inefficiencies in labor directly affect the quality and speed of the completion of the project.

vi. External Factors

These are the aspects that cannot be controlled by the stakeholders of the project. They consist of economic terms (inflation), government policies, political unrest, weather factors, and events which are unforeseen.

3.2.2. Dependent Variable

Construction project delay is dependent variable in this study that is defined as when construction activities are not completed in the time frame planned or agreed upon the contract. Time overrun, Cost overrun and the overall effect on project performance are common ways to measure project delay. It is assumed that this dependent variable is affected by a combination of client related, contractor related, consultant related and external factors. The classification of variables is common in quantitative research to understand the relationship and the effects that occur between variables (Creswell and Creswell 2018, Saunders et al. 2019).

3.3. Description of the study area and target population

This study aims at finding the root causes and their impacts of construction delays to timely completion of construction projects in Ethiopia Airlines (EAL). Ethiopian Airlines is fast growing and expanding, leading to an increased demand for infrastructure development in various units of the organization. Ethiopian Airlines has been organized into several major operational groups, namely: Operations, Ethiopian Cargo and Logistic Service, Ethiopian Aviation Academy, Customer Service, Corporate, Commercial, Group CEO and Ethiopian Skylight Hotel. These administrative staffs help support the airline's basic and auxiliary operations, delivering effective services and improving the airline's overall performance. The structure of these administrative functions has enabled Ethiopian Airlines to effectively manage their growing activities in both aviation and non-aviation sectors (Ethiopian Airlines, 2024).

The target population of this study will comprise stakeholders involved in construction projects completed within the past ten years by Ethiopian Airlines Group. The unit of analysis will be construction projects implemented during this period, as documented in reports from the Group Infrastructure Planning and Development Section.

The study population will include more stakeholders who had direct involvement in or responsibility for these projects. Specifically, the target population will consist of management staff of Ethiopian Airlines (the client) who are directly related to the construction projects, project managers, project engineers, project supervisors, and members of the project monitoring team. In addition, participants from various technical teams engaged in Ethiopian Airlines' construction projects will be include. The population of this study consisted of a total of 74 personnel respondents.

Furthermore, the target population encompass external stakeholders, namely consultants and contractors which participated on the project planning, supervision, and monitoring up to the end of completion stage of construction projects for Ethiopian Airlines. To complement the questionnaire survey, interviews will be conducted with the Manager and Director of the relevant sections to obtain in-depth managerial perspectives on project delays.

This population will consider appropriate because its members possess relevant experience and knowledge regarding the causes and impacts of delays in construction projects undertaken by Ethiopian Airlines.

3.4. Sampling Technique and Sampling Size

According to Kothari (2004) a sample is a subset of a population selected to represent the characteristics of the entire population in a study. While census is the most reliable way to gain information about a population, its use may be impractical for a variety of reasons including time, cost and other logistical factors. Therefore, sampling is often used as a practical alternative, where researchers investigate a manageable part of the population, so that they can get reliable results (Sarntakos, 1998).

The research used a census rather than a sampling approach. The target population involved in the construction projects of Ethiopian Airlines Group included 74 stakeholders, consisting of project managers, engineers, supervisors, consultants and contractors. Because the population size was small, all members of the target population were included in the study to increase the accuracy and reliability of the results. From the total population, 73 stakeholders took part in the study and provided complete and usable responses, resulting in a response rate of 98.6% for statistical analysis.

By utilizing a census approach, this study was able to reduce sampling bias and ensure that nearly all relevant stakeholders were represented in the data collected regarding construction projects for Ethiopian Airlines.

3.5. Data Collection Methods

The main instrument for gathering data from this study was a structured questionnaire. The design of this questionnaire included a five-point Likert Scale; the respondents rated their agreement level from “1” as Strongly Disagree through “5” as Strongly Agree for each question in the questionnaire. There is extensive use of this type of questionnaire within quantitative studies, allowing for gathering of data on respondents’ attitudes, perceptions, and opinions consistently (Creswell & Creswell, 2018).

The questionnaire used in this study was adapted from Abera, S. (2022), who conducted research on construction delays in Addis Ababa. The instrument was validated through expert review to ensure content validity. Furthermore, reliability was tested using Cronbach’s Alpha, where all values exceeded the acceptable threshold of 0.7, confirming internal consistency (Pallant, 2020).

his previous studies on construction project delays and was previously conducted. However, it has been updated to represent the unique environment of Ethiopian Airlines' construction projects; the

core structure of the instrument remains unchanged. The questionnaire contains contractor, client, consultant, material, labor and external elements related to construction project delays.

This study adopted primary and secondary data sources to collect relevant information to achieve research objectives.

- **Primary Data**: The principal method for collecting data was using structured questionnaires, which included both open-ended and closed-ended questions to allow for comprehensive and measurable answers. Additionally, direct interviews were conducted to provide additional context, as well as to aid in clarifying answers to the responses from the questionnaires. The combination of questionnaires and interviews is generally accepted as a means of obtaining accurate and reliable primary data for conducting quantitative research (Creswell & Creswell, 2018; Saunders et al., 2019).
- **Secondary Data**: Secondary data was gathered by reviewing pertinent documents, organizational reports, and records. The use of secondary data can improve the understanding of the context of the primary data and can assist in validating the findings of the primary data (Saunders et al., 2019).

3.6. Methods of Data Analysis and Mode of Presentation

3.6.1. Methods of Data Analysis

The data collected through structured questionnaires were analyzed using the Statistical Package for Social Sciences (SPSS). Both descriptive and inferential statistical techniques were employed to address the research objectives.

Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize respondents' demographic characteristics and assess the level of agreement regarding the causes and effects of construction project delays. Mean scores were used to rank the significance of delay factors, while standard deviation indicated the variability of responses.

To ensure the reliability of the measurement instruments, Cronbach's Alpha coefficient was applied. Values greater than 0.7 were considered acceptable, indicating adequate internal consistency of the questionnaire items.

In addition, correlation analysis was conducted to examine the relationships between the independent variables (contractor, client, consultant, material, labor, and external factors) and the dependent variable (construction project delay).

Furthermore, multiple regression analysis was employed to determine the effect of each independent variable on construction project delay and to test the study hypotheses. The overall significance of the regression model was evaluated using Analysis of Variance (ANOVA).

3.6.2. Mode of Data Presentation

The analyzed data were presented using a combination of tables, figures, and descriptive narratives. Tables were used to display numerical results such as frequencies, percentages, mean scores, and regression outputs, while figures were utilized to illustrate trends and relationships where appropriate.

Descriptive explanations were provided alongside tables and figures to facilitate interpretation of the results and to ensure clarity in presenting the research findings.

3.7. Validity and Reliability

The questionnaire was pre-tested before data collection to ensure reliability of the study. Pre-testing is used to determine ambiguities and inconsistencies in the research instrument to enhance the uniformity and reliability of the data obtained.

The validity was achieved by the expert review of the questionnaire and the correlation between the research instruments with the research objectives and conceptual framework. To increase the credibility and accuracy of research results, reliability and validity are important (Creswell & Creswell, 2018; Saunders et al., 2019).

3.8. Ethical Considerations

Care was taken to adhere to ethical standards during the research process. Before data collection, participants were informed on the purpose and objectives of the study. All respondents gave informed consent to ensure their voluntary participation.

Moreover, the confidentiality and anonymity of the respondents was also carefully ensured. The data gathered was strictly for research and not shared, nor would it be disclosed, any information that could be identified as personal or private. Research integrity, credibility and trustworthiness must be maintained by adhering to ethical principles (Creswell & Creswell, 2018; Saunders et al., 2019).

CHAPTER FOUR

4. DATA ANALYSIS AND INTERPRETATIONS

In this chapter, the analysis and interpretation of data collected through the questionnaire survey will be provided. The information to be presented includes the response rate, demographic characteristics of respondents, and the primary causes and effects of construction delays within EAG projects.

Data on demographic variables and delay factors will be analyzed and presented descriptively using techniques such as frequency, percentage, mean, and standard deviation. Additionally, correlations and regressions will be used to investigate the relationships among the variables collected from the structured questionnaire. The questionnaire will be included in the appendix section.

Additionally, the chapter will discuss the findings in detail and describe some of the major contributing factors to construction delays and how they affect project performance. Diagnostic tests, such as multicollinearity analysis, will also be performed on the regression results to ensure their reliability.

The overall purpose of this chapter is to use both descriptive and inferential statistical results to better understand the causes and effects of construction delays in EAG projects.

4.1. Response Rate

Construction stakeholders such as contractors, subcontractors, consultants & clients from Ethiopian Airlines Group received 74 questionnaires. 73 (98.6% Response Rate) successfully returned complete questionnaires (one was not). The demographics of the respondents are outlined in Table 1 which includes sex, age, education, the organization they work for, their number of years in service and their position and will give an indication of the various characteristics of our respondents and help the researchers understand the diversity, and relevance of the sample employed.

Table 1: Demographic Characteristics

Demographic type	Variables	Frequency	Percentage
I. Gender	Male	47	65.2
	Female	26	34.8
	Total	73	100.0
II. Age	<=25	10	13.0
	26-35	51	69.6
	36-40	10	14.5
	40 and above	2	2.9
	Total	73	100.0
III. Educational Status	PHD	0	0
	Masters	24	30.4
	Degree	45	63.8
	Diploma	4	5.8
	Total	73	100.0
IV. Organization	Ethiopian Airlines	39	53.6
	Contractor	11	15.9
	Consultant	13	15.9
	Sub-Contractor	0	0
	Other	10	14.5
	Total	73	100.0
V. Service year	≤ 3 Years	23	33.3
	4 – 10 Years	45	59.4
	11 – 15 Years	4	5.8
	16 – 20 Years	1	1.4
	Total	73	100.0
VI. Position	Directors and above	1	1.4%
	Project Manager	5	7.2%
	Team Leader	8	11.6%
	Project Member	39	50.7%
	Project Engineer	8	11.6%
	Supervisor/Forman	5	7.2%
	Other	7	10.1%
	Total	73	100%

Source: Owen Survey (May,2026)

Table 1 item (I) indicate that 47(65.2 %) were male respondents and 26 (34.8 %) were female respondents. The finding indicates that male respondent relatively more numerus than female respondents. Which means female involvement on the construction of Ethiopian airlines is small.

Table 1 item (II) shows that 10 (13.0%) of the respondents were aged 25 and below, while the majority, 51 (69.6%), were within the 26–35 age group. In addition, 10 (14.5%) respondents were in the 36–40 age group, and only 2 (2.9%) respondents were 40 years and above.

Table 1 item (III) above 4 (5.8%) completed College diploma, 45 (63.8 %) completed BSC/BA degree and the remaining 24 (30.4 %) of the participant completed master's degree and no respondent background was PhD in the project. This result indicates that the highest educational background recorded on BSC/BA degree and master's degree which totally measure 94.2 % out of the total respondent.

Table 1 item (IV) shows respondent rate in each organization out of each organization 11 (15.9%) were contractor, 13 (15.9 %) were consultant, 39 (53.6 %) were clients and 10 (14.5 %) of the respondents were other stake holders directly involve on the construction project of Ethiopian airlines. This result shows majority of the respondents were client staff.

According to Table 1 item (V) service year of the respondents 23(33.3 %) were below 3 years, 45 (59.4 %) work experience of the respondents were between 4 - 10 years, 4 (5.8 %) were between 11 up to 15 years and the remaining 1 (1.4 %) of the respondents were above 16 years work experience. Hence, the response shows that the highest proportion of respondents have work experience between 4 to 10 years in construction projects within Ethiopian Airlines.

In Table 1 item (VI), Data show that 1 (1.4) of the respondent are Director or above, 5 (7.2 % of the respondent, are Project Manager and 8 (11.6% of the respondents are Team Leader , and 39 (50.7%) of the respondent are Project Member, 8 (11.6%) of the respondents are Project Engineer, 5 (7.2%) of the respondents is Supervisor/Foreman, and 7 (10.1%) of the respondent are classified as others who are involved with the project. Overall, the findings show that most respondents (50.7%) classified themselves as Project Members.

4.2. Cronbach's alpha data reliability test

Before data collected from the questionnaire survey was analyzed, a reliability test was carried out in this study to check the reliability of the measurement system which was made up of Likert scale items. The measurement system was assessed using Cronbach's Alpha reliability method.

Cronbach's alpha is a commonly used statistical measure of test reliability that quantifies the level of agreement among the items of a test (Gliem and Gliem, 2003).

Table 2: Cronbach's Alpha Reliability

S/N	Cronbach's alpha, α	Internal consistency
1.	≥ 0.9	Excellent
2.	$0.8 - 0.89$	Good
3.	$0.7 - 0.79$	Acceptable
4.	$0.6 < 0.69$	Questionable
5.	$0.5 < 0.59$	Poor
6.	< 0.5	Unacceptable

Source: Adapted from Gliem and Gliem (2003)

The reliability analysis was performed on the six factors which affect the construction delays, which were identified in the research objectives of this study. The interpretation of the Cronbach's Alpha coefficient was done by referring to the standard scale for reliability presented in the table (Table 2).

Table 3 shows the results of the reliability test. The Cronbach's Alpha values for the different categories were found to be 0.848 for contractor-related factors, 0.855 for client/owner-related factors, 0.850 for consultant-related factors, 0.829 for labor-related factors, and 0.888 for external-related factors.

The internal consistency of the questionnaire items is high, as indicated by the values. Specifically, all values are above the generally accepted value of 0.7, indicating reliability of the data. Gliem and Gliem (2003) stated that Cronbach's Alpha coefficient greater than 0.80 is a good to excellent measurement scale, which is in line with the measurement scale used in this study.

In addition, the internal consistency of the items in the material-related dimension (Cronbach's alpha) is 0.788, which is considered acceptable. This indicates that the content of the tests used to measure material related delay factors is generally similar and sufficiently intercorrelated for the group.

Using the reliability scale shown in Table 2, it can be concluded that all items in the six categories of delay factors have good internal consistency. Therefore, the collected data can be considered reliable and suitable for further statistical analysis.

Furthermore, the overall reliability test – the sum of all the 57 delay factors – yielded a Cronbach's Alpha of 0.843 which is in the good reliability range. Gliem and Gliem (2003) suggest a strong internal consistency with values greater than 0.80. The overall reliability rate of the responses given by the participants on the delay factors is about 84.3%, which is confirmed by this result.

Table 3: Cronbach's Alpha reliability test

Factors	Numbers of questions	Cronbach's alpha, α	Internal consistency
Contractor related causes	10	0.848	Good
Owner/client related causes	12	0.855	Good
Consultant related causes	11	0.850	Good
Materials related causes	10	0.788	Acceptable
Labor related causes	4	0.829	Good
External Related Causes	10	0.888	Good

Source: Owen Survey (May 2026)

4.3. Descriptive Statistics

Descriptive statistics represent statistical techniques that help summarize, organize, and ultimately display data into a manageable, meaningful form. Descriptive statistics help researchers summarize the major characteristics of a data set without drawing conclusions that can be made beyond the data collected. According to Creswell and Creswell (2018), descriptive statistics create a summarized representation of the data via numerical measures and graphical representation, thus enhancing understanding of the research outcomes.

Additionally, Field (2017) states that descriptive statistics are useful in terms of finding out the data distribution of the responses and whether or not the responses indicate a consistent or widespread set of responses. For example, if the standard deviation is high (i.e., a larger range of values), this indicates that the respondents provide a wide variance of responses. Whereas if a standard deviation is low (i.e., a smaller range of values), this indicates that the responses are more similar.

With study designs that rely on a Likert scale (such as a 1 to 5 scale), a typical approach to interpreting descriptive statistics is by means of a mean score range. The ranges are used to determine the significance or the degree of agreement for each variable. There is a broadly accepted guideline:

Table 4: Standard for Mean score interpretation

Mean score Range	Standard
below 3.39	Low (low agreement/ weak impact)
From 3.40 up to 3.79	Moderate (Moderate agreement)
Above 3.8	High (strong agreement / significant impact)

The table above shows a breakdown of mean scores according to the level of agreement achieved with the questions on a 5-point Likert scale by respondents. It helps to interpret the significance and impact of different variables in the study.

Mean scores below 3.39 indicate low level of agreement or weak impact. This indicates that generally, respondents do not strongly support or feel the factor is influential. These are considered to be having little influence on the results of the study. Moderate level of agreement is from 3.40 to 3.79. This means that the perception of the factor by the respondents is moderate.

A mean score > 3.80 means high level of agreement or strong impact. This indicates that respondents are very much aware of the importance of the factor and it is treated as one of the important factors that contribute to the phenomenon being studied.

It can generally be used to rank variables based on their importance and determine which variables have the greatest effect on construction project delays. It also provides a systematic way of interpreting survey results and supports meaningful conclusions from the data analysis.

4.3.1. Descriptive statistics for the cause of delay

Analysis of descriptive statistics shows all the delay factors identified have a mean score above average level. This indicates that the factors listed generally contribute to construction delays within the Ethiopian Airlines Group (EAG) to a great extent.

Another confirmation of consistency of the mean values is provided by the responses, which match the findings from the analysis of the questionnaires. This means that the factors identified are important and can make a significant contribution to project performance. The results are also used to illustrate that delay factors of various categories, such as those related to the contractor, client, consultant, and external, also play important roles in construction project delays. The descriptive statistics demonstrate that the causes of delay are easily identified among respondents and are important in the delay of construction projects.

Table 5: Average Mean score of causes of delay in construction

Causes of Delay	Average Means Score	Average Std. Deviation	Rank	Respondent
Contractor related causes	3.03622	1.091778	2	73
Owner/client related causes	3.02175	1.162117	3	73
Consultant related causes	2.967082	1.102885	4	73
Materials related causes	3.10582	1.113378	1	73
Labor related causes	2.847825	1.191508	5	73
External Related Causes	2.77248	1.182016	6	73

Source: Owen Survey (May,2026)

Table 5 shows the ranking and average mean score given to the delay factors for construction projects for Ethiopian Airlines as obtained from 73 respondents of the study.

The findings show that the mean values of all categories of the delay factors vary from 2.77 to 3.11 indicating a moderate level of agreement among the respondents that these factors cause delays in the projects.

Material related causes had the highest mean score (3.10582) with a standard deviation (1.113378), which is the most identified among the factors. This indicates the problems of delayed material delivery, lack of material availability and fluctuations in materials cost are the most serious factors that cause delays in construction projects. The standard deviation is relatively low, suggesting there is some variation in responses, but there is general consensus on the importance of this factor.

Contractor related causes came in second with a Mean of 3.03622 followed closely by owner/Client related causes with a Mean of 3.02175 ranked third. The results of this study show that contractor-related problems (poor planning, inexperience, financial problems) and client related problems (delayed decision making, frequent changes in design) are the main causes of delay in construction projects.

Project delays with consultant related causes had the fourth highest mean score of 2.967082, indicating that it had a moderate influence on project delays. This means that the delays in approval, design faults and lack of supervision have an impact on project times as well, though not as significant as the material and contractor issues.

Labor-related caused ranked 5th with a mean score of 2.847825, indicating that labor related problems (e.g., unskilled workforce, low productivity) have some effect but are less significant compared to other factors.

Finally, external-related causes were the variable with the lowest mean score of 2.77248, showing that although important, the other factors listed have a lesser influence.

The overall result indicated that the internal project parameters (materials, contractors, and client) have more impact on construction delays, in comparison to the external parameters. This underscores the importance of better project management processes, particularly with regard to sourcing materials and stakeholder coordination.

4.3.2. Descriptive statistics for contractor related causes

Contractor related causes are causes which refer to factors of delay which come from the contractor technical, managerial, organizational and financial practices during the execution of the construction project.

Table 6: Mean score of contractor related causes

Items	Mean Score	Std. Deviation	N
Inefficient site management practice	2.6812	1.00722	73
Inadequate experience	3.0435	1.09053	73
Financial problems of contractors and sub-contractors	3.3768	1.04461	73
Inability of coordination	3.3043	1.07518	73
Poor communication	3.1159	1.43010	73
Mistakes during work	2.8261	.89042	73
Rework due to error	2.9420	1.08308	73
Delay of work without reason	2.7391	1.07993	73
Less sense of ownership	3.3768	1.11278	73
Corruption	2.9565	1.10393	73
Total mean	**3.03622**	**1.091778**	

Source: Owen Survey (May,2026)

Table 6 indicates that the average means of contractors related causes is 3.003622 and standard deviation of 1.091778. The individual mean score of contractor related causes was ranged from 2.6812 up to 3.3768 which indicates that the degree of influence on the construction delay is varying for contractor related causes.

From the above indicators out of the total respondent's financial problems of contractor and sub-contractors ($M = 3.3768, SD = 1.04461$) were the highest mean score which means causes related

to cash flow or payment are major significant factors for project delay. Inability of coordination and Less sense of ownership were major delay for Ethiopian Airlines group projects.

Poor communication($M = 3.01159, SD = 1.43010$) and Inadequate experience ($M = 3.0435, SD = 1.09053$) are others significant factors. Rework due to error ($M = 2.9420, SD = 1.08308$), Corruption($M = 2.9565, SD = 1.10393$) and Mistake during work ($M = 2.8261, SD = 0.89042$) rated at moderate level which indicates that they are not the most significance factor for the project delay.

Generally, the result of Table 6 shows that financial problems of contractor and sub-contractors, inability of coordination, less sense of ownership, Inadequate experience, Poor communication and Delay of work without reason are major contractor related causes of construction delay in Ethiopian airlines group.

4.3.3. Descriptive statistics for client related causes

Owner related causes indicate delay factors which rise from project owner during the time of planning and implementation phase of construction projects. Descriptive statistics for owner/client related causes of project delay in Ethiopian Airlines group presented on the below table 7.

Table 7: Means score of client related causes

Items	Mean score	Standard Deviation	N
Financial constraint	3.0290	1.13722	73
Frequent change of orders during construction	3.7971	1.00849	73
Slow decision making	3.0580	1.19907	73
Low level of technical expertise	2.5217	0.99423	73
Delayed release of payment	3.0000	1.15045	73
Bid award for lowest price	3.3478	1.13534	73
Lack of communication	2.8406	1.18350	73
Unnecessary interference	3.1884	1.06101	73
Corruption in awarding	2.8116	1.17917	73
Less sense of ownership	3.2754	1.08308	73
Poor monitoring and evaluation	2.6957	1.41737	73
Poor follow-up of progresses	2.6957	1.39647	73
Total mean	**3.02175**	**1.162117**	

Source: Owen Survey (May,2026)

The result on Table 7 above indicates that the average means of owner/Client related causes is 3.0218 with standard deviation of 1. 1621.This result show that the level of agreement is moderate based on respondents and it is major contribution factors for the delay of construction in Ethiopian Airlines group projects.

From listed factors in owner related causes Frequent change of orders during construction scored the highest mean ($M = 3.7971, SD = 1.00849$) which means that changing of order during project execution was a major factor for the completion. Bid award for lowest price($M = 3.3478, SD = 1.13534$) rated moderate, more stress on the cost minimization during the selection of contractors leads for time overrun.

4.3.4. Descriptive statistics for consultant related causes

Consultant related causes are delay factors which created from the consultants' sides including planning the project, preparation of design, project supervision, project scheduling and communication with project stakeholders.

Table 8: Mean score of consultant related causes

Items	Mean score	Standard Deviation	N
Inadequate experience	2.6377	1.09774	73
Incomplete design	2.6812	1.07775	73
Poor supervision	2.4638	1.30135	73
Slow to give instruction	2.6667	1.06642	73
Poor inspection and audit	2.6812	1.10471	73
Poor cost estimation	3.5362	1.05133	73
Poor project planning	2.9565	1.27688	73
Lack of proper cooperation	2.8696	1.09696	73
Corruption	2.8551	1.00404	73
Unrealistic time schedule	3.6667	1.03848	73
Failure to update schedule	3.6232	1.01607	73
Total mean	**2.967082**	**1.102885**	

Source: Owen Survey (May,2026)

According to Table 8. Above the average mean score of consultant related causes is 2.967082 with standard deviation of 1.102885 which indicate that consultant related causes have low level of influence on construction delay in Ethiopian airlines group.

Conversely, factors including Poor supervision, Incomplete design, Inadequate experience and Slow to give instruction are low impact on the construction delay of Ethiopian airlines.

4.3.5. Descriptive statistics for material related causes

Based on presented result on Table 9, average mean score of material related causes is 3.10582, this indicate that more respondent agree that the cause of material related significantly contribute for the construction delay in Ethiopian Airlines group.

Table 9: Mean score of material related causes

Items	Mean score	Standard Deviation	N
Lack of provision of quality	2.5507	1.00785	73
Scarcity in material	2.6667	1.18404	73
Late procurement of materials	3.6522	1.26986	73
Poor material management	3.0725	1.22857	73
Fluctuation in price of building materials	3.6522	0.99744	73
Delaying delivering material on site	3.6957	1.16700	73
Equipment breakdowns	3.1884	1.03292	73
Low level of equipment operators' skill	2.8551	1.08838	73
Low productivity and efficiency of equipment	2.8841	1.09190	73
Lack of equipment accessibility	2.8406	1.06582	73
Total mean	**3.10582**	**1.113378**	

Source: Owen Survey (May,2026)

According to Table 9 result above, delaying delivering material on site score highest mean which is ($M = 3.6957, SD = 1.167$) Late procurement of materials ($M = 3.6522\ and\ SD = 1.26986$) and Fluctuation in price of building materials ($M = 3.6522, SD = 0.99744$) these results indicate that these are the major material related causes for delay in Ethiopian Airline group.

Poor material management ($M = 3.0725,\ SD = 1.22857$) and Equipment breakdowns ($M = 3.1884, SD = 1.03292$) rated above the average mean score, which means moderate to high agreement of the respondent regarding their impact on the project delay.

Additionally, Lack of provision of quality material ($M = 2.5507\ and\ SD = 1.00785$) and Scarcity in material ($M = 2.6667\ and\ SD = 1.18404$) recorded lower mean score which mean that they have lower influence on the delay. Low level of equipment operators' skill, Low productivity and efficiency of equipment and Lack of equipment accessibility were considered moderator for the contribution of material related delay.

4.3.6. Descriptive statistics for labor related causes

With a mean score of 2.85 among the six independent variables, labor-related factors were ranked fifth as a cause of construction project delays in Ethiopian Airlines Group projects. The respondents noted that although labor related factors were not identified as the top causes, they still believe these factors have an important role in the successful implementation of construction projects.

Table 10: Mean Score of labor related causes

Items	Mean sore	Standard deviation	N
Labor strikes	2.9855	1.21864	73
Labor absenteeism	2.6087	1.12743	73
Low productivity	2.6232	1.29594	73
Unqualified work force	3.1739	1.12402	73
Total mean	**2.847825**	**1.191508**	

Source: Owen Survey (May,2026)

Table 10 reveals that among the many causes identified in the study, the presence of personnel that are not qualified is a major one (shortage of skilled personnel). This suggests that although professionals with different levels of experience are working in Ethiopian Airlines Group projects, there is still a lack of suitably skilled manpower needed for successful projects.

In addition, the results show poor performance among laborers, in terms of low labor productivity. This can be due to a variety of reasons including a lack of training, poor supervision, or poor workforce management, all of which can cause delays in construction project completion.

4.3.7. Descriptive Statistics for External Related Causes

As described on the table 5 above external related causes of delay in construction projects of Ethiopian Airlines group Construction Project are ranked the sixth based on their overall mean score from the major causes of delay factors listed above. The average mean score value is 2.77248 which indicates a moderate level of agreement.

Table 11: Mean score of external Related Causes

Items	Mean Score	Std. Deviation	N
Weather effect on construction	2.6957	1.17954	73
Regulatory changes	3.4493	0.99316	73
Unforeseen site condition	3.0145	0.94702	73
Accident during construction	2.4203	1.14283	73
Problem of electric supply	2.1884	1.44787	73
Shortage water supply	2.2029	1.46106	73
Unforeseen ground and geological conditions.	2.6957	1.15433	73

Fluctuations in cost/ currency	3.6812	1.00722	73
Local political instability	2.8406	1.11965	73
Lack of infrastructure (road, water, electric supply, etc.)	2.5362	1.36748	73
Total mean	**2.77248**	**1.182016**	

Source: Owen Survey (May,2026)

Based on individual indicators mentioned on Table 11 above Fluctuations in cost/ currency valued the highest mean score ($M = 3.6812\ and\ SD = 1.00722$) which mean that unstable cost and currency is highly significant factor for external related causes of delay following this Regulatory changes scores relatively high mean ($M = 3.4493$ and $\text{SD} = 0.99316$) which indicate that repetitive revision of law and regulation create strong challenge for project completion. Unforeseen site conditions also projected a moderate impact ($M = 3.0145$ and $\text{SD} = 0.94702$).

Accident during construction ($M = 2.4203$ and $\text{SD} = 1.14283$), Problem of electric supply($M = 2.1884$ and $\text{SD} = 1.44787$) and Shortage water supply ($M = 2.2029$ and $\text{SD} = 1.46106$) relatively lower mean scored which is lower influence on the project delay. Weather effect on construction and Unforeseen ground and geological conditions. ($M = 2.6957$) score moderate.

4.4. Descriptive statistics for effects of delay

The table below displays descriptive statistics for the construction delay effects. The following table provides descriptive statistics for the construction delay effects.

Table 12: Mean score of the indicators for Effects of Delay in Construction of ETAG

Items	Mean	Std. Deviation	N
Time overrun	4.0290	1.23635	73
Cost overrun	4.3478	1.02650	73
Dispute between parties involved	3.5362	0.90065	73
Reduced profit	4.0725	0.87982	73
Arbitration	3.3333	0.76055	73
Litigation and court case	3.4638	0.73923	73
Abandonment	3.3478	0.76362	73
Slowing down the growth of construction sector	3.5942	0.94431	73
Bad relationship with end users	3.5942	1.00468	73
Mistrust on owner of the project	3.6957	0.89614	73
Total Mean	**3.70145**	**0.915185**	

Source: Owen Survey (May 2026)

Table 12 includes the descriptive statistics of the effects of delay in construction projects at Ethiopian Airlines. The overall mean score is 3.701 that is within the moderate range, and it means that on average respondents believe the impacts of delay on project performance have a moderate to high effect.

The highest mean score ($M = 4.3478$) indicating a high category is cost overrun which was cited by respondents as the greatest impact of construction delays. It is followed by the low level of profit ($M = 4.0725$) and time overrun ($M = 4.0290$), which are also in the high range, indicating that delays can have a significant impact on the length of a project and lower the profits.

However, other factors like mistrust on the project owner ($M = 3.6957$), bad relationship with end users ($M = 3.5942$) and slowing down the growth of the construction sector ($M = 3.5942$) are in the moderate range, meaning that these elements are present but less dominant than the factors concerning cost and time impacts.

In the same vein, conflicts over delays ($M = 3.5362$) and litigation ($M = 3.4638$) are moderately rated, indicating that delays as such cause conflicts between stakeholders but are not the most critical consequences. By contrast, the outcomes of arbitration ($M = 3.3333$) and abandonment ($M = 3.3478$) are in the low to lower moderate range, indicating that these outcomes occur less often.

In all of the variables, the standard deviation is relatively low (between 0.73 and 1.23), suggesting that the opinions of respondents on the effects of delays are consistent.

4.5. Correlation Analysis

The statistical relationship between two variables that can be measured by a linear function is called linear correlation. It describes how much one variable varies with the other. The strength of this association is measured by the correlation coefficient (r) that can be any value from -1 to +1 (Bartz, 2009). A positive correlation coefficient of +1 indicates that there is a perfect positive linear relationship between the two variables, meaning they increase together. On the other hand, when the coefficient is negative (-1), there exists a perfect negative linear relation, that is, when one variable increases, the other decreases in a linear manner. A value of 0 indicates that there is no linear relationship between the variables. The closer the coefficient is to +1 or -1, the stronger the relationship between the variables, and the closer to 0, the weaker the relationship. It should be noted, however, that correlation does not say causation (Bartz, 2009).

Pearson correlation analysis was used to analyze the relationships between the dependent variable (construction project delay) and the independent variables (contractor related, client related, consultant related, labor related, material related and external related factors).

Table 13: Correlation between dependent and independent variables

Correlations								
		Mean contractor	Mean Client	Mean Consultant	Mean Material	Mean Labor	Mean External	Mean Effect
Mean contractor	Pearson Correlation	1	.423**	.411**	.255*	.635**	.383**	-.004
	Sig. (2-tailed)		.000	.000	.030	.000	.001	.972
	N	73	73	73	73	73	73	73
Mean Client	Pearson Correlation	.423**	1	.775**	.513**	.518**	.618**	.080
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.504
	N	73	73	73	73	73	73	73
Mean Consultant	Pearson Correlation	.411**	.775**	1	.649**	.620**	.567**	.237*
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.043
	N	73	73	73	73	73	73	73
Mean Material	Pearson Correlation	.255*	.513**	.649**	1	.525**	.576**	.341**
	Sig. (2-tailed)	.030	.000	.000		.000	.000	.003
	N	73	73	73	73	73	73	73
Mean Labor	Pearson Correlation	.635**	.518**	.620**	.525**	1	.671**	.003
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.977
	N	73	73	73	73	73	73	73
Mean ExternalR	Pearson Correlation	.383**	.618**	.567**	.576**	.671**	1	.134
	Sig. (2-tailed)	.001	.000	.000	.000	.000		.260
	N	73	73	73	73	73	73	73
Mean Effect	Pearson Correlation	-.004	.080	.237*	.341**	.003	.134	1
	Sig. (2-tailed)	.972	.504	.043	.003	.977	.260	
	N	73	73	73	73	73	73	73
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								

Source: Owen Survey (May,2026)

There appears to be a moderate to strong positive correlation between the independent (i.e., external factors, consultant factors, client factors, material factors, contractor factors and labor factors) and dependent (i.e., time overrun, cost overrun and overall project performance within Ethiopian airlines

construction projects) variables within the correlation analysis performed above. Table 13, which gives the results of correlation, indicates that: -

A Pearson product-moment correlation analysis was conducted to examine the relationship between the following variables: contractor, client, consultant, and material, labor, external and effect. The result suggests that some of the independent variables had a positive relationship among themselves, which was significant.

There are a number of strong and statistically significant positive relationships among the independent variables which means that the independent variables are very interrelated. There is a strong correlation between the consultant and client-related factors ($r = 0.775$, $p < 0.01$), indicating that inefficiencies or delays on the client side, such as slow decision making, frequent design changes, are related closely to corresponding inefficiencies or delays on the consultant side, such as delays in approvals and supervision. The same applies to the relationships between labor-related and external factors, which are also strong and positive ($r = 0.671$; $p < 0.01$). External factors, such as economic instability and changes in regulations, are seen to be significantly related to labor-related challenges, such as productivity and workforce availability. Further, the material factors are highly correlated with consultant related factors ($r = 0.649$, $p < 0.01$), meaning that poor design planning or delayed instructions from consultants can result in material procurement and supply problems. In addition, the correlation coefficient between contractor factors and labor factors is above 0.6 and significant ($r = 0.635$, $p < 0.01$), indicating that the contractor factors that cause difficulties in the coordination and management of contracts are directly related to the problems faced by labor during construction. Overall, these results highlighted that the main reasons for project delays are not separate from each other, but rather they interact with each other; problems in one area are likely to trigger or influence problems in other areas. This emphasizes the need to have an integrated project management methodology with as many project stakeholders and resources coordinated, to mitigate impacts of delays and enhance project performance.

With the dependent variable (effect), two variables were found to have statistically significant positive relations. The strongest significant relationship with effect was found with material factor ($r = .341$, $p < .01$) indicating that improved material availability, quality and management are linked to better project outcomes. Consultant factor also showed a weak yet significant positive association

with effect (r =.237, p less than.05), which means that good consultant performance has a positive impact on the success of projects.

On the other hand, contractor (r = -.004, p > .05), client (r = .080, p > .05), labor (r = .003, p > .05), and external factors (r = .134, p > .05) did not show statistically significant relationships with effect. This implies that these variables did not affect the outcomes of the projects independently in this study.

In general, the results show that material management and consultant performance are the most powerful issues to consider in project effect. This means that organizations should focus on effective material planning, procurement and utilization, as well as enhance consultant competency and supervision to enhance project performance.

4.6. Assumption tests for Regression Analysis

To analyze the causes of delay in construction projects at Ethiopian Airlines Group (ETAG) by using regression analysis, it is important to first check whether the data satisfy the important assumptions of regression analysis. The assumptions involve no multicollinearity of the independent variables, linear relationships between variables and normal distribution of residuals. To test these suppositions, a number of diagnostic tests were performed as set out below:

4.6.1. Multicollinearity test

Multicollonearity refers to a situation in which two or more independent variables are highly correlated in a regression model, which can affect the results and decrease the reliability of the model (Kothari, 2004).in this study multicollinearity was evaluated using tolerance values and the variance inflation factor (VIF).

Multicollinearity analysis is useful to determine if there is excessive interdependency between independent variables in the multiple regression model (Zikmund et al., 2010). Pallant (2010) states that tolerance is the percentage of variance in an independent variable that is not accounted for by the other independent variables and VIF is the inverse of the tolerance.

The general rule is that a VIF above 10 is considered to be multicollinearity among variables, whereas a tolerance value below 0.10 is considered as a sign of multicollinearity among variables (Pallant, 2010). Thus, the indicators were analyzed to see whether there are problems of multicollinearity between the independent variables in this study and whether the indicators are suitable for regression analysis.

Table 14: Multicollinearity test

Coefficients[a]			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Mean contractor	0.557	1.795
	Mean Client	0.331	3.022
	Mean Consultant	0.280	3.570
	Mean Material	0.502	1.993
	Mean Labor	0.327	3.062
	Mean External	0.406	2.464
a. Dependent Variable: Mean Effect			

Source: Owen Survey (May,2026)

A Multicollinearity test was carried out to establish whether there were strong interrelations among independent variables incorporated in the regression model. Based on the conventional interpretation, tolerance value must be more than 0.10 and VIF must be less than 10.

The findings in Table 15 shows tolerance values of all predictors are between 0.280 to 0.557, and that is higher than the minimum threshold of 0.10. On the same note, all the VIF values were between 1.795 and 3.570, which are considerably smaller than the acceptable maximum of 10.

Consultant was the most predictive (highest VIF) and the least tolerant (lowest tolerance) meaning that the predictor has the highest shared variance with other predictors than the other variables. Nevertheless, this is not extremely high and does not mean that there is severe multicollinearity. Contractor, on the other hand, had the lowest VIF (1.795) and the highest tolerance (.557), which means it had the least overlap with the rest of the explanatory variables.

In general, the results have confirmed that independent variables do not have any serious multicollinearity issues. Thus, every predictor variable was included in the multiple regression analysis, and the regression coefficients can be confidently interpreted.

4.6.2. Linearity Test

Linearity is the degree of linear association between the dependent variable and independent variables. The importance of establishing linear relationships in regression analysis is that it helps to ensure that the model is valid.

The association between the dependent variable (construction project delay) and the independent variables (external-related factors, consultant-related factors, client/owner-related factors, material-related factors, contractor-related factors, and labor-related factors) was explored in this study, using the linear relationship. SPSS software was used to create residual plots to check for linearity. A graph of the residuals can be used to decide if the data points form a straight line. The residual plots in figure 5 indicate that there is a linear relationship between the dependent and independent variables as there is no systematic pattern.

Therefore, it can be concluded that the assumption of linearity is satisfied, indicating that the data are suitable for regression analysis.

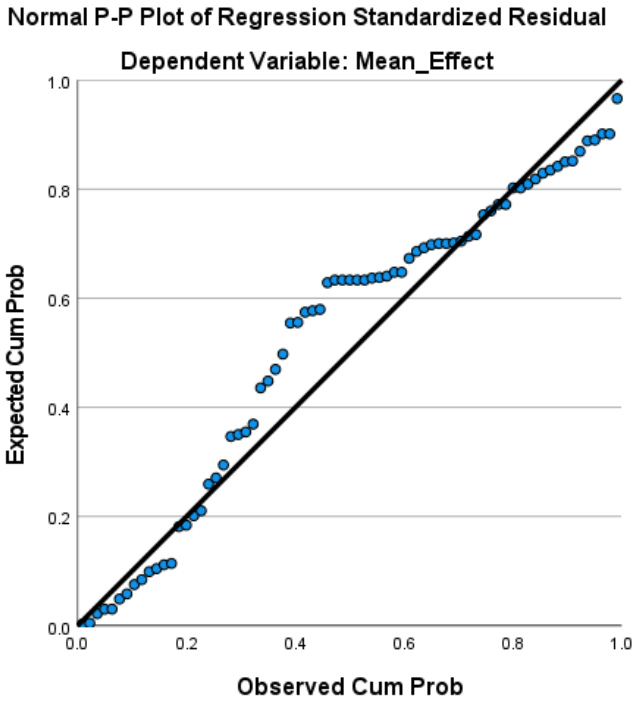


Figure 3: **Relationship of outcome variable and independent variables**

4.6.3. Normality Test

Normality indicates the degree to which the data resembles a bell curve (or normal) distribution; this is an important assumption underlying various types of statistical analysis (e.g., regression analysis). Normality describes both the pattern of distribution of a metric variable and how closely the metric variable's distribution conforms to the normal distribution defined as a benchmark for statistical procedures. (Hair et al., 2010).

The normality of the data was checked by plotting the distribution of the standardized residuals from the data in this study. The histogram of the residuals and a normal curve are displayed as shown in Figure 4. The histogram looks somewhat bell shaped, indicating that the residuals are reasonably normally distributed. There are a few residuals that don't follow the curve very closely, but most follow the curve closely.

Also, normality can be assessed by skewness and kurtosis values. If these values are near 0 then the data are normally distributed. While Osborne and Waters (2002) mention that extremes from normality are evident if the histogram is considerably skewed or deviates from a normal curve, they may not be the only indicators.

From the graphical analysis and distribution as shown, Although the histogram shows a slight skewness, the residuals are Approximately normally distributed. Thus, the assumption of normality is fulfilled, and the data are suitable for regression analysis.

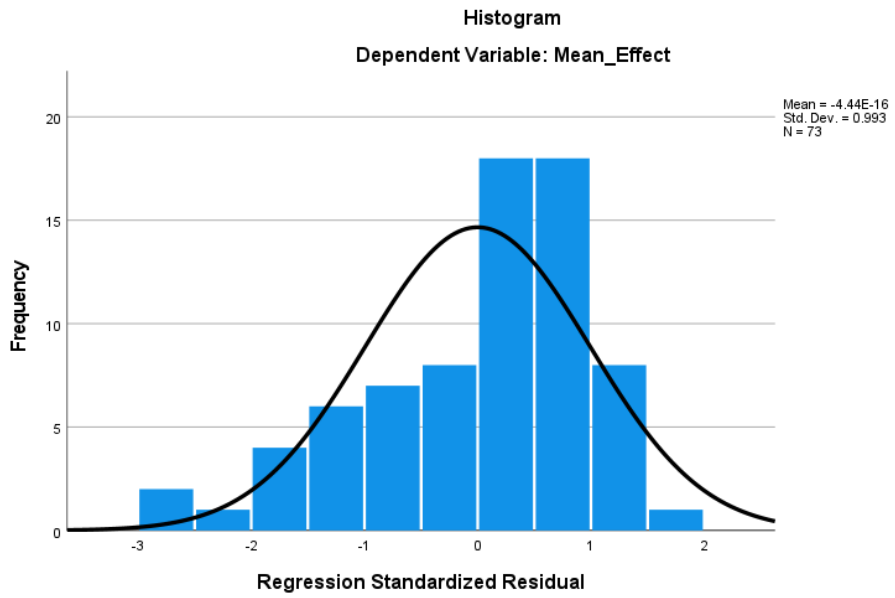


***Figure 4*: Frequency distribution of standardized residuals compared to a normal distribution.**

4.6.4. Homoscedasticity

The assumption that the variance of the error terms is the same at every level of the independent variables is known as homoscedasticity. That is, the distribution of residuals should be the same across all predicted values of the dependent variable. In regression analysis, this assumption is crucial as unequal variances (heteroscedasticity) can lead to errors in statistical inferences (Osborne & Waters, 2002).

Keith (2006) states that homoscedasticity means that the error terms are homogeneously distributed so that there is no discernible pattern when graphed against the predicted values. If this assumption is correct, it can be verified using scattergrams of standardized residuals and standardized predicted values.

The test for homoscedasticity in this study was conducted by creating a scatter plot using SPSS. There was no pattern or funnel shape in the plot of standardized residuals against standardized predicted values. The residuals were instead randomly distributed around zero meaning that the variance of the errors is constant.

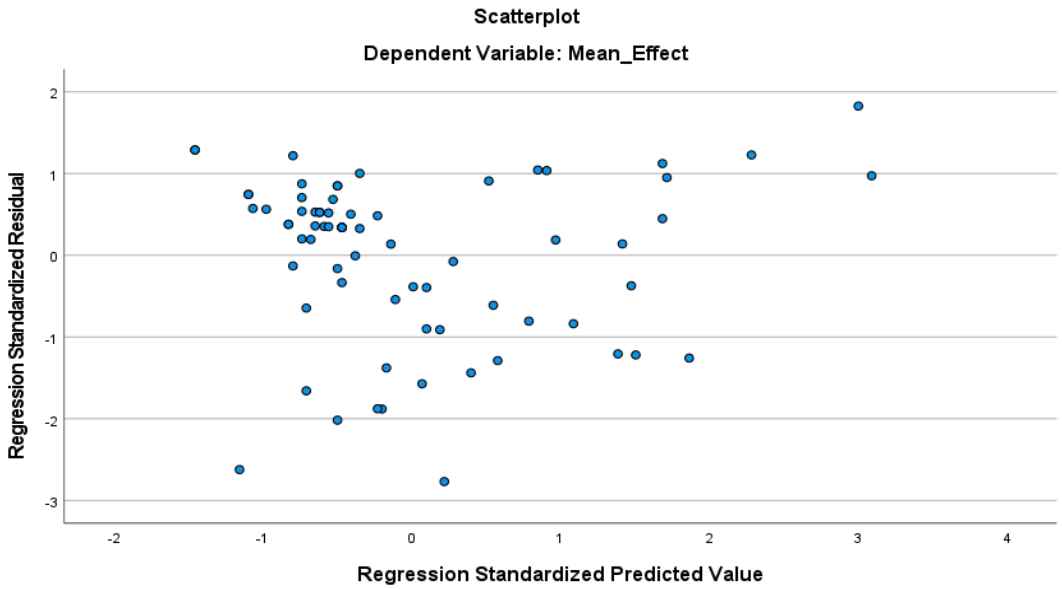


Figure 5: **Homoscedasticity**

4.7. Regression Analysis

In this section, the results of the regression analysis carried out in the context of the study are presented and discussed. The study laid the basic groundwork by conducting a thorough literature review and descriptive and correlation analysis, that revealed the key contributors to construction project delays in Ethiopian Airlines Group before reaching this stage.

A multiple regression model was constructed to further examine the effect of the identified variables on the construction project delays, which aims to determine the most important variables that affect the project delay by studying the relationship between the project delay (dependent variable) and a set of independent variables such as: the contractor, the client, the consultant, the materials, the labor and finally the external factors (Field, 2018).

In the present study, regression analysis is used to determine the delay factors which have the strongest relationship with the project performance as well as to infer the predictive effect of the independent variables on the dependent variable (Field, 2017; Creswell & Creswell, 2018).

Table 15: Model Summery

model	R	R square	adjusted R square	Std. Error of the Estimate
1	.553[a]	.306	.243	.51524
a. Predictors: (Constant), Mean External, mean contractor, Mean Material, Mean Client, Mean Labor, Mean Consultant				

Source: Owen Survey (May 2026)

The table above displays the R value of .553 which is the multiple correlation coefficient between the dependent variable of the dependent variable (the project's delay for Ethiopian Airlines Group) and the independent variables (causes of delay for Ethiopian Airlines Group). The R value is representative of the overall strength of the relationship between the predictor variables and the outcome (Field, 2005). The R value for this study is representative of the aggregate correlation of the external-related causes; consultant-related causes; client-related causes; material-related causes; contractor-related causes; labor-related causes; and project delay variables. Overall, the R value would be considered to show moderate positive correlation amongst the various variables.

The results of the regression model gave a multiple correlation coefficient of R =.553 which showed that there was a moderate positive relationship between the independent variables (contractor, client consultant, material, labor, and external factors) combined and project delay.

The coefficient of determination (R^2 =.306) demonstrates that the joint effect of the predictor variables included in the model explains 30.6% of the variation in the delay of the project. This means that the factors chosen are meaningful in explaining delays in construction projects of Ethiopian Airlines Group.

The value of Adjusted R^2 =. 243 means that a specific portion of the variance in the project delay is accounted by the model by including the number of predictors in the model, that is, 24.3%. The adjusted value is slightly smaller than R^2, which indicates that not all predictors can be as significant as others, but the model still can be considered as having acceptable explanatory power.

The standard error of the estimate (.51524) is the mean gap between the observed values and the regression line. The standard error is relatively moderate which indicates that the model forecasts are quite close to the actual values observed.

In general, the regression model shows that the proportion of project delay in Ethiopian Airlines Group construction projects is largely attributed to contractor, client, consultant, material, labor and external factors. Nevertheless, given that approximately 69.4% of the variation is not explained, other variables not captured in this research might also affect project delays. Thus, future studies can consider other factors like financial limitations, regulatory concerns, use of technology and project management behavior.

4.7.1. ANOVA

The ANOVA (Analysis of Variance) results in Table 16 present the output of an analysis conducted to measure the performance of a regression model that is looking at the delay respectively associated with the construction projects being completed for Ethiopian Airlines as the outcome variable, and to determine how much variability in construction project delays is attributable to the independent variables that have been included in the regression model by performing an analysis of variance. In particular, the analysis performed by the ANOVA will determine if there are variable relationships between external-related variables, consultant-related variables, client/owner-related variables, material-related variables, contractor-related variables, and labor-related variables and their respective contributions to variability in the construction delays in the data being analyzed.

The purpose of analysis of variance (ANOVA) is to test the significance of the complete regression model (includes all independent variables) and to determine if there is a statistically significant effect of all independent variables as a group on construction project delays. If there is evidence of statistical significance from the ANOVA results, we can conclude that the regression model does a good job of fitting the data. Likewise, if there is such evidence, it may be concluded that all independent variable(s), as a group, significantly influence the dependent variable (Field, 2017).

Table 16: ANOVA Results for Multiple Regression Analysis

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.724	6	1.287	4.850	.000[b]
	Residual	17.521	66	.265		
	Total	25.245	72			
a. Dependent Variable: Mean Effect						
b. Predictors: (Constant), Mean External, mean contractor, Mean Material, Mean Client, Mean Labor, Mean Consultant						

Source: Owen Survey (May,2026)

The ANOVA test concluded that there is a statistically significant relationship for the entire model predicting delays in Ethiopian Airlines Group construction projects with $F(6, 66) = 4.850, p < .001$ (see Table 16). This supports that all independent variables (contractor, client, consultant, materials, labor and external) have a combined effect on project delays.

The regression sum of squares (Regression $SS = 7.724$) is the amount of variance in project delay that is attributable to the independent variables, while the residual sum of squares (Residual $SS = 17.521$) is the amount of variance unaccounted for by the independent variables. At the significance level of $(p = .000)$ and the alpha of .05, the null hypothesis that all the regression coefficients are equal to zero is rejected, therefore at least one of the independent variables has a statistical relationship with project delays.

The results of ANOVA prove that the general regression model is suitable and can be used statistically to explain delays in Ethiopian Airlines Group construction projects. Thus, the causes of delay in a project are contractor, client, consultant, material, labor and external factors. This justifies the next step of analysis in individual regression coefficients analysis to establish which specific variables have most significant impact.

4.7.2. Beta Coefficients

Using beta coefficients (β) from regression analysis, we can determine how each independent variable relates to and influences the dependent variable of construction project delay. Beta coefficients are important in determining the strength of each predictor variable's impact on the outcome variable.

In multiple regression analysis, beta coefficients are standardized, making it easier to compare the comparative importance of multiple independent variables since they all use the same scale to measure the strength of the relationship (Hair et al., 2019). A positive beta coefficient indicates a direct relationship, which means as the independent variable increases, so does the construction project delay. A negative beta coefficient indicates an inverse relationship (Field, 2018).

Table 17: Beta Coefficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.586	.768		.763	.448
	Mean contractor	.018	.114	.021	.155	.878
	Mean Client	-.036	.144	-.045	-.250	.804
	Mean Consultant	.222	.164	.263	1.357	.179
	Mean Material	.487	.134	.525	3.630	.001
	Mean Labor	-.050	.107	-.084	-.468	.641
	Mean ExternalR	.358	.113	.509	3.165	.002
a. Dependent Variable: Mean Effect						

Source: Owen Survey (May,2026)

The regression analysis showed that the intercept was not significant, B = 0.586, SE = 0.768, t = 0.763, p = .448. The expected value of the dependent variable (Mean Effect) is 0.586 when all the predictor variables (Contractor, Client, Consultant, Material, Labor, External) are set to zero, but this estimate does not differ from zero significantly. Contractor related factors have a very weak and statistically insignificant positive effect on project delay, with the standardized beta coefficient being 0.021, and the p value of 0.878; likewise, client related factors have a very weak, non-significant negative effect on project delay with the standardized beta coefficient being −0.045 and the p value of 0.804. Likewise, consultant-related factors (β = +0.263, p = 0.179) have a moderate positive effect, but this effect is not statistically significant and thus not a reliable predictor. However, material factors (β = 0.525, p = 0.001) show strong positive and statistically significant results, meaning that material-related factors such as material shortage, delayed material supply, and fluctuating material prices have a significant impact on the delays of the projects, which is consistent with the knowledge of regression analysis which implies that the higher the β value, the greater the predictive power of the factor when p value is significant (Hair et al., 2019). Labor-related factors (β = −0.084, p = 0.641) have a weak and insignificant negative effect, indicating that they have little effect on delays. Finally, external factors (β = 0.509, p = 0.002) have an impact that is strong and statistically significant, reflecting the fact that economic instability, inflation and regulatory changes have a significant influence on the project outcome.

The overall findings indicate that material and external are the most important factors that contribute to construction project delay, and the rest of the factors have very little explanatory power in line

with the standard regression interpretation guidelines that prioritize both the magnitude and the level of statistical significance of the regression coefficient (Field, 2018; Pallant, 2020).

4.7.3. Hypothesis Testing

The aim of the hypothesis testing in the study was to investigate if the selected independent variables could be statistically significant to construction project delays. The p value (significance level) was used to decide whether to accept or reject each hypothesis, with a hypothesis being accepted if $p < 0.05$ and rejected if $p > 0.05$ (Field, 2018, Pallant, 2020).

Table 18 Summary of Hypothesis Testing

Statement	Beta Coefficient	P-value	Result
H1: Contractor-related factors have a significant positive effect on construction project delays	.021	.878	Rejected
H2: Client-related factors have a significant positive effect on construction project delays	-.045	.804	Rejected
H3: Consultant related factors have a significant positive effect on construction project delays	.263	.179	Rejected
H4: Material related factors have a significant positive effect on construction project delays	.525	.001	Accepted
H5: Labor related factors have a significant positive effect on construction project delays	-.084	.641	Rejected
H6: External related factors have a significant positive effect on construction project delays	.509	.002	Accepted

Source: Owen Survey (May,2026)

According to this model, the priority variables affecting construction project delays in Ethiopian Airlines are mainly material and External variables and the other variables have not a statistically significant influence in this model.

4.8. Discussion of Findings

The main objective of this study was to investigate the causes of construction projects delay in Ethiopian Airlines Group projects and determine the most important causes through regression analysis. The results showed that several factors affect the delay of projects, but only material-related factors and external factors are statistically significant factors. This finding is consistent with the existing empirical construction project management (PM) literature and theory.

The study identified that material related factors positively and significantly affected construction project delay. This means that factors like material delivery delays, procurement delays and price

volatility have a significant impact on project performance. This is in line with the Resource-Based View (RBV) that focuses on the influence of resources availability and utilization on project performance. This finding is supported by Fashina et al. (2021) who reported that material supply problems and cost fluctuations are among the biggest factors that cause the delays of construction projects. In a similar manner, Nguyen (2020) concluded that resource related variables, such as material availability, significantly influence the project completion time. These results indicate that materials directly interfere with the construction process, causing delays.

Second, the findings of this study showed that the external factors are negatively and statistically significant with the project delays, which demonstrates that project delays can be affected by external factors such as inflation, regulatory changes and economic instability. This result aligns with the Risk Management Theory, which emphasizes that external uncertainty can have an impact on project performance. Other factors have been identified as being important in previous studies. For example, Kikwasi (2012) found that delays in construction projects are attributed to economic instability and regulatory conditions. In a similar vein, Sambasivan and Soon (2007) found that other factors like government restrictions and financial uncertainties play a major role in determining the time of project completion.

On the contrary, the study revealed that other factors (contractor-related, client-related, consultant-related and labor-related) did not have any strong influence in the descriptive analysis and were not statistically significant in the regression model. This means that these factors were seen as factors important to respondents but when examined in conjunction with other factors they do not account for variation in delays to projects. This finding is consistent with the nature of multiple regression analysis, which assesses the unique contribution of each predictor, adjusting for the effects of the other predictors.

Further, the sample size of the study (n = 73) could have affected the regression results. Sample size is one of the factors that impact the power of a study, the power being the ability of the study to detect significant relationships. Weaker but meaningful relationships might not be detected in studies with moderate or small sample sizes because of limited statistical power (Cohen, 1992). Field (2013) also notes that for regression analyses, sample size, effect size and variability are all factors that determine whether a variable is significant or not, and that variables with lower effects may not be significant when there are fewer numbers in a sample. In the present study, some of the variables that are related to the contractors, related to the clients, related to the consultants, and related to the labor

can be practically significant in influencing the project delays, but were not statistically significant because of the combined effect of the sample size and overlapping variables.

Several empirical studies show this same pattern and so lend credence to the findings. Sambasivan and Soon (2007) noted various delay factors, but a few were identified as the critical factors that cause delays in projects. Likewise, Nguyen (2020) found that while a variety of factors can impact construction delays, only a select few that focused on planning and resource management were statistically significant in regression analysis. Furthermore, Fashina et al. (2021) determined more than 50 delay factors and limited them to a few that had a significant effect on project performance. This means that in construction research, few variables are still regarded as being significant predictors while others are not because the impact of the other variables is seen in their effect on the few variables. Previous empirical studies in Ethiopia and other countries support the fact that many variables are found to be causing construction delay, but regression analysis can only identify a sub-set of the variables that are statistically significant. However, among the variables they considered, only planning, monitoring, and material-related factors were found to be statistically significant by Shedaga et al. (2024). Likewise, Koshe and Jha (2016) found 88 delay factors but only a few of them were found to be critical. In addition, international research (Araújo-Rey & Sebastián, 2021; Gurumayum, 2025) indicates that regression methods highlight the most influential variables and make the rest of the variables statistically insignificant.

Interrelationships of the delay factors may be a possible explanation for this outcome. For instance, contractors' inefficiencies can be associated with the lack of some materials, and client delays can be related to the external economic environment. Consequently, the effects of these variables are not as statistically significant when they are used together in a regression model. This explanation is backed up by statistical theory which recommends that the importance of a variable is contingent upon their independent explanatory value in comparison to other variables in the model. Thus, only variables that have the strongest and most direct effects on the dependent variable are significant.

Moreover, the independent variables accounted for a moderate variance in the project delay, as it showed in the model summary of this study. This indicates that although the identified variables are a major concern, there could be other variables that are not in the model which also affect project delays. This is in line with past studies which focused on the complexity of construction delay due to the presence of various factors that are interrelated (Sambasivan & Soon, 2007).

In conclusion, the results of this study indicate that while there are numerous factors that contribute to construction delays, material-related and external factors are the most important factors in the Ethiopian Airlines construction projects. The results are in line with both theoretical implications and empirical findings from previous research, which increases the validity and reliability of this study.

CHAPTER FIVE
5. Summary, Conclusion and Recommendations

The purpose of this chapter is to summarize the most important findings, conclusions, and recommendations resulting from this research study to improve the timely completion of future Ethiopian Airlines Group construction projects. Additionally, it identifies the lessons learned on completion of previous projects and provides practical recommendations to parties involved, including clients, contractors, suppliers, external vendors; labor; and consultants. These recommendations will address the primary causes of project delays, as well as provide practical advice for mitigating delay-related issues during project implementation and completion.

5.1. Summary Findings

The study aimed at investigating the factors and impacts of construction delays in Ethiopian Airlines Group (ETAG) Build-out Projects. Data was gathered from 73 respondents, contractors, consultants and client representatives. The key delay factors were identified and evaluated using descriptive and inferential statistical methods.

The data shows that there are a variety of categories that contribute to delays within construction projects belonging to Ethiopian Airline Group (ETAG). The data showed that the most significant delays of these projects are caused by material-related factors followed by contractor-related factors and then, client-related factors each contributing to significant delays affecting project performance.

Research also revealed that consultant-related factors, labor-related factors and external factors respectively affect project delays, but to a lesser degree than the primary factors. Thus, although there exist multiple variable categories that cause delays, certain primary categories exert a more predominant influence on the overall timeline of projects.

More specifically, the most important material-related issues are late delivery of materials, material delivered late to the construction site and fluctuation of material prices. These aspects are the reasons for disruption of project schedules and uncertainty in project execution.

In the case of contractor causes, financial problems, coordination, communication, and sense of responsibility were highlighted as the main causes of delay. These can have direct impacts on project implementation and operational efficiency.

Other client-related issues, like frequent changes in project scope, slow decision-making times and delays in payment were also identified as having a significant impact on project progress. These issues can cause production delays and add to the uncertainty of a project.

Unrealistic scheduling, not updating schedules, and incorrect cost estimation were identified as moderate factors that contributed to the delay in the consultant related activities, especially during planning and monitoring.

The study also found that primary impacts of construction delays are cost overruns and time overrun, followed by loss of profitability, disagreements among stakeholders, and lack of trust between project stakeholders.

5.2. Conclusion

The results of this study clearly indicate that construction delays in Ethiopian Airlines Group projects are multidimensional and caused by the interaction of managerial, financial and operational issues.

The descriptive analysis reveals that the value of mean lies in between 2.77 and 3.11 in all categories of delay factors which suggests that there is no single cause of delays in a project, but rather several causes. Specifically, the study revealed that the most important single points of delay were delayed material delivery (mean = 3.70), late procurement (mean = 3.65) and price fluctuations (mean = 3.65). The financial issues (mean = 3.38) and lack of coordination were the most important ones identified for the contractors, while change orders (mean = 3.80) appeared as the most important factor for the client.

The regression analysis, however, gives further insight by determining which predictors are most important to project delays. Moderate explanatory power ($R^2 = 0.306$) indicates that the selected factors explain about 30.6% of the variation in project delay, and the model is statistically significant ($F = 4.850$, $p < 0.001$). Importantly, it is found that only external factors ($\beta = 0.509$, $p = 0.002$) and material related factors ($\beta = 0.525$, $p = 0.001$) were significant statistically with respect to construction project delays. The other variables that were not statistically significant in the regression model were: contractor, client, consultant, and labor related. This means that delays are mostly caused by resource-related constraints or external uncertainties in Ethiopian Airlines projects.

Furthermore, the reliability of the research results is also supported by the consistency of measurement as a whole so that the value of Cronbach's Alpha is 0.843 which shows good reliability of measurement data used in research analysis.

Hence, the efficiency of procurement mechanisms for external risk is necessary, as is the case of having a proactive approach to the management of external and internal risks and improving coordination amongst stakeholders in the implementation of ETAG projects. Solving these areas would greatly minimize delays, boost the cost and time aspect, and for the construction project to be delivered successfully.

5.3. Recommendation

From the result of this study, some recommendations are made to minimize construction delays in the Ethiopian Airlines Group projects. There is a need for better material management, and this can be done through timely procurement and efficient delivery of construction materials through a good plan and coordination with suppliers.

Additionally, capacity building of contractors is important to increase their financial management skills, promote team working within projects and ensure proper communication during the project implementation.

Project owners should also enhance their decision-making by reducing delays in the approval process and by not allowing too many changes to occur during construction. By consulting and improving their performance, they learn to create realistic project schedules, get better cost estimates and continuously update the schedules when there are any changes in the projects.

In addition, it is important to encourage good coordination and communication among all stakeholders to facilitate the flow of information and facilitate collaboration.

Effective project planning and monitoring systems are also needed to ensure proper monitoring and identification of delays at an early stage.

Finally, suitable approaches should be devised to deal with external factors like price variation, regulation changes, and other uncertainties that can impact the project.

From the results of this study, the following practical recommendations are suggested to reduce construction delays in Ethiopian Airlines Group projects:

5.4. Research Limitations

This research has its own limitations in certain aspects, but it has the following contributions related to the causes and impacts of construction delays in the Ethiopian Airlines Group projects. Though this study has some limitations, it has following contributions in relation to causes and impacts of construction delays in Ethiopian Airlines Group projects.

The study took place in a particular organizational setting, and the results might not be applicable to other sectors or regions. Furthermore, the number of respondents (N=73) could be limited to represent all stakeholders on construction projects, especially by region or project type.

The study was primarily based on self-reported information gathered from questionnaires and might be potentially biased by the perceptions and biases of the respondents.

In addition, the study was not comprehensive enough to include detailed technical or engineering evaluations and primarily looked at managerial and operational issues relating to construction delays.

The limitations need to be considered when using the results and serve as a basis for further research to broaden and enrich the knowledge of construction project delays.

5.5. Suggestion for future research

This study can be extended by recruiting larger and more varied samples from other organizations and sectors to enhance the generalizability of results. Comparative studies between industries and/or regions would be helpful to gain insight into the differences between construction delay factors. Also, future studies can use more sophisticated statistical methods to explore intricate relations between variables. Also, there is a need to investigate further the technical and engineering aspects of construction projects in addition to the managerial approach used in this research. Last, but not least, projects monitored over time (longitudinal studies) might generate more detailed information about the trends and long-term effects of construction delays.

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ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF PROJECT MANAGEMENT

QUESTIONNAIRE

DEAR SIR/MADAM,

The purpose of this questionnaire is to collect primary data for conducting a study on the topic, THE CAUSE AND EFECT OF PROJECT DELAY IN BUILDING CONSTRACTION PROJECTS: IN CASE FOR ETHIOPIAN AIR LINE GROUP to fulfill completion of MSC Degree in project management.

Dear respondent, I am glad to inform you that you are one of the preferred study participants to participate in this study case. This study is purely for academic purposes and under no circumstance will affect the respondents. The information provided in this questionnaire kept strictly confidential; will not be divulged to any one and only used for research purposes. In addition, your name and address will not be recorded or identified even by the researcher. Nevertheless, your genuine view, frank opinion & timely responses are very valuable in determining the success of the study.

These questioners have three parts **Part I Demographical Information, Part II Causes of Delay**, **and Part III Effects of Delay** and approximately will take 20 minutes of your time.

General Instruction

- No need to write your name .
- Please tick (√) the appropriate box.

Name: Melaku Tefera

Thank you in advance for your voluntary and timely response

Part I: Demographical Information

1. Indicate your Gender

   I) Male ☐ II) Female ☐

2. Indicate your Age Group:

   I) ≤ 25 ☐ II) 26 - 35 ☐ II) 36 - 40 ☐ IV) 41 and above ☐

3. Indicate your Educational status:

   I) P H D ☐ II) Masters ☐ III) Degree ☐ IV) Diploma ☐

   Other please specify _____

4. Indicate your organization

   I) Ethiopian Airlines ☐ II) Contractor ☐ III) Consultant ☐ IV) Sub-contractor ☐

5. Indicate your Service year:

   I) ≤ 3 Years ☐ II) 4 – 10 Years ☐ III) 11 – 15 Years ☐ IV) 16 – 20 Years ☐

   V) 21 and above ☐

6. Indicate your position

   I) Dir and above ☐ II) Project manager ☐ III) Team leader ☐ IV) Project Member ☐

   V) Project Engineer ☐ VI) Supervisor /Forman ☐

Other please specify _____

Part II: Causes of Delay in Construction of Ethiopian Airline Group

Dear respondent please rank the following critical success factors in terms of importance for the project success of Ethiopian Airline projects implementation. Please read each statement carefully and show the extent of your agreement on the statements by tick **(√)** in the column using the following rating scale from 1-5:

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

Causes of Delay		1	2	3	4	5
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Contractor related causes	Inefficient site management practice					
	Inadequate experience					
	Financial problem of contractor and sub-contractor(s)					
	Inability of coordination					
	Poor communication					
	Mistakes during work					
	Rework due to error					
	Delay of work without reason					
	Less sense of ownership					
	Corruption					
Owner/client related causes	Financial constraint					
	Frequent change of orders during					
	Slow decision making					
	Low level of technical expertise					
	Delayed release of payment					
	Bid award for lowest price					
	Lack of communication					
	Unnecessary interference					
	Corruption in awarding					
	Less sense of ownership					
	Poor monitoring and evaluation					
	Poor follow up of progresses					
Consultant related causes	Inadequate experience					
	incomplete design					
	Poor supervision					
	Slow to give instruction					
	Poor inspection and audit					
	Poor cost estimation					
	Poor project planning					
	Lack of proper cooperation					
	Corruption					
	Unrealistic time schedule					
	Failure to update schedule when the need arises					

Materials related causes	Lack of provision of quality					
	Scarcity in material					
	Late procurement of materials					
	Poor material management					
	Fluctuation in price of building					
	Delaying delivering material on					
	Equipment breakdowns					
	Scarcity of equipment					
	Low level of equipment operators skills					
	Low productivity and efficiency of equipment					
	Lack of equipment accessibility					
Labor related	Labor strikes					
	Labor absenteeism					
	Low productivity					
	Unqualified work force (Shortage of skilled labor)					
External Causes	Weather effect on construction					
	Regulatory changes					
	Unforeseen site condition					
	Accident during construction					
	Problem of electric supply					
	Shortage water supply					
	Unforeseen ground and geological conditions.					
	Fluctuations in cost/ currency					
	Local political instability					
	Right of way problem					
	Lack of infrastructure (road, water, electric supply, etc.)					

If you have any additional comment regarding the causes of delay of building construction in Ethiopian airlines please specify them here_____

_____

_____

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Part III: Effects of Delay in Construction of Ethiopian Airline Group

Effects of delay	**1** Strongly Disagree	**2** Disagree	**3** Neutral	**4** Agree	**5** Strongly Agree
Time overrun					
Cost overrun					
Dispute between parties involved					
Reduced profit					
Arbitration					
Litigation and court case					
Abandonment					
Slowing do wither growth of Housing construction sector.					
Bad relationship with end users					
Mistrust on owner of the project					

If you have any other additional information about the effects of delay of Construction in Ethiopian airline Group please specify
here._____
_____
_____.

APPENDICES

I. The results of the Cronbach's Alpha reliability test

Factors	Numbers of questions	Cronbach's alpha, α	Internal consistency
Contractor related causes	10	0.848	Excellent
Owner/client related causes	12	0.855	Excellent
Consultant related causes	11	0.850	Excellent
Materials related causes	10	0.788	Good
Labor related causes	4	0.829	Excellent
External Related Causes	10	0.888	Excellent

II. Correlation between dependent and independent variables

Correlations

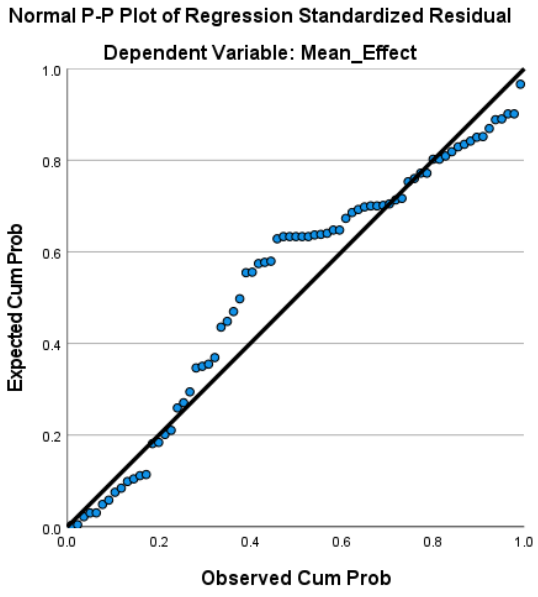
		Mean contractor	Mean Client	Mean Consultant	Mean Material	Mean Labor	Mean External	Mean Effect
Mean contractor	Pearson Correlation	1	.423**	.411**	.255*	.635**	.383**	-.004
	Sig. (2-tailed)		.000	.000	.030	.000	.001	.972
	N	73	73	73	73	73	73	73
Mean Client	Pearson Correlation	.423**	1	.775**	.513**	.518**	.618**	.080
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.504
	N	73	73	73	73	73	73	73
Mean Consultant	Pearson Correlation	.411**	.775**	1	.649**	.620**	.567**	.237*
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.043
	N	73	73	73	73	73	73	73
Mean Material	Pearson Correlation	.255*	.513**	.649**	1	.525**	.576**	.341**
	Sig. (2-tailed)	.030	.000	.000		.000	.000	.003
	N	73	73	73	73	73	73	73
Mean Labor	Pearson Correlation	.635**	.518**	.620**	.525**	1	.671**	.003
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.977
	N	73	73	73	73	73	73	73
Mean ExternalR	Pearson Correlation	.383**	.618**	.567**	.576**	.671**	1	.134
	Sig. (2-tailed)	.001	.000	.000	.000	.000		.260
	N	73	73	73	73	73	73	73

Mean Effect	Pearson Correlation	-.004	.080	.237*	.341**	.003	.134	1
	Sig. (2-tailed)	.972	.504	.043	.003	.977	.260	
	N	73	73	73	73	73	73	73
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								

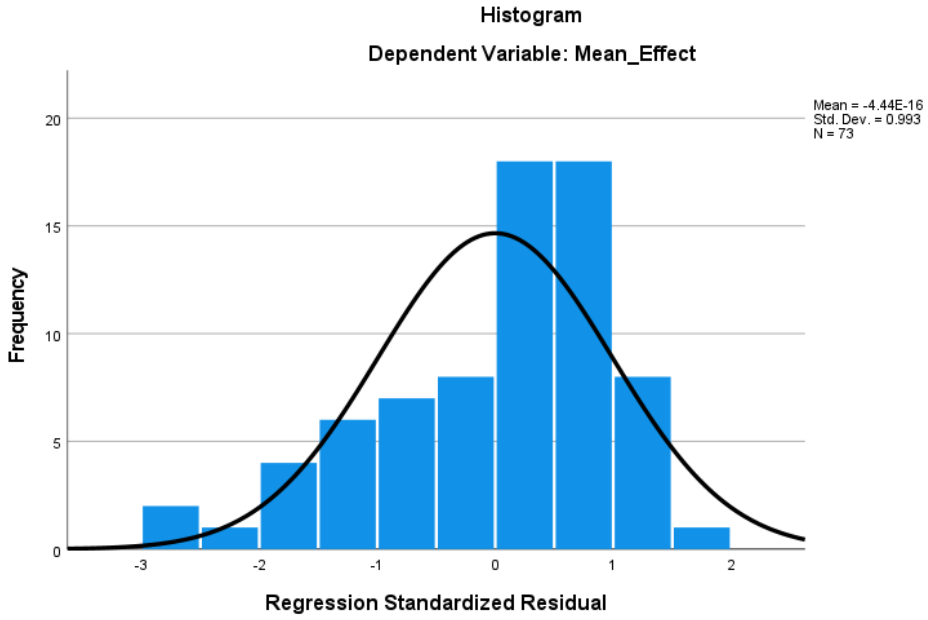
III. **Multicollinearity test**

Coefficients[a]			
Model		Collinearity Statistics	
		Tolerance	VIF
1	Mean contractor	.557	1.795
	Mean Client	.331	3.022
	Mean Consultant	.280	3.570
	Mean Material	.502	1.993
	Mean Labor	.327	3.062
	Mean External	.406	2.464
a. Dependent Variable: Mean Effect			

IV. **Linearity Test**



V. Normality Test (Frequency Distribution of Standardized Residual)



VI. Regression Analysis

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.553[a]	.306	.243	.51524
a. Predictors: (Constant), Mean External, mean contractor, Mean Material, Mean Client, Mean Labor, Mean Consultant				

5.5.1. ANOVA (Analysis of Variance)

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.724	6	1.287	4.850	.000[b]
	Residual	17.521	66	.265		
	Total	25.245	72			
a. Dependent Variable: Mean Effect						
b. Predictors: (Constant), Mean External, mean contractor, Mean Material, Mean Client, Mean Labor, Mean Consultant						

VII. **Beta Coefficients**

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.586	.768		.763	.448
	Mean contractor	.018	.114	.021	.155	.878
	Mean Client	-.036	.144	-.045	-.250	.804
	Mean Consultant	.222	.164	.263	1.357	.179
	Mean Material	.487	.134	.525	3.630	.001
	Mean Labor	-.050	.107	-.084	-.468	.641
	Mean ExternalR	.358	.113	.509	3.165	.002
a. Dependent Variable: Mean Effect						

VIII. **Summary of Hypothesis Testing**

Statement	Beta Coefficient	P-value	Result
H1: Contractor-related factors have a significant positive effect on construction project delays	.021	.878	Rejected
H2: Client-related factors have a significant positive effect on construction project delays	-.045	.804	Rejected
H3: Consultant related factors have a significant positive effect on construction project delays	.263	.179	Rejected
H4: Material related factors have a significant positive effect on construction project delays	.525	.001	Accepted
H5: Labor related factors have a significant positive effect on construction project delays	-.084	.641	Rejected
H6: External related factors have a significant positive effect on construction project delays	.509	.002	Accepted