


# ADDIS ABABA UNIVERSITY

## COLLEGE OF BUSINESS AND ECONOMICS, SCHOOL OF COMMERCE

## DEPARTMENT OF BUSINESS ADMINISTRATION AND INFORMATION SYSTEMS

# FACTORS AFFECTING CONSTRUCTION DELAY IN REAL ESTATE SECTOR: A CASE STUDY OF SELECTED PROJECTS IN ADDIS ABABA, ETHIOPIA.

**BY: NITSHET LAKEW**

**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF ARTS DEGREE IN PROJECT MANAGEMENT**

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*ADDIS ABABA, ETHIOPIA*

*APRIL, 2026*

# DECLARATION

I hereby declare that this thesis, titled " **Factors Affecting Construction Delay in Real Estate Sector: A Case Study of Selected Projects in Addis Ababa, Ethiopia**." is my original work with the guidance and supervision of my advisor Mahir Jebril (PhD). I confirm that all sources of materials used in this study have been duly acknowledged and properly cited. I further declare that this work has not been submitted at any other institution or University for the award of any degree or diploma.

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# CERTIFICATION

This thesis entitled “Factors Affecting Construction Delay in Real Estate Sector: A Case Study of Selected Projects in Addis Ababa, Ethiopia.” is submitted in partial fulfillment of the requirements for the award of the degree of Master of Arts in Project Management. This research was carried out by Ms. Nitshet Lakew under my supervision and guidance. The research presented herein is certified to be original, to meet the academic standards of the program, and to be suitable for submission for examination.

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# ABBREVIATIONS

| | |
|---|---|
| AACRA | Addis Ababa City Roads Authority |
| ANOVA | Analysis of Variance |
| AU | African Union. |
| EEA | Ethiopian Economic Association |
| ERA | Ethiopian Roads Authority |
| GDP | Gross Domestic Product |
| MoWUD | Ministry of Works and Urban Development |
| R | Correlation Coefficient |
| RII | Relative Importance Index |
| SPSS | Statistical Package for the Social Sciences |
| UN | United Nations |
| UNECA | United Nations Economic Commission for Africa |
| UN-Habitat | United Nations Human Settlements Programme |
| VIF | Variance Inflation Factor |

# ABSTRACT

*This study identifies the factors affecting construction delay in the real estate sector a case study of selected projects in Addis Ababa, Ethiopia. The primary objective is to identify the major causes of delays in building construction projects, which are vital to the city's socio economic growth. The research adopts a quantitative multi-case study design, focusing on five specific project categories luxury apartments, mid-income housing, mixed-use buildings, G+4 to G+7 residences, and large private estates. To ensure a representative and expert data set, purposive sampling was used to select professionals with direct experience and knowledge of project delays, resulting in 133 valid responses from a distributed 150 questionnaires. Data analysis was conducted using descriptive statistics, Pearson correlation, multiple regression, and the Relative Importance Index (RII). The findings reveal that while all stakeholder and external factors show a positive significant correlation with delays, client-related factors specifically financial constraints, slow decision-making, and scope changes are the only statistically significant predictors in the regression model. However, the RII analysis identifies external factors, including material shortages, exchange rate fluctuations, and price variations, as the most critical drivers of delay across all project types the study concludes that construction delays in Addis Ababa's are primarily a result of managerial and coordination failures rather than technical limitations.*

***Keywords:*** *Construction delays, Relative Importance Index (RII), Multi-case study*

# CHAPTER ONE

# 1. INTRODUCTION

## 1.1 Background of the Study

Construction work can be termed as a success only if it is done on time, within the planned budget, with utmost perfection, safety and satisfaction of all concerned parties in line with the standards set. Construction delays being one of the common challenges associated with the execution of construction projects. In general, this phenomenon is perceived to be associated with negative consequences regarding project completion in terms of time, quality, and cost. The problem does not only affect construction projects but also influences national economic development, especially in countries such as Ethiopia (Yosef et al., 2017). For example, construction delays in developing countries result from factors such as material shortage, poor project management, and ineffective regulations (Durdyev et al., 2018; Doloi et al., 2012). Research carried out in Sub-Saharan African regions indicates that more than 70% of construction projects in progress are affected by schedule delays caused by lack of adequate finance, planning, and contractor capability (Agyekum, 2012; Ofori, 2015).

Various research conducted in Ethiopia have been able to identify some of the important causes of delay in construction projects, whereby private real estate developments can be more susceptible to project delay since they are usually funded by investors through various processes (Alemu, 2018). Besides that, Private Real Estate development is subject to certain causes of delay such as changes in design, evolving customer needs, liquidity issues among others (Fakher & Tun, 2018; Agyekum, 2012).

Because of the variety of projects undertaken by Private Real Estate development in Addis Ababa such as luxury apartments, mid-income housing, mixed-use buildings, G+4 to G+7 residential buildings, and private estates, which have their own individual risk levels, it was necessary to conduct an analysis with multiple cases to find out the causes of delay in those various projects.

## 1.2 Statement of the Problem

The problem of delay in the private housing development projects is increasingly becoming prevalent in Addis Ababa because there are several developers who are unable to follow their schedule because of various problems including financial, managerial, regulatory, and technical issues (Alemu, 2018; Senbesha, 2017). This delay leads to several negative impacts including increased cost, conflict, low investor confidence, and client dissatisfaction particularly of the homebuyers.

Some of the common causes for delays found from research done in Ethiopia and internationally include shortage of skilled labor (Durdyev & Hosseini, 2019; Ethiopian Construction Authority, 2019), shortage of materials (MoWUD, 2012), poor planning and coordination (Doloi et al., 2012), insufficient capacity of contractors (Alemu, 2018), and time-consuming regulatory procedures (AACRA, 2018). However, these causes are not consistent among different construction projects, and there is little research on private real estate projects compared to others.

However, most previous researches fail to consider the impact of the combination of stakeholder relationships and external resource limitations on the duration of the project. According to Stakeholder Theory, construction projects are the result of the interests, power, and interactions of several stakeholders such as the client and contractors/consultants, where their conflicting goals and coordination problems affect decision-making processes and implementation (Freeman, 1984). On the other hand, Resource Dependence Theory highlights the importance of external resources for both real estate developers and contractors, which are necessary to implement projects. Real estate developments and contracting firms in Addis Ababa depend highly on external resources including financing, foreign currencies, building materials, skilled workforce, and governmental approval process, which are sources of potential delays in private real estate projects (Pfeffer & Salancik, 1978). Findings from Addis Ababa indicate that the interference from owners, changing designs, delays in permit issuance, shortage of material supply, and monetary problems are some of the top factors behind project delays (Hussien, 2018).

Thus, the study investigated the delay reasons using at least five case studies in private real estate construction projects in Addis Ababa through the combination of stakeholder and resource dependence and then proposed a solution to the problem identified based on the results obtained from the study.

## 1.3 Research Questions

To address the above objectives the research is intended to answer the following research questions:

1. What are the main causes of delays connected to Clients, Contractors, and Consultants in the selected five private real estate projects in Addis Ababa?
2. How do the roles and delay causing behaviors of contractors, consultants and clients differ across various categories of the selected five private real projects?
3. How do delay factors vary between different types of construction work?
4. How do client related factors, particularly financial decision making practices, and contractor related factors, such as resource planning and management, contribute to project delays in the selected five private real estate construction projects in Addis Ababa, Ethiopia?
5. How do shortages of construction materials contribute to project delays in private real estate construction projects in Addis Ababa, Ethiopia?

## 1.4 Objectives of the Study

### 1.4.1 General Objective

The general objective of this research is to examine major factors affecting Building construction delays in Addis Ababa, Ethiopia.

### 1.4.2 Specific Objectives

To attain the general objective the following specific objectives have been identified for its achievement.

- ✓ To identify the primary delay factors specifically related to Clients, Contractors, and Consultants.
- ✓ To compare how the roles and delay causing behaviors of these key stakeholders differ across various categories of the five selected private real estate developments.
- ✓ To examine the influence of client financial decision making and contractor resource planning on project delays in private real estate construction in Addis Ababa, Ethiopia.
- ✓ To examine how scarcity of construction materials, and skilled labor have on the project timelines of the five selected private real estate construction in Addis Ababa

## 1.5 Significance of the Study

The findings of this study are highly significant in helping to understand the causes of delays in privately funded real estate construction in Addis Ababa. Through investigating how the process of delay occurs as a result of the involvement of various parties in the project development process such as clients, contractors, consultants, and external forces, this study has provided guidelines that will be useful in making project management easier. By applying knowledge obtained from the findings, clients, contractors, and consultants will be able to make appropriate interventions towards strengthening their planning, coordination, and making decisions to mitigate delays while improving development's performance. In addition, the results of the investigation will be very important to academics and researchers working on the field of construction project management for future researches regarding construction delays. Therefore, general outcomes allow creating efficient management approaches and developing adequate regulations supporting timely finishing of projects and its overall performance improvement.

## 1.6 Scope of the Study

The scope of this study is geographically centered on Addis Ababa, Ethiopia, particularly targeting selected Building projects and not infrastructure related projects such as roads. The research investigates factors affecting construction delay, analyzing independent variables categorized into client, contractor, consultant, and external related factors and their influence on the dependent variable of construction delay. The study was carried out within five months (December 2025 to April 2026). Even though the analysis centers on s selected building projects, the findings are intended to extend to the broader management systems of the private real estate sector in Ethiopia

## 1.7 Limitations of the Study

Several factors could be noted as the limitation of the study. First, the study took place only in the region of Addis Ababa, making its generalization outside of the area unlikely. Second, while the sample had good participation levels, different readiness of the respondents made reaching the point of saturation difficult. In order to overcome these difficulties, the study used triangulation methods, which allowed integrating diverse sources of information and data from different stakeholders.

## 1.8 Organization of the study

The study is structured to cover Five chapters. Chapter one provides an overview of the research background, problem statement, objectives, research questions, research significance, scope of the research and likely limitations of the study. Chapter two presents the literature review and research gaps on construction delays, as well as the theoretical, empirical and conceptual framework for the study.

Chapter three covers the research methodology and methods to be used in conducting the research. Chapter four discusses the findings derived from the analysis of data collected from five case studies, highlighting differences in delay factors among different types of projects. Chapter five discusses the research findings, draws conclusion, gives recommendations and suggestions for future research.

## 1.9 Definition of key terms

**Construction delay:** is defined as the extension of a project's completion time from its planned (or contractual) completion date without a total stoppage of work. It reflects the late occurrence of project activities because of several influencing factors.

**Relative Importance Index (RII)**: is a statistical technique which determines the relative importance (or ranking) of different factors mostly collected from Likert scale surveys. In this study RII was used to assess and rank the significance of factors leading to delays.

**Multi-Case Study**: is a research methodology which examines two or more individual cases in detail in order to understand a phenomenon and allows comparison between these cases to determine whether there are common patterns or if they are unique. The research uses a quantitative multi-case study design to examine delays on five different project types in Addis Ababa

# CHAPTER TWO

# 2. LITERATURE REVIEW

## 2.1 Introduction

This chapter reviews the available literature on construction project delays. It starts with a definitions of delay and theoretical perspective and then moves to discuss different classifications of delay causes. Empirical studies both International and local were reviewed to highlight gap in the knowledge on delay.

## 2.2 Theoretical review

### 2.2.1 Definition of delay and Construction delay

According to Keith, (2005), the term "delay" refers to an event that occurs later than expected, planned, or required by the agreement, either beyond the date of the contract or beyond the date agreed upon by the parties for completion of the project. According to Fung et al., (2006), delay may be described as the slowing down of work without a full stoppage of construction and this could cause time overrun beyond the contract date or the date the parties agreed upon for completion of the project. Delay is described as the period when there has been a delay in completing the project because of some unforeseen situations.

Construction delay can thus be explained as the late accomplishment of activities as compared to the expected or planned schedule or contract schedule. Delay in construction is one of the key problems in the construction sector across the globe (Aibinu and Jagboro, 2002; Ika, 2012).

Up to this day, the construction sector has encountered various significant projects that did not achieve their intended deadlines due to inability to cope with delay in construction projects (Ika, 2012). According to Al Khalil and Al Ghafly (1999), delays happen in medium and large construction projects. Delays in construction projects lead to economic retardation (Global_Construction, 2015), job loss (Hart, 1973), and deterrence of foreign investments (Onyeiwu and Shrestha, 2004; Neary, 2009); it can therefore be seen that any delay in a project brings negative effects to its final outcome.

### 2.2.2 Classification of delay

Delay in construction can be classified as Non excusable delays, Excusable Non- Compensable delays and Excusable Compensable delays.

- Non Excusable Delays,

Fugar and Agyakwah Baah, (2010) referred to the definition of Non-excusable Delays as the causes of delay from the contractor and the supplier only. Relief will not normally be provided to the contractor and the contractor is expected to catch up for the lost time using acceleration or pay damages to the owner. This type of delay may arise from underestimating of productivity, poor scheduling and planning, poor management at the site, mistakes in construction techniques, equipment breakdowns, and incompetent suppliers or subcontractors. An example of such a delay is the inability of a contractor to employ sufficient personnel to perform the project on time (Majid, 2006).

Non-excusable delays are common in different construction projects and can lead to losses for those involved in them. It is well-known that project scheduling plays an important role in construction project management since it has an impact on the success of the project (Luu et al., 2009). The common consequences of project delays include delays in project completion, high costs, interruptions during work, reduction of productivity, third-party claims, disputes and contract termination or abandonment. Consequently, project delays in construction projects are a source of dissatisfaction for all the parties concerned (Majid, 2006).

- Excusable Compensable Delays,

According to (Syed M. et al., 2003), an excusable compensable delay refers to a delay which is either an excusable delay, suspension or interruption to the whole or part of the work arising from an act or omission by the owner owing to the owner's breach of an obligation, whether express or implied in the contract. According to (Fugar and Baah, 2010), compensable delays are delays that arise from the owner or the owner's agent. A good example would be a situation where the owner's architect delays in issuing drawings. Usually, an excusable compensable delay results in a schedule extension and makes the owner liable for monetary damages claimed by the contractor (Soon, 2010). In this regard, there will be increased indirect costs incurred through extended overheads at the field and head offices.

- Excusable Non Compensable delays

Definition of Excusable Non Compensable Delays (Syed M. et al., 2003). These delays were defined as the delays which happen due to the unforeseeable reasons, outside the contractor's control and which are not the result of the contractor's faults. Definition of Non Compensable Delays by Third Parties or Incidents (Alaghbari, 2007; Tumi, 2009). Those delays are those caused by reasons which lie outside the control of either the owner or the contractor. They can be termed as the "Acts of God."

- Concurrent delays

Syed et al., (2003) explained Concurrent delays as the type of delay in which the causes for delay are due to both the owner and the contractor. Delay or Extension of Time: The Contractor will be responsible for damages in case the actual completion date of the works falls after the agreed completion date, provided that the delay has been due to any reason for which extension of time may become available and the contractor fulfills all the requirements stated in the contract. As per Wa'el et al, (2007) as cited from Alaghbari, (2005) when the cause for delay is due to one specific reason and only one person among the stakeholders, then it becomes quite easy to compute both time and cost involved in it as well as handling the conflicts of interest between the contracting parties. A more complicated case scenario would be where there are multiple factors delaying the project simultaneously or during different intervals. Such types of delays are known as concurrent delays.

### 2.2.3 Stakeholder Theory and Resource Dependence Theory

This study is anchored on two complementary theoretical frameworks namely Stakeholder theory and Resource dependence theory that provides the underpinning of the dynamics leading to delays in the construction project in private real estate developments in Addis Ababa Ethiopia

**Stakeholder Theory**

Stakeholder Theory Freeman, (1984) suggests that any organization or project exists within a web of parties who have a vested interest in its success or failure. In construction, stakeholders can be clients, contractors, consultants, sub-contractors, regulators, financiers or end-users. Each will bring their own aims, hopes and power to bear on the project scene (Newcombe, 2003). According to Freeman (1984) one of the major causes of project dysfunction is a failure to identify and handle stakeholders' interests adequately.

When goals or when communication between parties fails, decision-making is impeded, leading to delays in approval, design change, payment issues and conflicts about scope (Yang et al., 2009). Specifically, within the construction projects, the relation between the client and contractor is of utmost importance. A client that keeps delaying financial decision, issues changes frequently, or fails to provide materials and approvals on time hinder the contractor's ability to maintain the schedule (Assaf & Al-Hejji, 2006). On the other hand, contractor who lacks the organizational capability to co-ordinate the subcontractors, manage the resources or communicate with the consultants causes delays from his/her side (Aibinu & Jagboro, 2002) . For the case of private real estate construction in Addis Ababa, Stakeholder Theory is particularly important given the multitude of parties involved in a single project. Private real estate developments are usually involving individual or corporate clients, local as well as sometimes foreign contractors, independent consulting companies, city authority which issues the permits and inspects, material providers and banks which give construction loans (Abebe, 2020).

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**Resource Dependence Theory**

Resource Dependence Theory formulated by (Pfeffer and Salancik, 1978), it's said that organizations are dependent on their external environments for the resources which they need to survive and function. Rather than being viewed as autonomous units, organizations are recognized as having to continuously secure critical resources, such as finance, materials, labor, technology and information, from beyond the organization's boundary. The resulting dependence leaves organizations vulnerable since the availability, timing, or uncertainty associated with any of these inputs can significantly undermine project success and completion (Davis & Cobb, 2010).

In the construction sector, Resource Dependence Theory provides a compelling framework for understanding why many projects experience delays that may not be attributable to poor internal management processes, but instead reflect difficulties in obtaining key resources from the external environment (Enshassi et al., 2009). Contractors require prompt payment from clients to support cash flow; clients rely on banks for financing construction loans; both sides need suppliers to deliver material supplies; and everyone depends on governments for permit approval and other regulatory clearances (Tumi et al., 2009). When any of these dependencies fail, project schedules are jeopardized (Pfeffer & Salancik, 1978).

**Integration of Both Theories**

Integrating Stakeholder Theory and Resource Dependence Theory provide a multi-dimensional framework for understanding construction project delays in private real estate development. Whereas Stakeholder Theory illuminates the relational and behavioral dimensions of delay focusing on how the interactions, conflicts and power dynamics among project parties affect decision-making and coordination Resource Dependence Theory addresses the structural and environmental dimensions, explaining how the unavailability or unreliability of critical external resources creates systemic vulnerabilities in project execution (Freeman, 1984; Pfeffer & Salancik, 1978). In combination, these two frameworks suggest that addressing construction delays in Addis Ababa's private real estate sector requires not just improvements in stakeholder management and communication but also broader interventions to stabilize resource supply chains, strengthen financial mechanisms, and streamline regulatory processes (Yang et al., 2009; Enshassi et al., 2009).

## 2.3. Empirical review on causes of Construction Delays

### 2.3.1 Previous International Studies conducted on construction project delay

Construction delays remain a significant challenge in the construction industry globally due to their adverse impact on project completion time, costs, and performance. In order to understand the leading cause of these delays, (Mohammed and Bello, 2022) reviewed 51 peer-reviewed journal papers published from 2010 to 2019 and found that inadequate planning/scheduling, financial constraints, delayed payment, design changes, poor site management, poor communication, material shortage, lack of equipment and inexperienced contractor are the top causes of project delay.

Most of the papers have been dedicated to finding out the reason for the project delay, mainly in Asian and African countries where delay problems are more pronounced. Strengthening the planning and management of finances, stakeholder coordination and risks are necessary for reducing delay and improving project performance.

According to (Yap et al., 2020) Construction delays are one of the most persistent challenges affecting project performance globally. Delays result from a combination of client, contractor, consultant, labor, material and external related factors, with contractor related issues having the strongest impact on project completion. Using a meta analysis of prior studies and a survey of 148 Malaysian construction professionals, Yap et al. found that lack of proper planning/scheduling, too many client change orders, incompetent site management/supervision, incompetent subcontractors and contractors' financial problems were the top five critical causes of project delay.

They also found these delay factors to be linked with five underlying managerial dimensions competency management, communication and coordination management, financial management, risk management and site management. Furthermore, their results show similar delay patterns existing across many developing countries suggesting that poor project management, poor planning and financial constraints are continuing to frustrate timely completion of construction projects. Thus, strengthening management capabilities, improving communication, better financial planning and adoption of proactive risk management will all help mitigate construction delays and improve project delivery.

Alaghbari et al. (2018) analysed the reasons behind delays in construction projects in Sana'a, Yemen using a questionnaire survey of 123 consultants. Based on an extensive literature review and expert validation they developed 32 delay factors divided into five groups: managerial, financial, technical, materials and equipment and external factors. Their results showed financial factors to be the biggest contributor to delays while being closely followed by managerial issues. Top individual contributors included delays in contractor payment, client financial problems, inexperience of contractors and consultants, poor site management and supervision, lack of adequate project funds, slow decisions, late payment of work done, bad planning and management by contractors, insufficient time estimation, and shortages of skilled labour. The authors concluded that whilst financial factors were the highest ranking, managerial issues explained most of the top contributors, highlighting the need for better project planning and financial management, timely payments, competent project teams, and good site practice in order to reduce construction delays.

Kumaraswamy and Chan, (1998) studied the causes of construction delays through questionnaire responses of clients, consultants, and contractors based in Hong Kong and ranked 83 delay causes by applying the Relative Importance Index and concluded that construction delays in Hong Kong are not determined only by the size of the project or the technical scope but mostly depend on non-scope issues, which involve the project participants. The research discovered that contractor-related, design team-related, and labor-related causes, such as poor site management, design delays, decision-making delays, and inefficiency of workers, are the key ones causing delays.The study further highlighted that there were great variations in the perceptions of clients, consultants, and contractors regarding the reasons behind the delays, indicating the existence of bias and poor communication between stakeholders, thus making it difficult to solve problems.

According to the results of the study, there is a need to increase productivity, improve management techniques, and enhance communication in order to reduce construction delays.

The study by (Durdyev and Hosseini, 2018) is an empirical systematic analysis of literature dealing with construction project delays, where delays that occurred between 1985 and 2018 were studied to find causes for delays and trends within the industry. The paper analyzed a total of 97 papers taken from Scopus and other sources. Their study found 149 reasons for construction delays with the topmost ones being unfavorable weather conditions, poor coordination between various parties, improper planning, shortage of materials, financial problems, late payments, shortage of equipment, incompetent parties, lack of sufficient labor, and ineffective site management. The results also highlighted that the majority of the research on causes of delay was conducted in developing nations because of limitations in resources and institutional constraints. In addition, they found that although there exist a few delay factors that depend upon the context, many delay causes have been identified by researches from various countries, showing their universal relevance. Effective planning, coordination, and management of resources would help reduce the construction delays.

The studies were carried out in order to identify the major factors causing construction delay. According to a survey made by (Battaineh1 et. al., 2002), the primary cause of construction delay under the conventional form of contract from the viewpoint of contractors and consultants. In addition, it has been mentioned that in the context of giving the economic viability of capital projects, long delays can act as a fertile field for expensive deputies and claims.

The findings revealed that the contractor and consultant both were of the opinion that "owner interface, contractor experience, financial and payment, labor productivity, decision making, planning, and subcontractors" are among the top ten factors.

The research conducted by Alaghbari et al., (2007) focused on determining the primary causes of delays in building construction in Malaysia. Specifically, the research aimed at determining the main sources of delay in projects located in the Klang Valley area. The study used questionnaire survey methodology with respondents comprising construction stakeholders namely contractors, consultants and the owners. Altogether, 31 delay factors were identified and classified into four responsibility groups: contractor factors, owner factors, consultant factors, and external factors. The analysis was done through mean score ranking and descriptive statistical methods. The findings indicated that financial issues emerged as the highest contributing factor among others such as delay in payments and economic challenges.

Other notable contributor of delays was contractor related factors such as poor site management, shortage of material, construction errors and inefficiency in manpower management. Delay on the part of consultants included delayed supervision, decision making process and unavailability of design drawings while those by owners involved financial challenges and delayed decisions making. External causes included material availability in the market, poor site conditions and transport delays. Another significant finding was that contractors were identified as the main cause of the delays, followed by consultants and then owners. Fashina et al. (2021) suggested that since construction delays mainly emanate from management, financial, and coordination issues, there should be better financial management, improved coordination between all the parties involved, and better site management practices.

Fashina et al., (2021) Investigated to find and rank the major causes of delays in construction projects in Hargeisa, Somaliland, with particular emphasis on roads and buildings. In this quantitative research methodology, the data collection procedure consisted of structured questionnaires, which were distributed to 61 stakeholders in construction projects, including contractors, consultants, and clients.

A total of 51 delay factors were identified from the literature review and divided into seven categories; these were client-related, contractor-related, consultant-related, labor-related, materials-related, equipment-related, and external factors.

Data collected was analyzed using Relative Importance Index (RII), while reliability was determined using Cronbach's alpha. From the findings, it was clear that problems that were

financial or management-related were the primary contributors to time overrun. The delay in payment, inaccurate estimation of project cost, approval of large scope changes, and many change orders requested by the client were identified as the primary causes of delay. In addition, from the findings, it became evident that contractor-related delays occurred the most, followed by owner and consultant related delays. The authors concluded that poor management of projects, miscommunication among project stakeholders, and lack of financial planning were the main contributors to construction time overruns.

### 2.3.2 Previous Studies conducted locally on construction project delay

The causes of delays in the construction industry in Ethiopia were studied by (Koshe and Jha, 2016) through a questionnaire survey conducted on clients, consultants, and contractors, with expert opinions being included in the research. The research highlighted 88 different causes for delay, classified into eight main categories. The causes found to contribute significantly to construction delays included contractor's financial problems, rise in the cost of materials, poor planning and scheduling, late payment of progress payments from clients, absence of construction management experts, irregular labor availability, delay in material supply, and low labor productivity, as only 8.25% of constructions completed on time. The contractor related causes were found to be the leading cause of project delay, followed by materials and labor-related problems. As a solution to these problems, the authors advised that the client ensure prompt payment, avoid awarding contract to only low bidders, and hire competent consultants; competent consultants were expected to carry out thorough site investigation, provide good drawings and bill of quantities, include risks in cost estimating, and quick approval; whereas contractors must manage their finances well, employ skilled project management personnel, plan and schedule effectively, motivate their labor, and purchase materials systematically.

Hussien, (2018) performed a study on the reasons and consequences of private real estate construction project delays in Addis Ababa, Ethiopia. In this regard, the researcher used quantitative methods to carry out the study through a structured questionnaire that was sent to 70 respondents from contractors and consultants dealing with real estate construction projects. It was noted that 29 delay reasons and six delay impacts were identified based on the reviewed literature, and then the 29 reasons were grouped into eight major categories such as client reasons, contractor reasons, consultant reasons, material reasons, labor and equipment reasons, contract reasons, contractual relationship reasons, and other external reasons. Data analysis in this study involved the use of Relative Importance Index (RII) to identify the importance of each delay reason. As per

the findings, the owner's interference, frequent change orders, lengthy waiting time for test and inspection approval, construction materials shortage, and design errors were found to be the most significant delay reasons. According to the study, the major causes of project delays within the realm of private real estate development projects were identified to be related to management issues, contractual disagreements, and materials, highlighting the significance of good project planning and contract management.

Anteneh, (2021) carried out a study on Project 12 of Addis Ababa Housing Development Corporation, where the key factors responsible for the delays in construction included improper management of resources by contractors, variation orders made by clients, and delays in deliveries of materials; it was also observed that stakeholders such as clients, contractors, and consultants had a tendency to blame each other for the delay problem along with ineffective time management techniques marked by the dominance of simple bar charts and excel in scheduling, lack of progress coordination, and use of project management tools. Hence, from this study, it can be concluded that project management is critical for managing delay problems in public housing projects in Addis Ababa.

Abebe, (2020) explored in his study the major causes and effects of construction delay in Addis Ababa 40/60 housing project. By employing questionnaire surveys, interview, direct observations and document scanning among 99 respondents from clients, consultants and contractors he extracted 20 major delay factors out of the listed 70 by applying the Relative Importance Index (RII). Accordingly, late delivery of material by the client, difficulties of finance by contractor, wrong choice of contractor, slowness of the clients' decision making process and old technologies applied by contractor are the top five delay causing factors. Client related problems have been rated first on the reasons of delay, second being the material, third being the contractor and fourth being the consultant. Moreover, out of the 24 effects of delay, costs overrun, time overrun, degradation of construction quality, increase of house prices are some of the effects which cumulatively cause greater social, economic and political impacts on the city. Finally, the study indicated that all the 40/60 construction sites went beyond their contractual period of construction by more than 150%.

Kuhil & Seifu (2019) assessed the reasons for delays in public building projects in Addis Ababa, Ethiopia using 42 delay factors including those related to clients, contractors, consultants, resources and external sources. The relative importance index (RII) and spearman rank correlation method were used to gather and analyze stakeholders' views

on the importance of these delays from clients, consultants and contractors. The results indicated that problematic funding due to inadequate financial system was the main cause of delays in projects, followed by difficulties in managing projects, late approval of designs and working drawings, scarcity of foreign material, design mistakes/complexity, slow payment for progress, late supply of resources, financial problems, incorrect site investigations, price escalation, and many other factors. There was a good degree of consensus among the three parties about the priority of the causes of delays. This suggests that financial, managerial, consultant-related and resource-related issues are the major causes of time overruns. The researchers proposed improving financial planning, enhancing project management, ensuring timely provision of designs, working drawings, site investigation reports and coordination among project players to reduce delays in Ethiopia.

Sinesilassie et al. (2017) assessed the key elements influencing schedule performance on Ethiopian public construction projects from an engineer's point of view. Thirty-five project performance indicators were established through comprehensive research of prior studies and interviews with industry experts and were then evaluated using factor analysis and multiple regression methods. The results showed that owners' competence is the most important factor driving on-time project delivery, emphasizing the necessity of appropriate decisions, commitment, and administration by project owners. In contrast, disagreement among project parties, poor personnel management, and project managers' lack of knowledge and expertise were identified as the primary factors leading to schedule delays. The authors concluded that improving owner competence, building project management skills, and fostering cooperation between project partners are vital for enhancing schedule performance and delivering successful public construction projects in Ethiopia.

According to Zidane and Andersen, (2017), who performed an analysis based on the data collected from 103 papers originating from 46 countries and from surveys conducted within the Norwegian construction sector, the ten most common delay factors in construction globally include design change during construction/change order, delay in contractor payment, bad planning/scheduling, bad site management/supervision, inadequacies in design/completion thereof, lack of experience and/or inappropriate construction technology by the contractor, the contractor's financial difficulty,

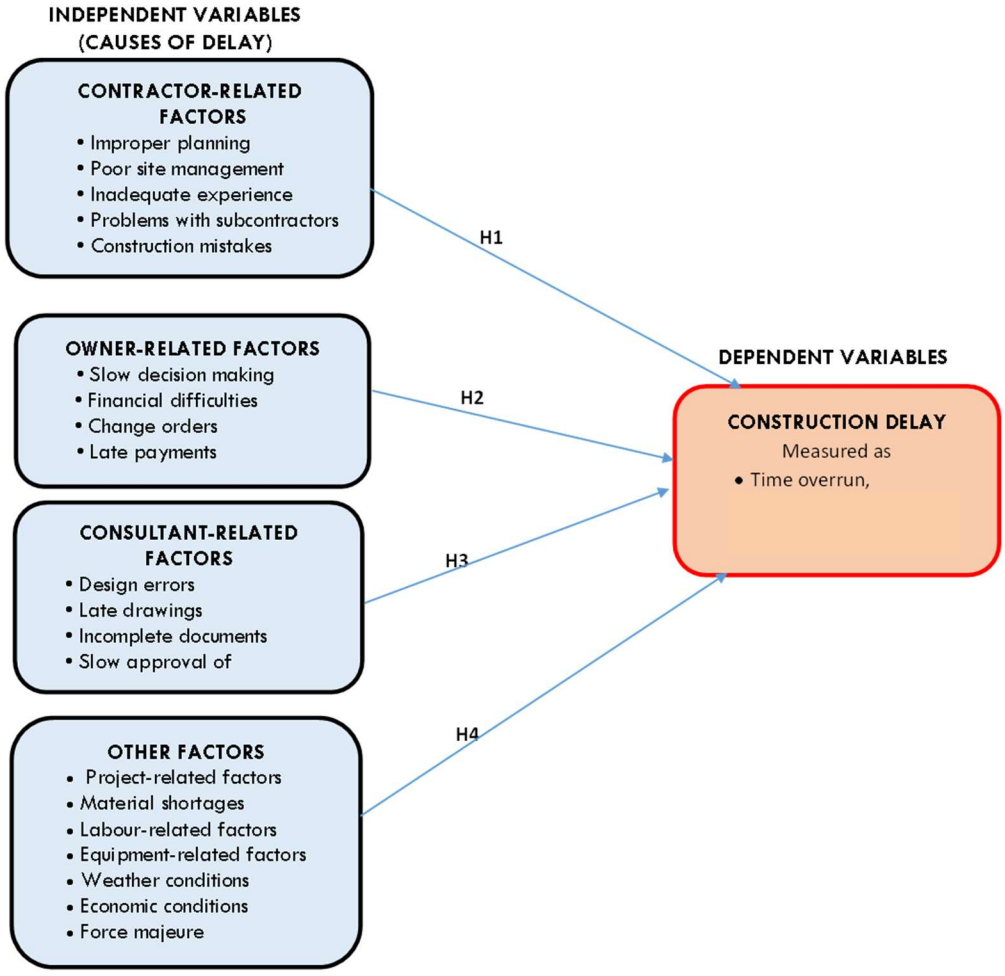
financial difficulty of the project sponsor/client/owner, shortage of resources, and low labor productivity/skill shortage. What is more, the authors recommend that project managers and policymakers recognize the universal character of such delays and develop organizational data banks of causes of delay to be kept up to date, considering that being aware of and recording such repetitive problems is one step towards their solution.

## 2.4 Literature Gap (Research Gap)

Following the careful analysis of international and local reviewed literature that addresses the causes of delays in construction projects, it is evident that most of the existing empirical literature has concentrated their research in either government constructions, general construction, and infrastructural construction such as road and housing construction projects, but few have considered the issue of private real estate constructions in Addis Ababa. On the other hand, some of the local reviews such as Koshe and Jha (2016) focused mainly on government building construction projects, whereas Hussien (2018) dealt with private real estate construction project delay issues without considering a theoretical approach to comparative analysis. Moreover, most of the empirical studies conducted within Ethiopia have failed to examine whether the identified causes of delays in different types of private real estate constructions, such as luxury apartments and mid-income housing projects, differ or not. Thus, the existing research gaps will be effectively addressed in this proposed research.

## 2.5 Conceptual frame work

Conceptual framework of this study shows the link between various independent determinant factors that influence Construction project delays. Construction Delays, the dependent variable in the study, is measured using measures such as project delays, schedule slippage or delays, and late project completion, caused by some independent factors in four major categories. These include Contractor related factors, such as improper planning and lack of good site management; Owner related factors like delays in decisions, financial problems; Consultant related factors including design errors and delayed drawings, and many others under External factors such as material shortage, weather, economic issues, and force majeure among others. Conceptual framework illustrates the causal relationship between all these causes and construction delays, whereas hypotheses (H1, H2, H3, and H4) help identify the critical independent factor influencing timely project completion.




Source: Kumaraswamy and Chan, (1998)

Figure 2.1 Conceptual Framework

# CHAPTER THREE

# 3. RESEARCH DESIGN AND METHODOLOGY

## 3.1 Introduction

Research methodology can be defined as a systematic approach to solving the problem being investigated, and the research methodology will provide the research background, research hypotheses or questions, research design, and research analysis (Kothari, 2004).

In this chapter, the research design and methodology adopted to accomplish the main objective of the research will be discussed. Apart from this, sources of data, study area, sample design, data collection methods, and reliability and validity of data have been provided.

## 3.2 Research Design

This study adopted an explanatory research design with descriptive elements. The explanatory research design was appropriate because the study sought to examine the influence of client-related, contractor-related, consultant-related, and external factors on construction delays in privately funded real estate projects in Addis Ababa. The design enabled the researcher to investigate the relationships between the independent variables and the dependent variable (construction delays) and to determine the extent to which each factor contributed to project delays (Creswell & Creswell, 2018; Saunders et al., 2019). In addition, descriptive elements were incorporated to identify and compare the major factors contributing to construction delays and to describe the characteristics of the respondents.

Descriptive statistical techniques, including frequencies, percentages, mean scores, standard deviations, and the Relative Importance Index (RII), were used to rank the identified delay factors and summarize the respondents' perceptions. Inferential statistical techniques, including correlation and multiple regression analyses, were employed to examine the relationships between the study variables and assess the influence of the identified factors on construction delays. Overall, the explanatory research design with descriptive elements was appropriate because it enabled the study to achieve its research objectives by identifying the major causes of construction delays, comparing stakeholder-related delay factors, and examining the effects of client, contractor, consultant, and external factors on project delays in privately funded real estate projects in Addis Ababa.

## 3.3 Research Approach

This study adopted a quantitative research approach because it enabled the systematic collection and analyze numerical data on the causes of construction delays under multi-case study design in privately funded real estate projects in Addis Ababa. The quantitative approach was appropriate for measuring and prioritizing the importance level of delay factors affecting project performance. In this study, structured questionnaires were used to collect data from respondents, and the Relative Importance Index (RII) was applied to rank the identified delay causes. In addition, descriptive statistical techniques were used to summarize respondents' perceptions, while inferential statistical techniques, including correlation and multiple regression analysis, were employed to examine the influence of client-related, contractor-related, consultant-related, and external factors on construction delays. This approach is justified by Creswell and Creswell (2018), who state that quantitative methods are suitable for studies that aim to quantify variables and test relationships among them using statistical analysis, and by Hair et al. (2004), who emphasize the use of quantitative techniques for examining relationships among multiple variables in construction management studies. Overall, the quantitative approach ensured objective measurement and alignment with the study's objectives and analytical procedures.

## 3.4 Study Area

The study was carried out in Addis Ababa, the capital city of Ethiopia. Addis Ababa is known as the hub for all private real estate developments. With a very fast urbanization rate, there is a high demand for houses and buildings in the city.

There is a large amount of construction projects within Addis Ababa due to its high real estate development projects. There are many real estate projects of various sizes and types in Addis Ababa that make it ideal for analyzing causes of construction delays.

## 3.5 Target Population

This research targeted the major stakeholders taking part in real estate projects carried out privately within Addis Ababa City. The selected stakeholders included customers, contractors, as well as consultants such as engineers, architects, and project managers who were actively involved in carrying out the real estate projects. They were selected for the purpose of the research since they have active participation in the projects being implemented and their involvement in various activities related to project scheduling. It is important to note that their expertise and experiences in the field will enable them to provide useful information regarding project delay reasons.

## 3.6 Sampling Size Determination

This study employed respondents who have previous experience and knowledge and were directly involved in five private real estate construction projects in Addis Ababa, Ethiopia. In the first instance, cluster sampling was employed to identify representative samples from the contractors, clients, and consultants, while in the second, purposive sampling was employed because it allows the researcher to deliberately sample those respondents who are knowledgeable on the subject of construction project delay and can contribute meaningfully. Creswell (2014) suggests that non-probability sampling is especially appropriate for studies that require deeper insights from individuals who have expertise in the area of the study.

In the same way, Etikan, Musa, and Alkassim (2016) suggest that non-probability sampling makes it possible for researchers to concentrate on individuals who are most capable of giving accurate information.

As suggested by earlier research (Kumaraswamy and Chan, 1998; Koshe and Jha, 2016), a questionnaire survey was conducted among selected industry professionals from all three stakeholder categories. A substantial number of questionnaires was sent out in order to increase the possibility of obtaining responses.

The sample size was calculated from the number of responses received and not from any mathematical formula. Response-driven sample sizes have been a standard practice in construction delay studies because of their expert and accessible nature (Kumaraswamy and Chan, 1998; Alaghbari et al., 2007).

| GROUP | Questioner Distributed (No) | Questioner returned (No) | Response Rate (%) |
|---|---|---|---|
| Temer Real-estate | 30 | 27 | 18 |
| AGAZ General Trading/Royal Real-estate | 30 | 23 | 15.33 |
| Temer Properties | 30 | 28 | 18.67 |
| Frieda Business Group PLC | 30 | 27 | 18 |
| Jambo Construction PLC /Jambo Real-estate | 30 | 28 | 18.67 |
| **Total** | **150** | **133** | **88.67** |

## 3.7 Data Sources

In collecting data for this study, both primary and secondary data sources so as to meet the objectives of the research. First, primary data was obtained from surveys conducted from key individuals who had taken part in private real estate construction works in Addis Ababa those include clients, contractors, and consultants.

This information was gathered through the use of questionnaire forms which provided first-hand data on the causes and effects of delays in construction. Second, secondary data were collected from literature review on construction delays. This was aimed at obtaining theoretical information concerning the problems under study. Materials utilized in the literature review included books, journal articles, research papers, and other published literature materials.

## 3.8 Data Collection Methods

Quantitative techniques were employed so that there would be a thorough investigation of the causes of delays in construction projects. The quantitative data was acquired using questionnaires that were distributed to various clients, contractors, and consultants who had participated in private real estate construction in Addis Ababa. These questionnaires had been designed according to delays found in other research studies and had a Likert scale rating system.

## 3.9 Data Analysis Methods

Analysis of the data gathered from questionnaires involved the use of descriptive and statistical analysis aided by the use of statistical packages like SPSS. Descriptive analysis involving frequencies and percentages was done to describe the characteristics of the participants.

The ranking of the different factors responsible for causing delays involved use of Relative Importance Index (RII). Microsoft Excel was used for calculating RII while SPSS software was used for analyzing all other data, such as reliability and correlation analysis.

Data analysis gave results that were interpreted to understand the reasons for delay in construction projects and give useful suggestions for improving project efficiency.

## 3.10 Validity and Reliability

Validity was achieved by using a standard questionnaire adapted from previous studies including three types of delay causes namely client, contractor, and consultant delay causes. Reliability was confirmed via Cronbach's alpha coefficient greater than 0.7 to determine whether the data collection instrument is internally coherent and dependable.

Table 3.1 Reliability Results

| | Item of Variables | No. Items | Cronbach's α | Remark |
|---|---|---|---|---|
| **A** | **Client Related Factor** | 10 | 0.828 | α > 0.7, reliable |
| **B** | **Contractor Related** | 12 | 0.910 | α > 0.7, reliable |
| **C** | **Consultant Related Factor** | 10 | 0.848 | α > 0.7, reliable |
| **D** | **Other Factors** | 10 | 0.910 | α > 0.7, reliable |
| **E** | **Construction Delay** | 6 | 0.748 | α > 0.7, reliable |

According to the table 3.1, all variables recorded Cronbach's Alpha values higher than the acceptable level of 0.70, showing that these instruments possessed a very high level of consistency and reliability. The Contractor Related Factor and Other Factors had the highest levels of reliability, as their Cronbach's Alpha values were 0.910. On the other hand, the Consultant Related Factor and the Client Related Factor also proved to be highly reliable because of their respective Cronbach's Alpha values of 0.848 and 0.828, while the Construction Delay factor had an acceptable Cronbach's Alpha value of 0.748.

## 3.11 Ethical Considerations

The study was carried out considering all the rights of all the involved individuals. Prior to starting collecting the information, all the respondents were well aware about the nature of the investigation and also had the freedom to refuse from taking part in it. It was made clear that the participants can avoid answering some questions or even terminate their participation in the research without having to fear any consequences. Informed consent was secured from all the respondents before distributing the questionnaire among them. Confidentiality was assured by avoiding the collection of any identifying personal data.

# CHAPTER FOUR

# 4.DATA PRESENTATION AND ANALYSIS

## 4.1 Introduction

In this chapter, the collected data of the respondents about the determinant factor affecting construction causes for delay in private real estate construction projects in Addis Ababa are analyzed and interpreted. Quantitative approach was applied for analyzing the gathered data, considering the nature of the research. The quantitative data was analyzed using descriptive statistics and relative importance index.

## 4.2 Response Rate

Table 4.1 Sample Distribution by construction project type

| GROUP | Questioner Distributed (No) | Questioner returned (No) | Response Rate (%) |
|---|---|---|---|
| Luxury Apartment Projects | 30 | 27 | 18 |
| Mid Income Apartments | 30 | 23 | 15.33 |
| Mixed Use Building Project | 30 | 28 | 18.67 |
| G+4–G+7 Private Residential Buildings | 30 | 27 | 18 |
| Large Private Estates | 30 | 28 | 18.67 |
| **Total** | **150** | **133** | **88.67** |

150 questionnaires were used in all, out of which 133 were filled and returned back, giving an impressive response rate of 88.67%, which is very satisfactory. The even distribution of the responses have been received for each project type gives an insight into a broad perspective of the project types of the private real estate sector in Addis Ababa.

## 4.3 Respondents Demographic Characteristics

The need for the demographic profile of respondents is essential in providing an accurate description of the sample population.

Table 4.2 Gender Distribution of Respondent

| | | Frequency | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Valid | **Female** | 46 | 34.6 | 34.6 |
| | **Male** | 87 | 65.4 | 100.0 |
| | **Total** | 133 | 100.0 | |

*Source: Survey SPSS result, 2017*

Table 4.2 shows the distribution of gender among the respondents, with the total number of respondents being 133 in the study. From the table, 87 out of the 133 respondents are male (65.4%), while 46 of the 133 respondents are females (34.6%). There were no missing values in the data, hence, making the valid percentages tally with the total percentages. The cumulative percentage indicates that females represent 34.6%, whereas males together with females represent 100% of the respondents.

Table 4.3 Age Distribution of Respondent

| | | Frequency | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Valid | **18 - 25** | 20 | 15.0 | 15.0 |
| | **26___35** | 88 | 66.2 | 81.2 |
| | **36 - 45** | 12 | 9.0 | 90.2 |
| | **Above_45_years** | 13 | 9.8 | 100.0 |
| | **Total** | 133 | 100.0 | |

*Source: Survey SPSS result, 2017*

As presented in Table 4.3, the age composition of respondents consists of 133 respondents; however, the majority are within the age of 26-35, with 88 respondents (66.2%). The next largest age group is within the range of 18-25 years, comprising of 20 respondents (15.0%). The age group of 36-45 years contains 12 respondents (9.0%), while those above 45 years contain 13 respondents (9.8%). As seen from the cumulative percentage figure, more than 80% (81.2%) of the respondents fall below 35 years old. In relation to research on construction and real estate, it implies that the majority of the sample is relatively younger and actively engaged in their profession.

Table 4.4 Highest Educational Qualification of Respondent

| | | Frequency | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Valid | Degree | 84 | 63.2 | 63.2 |
| | Diploma | 4 | 3.0 | 66.2 |
| | Master's Degree | 23 | 17.3 | 83.5 |
| | Other | 22 | 16.5 | 100.0 |
| | Total | 133 | 100.0 | |

*Source: Survey SPSS result, 2017*

The educational distribution of the respondents in Table 4.4 shows a diverse professional background, thus strengthening the credibility of the study. The majority of respondents, or rather 84 respondents (63.2 percent), hold a Bachelor's degree, meaning that the majority of study participants are academically qualified construction industry-related experts.

Besides, 23 respondents (17.3%) have a Master's degree, which imply there is advanced expertise available and a higher level of analytical expertise. Diploma holders form the least professional category, accounting for only 4 respondents or 3.0%, and represent technically oriented professionals with practical knowledge.

The category of "others" educational backgrounds is 22 respondents (16.5%), which may include measures to strengthen the diversity of the sample, such as specialized certifications or alternative educational backgrounds. However, this distribution cumulatively shows that the respondents are academically and professionally competent, thereby boosting the reliability and validity of the data employed in this study.

Table 4.5 Job Designation of Respondent

| | | Frequency | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Valid | Architect | 9 | 6.8 | 6.8 |
| | Office Engineers | 20 | 15.0 | 21.8 |
| | Other | 17 | 12.8 | 34.6 |
| | Owner | 22 | 16.5 | 51.1 |
| | Project Manager | 19 | 14.3 | 65.4 |
| | Resident Engineer | 12 | 9.0 | 74.4 |
| | Site Engineer | 20 | 15.0 | 89.5 |
| | Site Supervisor | 14 | 10.5 | 100.0 |
| | Total | 133 | 100.0 | |

*Source: Survey SPSS result, 2017*

Table 4.5 shows the job designation of respondent a broad range of stakeholders to make certain that the findings make reference to various levels of oversight and execution of the projects. Owners are 16.5% of the sample, while Office Engineers and Site Engineers are 15.0% each. Then there are Project managers 14.3%, Site supervisors 10.5%, and Resident engineers 9%, while architects constitute 6.8%. Thus the data is collected from a wide array of technical and managerial project roles that incorporates the strategic office based planning and the active site operations.

Table 4.6 Years of Work Experience of Respondent

| | | Frequency | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Valid | 0–5 years | 65 | 48.9 | 48.9 |
| | 6–15 years | 57 | 42.9 | 91.7 |
| | Above_15_years | 11 | 8.3 | 100.0 |
| | Total | 133 | 100.0 | |

*Source: Survey SPSS result, 2017*

Table 4.6 shows distribution of respondents by years of work experience in reference to the level of exposure of the sample to the industry. Respondents with 0 to 5 years of work experience formed the majority at 65 or 48.9 percent, indicating the participation of more young professionals in construction projects. Respondents with experience ranging from 6 to 15 years made up the majority of 57 respondents or 42.9 per cent, demonstrating a strong representation of mid-career experts with the most knowledge of the industry.

Finally, 11 respondents (8.3%) had above 15 years' experience, which represented a smaller, yet valuable, segment of senior professionals whose vantage point of construction delays through a longer time frame leads to a balanced appreciation of the key findings. The cumulative percentage indicates that 91.7 percent of the respondents had 15 years work experience or below, and only 8.3 percent had work experience of more than 15 years. This distribution ensures that there is a balance between the perspectives obtained from the lower and senior levels, with a major bias towards participants from the lower and mid-level who carry out most of the project work and implement decisions.

Table 4.7 Distribution of Respondent by Organization Category

| | | **Frequency** | **Valid Percent** | **Cumulative Percent** |
|---|---|---|---|---|
| Valid | G+4, G+7 Private Residential Buildings | 27 | 20.3 | 20.3 |
| | Large Private Estates | 28 | 21.1 | 41.4 |
| | Luxury Apartments | 27 | 20.3 | 61.7 |
| | Mid Income Apartments | 23 | 17.3 | 78.9 |
| | Mixed Use Buildings | 28 | 21.1 | 100.0 |
| | Total | 133 | 100.0 | |

*Source: Survey SPSS result, 2017*

Table 4.7 shows that the distribution of organization are nearly evenly across five major project types, providing a balanced look at the private real estate sector. Mixed-Use Buildings and Large Private Estates are the most featured, at 21.1% apiece, while the G+4 to G+7 Private Residential Building and Luxury Apartments are represented at 20.3%, and Mid-Income Apartments occupy 17.3% of the data. The distribution of organizations across the categories is high enough to ensure that conclusions drawn from the study are not skewed toward a particular building type, but rather, reflect the reality and challenges of the private real estate sector across different scales of residential and commercial construction.

Table 4.8 Distribution of Respondent by Grade

| | | Frequency | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Valid | above_5 | 15 | 11.3 | 11.3 |
| | Four | 2 | 1.5 | 12.8 |
| | One | 69 | 51.9 | 64.7 |
| | Three | 16 | 12.0 | 76.7 |
| | Two | 31 | 23.3 | 100.0 |
| | Total | 133 | 100.0 | |

*Source: Survey SPSS result, 2017*

Table 4.8 Distribution of Respondents by Grade or Class based on capacity and licensing of firms operating in the private real estate construction sector. Grade One organizations are the majority, with 69 (51.9%) respondents, meaning that most respondents are from well and highly licensed construction organizations. This is followed by Grade Two organizations that account for 31 respondents (23.3%). Grade Three organizations are at 16 respondents (12.0%), with above Grade Five recording 15 respondents (11.3%). Grade Four organizations are the least in number, with only two which make 1.5% respondents in the sample. Three-quarters (76.7%) of respondents came from organizations graded One through Three, while only 23.3% came from Grade Two and below, cumulatively. Such distribution is appropriate because it would capture organizational capacity with more focus on higher grade firms, which normally handle bigger and more complex private real estate projects in Addis.

Table 4.9 Distribution of Respondent by Organization Type

| | | Frequency | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Valid | Client | 37 | 27.8 | 27.8 |
| | Consultant | 39 | 29.3 | 57.1 |
| | Contractor | 57 | 42.9 | 100.0 |
| | Total | 133 | 100.0 | |

*Source: Survey SPSS result, 2017*

Table 4.9 shows the type of organization of the respondent engaging the three primary stakeholders of the construction industry, with Contractors leading at 42.9% of the sample. However, Consultants and Clients are also strongly represented at 29.3% and 27.8%, respectively. Significant input from all three groups was used in the study to provide a broader perspective of the project environment and to minimize the effects of divergent priorities and/or observations of those who fund construction works and those who design and execute the works.

## 4.4 Descriptive Analysis

Descriptive statistics are used in research for summarizing, organizing, and formulating data in a meaningful manner for a better understanding of the basic features of the data collected prior to conducting further analysis. This involves describing the central tendency (mean) and variability (standard deviation) of variables to identify relationships among the study variables. In quantitative research, descriptive statistics are regarded as the first step in the analysis of data because it offers an outline of data that provides a foundation for inferential analysis and hypothesis testing (Pritha Bhandari, 2023).

Table 4.10 Descriptive Statistics Analysis

| **Descriptive Statistics** | | | |
|---|---|---|---|
| | N | Mean | Std. Deviation |
| Client Related Factor | 133 | 3.307 | .7456 |
| Contractor Related Factor | 133 | 3.34 | .852 |
| Consultant Related Factor | 133 | 3.28 | .727 |
| Other Related Factors | 133 | 3.42 | .830 |
| Construction Delay | 133 | 2.89 | .950 |
| Valid N (listwise) | 133 | | |

*Source: Survey SPSS result, 2017*

Descriptive statistics were used in this study to test the independent variables which includes; client related factors, contractor related factors, consultant related factors, and other related factors and the dependent variable, construction delay based on 133 respondents. Further findings on Table 4.10 point out that other related factors have the highest mean score (M = 3.42, SD = 0.830), pointing out that respondents see external factors as the major contributors to delays in construction; This is followed by contractor related factors (M = 3.34, SD = 0.852) indicating that contractor issues like poor planning and managing the site effectively have a significant effect on the time taken to complete projects. Client related factors recorded a mean value of 3.31 (SD = 0.746), showing that client decisions and financial issues are some of the contributing delay factors. Likewise, consultant related factors had a mean of 3.28 (SD = 0.727), implying that consultant errors such as design errors and delayed drawings moderately project delay. Construction delay (dependent variable) records a mean score of 2.89 (SD = 0.950), with observations pointing to a moderate level of delay occurrence in private real estate construction projects. There was consensus in the opinions of respondents, as indicated by the low standard deviation values in reference to all the variable values.

## 4.5 Inferential Statistics Analysis

Inferential statistics analysis refers to the statistical methods used to make conclusions, predictions, and test the relationship between the variables based on sample data, which are then generalized to the rest of the population.

Inferential statistics analysis is used to examine and test the relationship between the independent variables (client related factors, contractor related factors, consultant related factors and other related factors) and the dependent variable (construction delay). Inferential statistical tools such as Pearson correlation and linear regression analysis, in particular, help identify whether the factors have any significant influence on construction delay and the magnitude of project delay caused by each factor. This allows make theoretical conclusions on the determinant factors that affects delays in private real estate construction projects based on evidence.

### 4.5.1 Correlation Analysis

Thus, the purpose of conducting correlation analysis is to ascertain whether these factors are correlated with construction delays and the degree of correlation. This is to give a preemptive view of the influence of changes in the independent variables on the dependent variable. Besides, correlation analysis aims at establishing the relationship between the independent variables to identify any multicollinearity before regression analysis. Therefore, in this study, pearson correlation analysis is an important step in establishing the existence and significance of relationships between the identified causes and construction delays in private real estate construction projects.

Table 4.11 Pearson Correlation Matrix

| | Client Related Factor | Contractor Related Factor | Consultant Related Factor | Other Related Factor | Construction Delay |
|---|---|---|---|---|---|
| Client related Factor | 1 | .475** | .527** | .545** | .420** |
| Contractor Related Factor | .475** | 1 | .498** | .583** | .362** |
| Consultant Related Factor | .527** | .498** | 1 | .496** | .387** |
| Other Related Factor | .545** | .583** | .496** | 1 | .398** |
| Construction Delay | .420** | .362** | .387** | .398** | 1 |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | |

*Source: Survey SPSS result, 2017*

This suggests that a rise in the independent variables causes a rise in construction delay. Client related factors show the strongest relationship as an independent variable (r = 0.420) with construction delay, with a moderate positive correlation, suggesting that delay in decision making by client as well as financial problems has maximum contribution to project delay. This is followed by other related factors (r = 0.398), pointing out that external factors have some relevant influence on the delay in project works. There is also a moderate positive correlation between Consultant related factors and construction delay (r = 0.387) indicating design changes, drawing delays, and technical errors in prolonging project completion time. Contractor related factors have the lowest but still significant positive correlation with construction delay (r = 0.362), indicating that contractor performance issues also contribute to delays. Also, the correlation among the independent variables ranges from 0.475 to 0.583, which indicates moderate correlations but no sign of high multicollinearity. Overall, the results point out that all factors identified are important contributors to construction delays in private real estate construction projects.

### 4.5.2 Multiple Regression Analysis Assumptions

In conducting Multiple Regression Analysis, the assessment of the key assumptions that include normality test, multi-colinearity test, linearity and homoscedasticity test based on whether the collected data violates them or not is done first. Such a case leads to distorted and biased estimates of parameters.

### Assumption-1 Normality test

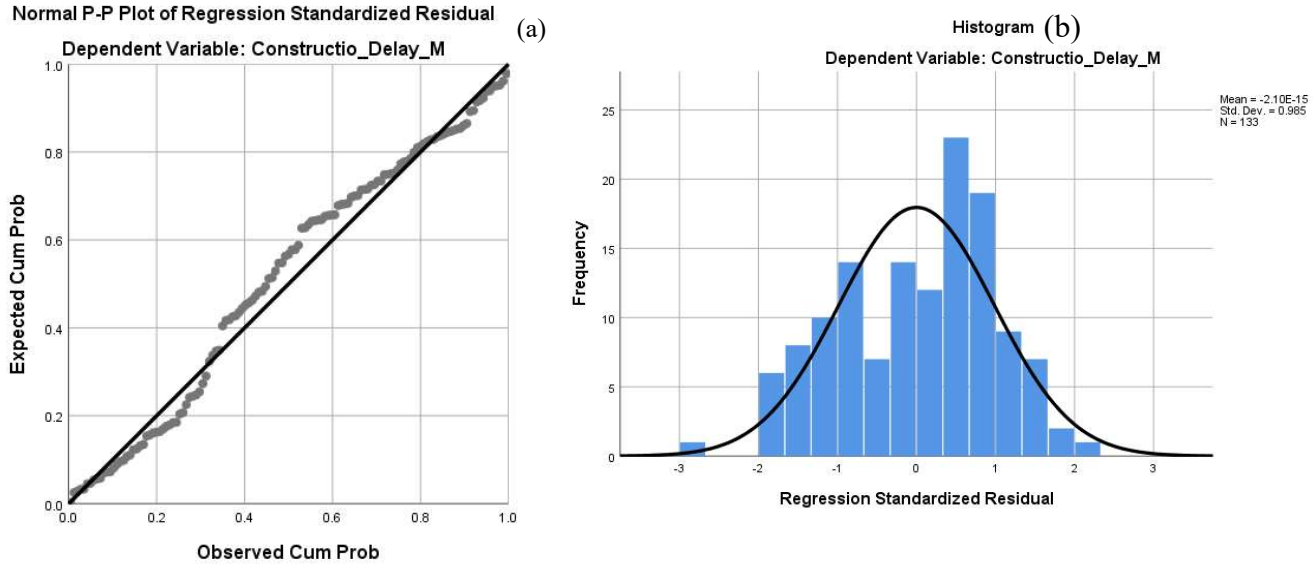



Figure 4.1 Normal P-P Plot (a) and Histogram (b) of Regression standardized residual

*Source: Survey SPSS result, 2017*

Based on the Figure 4.1 Normal P-P plot and Histogram the residuals seem to be normally distributed to a satisfactory degree, thus fulfilling the assumption of normality in linear regression. The Histogram shows a symmetric, bell-shaped distribution centred nearly on zero (Mean = -2.10E-15, effectively zero), with a Standard Deviation of 0.985 (very close to the desirable figure of 1), demonstrating that there is no significant skew and outliers among the standardized residuals. The points on the Normal P-P Plot lie mostly on the diagonal line from (0,0) to (1,1). Together, these tests confirm that the normality assumption for regression residuals is met no transformation of the dependent variable is required.

## Assumption-2 Multi Collinearity test

Table 4.12 Multi Collinearity test

| **Coefficients[a]** | | | |
|---|---|---|---|
| Model | | Collinearity Statistics | |
| | | Tolerance | VIF |
| 1 | Client Related Factor | .603 | 1.657 |
| | Contractor Related Factor | .590 | 1.694 |
| | Consultant Related Factor | .624 | 1.603 |
| | Other Related Factors | .550 | 1.817 |
| a. Dependent Variable: Construction Delay | | | |

*Source: Survey SPSS result, 2017*

Based on the multicollinearity test results presented in Table 4.12, all independent variables Client Related Factor, Contractor Related Factor, Consultant Related Factor, and Other Related Factors were within the acceptable range of values, indicating a lack of a serious multicollinearity problem in the regression model. The Tolerance is in the range of 0.550 to 0.624, and all are greater than the recommended threshold of 10%. Correspondingly, the Variance Inflation Factor (VIF) values ranged between 1.603 and 1.817, all falling well below the critical threshold of 10. This means all four factors can be simultaneously used in the model and their individual effects on Construction Delay can be interpreted.

## Assumption-3 Linearity and Homoscedasticity test

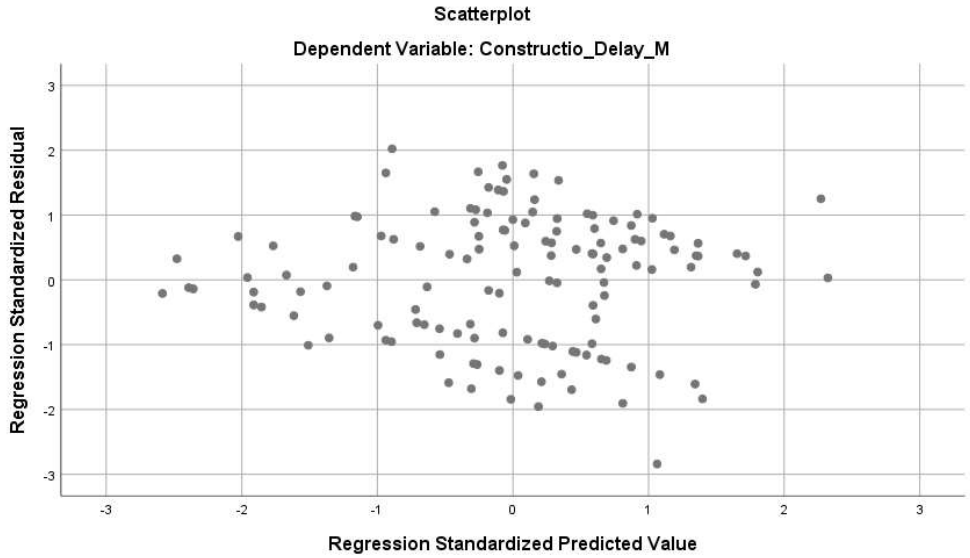



Figure 4.2 Linearity and Homoscedasticity test

*Source: Survey SPSS result, 2017*

Looking at Figure 4.2 which shows a scatterplot of the Regression Standardized Residuals against the Regression Standardized Predicted Values for the dependent variable Construction Delay, there seems to be an equal and random distribution of residuals around the zero line across all ranges of predicted values from about -3 to +3 on both axes. There are no clusters or outliers that could indicate heteroscedasticity or nonlinearity. There appears to be a negligible number of residuals that are scattered at around -3 to +3, though most fall between the -2 and +2 range. Homoscedasticity is thus confirmed with reference to construction delay by this random allocation of variability to all levels of predicted delay. Also, there is no curvature in the data, which further confirms that there is a linear relationship between the independent variables and the dependent variable. This scatterplot provides that the regression model for Construction Delay is well specified and meets the key assumptions for valid statistical analysis.

## 4.5.3 Multiple Regression Analysis

With all the relevant regression assumptions successfully validated, a standard multiple regression was run to determine the regression determinant factor of all the four independent variables on Construction Delay. The results of multiple regression analysis are shown below, starting with the model summary and then the ANOVA table and Beta Coefficient.

#### 4.5.3.1 Model Summary

Table 4.13 Model Summary

| Model Summary[b] | | | | | |
|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
| 1 | .493[a] | .243 | .219 | .839 | 1.388 |
| a. Predictors: (Constant), Other Related Factor, Consultant Related Factor, Client Related Factor, Contractor Related Factor | | | | | |
| b. Dependent Variable: Construction Delay | | | | | |

*Source: Survey SPSS result, 2017*

According to (Montgomery et al., 2021) R2 (coefficient of determination) measures the proportion of variance in the dependent variable explained by the independent variables in a regression model. Adjusted $R^2$ adjusts results according to the number of independent variables included and the sample size and is appropriate to use in multiple regression models. The result of correlation coefficient (R = 0.493) is shown in Table 4. The R Square value of 0.243 means that 24.3% of the variation in construction delay is explained by the combined effect of the independent variables while the remaining 75.7% is controlled for by other factors not captured by the model. The value of Adjusted R Square (R2 = 0.219) shows that after having adjustment on the number of predictors, there is still a variation of 21.9% on construction delay by the predictors determined in the model. The standard error of estimate value of 0.839 shows the average distance that the observed values fall from the regression line. This means that there is prediction error but not significant enough to affect the results of the study.

(Cohen, 1988) classifies $R^2$ values around 0.13 as a medium effect size and values above 0.26 as a large effect size in behavioral research, indicating that the current model's $R^2$ of 0.243 falls into the acceptable to strong range.

In different disciplines, good R2 values mean different things. In the social science disciplines, in which the attitudes of human subjects hinder the entire exercise, anything between 0.10 and 0.30 is acceptable (Gupta et al., 2024). Therefor the model is a determinant factor of a reasonable level of contributing factors of construction delays.

#### 4.5.3.2. ANOVA Model

Table 4.14 ANOVA Summary

| ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| **1** | **Regression** | **28.942** | **4** | **7.236** | **10.268** | **.000[b]** |
| | **Residual** | **90.199** | **128** | **.705** | | |
| | **Total** | **119.142** | **132** | | | |
| **a. Dependent Variable: Constructio_Delay** | | | | | | |
| **b. Predictors: (Constant), Other Related Factor, Consultant Related Factor, Client Related Factor, Contractor Related Factor** | | | | | | |

*Source: Survey SPSS result, 2017*

Table 4.14 The result shows the results of ANOVA which indicates that the regression model is statistically significant ($F = 10.268$, $p < 0.001$). It shows that the combination of contractor, Client, Consultant, and other-related variables contributes to construction delays significantly. The significant value ($p < 0.001$) shows that the model is valid statistically. Despite the regression sum of squares being lower than the residual sum of squares ($28.942 < 90.199$), there is a lot more that needs to be considered in the analysis. There is a total sum of variation (119.142) in construction delays which are partly caused by the independent variables in this model. The significance value ($p < 0.05$) is less than the acceptable significance level meaning that the null hypothesis should be rejected since it states that there is no relationship between the variables and construction delays.

#### 4.5.3.3. Beta Coefficient

Table 4.15 Beta Coefficient

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .392 | .398 | | .985 | .326 |
| | Client Related Factor | .269 | .126 | .211 | 2.136 | .035 |
| | Contractor Related Factor | .111 | .112 | .099 | .991 | .324 |
| | Consultant Related Factor | .198 | .127 | .151 | 1.555 | .122 |
| | Other Related Factors | .172 | .119 | .150 | 1.446 | .151 |
| a. Dependent Variable: Construction Delay | | | | | | |

*Source: Survey SPSS result, 2017*

According to Beta coefficients table individual contribution of each independent variable in predicting construction delay while controlling for the effects of the other variables. The regression equation indicates that all independent variables have a positive relationship with construction delay, meaning that an increase in these factors is associated with an increase in project delays.

Among the independent variable, client related factors have a statistically significant effect on construction delay (β = 0.211, t = 2.136, p = 0.035), as the significance value is less than 0.05. This implies that issues such as delayed decision making, financial constraints, and changes initiated by clients significantly contribute to project delays.

In contrast, contractor related factors (β = 0.099, p = 0.324), consultant related factors (β = 0.151, p = 0.122), and other related factors (β = 0.150, p = 0.151) were found to have positive but statistically insignificant effects on construction delay since their p-values are greater than 0.05. This suggests that although these factors contribute to delays, their individual effect is not strong enough to be considered statistically significant within this model. Based on the standardized beta coefficients, client related factors have the strongest influence on construction delay compared to the other independent variables and are the most critical determinant of construction delays in private real estate construction projects.

**$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + Ɛ$**

$Y=0.392+0.269X1+0.111X2+0.198X3+0.172X4+ Ɛ$

**Where ; -** Y- Construction Delay (Dependent Variable) - β 0-the constant

- X1-Client Related Factor (Independent Variable) - β1- β4 Coefficients
- X2-Contractor Related Factor (Independent Variable) - Ɛ-Error Term
- X3-Consultant Related Factor (Independent Variable)
- X4-Other Related Factors (Independent Variable)

### 4.5.4 Hypothesis Testing

Table 4.16 Summary of Hypothesis Testing Results

| No | Hypothesis | Beta coefficients and significance value | Result |
|---|---|---|---|
| **H1** | **Client related factor** has statistically significant effect on Construction Delay. | **β = 0.211, p = 0.035** | **Accepted** |
| **H2** | **Contractor related factor** has statistically significant effect on Construction Delay.. | **β = 0.099, p = 0.324** | **Not Accepted** |
| **H3** | **Consultant related factor** has statistically significant effect on Construction Delay. | **β = 0.151, p = 0.122** | **Not Accepted** |
| **H4** | **Other related factor** has statistically significant effect on Construction Delay. | **β = 0.150, p = 0.151** | **Not Accepted** |

Based on the hypothesis testing results presented in the table, the following interpretations can be made:

**Hypothesis 1 (H1):** Client related factor exhibits a value for the beta coefficient of 0.211 and p-value of 0.035. Because the p-value is less than 0.05, the hypothesis is accepted. Therefore, client-related factors exert a significantly positive influence on Construction Delay. Of all four factors, client related factors exhibit the highest level of influence on construction delay (highest beta coefficient value of 0.211).

**Hypothesis 2 (H2):** The contractor-related factor is associated with the beta coefficient value of 0.099, with a p-value of 0.324. Since the p-value is greater than 0.05, this hypothesis is thus rejected. Although the association is positively directed (because of the positive beta value), contractor-related factors do not significantly influence Construction Delay in this case.

**Hypothesis 3 (H3):** Factor consultant-related displays a value of beta coefficient of 0.151, with p-value of 0.122. The hypothesis is therefore rejected since $0.122 > 0.05$. Even though the beta coefficient is an indication of a positive correlation between the dependent variable and the independent variable, the result is insignificant.

**Hypothesis 4 (H4):** Other related factors show a beta value of 0.150 and a p-value of 0.151. Since the probability is higher than 0.05, H4 cannot be accepted. Other related factors have no predictive value for construction delay, like H2 and H3.

Only H1 proved to be true with the Client related factors becoming the single statistical predictor of construction delay ($\beta = 0.211$, $p = 0.035$). This implies that problems associated with the client such as lack of timely payments, delayed decision-making, and change in scope of work are the main causes of construction delays in this study. The rest of the factors including contractor, consultant, and others failed to prove their significance in explaining construction delays

## 4.6 Relative Importance Index(RII) Result Presentation

The Relative Importance Index (RII) method is employed in this study to evaluate and rank the significance of various factors contributing to delays in private real estate construction projects. The RII is calculated using the formula

$\boldsymbol{RII} = \frac{\sum \boldsymbol{W}}{\boldsymbol{A} \times \boldsymbol{N}}$, where **; W** represents the weight assigned to each factor on a five-point Likert scale,

**A** is the highest possible weight (5), and

**N** is the total number of respondents.

This method enables the prioritization of delay factors, which are normally grouped into contractor-related, client-related, consultant related and other factor, based on the respondents' perceptions, thus a reliable and widely accepted tool in construction delay analysis. In other words, this approach thus enables the ranking of delay factors normally categorized into contractor-related, client-related, consultant related and other factor based on respondents' perceptions, a powerful and widely used tool in construction delay analysis.

### 4.6.1 Client, Consultant and Contractor Responses and Ranking of the Factor Causing Delay In Luxury Apartment Projects

Average scores based on the perception of the three groups of respondents (clients, contractors and consultants) against the factors causing delay in luxury apartment projects were used to determine the ranking of the factors which supporting tables 4.17 and 4.18 for ten most significant delay factors with the RII act as evidence, and show that shortage of material ranks highest(0.88), with the consultants having the strongest perception on this factor (1.00).

Exchange rate fluctuation comes next with 0.86, highlighting the vulnerability of luxury projects to financial volatility. "Frequent change of subcontractors" (0.81) and "unforeseen ground conditions" (0.79) are also critical, with the first risk showing a perception gap as clients (0.90) and consultants (0.98) rate it far higher than contractors (0.60).

Delay to deliver the site and award to lowest bidder, both scoring 0.78 indicates, that client related issues are well-recognized delay sources, though the consultants perceive the latter as being of a higher magnitude (0.93 vs. client, 0.75). Construction equipment unavailability (0.77) and ineffective project planning (0.76) further emphasize contractor side weaknesses while material price variations (0.75) are felt most by contractors (0.86). Finally, absence of consultant on site (0.73) rounds to ten, with consultant themselves acknowledging the issue (0.82) than clients (0.63).

Overall, the data shows that material supply, financial factors, and subcontractor's instability dominate delay causes.

Table 4.17 Client, Consultant and Contractor Responses and Ranking of the Factor Causing Delay In Luxury Apartment Projects

| Item no | Delay Factor | Client (RII) | Consultant (RII) | Contractor (RII) | Weighted Avg |
|---|---|---|---|---|---|
| 1 | shortage of material | 0.88 | 1.00 | 0.78 | 0.88 |
| 2 | Exchange rate fluctuation | 0.83 | 0.96 | 0.80 | 0.86 |
| 3 | Frequent change of subcontractors, | 0.90 | 0.98 | 0.60 | 0.81 |
| 4 | Unforeseen ground condition | 0.78 | 0.87 | 0.72 | 0.79 |
| 5 | Delay to deliver the site | 0.78 | 0.80 | 0.76 | 0.78 |
| 6 | Award to list bidder | 0.75 | 0.93 | 0.66 | 0.78 |
| 7 | Construction equipment unavailability | 0.80 | 0.93 | 0.60 | 0.77 |
| 8 | Ineffective project planning and scheduling | 0.80 | 0.80 | 0.70 | 0.76 |
| 9 | Material price variations (inflation/escalation) | 0.63 | 0.73 | 0.86 | 0.75 |
| 10 | Absence of consultant in site | 0.63 | 0.82 | 0.72 | 0.73 |
| 11 | Delay in Preparation and approval of drawing | 0.58 | 0.80 | 0.74 | 0.71 |
| 12 | Incomplete design at the time of tender | 0.73 | 0.73 | 0.66 | 0.70 |
| 13 | Material problem | 0.65 | 0.71 | 0.74 | 0.70 |
| 14 | Financial problem | 0.75 | 0.64 | 0.68 | 0.69 |
| 15 | weather condition | 0.63 | 0.78 | 0.66 | 0.69 |
| 16 | Delay and difficulties of supplier | 0.68 | 0.71 | 0.68 | 0.69 |
| 17 | Insufficient contract period | 0.58 | 0.71 | 0.74 | 0.68 |
| 18 | Delay to payment and finance problem | 0.50 | 0.84 | 0.68 | 0.68 |
| 19 | Lack of quality control | 0.63 | 0.78 | 0.64 | 0.68 |
| 20 | Design problem | 0.63 | 0.76 | 0.64 | 0.67 |
| 21 | Complicated specification | 0.73 | 0.67 | 0.62 | 0.67 |
| 22 | Frequent design change | 0.58 | 0.71 | 0.66 | 0.65 |
| 23 | Utility problems (electricity, water, telephone) | 0.60 | 0.76 | 0.60 | 0.65 |
| 24 | Equipment unavailability | 0.63 | 0.71 | 0.62 | 0.65 |
| 25 | Poor coordination | 0.58 | 0.78 | 0.58 | 0.64 |
| 26 | Change in scope of the project | 0.60 | 0.69 | 0.64 | 0.64 |
| 27 | Project management problem | 0.65 | 0.64 | 0.64 | 0.64 |
| 28 | Contract management problem | 0.58 | 0.64 | 0.66 | 0.63 |
| 29 | Major disputes and negotiations | 0.58 | 0.64 | 0.66 | 0.63 |
| 30 | Inadequate subcontractor | 0.65 | 0.67 | 0.56 | 0.62 |
| 31 | poor workmanship | 0.70 | 0.62 | 0.56 | 0.62 |
| 32 | Spent time for approval of test and inspection | 0.58 | 0.60 | 0.68 | 0.62 |
| 33 | There is a significant time overrun in most private real estate construction projects. | 0.53 | 0.60 | 0.70 | 0.61 |
| 34 | Poor management of the contract | 0.60 | 0.60 | 0.62 | 0.61 |
| 35 | low quality materials | 0.65 | 0.60 | 0.56 | 0.60 |
| 36 | Delay to decision making | 0.58 | 0.47 | 0.68 | 0.58 |
| 37 | Project activities often experience schedule slippage during execution. | 0.55 | 0.47 | 0.70 | 0.58 |
| 38 | Lack of experience | 0.50 | 0.62 | 0.60 | 0.58 |
| 39 | The actual completion time of projects usually exceeds the planned duration. | 0.48 | 0.62 | 0.62 | 0.58 |
| 40 | Most projects are completed within the originally agreed time frame | 0.58 | 0.62 | 0.54 | 0.58 |
| 41 | Poor communication and management | 0.55 | 0.47 | 0.68 | 0.57 |
| 42 | Poor construction methodologies | 0.58 | 0.47 | 0.66 | 0.57 |
| 43 | Delays in construction projects are a common occurrence. | 0.48 | 0.49 | 0.72 | 0.57 |
| 44 | Inappropriate construction methods, | 0.63 | 0.53 | 0.54 | 0.56 |
| 45 | Rework due to errors | 0.55 | 0.51 | 0.60 | 0.56 |
| 46 | Regulatory problems | 0.43 | 0.58 | 0.64 | 0.56 |
| 47 | Construction projects are frequently completed later than the planned schedule. | 0.58 | 0.40 | 0.64 | 0.54 |
| 48 | Design error | 0.43 | 0.44 | 0.70 | 0.53 |

Table 4.18 Relative Importance Indices (RII) of The Ten Most Significant Factors Causing Delays In Luxury Apartment Projects

| Item no | Delay Factor | Factor Category | Client (RII) | Consultant (RII) | Contractor (RII) | Weighted Avg |
|---|---|---|---|---|---|---|
| 1 | Shortage of material | Contractor Related | 0.88 | 1.00 | 0.78 | 0.88 |
| 2 | Exchange rate fluctuation | Other Factor related | 0.83 | 0.96 | 0.80 | 0.86 |
| 3 | Frequent change of subcontractors, | Contractor Related | 0.90 | 0.98 | 0.60 | 0.81 |
| 4 | Unforeseen ground condition | Other Factor related | 0.78 | 0.87 | 0.72 | 0.79 |
| 5 | Delay to deliver the site | Client Related | 0.78 | 0.80 | 0.76 | 0.78 |
| 6 | Award to list bidder | Client Related | 0.75 | 0.93 | 0.66 | 0.78 |
| 7 | Construction equipment unavailability | Contractor Related | 0.80 | 0.93 | 0.60 | 0.77 |
| 8 | Ineffective project planning and scheduling | Contractor Related | 0.80 | 0.80 | 0.70 | 0.76 |
| 9 | Material price variations (inflation/escalation) | Other Factor related | 0.63 | 0.73 | 0.86 | 0.75 |
| 10 | Absence of consultant in site | Consultant Related | 0.63 | 0.82 | 0.72 | 0.73 |

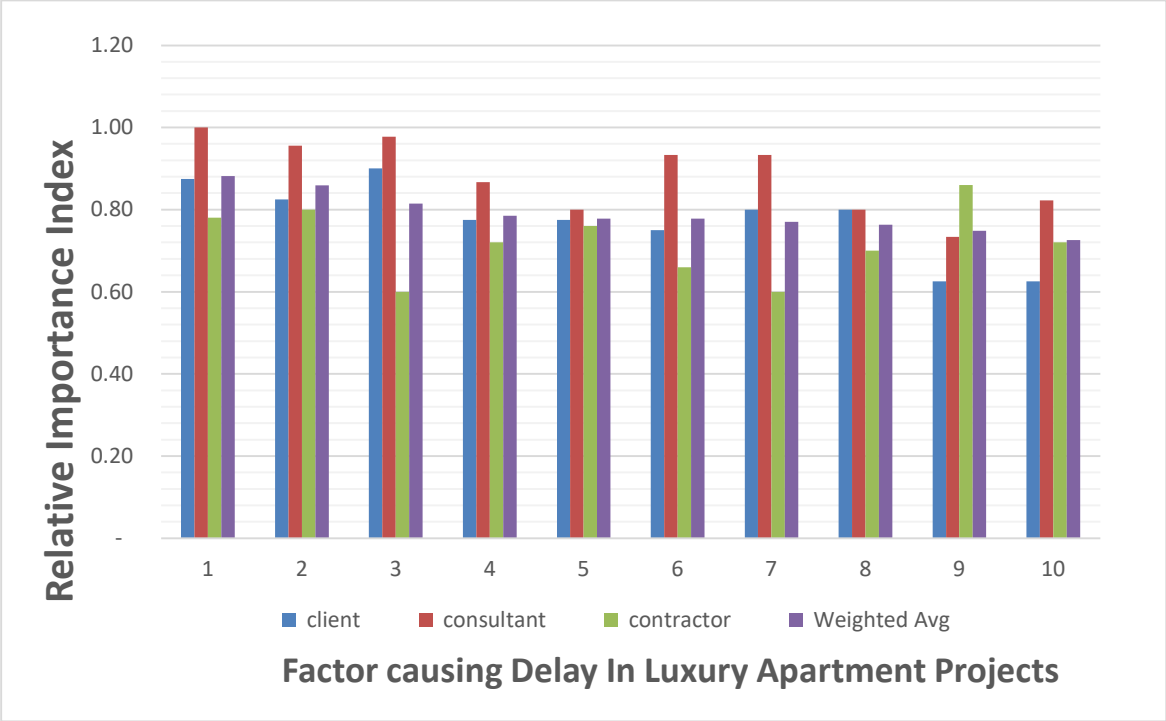



Figure 4.3 Relative Importance Indices (RII) of The Ten Most Significant Factors Causing Delays In Luxury Apartment Projects

### 4.6.2 Client, Consultant and Contractor Responses and Ranking of the Factor Causing Delay In Mid Income Apartments

The table of ten most delay factors in Mid Income Apartments by Relative Importance Indices (RII) confirms that Material price variations (inflation/escalation) was ranked highest with a weighted average RII of 0.76 with clients ranking the variable highest at 0.84.

Exchange rate fluctuation and Material problem come close second with a 0.75 of significance underlining the vulnerability of mid-income projects to financial volatility and material supply problems. Frequent change of subcontractors, (0.73), and Utility problems (electricity, water, telephone) (0.73) are also critical the later having a perception gap, with the consultants (0.77) ranking it higher than the contractors (0.69). Delay and difficulties of supplier, Delay to deliver the site, and Delay to payment and finance problem score 0.72, indicating logistics, site delivery, and financial issues as well- known delay sources. Unforeseen ground condition (0.71) further emphasize site risks, and this is most felt by the clients (0.84). Finally, Inadequate subcontractor (0.71) makes up the ten, with the consultants and contractors all acknowledging the issue (0.73) more than the clients (0.64).

Overall, the data shows that macroeconomic instability, material issues, and external site factors dominate delay causes.

Table 4.19 Client, Consultant and Contractor Responses and Ranking of the Factor Causing Delay In Mid Income Apartments

| Item no | Delay Factor | Client (RII) | Consultant (RII) | Contractor (RII) | Weighted Avg |
|---|---|---|---|---|---|
| 1 | Material price variations (inflation/escalation) | 0.84 | 0.70 | 0.75 | 0.76 |
| 2 | Exchange rate fluctuation | 0.84 | 0.70 | 0.73 | 0.75 |
| 3 | Material problem | 0.84 | 0.70 | 0.73 | 0.75 |
| 4 | Frequent change of subcontractors, | 0.72 | 0.70 | 0.75 | 0.73 |
| 5 | Utility problems (electricity, water, telephone) | 0.76 | 0.77 | 0.69 | 0.73 |
| 6 | Delay and difficulties of supplier | 0.80 | 0.67 | 0.72 | 0.72 |
| 7 | Delay to deliver the site | 0.72 | 0.73 | 0.72 | 0.72 |
| 8 | Delay to payment and finance problem | 0.80 | 0.70 | 0.70 | 0.72 |
| 9 | Unforeseen ground condition | 0.84 | 0.67 | 0.68 | 0.71 |
| 10 | Inadequate subcontractor | 0.64 | 0.73 | 0.73 | 0.71 |
| 11 | Equipment unavailability | 0.80 | 0.63 | 0.68 | 0.70 |
| 12 | Incomplete design at the time of tender | 0.64 | 0.70 | 0.69 | 0.68 |
| 13 | Complicated specification | 0.48 | 0.83 | 0.69 | 0.68 |
| 14 | Change in scope of the project | 0.80 | 0.63 | 0.65 | 0.68 |
| 15 | Ineffective project planning and scheduling | 0.68 | 0.60 | 0.72 | 0.68 |
| 16 | Award to list bidder | 0.60 | 0.80 | 0.64 | 0.67 |
| 17 | Inappropriate construction methods, | 0.72 | 0.67 | 0.64 | 0.66 |
| 18 | Poor construction methodologies | 0.80 | 0.50 | 0.68 | 0.66 |
| 19 | Delay to decision making | 0.80 | 0.60 | 0.62 | 0.65 |
| 20 | Project management problem | 0.68 | 0.57 | 0.68 | 0.65 |
| 21 | shortage of material | 0.68 | 0.60 | 0.67 | 0.65 |
| 22 | poor workmanship | 0.64 | 0.50 | 0.73 | 0.65 |

| | | | | | |
|---|---|---|---|---|---|
| 23 | Most projects are completed within the originally agreed time frame | 0.72 | 0.77 | 0.56 | 0.65 |
| 24 | Absence of consultant in site | 0.72 | 0.53 | 0.67 | 0.65 |
| 25 | Lack of experience | 0.68 | 0.47 | 0.71 | 0.64 |
| 26 | Financial problem | 0.68 | 0.53 | 0.67 | 0.63 |
| 27 | Frequent design change | 0.60 | 0.60 | 0.67 | 0.63 |
| 28 | Rework due to errors | 0.72 | 0.57 | 0.62 | 0.63 |
| 29 | Poor communication and management | 0.72 | 0.67 | 0.57 | 0.63 |
| 30 | Spent time for approval of test and inspection | 0.68 | 0.57 | 0.62 | 0.62 |
| 31 | Delay in Preparation and approval of drawing | 0.64 | 0.43 | 0.70 | 0.62 |
| 32 | Design problem | 0.72 | 0.57 | 0.58 | 0.61 |
| 33 | Poor management of the contract | 0.72 | 0.53 | 0.60 | 0.61 |
| 34 | Construction equipment unavailability | 0.68 | 0.53 | 0.62 | 0.61 |
| 35 | weather condition | 0.80 | 0.57 | 0.55 | 0.61 |
| 36 | Lack of quality control | 0.64 | 0.50 | 0.63 | 0.60 |
| 37 | Design error | 0.64 | 0.53 | 0.62 | 0.60 |
| 38 | Contract management problem | 0.68 | 0.50 | 0.58 | 0.58 |
| 39 | Construction projects are frequently completed later than the planned schedule. | 0.36 | 0.43 | 0.72 | 0.57 |
| 40 | There is a significant time overrun in most private real estate construction projects. | 0.36 | 0.47 | 0.70 | 0.57 |
| 41 | Regulatory problems | 0.68 | 0.50 | 0.54 | 0.56 |
| 42 | Delays in construction projects are a common occurrence. | 0.36 | 0.40 | 0.72 | 0.56 |
| 43 | The actual completion time of projects usually exceeds the planned duration. | 0.28 | 0.40 | 0.73 | 0.55 |
| 44 | Major disputes and negotiations | 0.76 | 0.50 | 0.48 | 0.55 |
| 45 | low quality materials | 0.56 | 0.60 | 0.51 | 0.54 |
| 46 | Poor coordination | 0.64 | 0.43 | 0.55 | 0.54 |
| 47 | Insufficient contract period | 0.68 | 0.40 | 0.55 | 0.54 |
| 48 | Project activities often experience schedule slippage during execution. | 0.32 | 0.43 | 0.67 | 0.53 |

Table 4.20 Relative Importance Indices (RII) of The Ten Most Significant Factors Causing Delays In Mid Income Apartments

| Item no | Delay Factor | Factor Category | Client (RII) | Consultant (RII) | Contractor (RII) | Weighted Avg |
|---|---|---|---|---|---|---|
| 1 | Material price variations (inflation/escalation) | Other Factor related | 0.84 | 0.70 | 0.75 | 0.76 |
| 2 | Exchange rate fluctuation | Other Factor related | 0.84 | 0.70 | 0.73 | 0.75 |
| 3 | Material problem | Other Factor related | 0.84 | 0.70 | 0.73 | 0.75 |
| 4 | Frequent change of subcontractors, | Contractor Related | 0.72 | 0.70 | 0.75 | 0.73 |
| 5 | Utility problems (electricity, water, telephone) | Other Factor related | 0.76 | 0.77 | 0.69 | 0.73 |
| 6 | Delay and difficulties of supplier | Other Factor related | 0.80 | 0.67 | 0.72 | 0.72 |
| 7 | Delay to deliver the site | Client Related | 0.72 | 0.73 | 0.72 | 0.72 |
| 8 | Delay to payment and finance problem | Client Related | 0.80 | 0.70 | 0.70 | 0.72 |
| 9 | Unforeseen ground condition | Other Factor related | 0.84 | 0.67 | 0.68 | 0.71 |
| 10 | Inadequate subcontractor | Contractor Related | 0.64 | 0.73 | 0.73 | 0.71 |

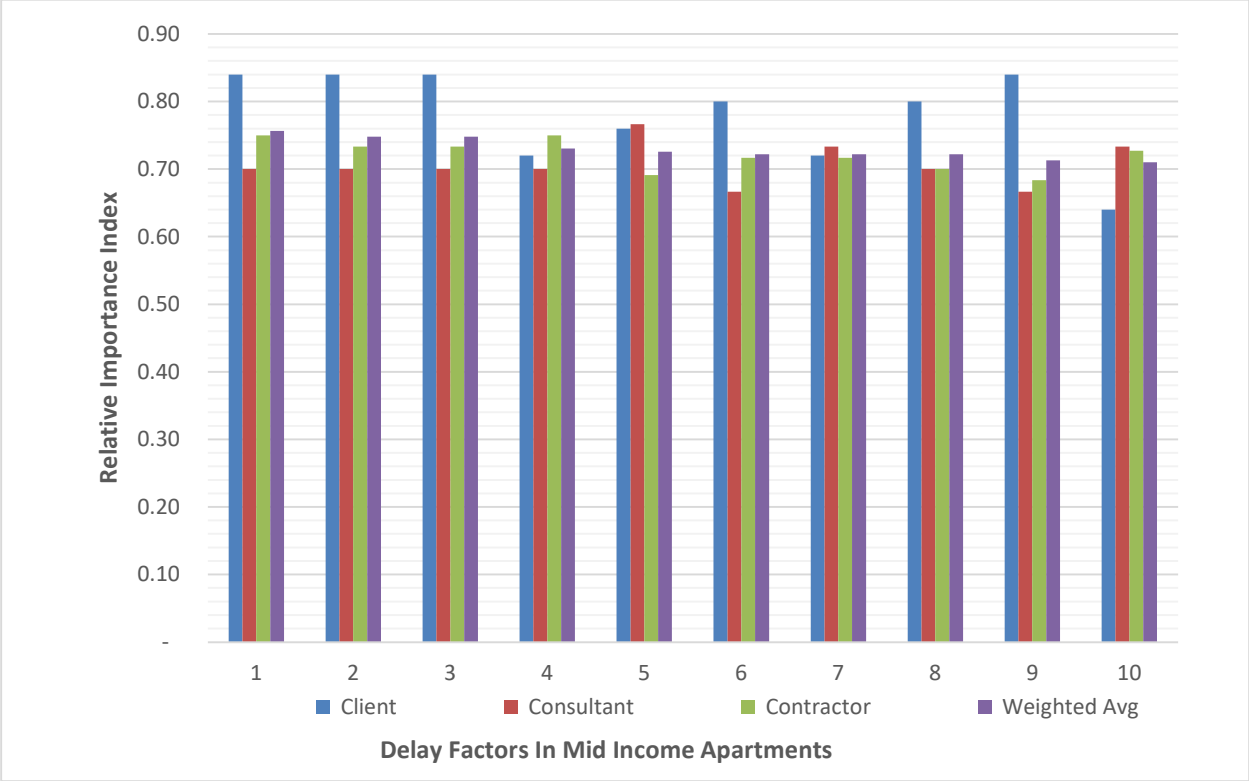



Figure 4.4 Relative Importance Indices (RII) of The Ten Most Significant Factors Causing Delays In Mid Income Apartments

### 4.6.3 Client, Consultant and Contractor Responses and Ranking of the Factor Causing Delay In Mixed Use Building Project

According to the table showing the ten most significant delay factors in Mixed use Building project Delay to deliver site has the highest ranking, with a weighted average RII of 0.81, with both consultants and contractors having 0.83 each. Delay to decision making (0.79) and Delay to payment and finance problem (0.76) come next, with the four major delay factors identified pointing towards client related administrative and financial hurdles as dominant factors in project delay. Both Major disputes and negotiations and Material price variations (inflation/escalation) are at 0.75, indicating that legal conflicts and external shocks are also crucial risks. This is compounded by perceived risk factors once again sorted by their RII that include Absence of consultant in site (0.74) being highlighted most by clients (0.80), Frequent change of subcontractors, (0.74) and Exchange rate fluctuation (0.74), with the first factor being perceived variably between consultants being much higher at (0.85) than the clients at (0.66). Finally, Financial problem (0.72) and Change in scope of the project (0.72) make up the last of the top ten. The client related factor with relation to possession of the site, speed of decision-making, and funding are the primary drivers of delay in the mixed-use project environment.

Table 4.21 Client, Consultant and Contractor Responses and Ranking of the Factor Causing Delay In

Mixed Use Building Project

| Item no | Delay Factor | Client (RII) | Consultant (RII) | Contractor (RII) | Weighted Avg |
|---|---|---|---|---|---|
| 1 | Delay to deliver the site | 0.77 | 0.83 | 0.83 | 0.81 |
| 2 | Delay to decision making | 0.74 | 0.78 | 0.82 | 0.79 |
| 3 | Delay to payment and finance problem | 0.77 | 0.70 | 0.78 | 0.76 |
| 4 | Major disputes and negotiations | 0.74 | 0.73 | 0.77 | 0.75 |
| 5 | Material price variations (inflation/escalation) | 0.77 | 0.78 | 0.72 | 0.75 |
| 6 | Absence of consultant in site | 0.80 | 0.78 | 0.69 | 0.74 |
| 7 | Frequent change of subcontractors, | 0.66 | 0.85 | 0.71 | 0.74 |
| 8 | Exchange rate fluctuation | 0.74 | 0.75 | 0.72 | 0.74 |
| 9 | Financial problem | 0.60 | 0.78 | 0.75 | 0.72 |
| 10 | Change in scope of the project | 0.66 | 0.73 | 0.75 | 0.72 |
| 11 | Ineffective project planning and scheduling | 0.63 | 0.68 | 0.78 | 0.71 |
| 12 | Spent time for approval of test and inspection | 0.66 | 0.73 | 0.74 | 0.71 |
| 13 | Frequent design change | 0.71 | 0.68 | 0.74 | 0.71 |
| 14 | Award to list bidder | 0.66 | 0.68 | 0.75 | 0.71 |
| 15 | Contract management problem | 0.69 | 0.68 | 0.74 | 0.71 |
| 16 | Delay and difficulties of supplier | 0.69 | 0.75 | 0.69 | 0.71 |
| 17 | Poor management of the contract | 0.63 | 0.65 | 0.77 | 0.70 |
| 18 | Poor construction methodologies | 0.54 | 0.68 | 0.80 | 0.70 |
| 19 | Delay in Preparation and approval of drawing | 0.66 | 0.75 | 0.69 | 0.70 |
| 20 | Incomplete design at the time of tender | 0.71 | 0.65 | 0.72 | 0.70 |
| 21 | Unforeseen ground condition | 0.77 | 0.75 | 0.63 | 0.70 |
| 22 | Material problem | 0.63 | 0.70 | 0.74 | 0.70 |
| 23 | Project management problem | 0.60 | 0.65 | 0.74 | 0.68 |
| 24 | weather condition | 0.69 | 0.65 | 0.69 | 0.68 |
| 25 | Poor coordination | 0.63 | 0.70 | 0.68 | 0.67 |
| 26 | Poor communication and management | 0.60 | 0.63 | 0.74 | 0.67 |
| 27 | shortage of material | 0.66 | 0.73 | 0.65 | 0.67 |
| 28 | Design problem | 0.60 | 0.65 | 0.71 | 0.66 |
| 29 | Inappropriate construction methods, | 0.51 | 0.65 | 0.75 | 0.66 |
| 30 | Design error | 0.63 | 0.63 | 0.71 | 0.66 |
| 31 | Lack of experience | 0.60 | 0.60 | 0.72 | 0.66 |
| 32 | low quality materials | 0.57 | 0.63 | 0.71 | 0.65 |
| 33 | poor workmanship | 0.57 | 0.58 | 0.74 | 0.65 |
| 34 | Regulatory problems | 0.63 | 0.65 | 0.66 | 0.65 |
| 35 | Lack of quality control | 0.66 | 0.68 | 0.63 | 0.65 |
| 36 | There is a significant time overrun in most private real estate construction projects. | 0.29 | 0.78 | 0.77 | 0.65 |
| 37 | Construction equipment unavailability | 0.57 | 0.65 | 0.68 | 0.64 |
| 38 | Rework due to errors | 0.54 | 0.60 | 0.71 | 0.64 |
| 39 | Utility problems (electricity, water, telephone) | 0.60 | 0.68 | 0.62 | 0.63 |
| 40 | Equipment unavailability | 0.57 | 0.65 | 0.63 | 0.62 |
| 41 | Construction projects are frequently completed later than the planned schedule. | 0.29 | 0.63 | 0.80 | 0.62 |
| 42 | Inadequate subcontractor | 0.60 | 0.58 | 0.65 | 0.61 |
| 43 | Insufficient contract period | 0.63 | 0.53 | 0.65 | 0.61 |
| 44 | Project activities often experience schedule slippage during execution. | 0.29 | 0.70 | 0.72 | 0.61 |
| 45 | Complicated specification | 0.66 | 0.50 | 0.63 | 0.60 |
| 46 | The actual completion time of projects usually exceeds the planned duration. | 0.26 | 0.60 | 0.78 | 0.60 |
| 47 | Delays in construction projects are a common occurrence. | 0.31 | 0.65 | 0.71 | 0.59 |
| 48 | Most projects are completed within the originally agreed time frame | 0.60 | 0.48 | 0.48 | 0.51 |

Table 4.22 Relative Importance Indices (RII) of The Ten Most Significant Factors Causing Delays In Mixed Use Building Project

| Item no | Delay Factor | Factor Category | Client (RII) | Consultant (RII) | Contractor (RII) | Weighted Avg |
|---|---|---|---|---|---|---|
| 1 | Delay to deliver the site | Client Related | 0.77 | 0.83 | 0.83 | 0.81 |
| 2 | Delay to decision making | Client Related | 0.74 | 0.78 | 0.82 | 0.79 |
| 3 | Delay to payment and finance problem | Client Related | 0.77 | 0.70 | 0.78 | 0.76 |
| 4 | Major disputes and negotiations | Other Factor related | 0.74 | 0.73 | 0.77 | 0.75 |
| 5 | Material price variations (inflation/escalation) | Other Factor related | 0.77 | 0.78 | 0.72 | 0.75 |
| 6 | Absence of consultant in site | Consultant Related | 0.80 | 0.78 | 0.69 | 0.74 |
| 7 | Frequent change of subcontractors, | Contractor Related | 0.66 | 0.85 | 0.71 | 0.74 |
| 8 | Exchange rate fluctuation | Other Factor related | 0.74 | 0.75 | 0.72 | 0.74 |
| 9 | Financial problem | Contractor Related | 0.60 | 0.78 | 0.75 | 0.72 |
| 10 | Change in scope of the project | Client Related | 0.66 | 0.73 | 0.75 | 0.72 |

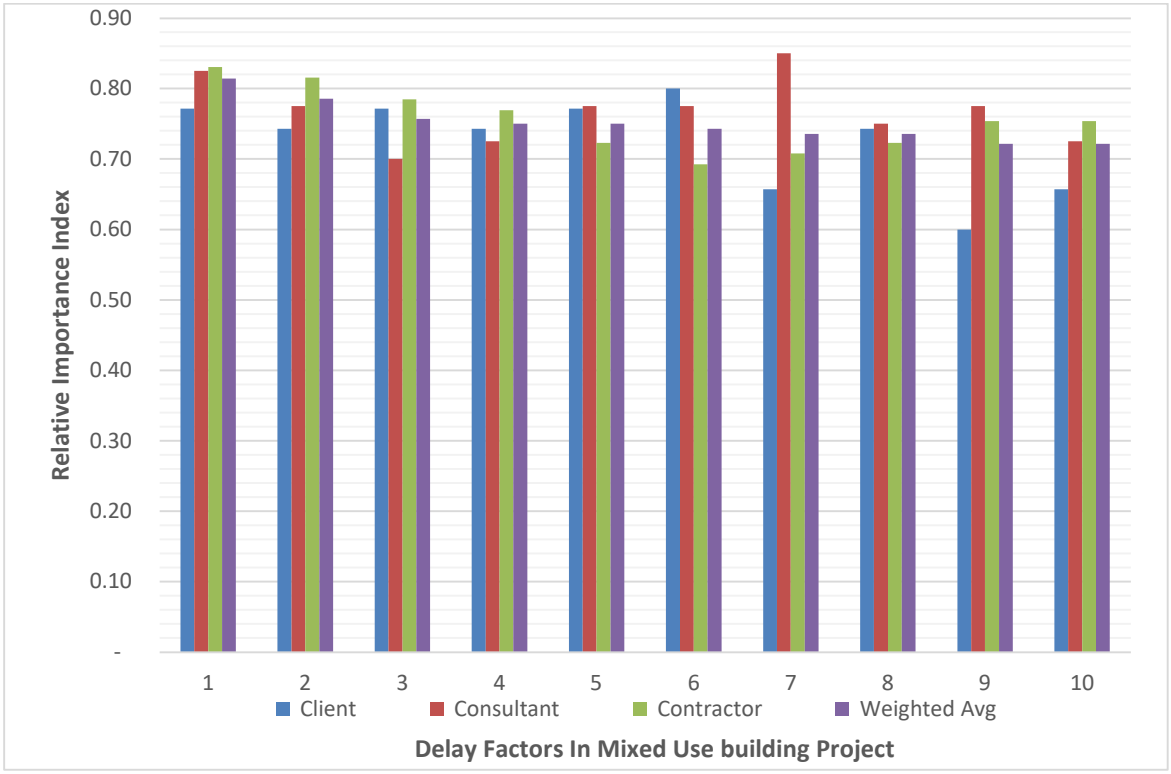



Figure 4.5 Relative Importance Indices (RII) of The Ten Most Significant Factors Causing Delays In Mixed Use Building Project

### 4.6.4 Client, Consultant and Contractor Responses and Ranking of the Factor Causing Delay In G+4–G+7 Private Residential Buildings

According to the table showing the ten most significant delay factors in G+4–G+7 Private Residential Buildings ranked by their Relative Importance Indices (RII), Delay in Preparation and approval of drawing ranks highest with a weighted average of 0.76, with consultants strongly ranking it at 0.89 (ibid). Following closely are Shortage of material and Poor construction methodologies averaging 0.75 in weights, with the latter topping clients' concerns at 0.80.

Low quality materials (0.73) and Delay to deliver the site (0.72) underscores other operational and administrative bottlenecks, with the consultants identifying site delivery as an issue (0.89). Construction equipment unavailability (0.72) and Exchange rate fluctuation (0.71) also highlight the effects of logistical issues and external economic factors. Financial problem, absence of consultant in site, and incomplete design at the time of tender complete the top ten with a weighted average of 0.70. In other words, delays on these mid-rise residential projects occur mostly on consultant-related documentation and contractor-related execution and resource failures.

Table 4.23 Client, Consultant and Contractor Responses and Ranking of the Factor Causing Delay In

Mixed Use Building Project

| Item no | Delay Factor | Client (RII) | Consultant (RII) | Contractor (RII) | Weighted Avg |
|---|---|---|---|---|---|
| 1 | Delay in Preparation and approval of drawing | 0.75 | 0.89 | 0.69 | 0.76 |
| 2 | shortage of material | 0.75 | 0.80 | 0.71 | 0.75 |
| 3 | Poor construction methodologies | 0.80 | 0.74 | 0.69 | 0.75 |
| 4 | low quality materials | 0.76 | 0.77 | 0.64 | 0.73 |
| 5 | Delay to deliver the site | 0.65 | 0.89 | 0.67 | 0.72 |
| 6 | Construction equipment unavailability | 0.73 | 0.71 | 0.71 | 0.72 |
| 7 | Exchange rate fluctuation | 0.67 | 0.80 | 0.69 | 0.71 |
| 8 | Financial problem | 0.73 | 0.77 | 0.62 | 0.70 |
| 9 | Absence of consultant in site | 0.60 | 0.89 | 0.69 | 0.70 |
| 10 | Incomplete design at the time of tender | 0.71 | 0.74 | 0.67 | 0.70 |
| 11 | Material price variations (inflation/escalation) | 0.69 | 0.74 | 0.69 | 0.70 |
| 12 | Equipment unavailability | 0.71 | 0.74 | 0.67 | 0.70 |
| 13 | Inadequate subcontractor | 0.75 | 0.77 | 0.58 | 0.70 |
| 14 | Frequent design change | 0.65 | 0.69 | 0.76 | 0.70 |
| 15 | Unforeseen ground condition | 0.64 | 0.77 | 0.71 | 0.70 |
| 16 | Delay and difficulties of supplier | 0.67 | 0.74 | 0.69 | 0.70 |
| 17 | Lack of experience | 0.65 | 0.66 | 0.76 | 0.69 |
| 18 | Material problem | 0.69 | 0.71 | 0.67 | 0.69 |
| 19 | Most projects are completed within the originally agreed time frame | 0.71 | 0.63 | 0.71 | 0.69 |
| 20 | Ineffective project planning and scheduling | 0.71 | 0.74 | 0.60 | 0.68 |
| 21 | Inappropriate construction methods, | 0.78 | 0.69 | 0.56 | 0.68 |
| 22 | poor workmanship | 0.71 | 0.69 | 0.64 | 0.68 |
| 23 | Design error | 0.60 | 0.69 | 0.78 | 0.68 |
| 24 | Contract management problem | 0.67 | 0.71 | 0.64 | 0.67 |

| | | | | | |
|---|---|---|---|---|---|
| 25 | Project management problem | 0.71 | 0.71 | 0.60 | 0.67 |
| 26 | Frequent change of subcontractors, | 0.64 | 0.89 | 0.53 | 0.67 |
| 27 | Major disputes and negotiations | 0.65 | 0.66 | 0.69 | 0.67 |
| 28 | Rework due to errors | 0.76 | 0.60 | 0.56 | 0.65 |
| 29 | Utility problems (electricity, water, telephone) | 0.65 | 0.69 | 0.62 | 0.65 |
| 30 | Lack of quality control | 0.64 | 0.74 | 0.60 | 0.65 |
| 31 | Delay to payment and finance problem | 0.56 | 0.77 | 0.64 | 0.64 |
| 32 | Spent time for approval of test and inspection | 0.55 | 0.71 | 0.71 | 0.64 |
| 33 | weather condition | 0.55 | 0.74 | 0.67 | 0.64 |
| 34 | Delay to decision making | 0.53 | 0.77 | 0.64 | 0.63 |
| 35 | Change in scope of the project | 0.49 | 0.83 | 0.64 | 0.63 |
| 36 | Design problem | 0.53 | 0.74 | 0.62 | 0.61 |
| 37 | Complicated specification | 0.60 | 0.66 | 0.60 | 0.61 |
| 38 | Award to list bidder | 0.51 | 0.71 | 0.64 | 0.61 |
| 39 | There is a significant time overrun in most private real estate construction projects. | 0.55 | 0.69 | 0.60 | 0.60 |
| 40 | Insufficient contract period | 0.53 | 0.69 | 0.60 | 0.59 |
| 41 | Poor communication and management | 0.55 | 0.63 | 0.62 | 0.59 |
| 42 | Regulatory problems | 0.58 | 0.54 | 0.60 | 0.58 |
| 43 | Poor management of the contract | 0.53 | 0.60 | 0.60 | 0.57 |
| 44 | Poor coordination | 0.44 | 0.66 | 0.60 | 0.55 |
| 45 | The actual completion time of projects usually exceeds the planned duration. | 0.49 | 0.66 | 0.51 | 0.54 |
| 46 | Construction projects are frequently completed later than the planned schedule. | 0.42 | 0.66 | 0.53 | 0.52 |
| 47 | Delays in construction projects are a common occurrence. | 0.47 | 0.57 | 0.49 | 0.50 |
| 48 | Project activities often experience schedule slippage during execution. | 0.40 | 0.54 | 0.53 | 0.48 |

Table 4.24 Relative Importance Indices (RII) of The Ten Most Significant Factors Causing Delays In G+4–G+7 Private Residential Buildings

| Item no | Delay Factor | Factor Category | Client (RII) | Consultant (RII) | Contractor (RII) | Weighted Avg |
|---|---|---|---|---|---|---|
| 1 | Delay in Preparation and approval of drawing | Consultant Related | 0.75 | 0.89 | 0.69 | 0.76 |
| 2 | shortage of material | Contractor Related | 0.75 | 0.80 | 0.71 | 0.75 |
| 3 | Poor construction methodologies | Contractor Related | 0.80 | 0.74 | 0.69 | 0.75 |
| 4 | low quality materials | Contractor Related | 0.76 | 0.77 | 0.64 | 0.73 |
| 5 | Delay to deliver the site | Client Related | 0.65 | 0.89 | 0.67 | 0.72 |
| 6 | Construction equipment unavailability | Contractor Related | 0.73 | 0.71 | 0.71 | 0.72 |
| 7 | Exchange rate fluctuation | Other Factor related | 0.67 | 0.80 | 0.69 | 0.71 |
| 8 | Financial problem | Contractor Related | 0.73 | 0.77 | 0.62 | 0.70 |
| 9 | Absence of consultant in site | Consultant Related | 0.60 | 0.89 | 0.69 | 0.70 |
| 10 | Incomplete design at the time of tender | Consultant Related | 0.71 | 0.74 | 0.67 | 0.70 |

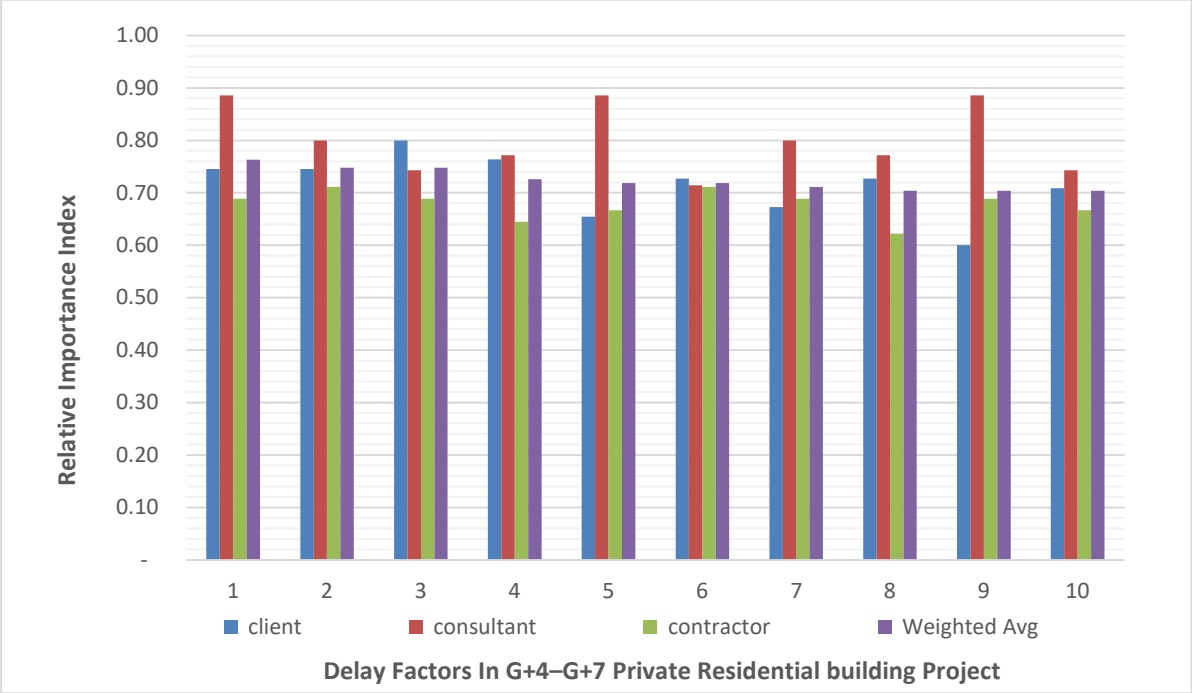



Figure 4.6 Relative Importance Indices (RII) of The Ten Most Significant Factors Causing Delays In G+4–G+7 Private Residential Buildings

### 4.6.5 Client, Consultant and Contractor Responses and Ranking of the Factor Causing Delay In Large Private Estates

Delay to deliver the site ranks first among the ten most significant delay factors in large private estates with a weighted average RII of 0.79 and the clients' RII score stands at 0.87.

Material price variations (inflation/escalation) (0.78) and Exchange rate fluctuation (0.77) closely come next, a clear indication of extreme vulnerability to external economic pressures on large scale projects, with the clients rating both factors very high (0.90 and 0.87 respectively).

Delay to payment and finance problem (0.74) and Change in scope of the project (0.72) are also critical hurdles, although the former case signifies a perception gap as seen from the Client (0.90) and Consultant (0.60) scores.

Delay and difficulties of supplier (0.71), Project management problem (0.70), and shortage of material (0.70) further point to a mix of logistical and contractor-related weaknesses as one of the factors contributing to timelines slipping.

Finally, one of the top ten includes the Incomplete design at the time of tender (0.69) and Delay to decision making (0.68).

Overall, the findings indicate that incidences of delays in large estate projects is more attributed to client-related administrative issues and macroeconomic instability than any consultant or design-related failures.

Table 4.25 Client, Consultant and Contractor Responses and Ranking of the Factor Causing Delay In Large Private Estates

| Item no | Delay Factor | Client (RII) | Consultant (RII) | Contractor (RII) | Weighted Avg |
|---|---|---|---|---|---|
| 1 | Delay to deliver the site | 0.87 | 0.80 | 0.74 | 0.79 |
| 2 | Material price variations (inflation/escalation) | 0.90 | 0.71 | 0.77 | 0.78 |
| 3 | Exchange rate fluctuation | 0.87 | 0.71 | 0.77 | 0.77 |
| 4 | Delay to payment and finance problem | 0.90 | 0.60 | 0.75 | 0.74 |
| 5 | Change in scope of the project | 0.83 | 0.69 | 0.69 | 0.72 |
| 6 | Delay and difficulties of supplier | 0.83 | 0.62 | 0.72 | 0.71 |
| 7 | Project management problem | 0.77 | 0.58 | 0.75 | 0.70 |
| 8 | shortage of material | 0.73 | 0.64 | 0.72 | 0.70 |
| 9 | Incomplete design at the time of tender | 0.70 | 0.71 | 0.68 | 0.69 |
| 10 | Delay to decision making | 0.77 | 0.58 | 0.71 | 0.68 |
| 11 | Poor construction methodologies | 0.67 | 0.56 | 0.77 | 0.68 |
| 12 | Unforeseen ground condition | 0.77 | 0.64 | 0.65 | 0.67 |
| 13 | Poor communication and management | 0.70 | 0.60 | 0.71 | 0.67 |
| 14 | weather condition | 0.70 | 0.67 | 0.66 | 0.67 |
| 15 | Poor coordination | 0.67 | 0.58 | 0.72 | 0.66 |
| 16 | Award to list bidder | 0.80 | 0.62 | 0.63 | 0.66 |
| 17 | Financial problem | 0.73 | 0.56 | 0.71 | 0.66 |
| 18 | Ineffective project planning and scheduling | 0.77 | 0.56 | 0.69 | 0.66 |
| 19 | Inadequate subcontractor | 0.60 | 0.64 | 0.71 | 0.66 |
| 20 | poor workmanship | 0.67 | 0.58 | 0.72 | 0.66 |
| 21 | Delay in Preparation and approval of drawing | 0.77 | 0.53 | 0.71 | 0.66 |
| 22 | Material problem | 0.73 | 0.60 | 0.68 | 0.66 |
| 23 | Lack of quality control | 0.70 | 0.58 | 0.69 | 0.66 |
| 24 | Frequent design change | 0.80 | 0.53 | 0.66 | 0.65 |
| 25 | There is a significant time overrun in most private real estate construction projects. | 0.80 | 0.51 | 0.68 | 0.65 |
| 26 | Rework due to errors | 0.63 | 0.51 | 0.74 | 0.64 |
| 27 | Contract management problem | 0.67 | 0.56 | 0.68 | 0.64 |
| 28 | Complicated specification | 0.67 | 0.73 | 0.55 | 0.64 |
| 29 | Poor management of the contract | 0.67 | 0.58 | 0.66 | 0.64 |
| 30 | Major disputes and negotiations | 0.60 | 0.69 | 0.60 | 0.63 |
| 31 | Utility problems (electricity, water, telephone) | 0.73 | 0.49 | 0.68 | 0.63 |
| 32 | Design problem | 0.73 | 0.53 | 0.62 | 0.61 |
| 33 | Construction equipment unavailability | 0.60 | 0.51 | 0.69 | 0.61 |
| 34 | Inappropriate construction methods, | 0.57 | 0.53 | 0.68 | 0.61 |
| 35 | Absence of consultant in site | 0.67 | 0.49 | 0.66 | 0.61 |
| 36 | Regulatory problems | 0.63 | 0.58 | 0.62 | 0.61 |
| 37 | The actual completion time of projects usually exceeds the planned duration. | 0.47 | 0.56 | 0.71 | 0.61 |
| 38 | Frequent change of subcontractors, | 0.60 | 0.56 | 0.62 | 0.59 |
| 39 | Design error | 0.73 | 0.47 | 0.62 | 0.59 |
| 40 | Construction projects are frequently completed later than the planned schedule. | 0.77 | 0.44 | 0.62 | 0.59 |
| 41 | Insufficient contract period | 0.67 | 0.60 | 0.54 | 0.59 |
| 42 | Equipment unavailability | 0.63 | 0.47 | 0.65 | 0.59 |
| 43 | Project activities often experience schedule slippage during execution. | 0.60 | 0.49 | 0.65 | 0.59 |
| 44 | Delays in construction projects are a common occurrence. | 0.53 | 0.58 | 0.62 | 0.59 |
| 45 | Lack of experience | 0.67 | 0.40 | 0.63 | 0.56 |
| 46 | low quality materials | 0.53 | 0.49 | 0.60 | 0.55 |
| 47 | Spent time for approval of test and inspection | 0.67 | 0.47 | 0.55 | 0.55 |
| 48 | Most projects are completed within the originally agreed time frame | 0.43 | 0.60 | 0.46 | 0.50 |

Table 4.26 Relative Importance Indices (RII) of The Ten Most Significant Factors Causing Delays In Large Private Estates

| Item no | Delay Factor | Factor Category | Client (RII) | Consultant (RII) | Contractor (RII) | Weighted Avg |
|---|---|---|---|---|---|---|
| 1 | Delay to deliver the site | Client Related | 0.87 | 0.80 | 0.74 | 0.79 |
| 2 | Material price variations (inflation/escalation) | Other Factor related | 0.90 | 0.71 | 0.77 | 0.78 |
| 3 | Exchange rate fluctuation | Other Factor related | 0.87 | 0.71 | 0.77 | 0.77 |
| 4 | Delay to payment and finance problem | Client Related | 0.90 | 0.60 | 0.75 | 0.74 |
| 5 | Change in scope of the project | Client Related | 0.83 | 0.69 | 0.69 | 0.72 |
| 6 | Delay and difficulties of supplier | Other Factor related | 0.83 | 0.62 | 0.72 | 0.71 |
| 7 | Project management problem | Contractor Related | 0.77 | 0.58 | 0.75 | 0.70 |
| 8 | shortage of material | Contractor Related | 0.73 | 0.64 | 0.72 | 0.70 |
| 9 | Incomplete design at the time of tender | Consultant Related | 0.70 | 0.71 | 0.68 | 0.69 |
| 10 | Delay to decision making | Client Related | 0.77 | 0.58 | 0.71 | 0.68 |

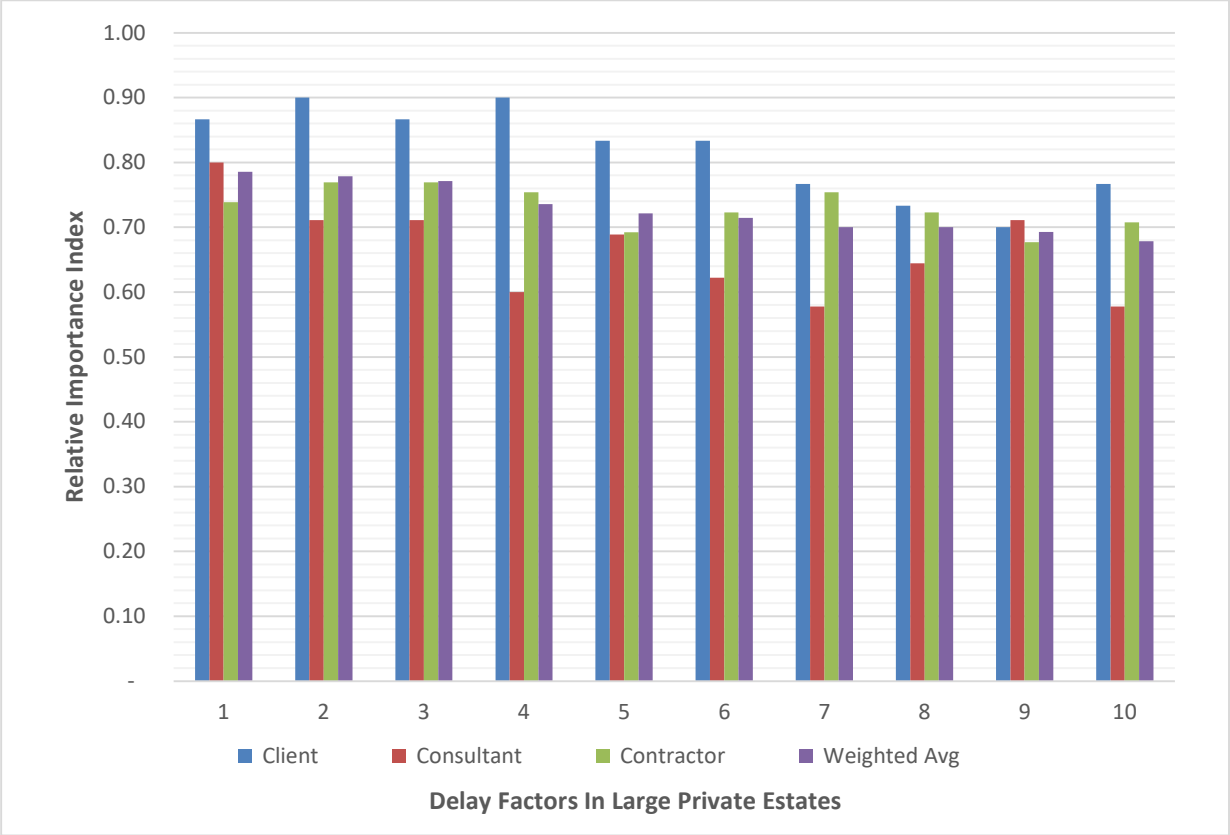



Figure 4.7 Relative Importance Indices (RII) of The Ten Most Significant Factors Causing Delays In Large Private Estates

### 4.6.6 Relative Importance Index (RII) and ranks (R) for different factor categories, and by different survey respondents in the Luxury Apartment Projects

Other Related Factors average by 0.70 RII, ranking highest, making it the most significant group of delay causes overall, based on the analysis of the factor categories in Luxury Apartment Projects by their Relative Importance Indices (RII). This category is further prioritized by the consultants at 0.74 and 0.70 by the contractors as the major threat leading to delay on a project basis. Contractor Related Factor comes in as the second major category with a weighted average of 0.67 and identified as the most critical by the Clients group at 0.71. Third, on the whole, is the Client Related Factor (0.66), with the consultants registering a higher value (0.70) than the clients (0.61). Finally, Consultant Related Factor (0.65) is ranked fourth, being the least significant category of all four categories. Overall, while external risks dominate, there is a clear gap in risk perception and identification among the various stakeholders, with each assigning more importance to factors that are external or outside of their direct control.

Table 4.27 Luxury Apartment Projects Relative Importance Index (RII) and ranks (R) for different factor categories

| Factor categories | Contractor (10) | Client (8) | Consultant (9) | Wetted Average (27) | Rank |
|---|---|---|---|---|---|
| | RII | RII | RII | RII | |
| Client Related Factor | 0.67 | 0.61 | 0.70 | 0.66 | 3 |
| Contractor Related Factor | 0.62 | 0.71 | 0.70 | 0.67 | 2 |
| Consultant Related Factor | 0.67 | 0.59 | 0.68 | 0.65 | 4 |
| Other Related Factors | 0.70 | 0.64 | 0.74 | 0.70 | 1 |

### 4.6.7 Relative Importance Index (RII) and ranks (R) for different factor categories, and by different survey respondents in the Mid Income Apartments

Other Related Factors based on their Relative Importance Indices (RII) is the highest with a wetted average RII of 0.68, making it the most significant group of delay causes in general. This category is the most critical according to clients whose RII was very high at 0.80.

Contractor Related Factor follows as the second most critical category with a weighted average of 0.65. Client Related Factor is the third category (0.64) though clients rate their related factors much higher (0.72) than both contractors (0.62) and consultants (0.61).

Overall, Consultant Related Factor (0.63) is ranked fourth to represent the category least significant of the four, although rated fairly high in importance by contractors (0.66).

The results show that for mid income projects, external and risks are the predominant causes of delay, followed by contractor related operational matters.

Table 4.28 Mid Income Apartments Projects Relative Importance Index (RII) and ranks (R) for different factor categories

| Factor categories | Contractor (12) | Client (5) | Consultant (6) | Wetted Average (23) | Rank |
|---|---|---|---|---|---|
| | RII | RII | RII | RII | |
| Client Related Factor | 0.62 | 0.72 | 0.61 | 0.64 | 3 |
| Contractor Related Factor | 0.67 | 0.68 | 0.59 | 0.65 | 2 |
| Consultant Related Factor | 0.66 | 0.64 | 0.57 | 0.63 | 4 |
| Other Related Factors | 0.66 | 0.80 | 0.64 | 0.68 | 1 |

### 4.6.8 Relative importance Index (RII) and ranks (R) for different factor categories, and by different survey respondents in the Mixed Use Building Project

The analysis of factor categories in the case of Mixed Use Building Projects, based on their Relative Importance Indices (RII), Client Related Factor ranks highest with the weighted average RII of 0.71 identifies it as delay cause group most significant for this project type. Contractors registered it with an RII of 0.75, viewing it as a trait of particular concern. Consultant Related Factor and Other Related Factors are tied in second and third place with a weighted average of 0.69 with consultants ranking “Other” factors higher related to them at 0.71 as opposed to their own related factors at 0.67. overall, it appears that for mixed use building environments, delays emerge most heavily out of client side financial or administrative issues, with consultant and “other” risks forming the immediate next set of risk factors, leaving contractor related factor as the least factor.

Table 4.29 Mixed Use Building Project Relative Importance Index (RII) and ranks (R) for different factor categories

| Factor categories | Contractor (13) | Client (7) | Consultant (8) | Wetted Average (28) | Rank |
|---|---|---|---|---|---|
| | RII | RII | RII | RII | |
| Client Related Factor | 0.75 | 0.67 | 0.69 | 0.71 | 1 |
| Contractor Related Factor | 0.72 | 0.59 | 0.67 | 0.67 | 4 |
| Consultant Related Factor | 0.70 | 0.68 | 0.67 | 0.69 | 2 |
| Other Related Factors | 0.69 | 0.68 | 0.71 | 0.69 | 3 |

### 4.6.9 Relative importance Index (RII) and ranks (R) for different factor categories, and by different survey respondents in the G+4–G+7 Private Residential Buildings

The analysis of factor categories in G+4–G+7 Private Residential Buildings based on their Relative Importance Indices (RII) indicates Contractor Related Factor to be ranked first with a weighted average RII of 0.70, overall being the most significant group of delay causes. The category is viewed with serious concern both by the consultants (0.74) and clients (0.73).

Consultant Related Factor comes next as the second highest category at a weighted average RII of 0.68.

Other Related Factors come third overall (0.67), with consultants providing the highest rating for this group (0.71) as well.

Finally, Client Related Factor (0.61) is ranked fourth as the least significant category of the four, which consultants rate high (0.73) in comparison to clients who give a very low rating of 0.53.

overall, G+4–G+7 Private Residential Building projects are delayed mainly by contractor side executing/performance and resource problems coupled with consultant side documentation obstacles.

Table 4.30 G+4–G+7 Private Residential Buildings Relative Importance Index (RII) and ranks (R) for different factor categories

| Factor categories | Contractor (9) | Client (11) | Consultant (7) | Wetted Average (27) | Rank |
|---|---|---|---|---|---|
| | RII | RII | RII | RII | |
| Client Related Factor | 0.63 | 0.53 | 0.73 | 0.61 | 4 |
| Contractor Related Factor | 0.62 | 0.73 | 0.74 | 0.70 | 1 |
| Consultant Related Factor | 0.69 | 0.64 | 0.74 | 0.68 | 2 |
| Other Related Factors | 0.67 | 0.65 | 0.71 | 0.67 | 3 |

### 4.6.10 Relative importance Index (RII) and ranks (R) for different factor categories, and by different survey respondents in Large Private Estates

Analysis of the factor categories, considering their Relative Importance Indices (RII) in Large Private Estates exhibits that Client Related Factor with an averaged wetted RII of 0.68 is highest placing this group as the most significant cause of delay factors overall.

Other Related Factors comes in a close second as the most critical category with a wetted average of 0.67, again most highlighted by the clients (0.74) and contractors (0.68) on this matter.

Thirdly, Contractor Related Factor stands at a wetted average of 0.65 overall, with contractors ranking the highest on their related issues (0.70).

Finally, Consultant Related Factor (0.63) is ranked fourth to mean the least rated category of the four, despite that the clients rated it significantly higher (0.70) than the ratings given by the consultants themselves (0.55).

Overall, client related factor and external related factor are the key drivers of delays for large private estates. On this basis, consultant related factor have the lowest relative impact on project timelines.

Table 4.31 Large Private Estates Relative Importance Index (RII) and ranks (R) for different factor categories

| Factor categories | Contractor (13) | Client (6) | Consultant (9) | Wetted Average (28) | Rank |
|---|---|---|---|---|---|
| | RII | RII | RII | RII | |
| Client Related Factor | 0.76 | 0.68 | 0.62 | 0.68 | 1 |
| Contractor Related Factor | 0.70 | 0.66 | 0.56 | 0.65 | 3 |
| Consultant Related Factor | 0.64 | 0.70 | 0.55 | 0.63 | 4 |
| Other Related Factors | 0.68 | 0.74 | 0.62 | 0.67 | 2 |

**4.6.11 Relative importance Index (RII) and ranks (R) for Construction Delay different factor categories, and by different survey respondents in Large Private Estates**

| Effects of delays | Client | Consultant | Contractor | Wetted Average | Rank |
|---|---|---|---|---|---|
| | RII | RII | RII | RII | |
| Luxury Apartments | 0.54 | 0.53 | 0.67 | 0.58 | 3 |
| Mid Income Apartments | 0.36 | 0.43 | 0.69 | 0.55 | 4 |
| Mixed Use Building | 0.34 | 0.68 | 0.75 | 0.63 | 1 |
| G+4 and G+7 Private Residential Buildings | 0.47 | 0.61 | 0.53 | 0.53 | 5 |
| Large Private Estates | 0.66 | 0.53 | 0.67 | 0.62 | 2 |

The analysis done on the impact of delays on various types of projects show variance on the effects of restrictions imposed by the external environment on the project duration. From this analysis, it is evident that mixed-use developments are impacted to a larger extent (RII=0.63). This puts them on top of the other chosen projects, suggesting that mixed-use projects are highly sensitive to material and labor shortages.

Large private estates come in the second place with an RII value of 0.62, which also indicate increased impact due to their size; and use of resources. Luxury apartment projects come third with a value of 0.58, indicating a moderate level of delay influence. Mid-income apartments, with an RII of 0.55, rank fourth, suggesting comparatively lower sensitivity to external resource shortages. The least affected are G+4 and G+7 private residential buildings, which have an RII value of 0.53, indicating that delays in these projects are less influenced by material and labor scarcity. Overall, the results demonstrate that larger and more complex project types experience greater delays due to external resource dependencies than smaller scale residential developments.

## 4.7 Respondents' Views on the Causes of Construction Delays

From the answers given to the open ended questions, it is clear that delay in the private real estate projects in Addis Ababa is primarily a consequence of lack of money, shortages of materials, increase in price, poor project planning, and bad project management practices. Some of the respondents pointed out factors such as inflation, the instability of foreign currency exchange rates, and the variability in the prices of construction materials like cement and steel to be the main problems faced in construction project development. Lack of sufficient money for the project, delay in payments, and the financial inability of the developer and contractor to continue work on the project were the other important reasons pointed out by the respondents to be responsible for project delay. Apart from these, poor scheduling, lack of coordination between various parties, shortage of skilled labor, inefficiencies on the part of subcontractors, delay in getting the materials were some of the operation related problems cited by respondents. Changes in design during construction, delay in decision making by the client, inadequate participation of consultants were some of the other problems cited as contributing factors for delay.

## 4.8 Results and Discussion

Findings of this study are very important and relevant to the objectives of this study as they identify the main factors which result in delays. According to Multiple Regression Analysis, the joint effect of stakeholders' and external factors explains Client related factors namely Financial constraints ($\beta = 0.211$, $p = 0.035$) and Slow Decision Making and Scope Changes were the only statistically significant predictors of the delays. This is in line with the local literature (Kuhil & Seifu, 2019) where they mention Inadequate Financing Systems in Ethiopia as being the main cause and International Studies (Alaghbari et al., 2018) in Yemen.

Relative Importance Index (RII) also provided project-specific insights showing that luxury/mid-income apartments are predominantly hindered by external issues such as material shortages (RII = 0.88) and exchange rate volatility (RII = 0.86) while mixed-use buildings and larger private estates face more internal problems such as delays in site availability (RII = 0.81) and decision making within government departments. Smaller residential projects (G+4–G+7) were uniquely driven by contractor related planning and management failures (RII = 0.70). These results are consistent with the observations of (Adem, 2018) regarding owner interference and material scarcity in Addis Ababa

Therefore, the result confirms that construction delays in Ethiopia reflects "universal" factors such as design changes and financial difficulties noted by (Zidane and Andersen, 2017) they are heavily influenced by local macroeconomic conditions. high ranking of material price inflation and price variations matches (Koshe & Jha , 2016) finding that very few Ethiopian projects are completed on time due to such escalations. Delays in the sector are mainly managerial/coordination related rather than technical, driven by both internal stakeholder actions and external resource constraints

# CHAPTER FIVE

# 5.CONCLUSION AND RECOMMENDATION

## 5.1 Conclusion

The study concludes that construction delays on building projects in Addis Ababa are mainly a mix of client, contractor, consultant, and external factors. From the analysis done, it is observed that client factors are the most significant causes of delays to construction projects. Moreover, from the correlation and regression analysis, it is clear that such client related factors as delaying decision, financial problem and design changes. have great influence on the project completion period. While contractor, consultant and external factors tended to be positively related to construction delays, they were not found to be statistically significant in the regression model. However, the descriptive analysis and RII scores indicate these factors play supporting roles in causing delays, particularly poor planning, material and information shortages and poor coordination between teams.

The external factors like material unavailability, price increase, and exchange rate changes are the ones that are considered to be very significant for the luxury and middle-class projects, whereas the factors associated with the clients, like the delay in decision-making, budget problems, and site delivery delay are significant for the mixed-used structures and large private housing estates. The contractor-associated delays like the planning issues, the management problem, and the shortage of resources are considered to be the most significant in the case of the G+4-G+7 residential constructions, whereas the consultant-associated delays are found to be significant in all kinds of construction projects.

The results indicate a moderate ability of the regression model to explain variations in time delay, indicating that there are factors that was not addressed in addition to those examined. Importantly, the analysis supports the view that the majority of causes of construction delays are managerial/ coordination related rather than technical, and thus are influenced by decisions taken during the construction process, often from a multi-stakeholder perspective.

## 5.2 Recommendation

Clients are advised to improve financial management, have payments made timely, have decisions being made faster to reduce delays due to lack of approval and frequent change of project scope, delivery of project sites on schedule, and not allocating projects to the lowest bidders.

Contractors are advised to develop better abilities to plan projects, manage and schedule resources efficiently to reduce delay due to inefficiencies, have better site supervision to improve work productivity, reduce rework, procurement processes that would prevent any material shortages and also be better able to manage subcontractors to reduce frequency of changes and bad workmanship.

Consultants are advised to improve the quality and speed in which designs and drawings are done and approved, have site visits and supervision on regular basis, avoid any errors in design by ensuring that designs are ready when tendering is undertaken and also improving on contract management and coordination of all parties.

There is need for proper communication and coordination through regular project meeting for identification of proper steps to take to deal with project delays in addition to clear contractual terms such as responsibilities, payment schedules, and change order procedures..

In case of external risks, there is need to have better risk management policies that can counter problems of material shortages, price increases, and exchange rates by including contingency plans in the project budgets and schedules, locally procuring material, and entering into forward contracts against price changes.

Finally, it is adviesd for policymakers to minimize bureaucratic delay and establish support systems for securing foreign exchange and building material to overcome exchange rate and material shortages problems.

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# Appendix: Questionnaire.

Dear Respondents,

This questionnaire is prepared as part of an academic research study entitled **"Determinant Factors Affecting Construction Delay in Real Estate Sector: A Case Study of Selected Projects in Addis Ababa, Ethiopia**." The purpose of this study is to identify and analyze the major factors contributing to delays in private real estate construction projects from the perspectives of key stakeholders, including clients, contractors, and consultants.

Your participation is very important for the success of this research. The information you provide will be used strictly for academic purposes only and will be treated with full confidentiality. You are not required to write your name, and your responses will be analyzed collectively with those of other participants.

There are no right or wrong answers therefore, you are kindly requested to answer all questions honestly and based on your professional experience. Your cooperation and time in completing this questionnaire are highly appreciated and will contribute significantly to the accuracy and reliability of the study findings.

Thank you very much for your valuable time and cooperation.

**SECTION A1: RESPONDENT DEMOGRAPHICS**

1.1) Gender?

☐ Male ☐Female

1.2) Age?

☐ 18 – 25 ☐ 26 – 35 ☐ 36 – 45 ☐ Above 45

1.3)What is your highest educational qualification?

☐ High School ☐ Diploma ☐ Degree ☐ Master's Degree

☐ Other

1.4) What is your Designation (Position) in the Company?

☐Owner ☐ Project Manager ☐ Site Engineer ☐ Resident Engineer ☐ Site Supervisor

☐ Other

1.5) How many Years of Work Experience do you have?

☐ 0 to 5 years ☐ 6 to 15 years ☐ Above 15 years

**SECTION A2: GENERAL ORGANIZATION INFORMATION**

1.6 What is the Major type of work your organization is involved?

☐ Luxury Apartments ☐ Mid Income Apartments ☐ Mixed Use Buildings

☐ G+4–G+7 Private Residential Buildings ☐ Large Private Estates

1.7 What is the Grade / Class of your organization?

☐ One ☐ Two ☐ Three ☐ Four ☐ Above 5

1.8) What Type of agency is your organization?

☐ Consultant ☐ Contractor ☐ Client

**SECTION B: SIGNIFICANCE OF FACTORS CAUSING DELAY IN CONSTRUCTION PROJECTS**

Please use the following key words to answer and make ticking mark (🖒) on the provided space

(5) =strongly agree, (4) = agree, (3) = Neutral, (2) = disagree, (1) strongly disagree

| No | Related factor | Cause of Delay | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| **A** | **Client related** | | | | | |
| 1 | Poor coordination | | | | | |
| 2 | Design problem | | | | | |
| 3 | Delay to deliver the site | | | | | |
| 4 | Insufficient contract period | | | | | |
| 5 | Award to list bidder | | | | | |
| 6 | Poor management of the contract | | | | | |
| 7 | Poor communication and management | | | | | |
| 8 | Delay to payment and finance problem | | | | | |
| 9 | Delay to decision making | | | | | |
| 10 | Change in scope of the project | | | | | |
| **B** | **Contractor Related Factor** | | | | | |
| 1 | Financial problem | | | | | |
| 2 | Project management problem | | | | | |
| 3 | Poor construction methodologies | | | | | |
| 4 | Construction equipment unavailability | | | | | |
| 5 | Ineffective project planning and scheduling | | | | | |
| 6 | Rework due to errors | | | | | |
| 7 | Inappropriate construction methods, | | | | | |
| 8 | Frequent change of subcontractors, | | | | | |
| 9 | low quality materials | | | | | |
| 10 | shortage of material | | | | | |
| 11 | Inadequate subcontractor | | | | | |
| 12 | poor workmanship | | | | | |

| C | Consultant related Factor | | | | | |
|---|---|---|---|---|---|---|
| 1 | Lack of experience | | | | | |
| 2 | Absence of consultant in site | | | | | |
| 3 | Delay in Preparation and approval of drawing | | | | | |
| 4 | Lack of quality control | | | | | |
| 5 | Contract management problem | | | | | |
| 6 | Spent time for approval of test and inspection | | | | | |
| 7 | Design error | | | | | |
| 8 | Frequent design change | | | | | |
| 9 | Incomplete design at the time of tender | | | | | |
| 10 | Complicated specification | | | | | |
| **D** | **Other__ Related _factors** | | | | | |
| 1 | Major disputes and negotiations | | | | | |
| 2 | weather condition | | | | | |
| 3 | Regulatory problems | | | | | |
| 4 | Utility problems (electricity, water, telephone) | | | | | |
| 5 | Material price variations (inflation/escalation) | | | | | |
| 6 | Exchange rate fluctuation | | | | | |
| 7 | Unforeseen ground condition | | | | | |
| 8 | Equipment unavailability | | | | | |
| 9 | Material problem | | | | | |
| 10 | Delay and difficulties of supplier | | | | | |

**SECTION C: MEASUREMENT OF CONSTRUCTION DELAY**

| No | Related factor | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| **A** | **Construction Delay** | | | | | |
| 1 | Construction projects are frequently completed later than the planned schedule. | | | | | |
| 2 | There is a significant time overrun in most private real estate construction projects. | | | | | |
| 3 | Project activities often experience schedule slippage during execution. | | | | | |
| 4 | The actual completion time of projects usually exceeds the planned duration. | | | | | |
| 5 | Delays in construction projects are a common occurrence. | | | | | |
| 6 | Most projects are completed within the originally agreed time frame | | | | | |

1. From your experience, what do you consider to be the major causes contributing to delays in private real estate construction projects?
2. Any additional comments you would like to share?