



**St. MARY'S UNIVERSITY  
SCHOOL OF GRADUATE STUDIES  
DEPARTMENT OF PROJECT MANAGEMENT**

**CAUSES AND EFFECTS OF CONSTRUCTION DELAY IN KOYE FECHE  
CONDOMINIUM HOUSES IN ADDIS ABABA:  
PROJECT 08 BRANCH OFFICE**

**BY  
SIMEON ABERA**

JUNE 2022  
ADDIS ABABA, ETHIOPIA

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**SIMEON ABERA**

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**A THESIS SUBMITTED TO ST. MARY'S UNIVERSITY, SCHOOL OF  
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## DECLARATION

I, am **Simeon Abera** hereby declare that the thesis entitled the causes and effects of the delay in the construction of condominium house Project in Addis Ababa has been carried out under the guidance and supervision of **Muluadam Alemu (PhD)**. This thesis is original and has not been submitted for the award of any degree or diploma to any university or institutions

Simeon Abera

**St. Mary's University, Addis Ababa**

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June 2022

## CERTIFICATE

This is to certify that the thesis entitled the factors that influence effective implementation success of relief projects submitted to St. Marys University for the award of Degree of Masters of Project Management Department and is a record of bona fide research work carried out by **Simeon Abera** under guidance and supervision. Therefore, we hereby declare that no part of this thesis has been submitted to any other university or institutions for the award of any degree or diploma.

Muluadam Alemu (PhD)

**St. Mary's University, Addis Ababa**



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June 2022

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## **ABBREVIATION AND ACRONYMS**

AC	Actual cost
HDC	Housing Development Corporation
AAIHDP	Addis Ababa Integrated Housing Development Program
AAHDPO	Addis Ababa Housing Development Project Office
CBE	Commercial Bank of Ethiopia
CPI	Cost Performance Index
CPM	Critical Path Method
CSA	Central Statistics Agency
EC	Ethiopian calendar
EV	Earned Value
FI	Frequency Index
GPPAA	Government Procurement and Property Administration Agency
G+	G+ Ground plus
IHDP	Integrated Housing Development Program
MoWUD	Ministry of Works and Urban Development
PV	Planned Value
RII	Relative Importance Index
SI	Severity Index
SPI	schedule performance index
TIBPI	Transparency International's Bribe Payers Index
UAE	United Arab Emirates
UN	United Nation
VIF	Variance Inflation Factor

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## ABSTRACT

*Delay is one of the biggest problems often experienced on construction project sites. Delays can instigate negative effects such as increased costs, loss of productivity and revenue, many lawsuits between owners and contractors and contract termination. The aim of this project is to investigate the causes and effects of construction delay in Project 08 Branch Office. Among 13 projects branch office sites of condominium houses in Addis Ababa, Project 08 Branch office housing development construction was chosen purposively for this study because it is the most delayed project compared to its baseline plan, which was planned to be completed in 18 months but it has already taken 96 months with 99.01% performance. A structured questionnaire in Likert scale was used in data collection. 114 project team members filled the questionnaire and 6 of them took part in the interview. It was done based on descriptive and explanatory type of research. The research adopts both mixed methods research approach. This research categorized the causes of delay under six main groups of client related, consultant related, contractor related, labor and equipment related, material related and external related and then the data obtained were analyzed using descriptive statistics and multiple linear regression methods. Descriptive statistics of frequency mean and percentage tables are used to present the results of the study. Based on result, out of the top six major causes of delay in construction 3.24 of problems were materials related causes, 2.89 of problems were client related causes and 2.37 of problems were Contractor related problems. This indicated that the majority of construction delay occurred due to materials, client and contractor related causes. In addition, the top major effects of delay were; time overrun and cost overrun of the project were the most significant effect of delay in this project 08. And 88.3% of the variance on effect of construction delay had been significantly explained by client, contractor, consultant, materials, equipment's, labor and external related causes of construction delay in project 08 branch office.*

**Key words:** delay in construction, causes of project delay, effects of project delay.

# CHAPTER ONE

## INTRODUCTION

### 11. Background of the Study

The construction industry is one among the most sectors that provide important ingredient for the event of an economy. However, many projects experience extensive delays, and thereby exceed initial time and price estimates (Tawana, 2015).

The success of a project depends on the foremost efficient programming, scheduling and control of obtainable resources and project activities by keeping its time, cost and utility values at the highest. However, alongside cost and quality, project schedule is considered the foremost important aspect of the development management life cycle and together of the most drivers of the project success (Durdyev, *et al.*, 2017).

In the literature, there are many studies that examine the causes and effects of delays within the construction sector. Accordingly, financial problems, inflation, late payments etc. are the foremost common causes of delay in developing countries, while change orders by the client, planning and programming errors, slowness within the decision by the client etc. are the foremost common causes within the developed countries (Assaf and Al-Hejji 2006, Pourrostan, *et al.*, 2011, Kumar 2016).

Furthermore, time overrun and price overrun are the foremost common delay effects seen altogether countries no matter development level (Sarıkaya 2010, Sunjka and Jacob 2013, Kuşakçı, *et al.*, 2017). However, there also are delays within the sector that are shaped by different internal and external influences on the local scale. For this reason, it is important to look at the causes and effects of the delay in construction

Since 2005 Ethiopia has been implementing an ambitious government-led low- and middle-income housing programme: The Integrated Housing Development Programme (IHDP). The initial goal of the programme was to construct 400,000 condominium units, create 200,000 jobs, promote the development of 10,000 micro - and small - enterprises, enhance the capacity of the construction sector, regenerate inner city slum areas, and promote home ownership for low income households. As the five-year programme nears completion, documentation of the programme is timely. UN-HABITAT (2011)

Addis Ababa City government estimates that the current housing deficit is above 900,000 units, in Addis Ababa. (AAHDC, 2022). Independent of finance source is Commercial Bank of Ethiopia (CBE) which provides funding directly to housing development program and loan service to the beneficiaries (Integrated Housing Development Program [IHDP], 2008).

Now therefore, construction of housing development program's essentiality and the urgent need is to build and deliver condominium houses without delay to users as soon as possible since the demand of those houses are significantly increasing. About 228,648 units of condominium houses were completed and transferred up to November, 2022 in the past 13 rounds, however 100,768 units 20/80 program and 38,240 units 40/60 program still not completely executed or under construction. (AAHDC, 2022).

Delay could be defined as an act or event that extends the time required to perform the tasks under a contract. It usually shows up as additional days of work or as a delayed start of an activity (G. Sweis et al 2007).

Project 08 Branch office was planned to finish the construction with in original contract time of G+4 was 18 moths (540 days) and G+7 buildings was 24 moths While the plan was to finish them within 18 months, they have taken 96 months and the construction performance was 99.01%. It was reported to have delayed around 5 times from its schedule baseline. This delay may be caused by either the contractual parties such as client, contractors and consultant or factors beyond the control of the parties or force majeure. (Misganaw Alem Engineering Consultancy, 2022).

Project delays causes either by the client, contractors, consultant, design team, financing, manpower and equipment, project, material, contract or contractual relationship have serious effects on project objectives such as schedule and cost overrun of the project and sometimes abandoned the project.

In the Millennium Development Goal Cities are expected without slum and reduction of poverty by 50% up to 2015 Internationally agreed Millennium Development Goal, but the challenges of housing continued in the worst condition in Addis Ababa (UN-Habitat, 2014), due to that government of Ethiopia initiated the Condominium Housing Development Program in order to reduce the shortage of housing and provide a house that meets the minimum standards (kitchen, toilet and bath facilities) to low and middle income people and achieve its target in reducing housing problem.

Project 08 Branch Office is delayed and still not accessed to the owners of the beneficiary, the Construction of sanitary sewer line is 41.76% performance. So that, it should investigate the problem of construction delayed to minimize the negative Effect.

The study would focus to identify the causes and effects of delay that challenging doesn't timely completion in Addis Ababa Housing Development Corporation targeted to one of the

Koye Feche Site Project 8 branch office. As well as there is no study investigate the reasons for such kind of high range of delayed?

## **1.2 Statement of the Problems**

Delays in a construction project is counted as a common problem and became a cause for projects completion with huge cost overrun (requiring higher budget than estimated), extended completion time, inferior quality deliverables and contract termination. In recent time it was an accepted phenomenon to have delays in construction projects completion time.

Ethiopian News Agency (2018) reported that Ethiopian Construction Project Management Institute found that completion of the projects within time frame and budget become increasingly difficult due to lack of effective construction management capacity. According to Ethiopian Construction Project Management Institute (2018), projects budget and time overrun reached 76% and 124% respectively.

Addis Ababa City Administration has allocated 5.4 billion Ethiopian Birr for the finalization of 139, 008 condominium houses being constructed under the 20/80 and 40/60 housing (AAHDC, 2022). Addis Ababa Housing Development Corporation has planned to execute completely the remaining housing up to January 2022. However, there is no progress recorded, so still the delay continues whereas the people (the owner) are waiting to live in condominium and they are facing the house rental expenditure.

As it has been observed most Condominium construction projects implementation schedule lag behind from what was planned in the feasibility studies submitted by the project owners to the Commercial Bank Ethiopia and on revised appraisal studies of the Bank and as a result, there is frequent request for an additional loan for incomplete construction works and loan repayment rescheduling request by hugest and large sized projects due to delay of implementation schedule.

According to Addis Ababa Housing Development Corporation (AAHDC) the bank loan of the Corporation is 53 Billion (52,947,685,928.68) ETB including interest. To finish the reaming 139,008 incomplete houses the office need Extra 5.4 Billion birr. (AAHDAB, 2022).

Due to project delay in the long term, prices of materials, equipment, and labor costs will be increased. Besides, economic inflation, the extra amount of bank interest, and indirect cost like staff salary and rental price of project offices increase. All these effects incurred a good amount of cost and directly increase project cost (Bajjou et al., 2018; Hareru et al., 2016).

Among 13 Project Branch Offices in AAHDC (2022) Project 08 Branch office is one and it was started in July 2014. Although they were planned to be completed in 18 months, 96 months

elapsed with 99.01% performance. This delay is five times than schedule baseline. From 18 housing construction projects in Addis Ababa, Project 08 branch office was chosen purposively for this study because it is the most delayed project when compared to its baseline plan (AAHDC, 2020).in addition the construction of sewer line is only 41.76 % performance.

It is thus clear that all stakeholders, the client, the contractor, the consultant and project offices are not beneficial from the effects of delays. Therefore, it is important to investigate the extent of delayed in condominium housing of Addis Ababa City and best know-how of their effects.

Cost overrun is one of the negative impacts of on economy specially as we stated in the above Addis Ababa city has bank loan of 52,947,685,928.68 birr, this amount of figure is the implication of cost over run happened in the condominium housing construction projects due to projects delayed.

Cost-overrun has the ill effect of affecting the financial viability of the project. Project 08 branch office revised eight times the original schedule. Even though still not solved and completed the projects. Causes of the delay of such a project are not identified and the corrective measurement not taken.

Any delay in arranging for the finance needed to meet the cost overrun will only further tend to increase the cost and this may land the project in trouble leading eventually to the death of the project and the project may not take off. IPMA, (2013).

The causes of project delay may vary for specific project from country to country, region to region, and even project to project. further study can be also undertaken to investigate major causes and the magnitude of their effect on project. Therefore, this study tried to identify the most important and frequent causes and effects of delay in Project 08 Branch office and it also aimed to provide an input for the management of the AAHDC to take lessons from this project and then take an appropriate measure for the future Condominium construction projects.

### **1.3. Research Questions**

This study would address the following questions.

1. What are the factors contributing to the construction delay of Project 08 Branch Office?
2. What are the effects of delay in Project 08 Branch office?
3. What are the correlation of those causes and effects on delay in project 08?
4. What are the mitigation measurements of those causes and effects on delay in this project?



## **1.4. Research Objectives**

### **1.4.1. General Objective**

The main objective of this research is to analyze the causes and effects of the delay in construction of condominium house of Project 08 Branch Office.

### **1.4.2. Specific Objectives**

The specific objectives of the study were:

1. To examine the factors which causes of delay in condominium house of Project 08 Branch Office?
2. To determine the effects of delay in condominium house of Project 08 Branch Office.
3. To identify the most significant delay causing factors that affects Project 08 Branch Office.
4. To establish the existing condition of housing development in Addis Ababa housing Development Corporation project 8 branch office.

## **1.5. Significance of the Study**

This research will have a great role in identifying the causes and effects of schedule delay in Condominium construction projects. Proper planning, execution and monitoring will save the life of the project and reduces the risks associated with delay, cost overrun and quality issues. Failure to manage delay causes and their factors accordingly hamper the project completion and the stakeholder's relationship. The findings of the study will further add value by proposing ways and inputs of mitigation measures for the management of AAHDC to take corrective actions and make informed. In Addition, the study will also be important to the researchers as it will be contributing to add theoretical and practical knowledge on how to conduct research and it may be also useful to those researchers who require bases for further research in this area.

## **1.6. Scope of the Study**

The study considered and is limited to investigating the cause of project delay in Koye Feche Condominium in Addis Ababa housing Development Corporation project 8 branch offices. The area of study in Akaki Kaliti Sub-city Woreda 10 the local name called Koye Feche condominium project site. The Woreda 10 located North-West of Addis Ababa Science & Technology University and South-West of Bole International Air Port. Specifically, my study area Addis Ababa Housing Development Corporation project 8 branch office located in Akaki Kaliti Sub-city Woreda 10. The average altitude of the area is 2200m-2240m at sea level. Have moderate climate condition and the temperature of maximum 24c<sup>0</sup>-26 c<sup>0</sup> whereas minimum 11 c<sup>0</sup> -12 c<sup>0</sup>. This study as a subject matter was specified on the causes and effects of delay in

condominium house construction. This study focus on the housing project because this project was planned to be completed in 18 months, 96 months elapsed with 99.01% performance. This delay is above five times than schedule baseline.

### **1.7. Limitation of the Study**

Here would be time and budget limitation in conducting field observation. In data collection, some of a few respondents did not provide proper information. Lack of full documents on the financial report utilized from this project was not fully complied; on the other hand, there is no technological way of data collection method. The findings are based on analysis of data collected from AAHDC sites and offices.

### **1.8 ORGANIZAATION OF THE STUDY**

This study is organized in five consequent chapters. The first chapter introduces the back ground of the study, statement of the problem, basic research questions, and objectives of the study, significance, scope of the study and limitation of the study. The second chapter presents literature review with general descriptions by different researchers on causes and effect of construction delay. The third chapter deals with the research methodology, design, sources of data, target population, sampling technique and sample size, validity and reliability of instrument and research ethics throughout the data collection and analysis. The fourth chapter presents results and discussion which prevails about the most important and frequently occurring causes and effects of delay. And the fifth chapter encompasses the summary, conclusions and recommendations based on the discussions of the previous chapters.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

#### **INTRODUCTION**

This chapter provides general overview on the major causes and effects of delay in condominium housing construction projects. The first section discusses main causes and effects of construction delay and analyses factors that contribute to delay in construction in condominium projects.

It also, address delay issues and stakeholder involvement in building construction. These specific sections together with dealing with on the relationship or correlation and the research gap which found before which done by different researchers and that are support the area of my study focuses.

#### **2.1 Theoretical Literature Review**

Construction projects are graded very successful if the work is completed within budget and to the deadlines agreed in the specification. However, Many projects experience failure due to the uncertainties associated with construction projects which include weather, materials, equipment, money and profitability, disagreements between clients, contractors and sub-contractors, statutory regulations, economic and political issues and functionality and purpose. To prevent these failures from constantly occurring, the types of failures need to be addressed so future construction projects do not fall into the same category of 'unsuccessful construction projects'.

Delay could be defined as an act or event that extends the time required to perform the tasks under a contract. It usually shows up as additional days of work or as a delayed start of an activity (Sweis et al., 2007).

There are various consequences of construction delays on project performance. The delay in construction projects has huge impacts on time and cost overrun.

According to Oshungade (2017) cost overrun is considered as the most significant effect which may suspend or even terminate the project before completion.

##### **2.1.1. Definition of Construction Delay**

Various scholars have stated different definitions of delay in construction and projects some of them are: Delay is a gap between the real project completion and its scheduled completion time (Zwikael, 2006).

In other words, delay is a state in which a time extension is required for executing all or part of a project, Consequently postponing its completion (Manavazhia & Adhikarib, 2002; Fugar & Agyakwah-Baah, 2010; Gardezi et al., 2014).

Delay is a situation when the contractor and the project owner jointly or individually contributed to the non-completion of the project within the original or stipulated contract period. On time completion of any project is beneficiary both for contractor and project owner (Levy, 1994: 54-65).

Project delay is the time overrun either beyond the completion date specified in a contract. Or beyond the date that the parties agreed upon for delivery of project (Assaf and Hejji, 2006).

Delay is known as the most common, costly and risky problem encountered in construction project and that because of the overriding importance of time for both the owner in terms of performance and the contractor in terms of money, it is the source of frequent disputes and claims leading to arbitration, litigation and eventual abandonment of the total project scheme (Ahmed, 1999)

Delays in the construction industry have been a subject of study in a wide array of works undertaken in several countries (Ruqaishi & Bashir, 2015; Alavifar & Motamedi, 2014).

Now therefore, from the above stated definition of delay it can be concluded as more slowly than normal, time lag in completion of activities, wait or postponement of additional from contract schedule,

### **2.1.2. Types of project delays**

There are four basic ways to categorize delays: as stated by (Theodore, 2009)

2.1.2.1 Critical or noncritical

2.1.2.2 Excusable or non-excusable

2.1.2.3 Compensable or non-compensable

2.1.2.4 Concurrent or non-concurrent

In the process of determining the effect of a delay on the project, the analyst must determine whether the delay is critical or noncritical. The analyst must also assess if delay are concurrent. All delays that are identified in the analysis will be either excusable or non-excusable. Delay can be further categorized into compensable or non-compensable delays.

#### **2.1.2.1 Critical Versus Non critical Delays**

In any analysis of delays to a Project, the primary focus is on delays that affect the progress of the entire Project (the Project end date or milestone date) or that are critical to the Project completion. However, many delays occur that do not delay the Project completion date or a milestone date. Delays that affect the Project completion, or in some cases a milestone date, are considered critical delays, and delays that do not affect the Project completion, or a milestone date, are non-critical delays. The concept of “critical” delays emanates from Critical Path

Method (CPM) scheduling. While the determination of a critical activity is a major element of CPM scheduling, all projects, regardless of the type of schedule, have “critical” activities. If these activities are delayed, the Project completion date or a milestone date will be delayed. In some contracts, the term “controlling item of work” will be used. Normally, this refers to critical activities or critical work

The process of determining which activities truly control the project completion date depends on the following:

- a) The project itself
- b) The contractor’s plan and schedule (particularly the critical path)
- c) The requirement of the contract for sequence and phasing
- d) The physical constraint of the project, i.e. how to build the job from a practical perspective.

#### **2.1.2.2 Excusable versus Non-Excusable Delays**

Callahan et al. (1992) and Trauner et al. (2009) state that whether a delay is excusable or non-excusable depends on the clauses in the contract. The authors remind that standard construction contracts indicate types of delay that will let the contractor to extension of time. For example, in some contracts, unexpected or strange weather conditions are not consider as excusable and so these contracts do not consent to for any time extensions. According to

Trauner et al. (2009) an excusable delay, in broad, is owing to an unforeseeable incident beyond the contractor’s or the subcontractor’s power. The authors further clarify that delays resulting from the following matter are known as excusable:

- |                                     |                                                         |
|-------------------------------------|---------------------------------------------------------|
| ➤ directed changes                  | • Errors and omissions in the plans and specifications, |
| ➤ General labor strikes,            | • Differing site conditions or concealed conditions,    |
| ➤ Fires,                            | • Lack of action by government bodies,                  |
| ➤ Floods,                           | building                                                |
| ➤ Unusually severe weather,         |                                                         |
| ➤ Intervention by outside agencies, |                                                         |

Levy (2006) adds two more excusable delays in another study to the above list as:

- Transportation delays over which the contractor has no control.
- Illness or death of one or more of the contractors,
- Moreover, Kelleher (2005) supplies the above list with two more delays as:
- Epidemics, Quarantine restrictions.

According to Mubarak (2005) non-excusable delays defined as “delays that are either caused by the contractor or not caused by the contractor but should have been foreseen by the contractor”. He also explained that a non-excusable delay does not permit the contractor to either a monetary compensation or time extension. Trauner et al(2009) .list some examples of non-excusable delays as follows:

- Untimely performance by suppliers,
- Late performance of subcontractors,
- Faulty workmanship by the contractor or subcontractors

### **2.1.2.3 Compensable versus No compensable Delays**

According Callahan et al. (1992), Kartam (1999) and Mubarak (2005)an excusable delay can be grouped as “excusable compensable” and “excusable non-compensable”. As 19 Mubarak (2005) explained compensable delays are caused by the owner or the designer (engineer or architect). The contractor is typically permitted to a time extension or recovery of the costs related with the delay, or both. Factors which are explained in the contract resulting in delays such as differing site conditions, access to the site, changes in the work, are some examples of compensable delays. According to Trauner et al. (2009) only excusable delays may be compensable.

The authors further explain non-compensable delays as those which despite being excusable do not permit the contractor to any compensation. Many authors such as Barrie and Paulson (1992) and Mubarak (2005), stated that excusable non- compensable delays are normally beyond the control of either owner or contractor such as wars, national crises, floods, fires or labor strikes natural disasters, unusual weather conditions. They add that usually the contractor is allowed to a time extension, but not additional compensation.

### **2.1.2.4 Concurrent Delays**

According to Mubarak (2005) concurrent delay includes a combination of two or more independent causes of delay happening within the same time frame. According to the author, a concurrent delay frequently includes an excusable delay and a non-excusable delay.

Callahan et al. (1992) also defined that “more than one delay contributed to the project delay, not that the delays necessarily occurred at the same time”. Although this type of delays seems like a simple issue, still there is no clear definition of concurrent delays. According to Trauner et al. (2009) concurrent delays are defined as “separate delays to the critical path that happen at the same time”. Levy (2006) names this type of delays 20 as overlapping delays.

Nguyen (2007) also explained that simultaneous delays, intertwined delays and commingled delays are other names used for concurrent delays.

Levy (2006) further showed that concurrent delays may be generated by the contractor or by the client, but if it happens that both parties are responsible, and these delays overlap then neither party can be able to recover damages.

### **2.2.3. Causes of Delays**

Delay in implementation of projects and cost increase are common phenomena in projects worldwide. However, these are especially severe in developing countries. Delayed implementation gives a project a difficult start. Unduly long time taken for project implementation results in time-overrun which is invariably followed by cost overrun. Cost-overrun has the ill effect of affecting the financial viability of the project. The problem of cost-overrun will get more compounded if the finance necessary to meet the increased cost cannot be arranged in time. Any delay in arranging for the finance needed to meet the cost overrun will only further tend to increase the cost and this may land the project in trouble leading eventually to the death of the project and the project may not take off (IPMA, 2013). According to Wateno (2015), causes of project delays in Indonesia were related to projects' main contractor, consultant and owner of the project. According to this study factors that cause delays include: the vagueness of policies and procedures, slow decision-making, unnecessary interference, delay of the work without reason, inability to coordinate, and many meetings do not produce decisions, and others that influence the construction project delays. Ndekugri (2007) stated that delay is equally a major financial risk to the employer. If the economic viability of the overall commercial venture depends on generating an income stream from a particular date, failure to complete the construction project by the date could turn a profitable venture into a loss-making one. Even though the delay does not cause losses but it reduces profitability on account of delay in the inception of revenue generation.

According to Shaikh (2009) 50% of the construction's projects in UAE encounter delays and are not completed on time. The reasons for delays are primarily due to an unreasonable project scope, inadequate early planning and the absence of risk management systems. In this study, contractor was found to contribute to delay due to lack of resources and labor productivity. As well as over-ambitious estimates, incorrect task assessment, lack of task clarity, design approval delays and interference in the decision-making process by the client add on to the delay.

Abdo (2006) made a survey on delays in public building construction projects in Ethiopia. The result of the research indicated that 94% of the 52 surveyed public building projects have encountered delays. Moreover, the time extension ranges from 10% to 367% and the average delay is found to be 89.9%. The most frequent causes of delay were found to be necessary variations, delayed payments, scarcity of materials, late material supply, less emphasis to planning, sub-surface condition, changes in design, material and labor price escalation, unrealistic time schedule and failure to update schedules on time.

Worku and Jha (2016) identified most frequent and serious causes of construction delay in Ethiopia. The study result showed that (1) difficulties in financing project by a contractor, (2) escalation of the materials price, (3) poor project planning, (4) scheduling or resource management, (5) delay in progress payments for completed works, (6) lack of skilled professionals in the field of construction management in the organization, and (7) fluctuating labor availability season to season /seasonal labors availability where the major causes of delay.

This study also shows that in Ethiopia only 8.25% projects have been completed to the original targeted baseline but the remaining 91.75% delayed more than three times from its contractual baseline.

Accordingly, major causes and effects of construction project delays in Nigerian construction industries are identified as, Insufficient number of equipment, inaccurate time estimate, interim payment difficulties, change orders, inaccurate cost estimate, poor site management and supervision, inadequate modern equipment, shortage of construction materials, incompetent project team, improper project planning and scheduling and contractors' financial difficulties. Obodoh ,( 2016)

Endale (2016) identified ten major causes of delay in the construction of 40/60 saving houses project. The result of this research showed that late material supply, financial difficulties faced by the contractor, problem of electric supply, problem of water supply, equipment unavailability, delayed payments to contractors, poor site management, ineffective planning and scheduling, late design review and approval, and lateness in decision making process.

Robel (2015) in his research study states that construction delay in Ethiopia is mostly caused due to financial problem, managerial problem or local contractors' limited capacity and ability. Roble (2015) further stated causes of delay as delay in delivering material on site, poor site management, slow



Supervision and decision by the consultant, late in approving payments and lack of proper cooperation work of the employer with local authorities.

Corruption in construction projects can reduce the efficiency, effectiveness and equity of infrastructure services. Corrupt practices can occur at every phase of a construction project: during planning, inspection, design, bid and contract signing, construction, service delivery and operation and maintenance (Rodriguez et al., 2005).

The vital causes of delay in the Ethiopian construction project known and ranked are corruption,

Unavailability of utilities at site, inflation or price increases in supplies, not having worth Materials, delayed design and design documents, sluggish delivery of materials, late in approving and receiving of complete project work, poor site management and performance, late discharge budget/ funds, and unsuccessful project planning and scheduling (Tsegay and Hanbin, 2017).

According to Theodore (2009) causes of delay categorized into 7 groups.

**Group 1: Causes of delay by client**

- Delay in progress payments by owner
- Delay to furnish and deliver the site
- Change orders by owner during construction
- Delay in approving shop drawing and sample materials
- Late in revising and approving design documents
- Slowness in decision making process
- Poor communication and coordination

**Group 2: Causes of delay by contractor**

- Difficulties in financing project by contractor,
- Conflicts in sub-contractors schedule in execution of project
- Rework due to errors during construction
- Conflicts between contractor and other parties (consultant and owner)
- Poor communication and coordination
- Ineffective planning and scheduling of project
- Improper construction methods implement
- Delays in sub-contractors work
- Inadequate contractor's work
- Frequent change of sub-contractors

- Poor qualification of the contractor's technical staff
- Delays in site mobilization

### **Group 3: Causes of delay by Consultant**

- Delay in approving major changes in the scope of work
- Poor communication and coordination
- Inadequate experience of consultant
- Mistakes and discrepancies in design documents
- Delays in producing design documents
- Unclear and inadequate details in drawings
- Insufficient data collection and survey before design
- Un-use of advanced engineering design software

### **Group 4: Causes of delay by materials**

- Shortage of construction materials in market
- Changes in material types and specifications during construction
- Delay in material delivery
- Damage of sorted material while they are needed urgently
- Delay in manufacturing special building materials
- Late procurement of materials

### **Group 5: Causes of delay by equipment**

- Equipment breakdowns
- Shortage of equipment
- Low level of equipment-operator's skill
- Low productivity and efficiency of equipment
- Lack of high-technology mechanical equipment

### **Group 6: Causes of delay by labors**

- Shortage of labors
- Working permit of labors
- Low productivity level of labors
- Personal conflicts among labors

### **Group 7: Causes of delay by external factors**

- Effects of subsurface conditions (e.g. soil, high water table, etc.)
- Delay in obtaining permits from municipality

- Hot weather effects on construction activities
- Traffic control and restriction at job site
- Accident during construction
  
- Changes in government regulations and laws
- Delay in providing services from utilities.
- Delay in performing final inspection and certification by a third

#### **2.2.4. Effects of project Delays**

There are various consequences of construction delays on project performance. The delay in construction projects has huge impacts on time and cost overrun. Time overrun, cost overrun, wastages and underutilization of manpower, reduced profits, arbitration, litigation, disputes between parties, reduced economic growth, frustration and dissatisfaction of clients, tying down of client capital due to non-completion and total abandonment of projects are found the major effects of delay on African construction industry (Khair et al., 2016; Nyoni, 2018

According to Oshungade (2017) create stress on the contractors, cost overrun, time overrun, and poor quality of work the four most important effects common to all the participants. Due to project delay in the long term, prices of materials, equipment, and labor costs will be incurred. Besides, economic inflation, the extra amount of bank interest, and indirect cost like salaries of the staff, and rental price of project offices increase. All these effects incurred a good amount of cost and directly increase project cost (Bajjou et al., 2018; Hareru et al., 2016).

Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigerian construction industry. The six effects of delay identified were:

According to Aibinu and Jagboro (2002) there are six effects that studied the effects of construction delays on project delivery in Nigerian construction industry:

- a) Time overrun
- b) Cost overrun
- c) Dispute
- d) Negotiation;
- e) Total abandonment and
- f) Litigation.

Sunjka, and U. Jacob, (2013) stated that poor quality completed projects and bad public relations are also the effects caused due to delay in construction projects in addition to the above six effects.

#### **2.2.4.1 Cost overrun**

Project Cost Management includes the processes involved in planning, estimating, budgeting,

Financing, funding, managing, and controlling costs so that the project can be completed within the approved budget. However, cost overrun is defined as over finance or over budget of work

Compared to the cost baseline or estimated cost (PMP, 2013).

Ashraf & Ghanim (2016) studied causes and effects of delay in public construction projects in Jordan identify critical factors that cause cost overruns in construction projects as changes in Scope of work on site, incomplete design at the time of tender, contractual claims (extension of Time with cost), lack of cost planning and monitoring of funds, delays in costing variations and Additional works. These critical factors in turn are the delay factors.

According to PMBOK (2013), Cost Performance Index (CPI) is a tool to measure cost efficiency of budgeted resource for the work completed and expressed as a ratio of earned value to actual cost.

*Equation:  $CPI = EV/AC$*

Where

- Earned Value (EV) is a measure of work performed expressed in terms of the budget Authorized for that work.
- Actual cost (AC) is the realized cost incurred for the work performed on an activity during a specific time period. It is the total cost incurred in accomplishing the work that the EV measured.

If CPI value is less than 1, there is cost overrun for work completed.

If CPI value is greater than 1, there is cost under run of performance to date.

If CPI value is equal to 1, a project is completed within the approved budget.

Cost overrun leads to project failure and it affects project negatively because project is running

over budget since cost is part of iron triangle and affects scope as well as the quality of the project (PMBOK, 2013).

Regarding cost overrun Koushki *et al.*, (2005) identified three main causes that were contractor related problems, material-related problems, and owners financial constraints, whereas Wiguna and Scott (2005) identified the most critical factors included: high inflation/increased material price; design change by client; defective design; weather conditions; delayed payment on contracts and defective construction work.

According to Keane & Caletka (2015) the clients, cost overrun imply added costs over and resulting in less income on investment. To the end user, the extra costs are passed on as advanced leasing or rent costs or prices. To the professionals, cost overrun implies incapability to deliver value for money and could well tarnish their reputations and consequence in loss of self-belief reposed within them by clients. To the contractor, it implies loss of profit for non-completion, and offence that could jeopardize his or her chances of winning further jobs, if at fault. To the industry, cost overruns could bring about project abandonment and a drop-in building activities, bad reputation, and inability to secure project finance or securing it at higher costs due to added risks.

#### **2.2.4.2 Time overrun**

The time overrun affects project negatively by increasing costs. The associated increases cost Incurred by the client is consultant payment, payment for head office follow-up, loss of revenue and compensation to the contractor if the time overrun is caused by the client. The costs incurred by the contractor are costs associated with operation and maintenance of temporary facilities, project and head office overhead cost, cost of extension of performance and advance payment Guarantees, and loss of revenue (Assaf & Al-Hejji, 2006).

Time overrun affects project negatively by increasing the planed time of project completion. Although this will result in cost increase and will affect the scope as well as the quality of the project. However, execute a project on time and on budget will deliver the agreed (scope) and meet the quality requirement and will create value by meeting organizational market need and achieve project outcome (PMBOK, 2013).

According to PMBOK (2013) schedule performance index (SPI) is a tool to measure time efficiency of schedule and expressed as a ratio of earned value to planned value. It measures how efficiently the project team is using its time.

*Equation:  $SPI = EV/PV$*

Where

- ❖ Earned Value (EV) is a measure of work performed expressed in terms of the budget authorized for that work.

- ❖ Planned Value (PV) is the authorized budget planned for the work to be accomplished for an activity or work break down structure component, not including management reserve.

If SPI value is less than 1, it indicates less work was completed than was planned

If SPI value is greater than 1, it indicates that more work was completed than was planned

If SPI value equal to 1, a project is completed within the planned schedule (Roger, 2008)

#### **2.2.4.3 Disputes**

Disputes are the effects of major causes of delays in construction projects such as causes of Client related, Contractor related, Consultant related and external related that may be arisen during the construction projects among the project parties. Lack of communication may also leads to misunderstandings, conflicts and disputes. Hence it necessitates the project managers to have effective communication skills which are one of the significant soft skills (People skills) with the project parties involving in construction projects.

Based on Murali *et al.*, (2007) the factors such as lack of communication between the various parties, problem with neighbors, unforeseen site conditions, delay in payments for completed work, improper construction method, delay caused by the subcontractor and discrepancies in contract documents will give rise to disputes between the various parties. Furthermore, if the disputes cannot be solved amicably or easily it can lead to arbitration or litigation.

#### **2.2.4.4 Arbitration**

According to Murali *et al.* (2007) delays caused by either client or contractor related factors such as change order, delayed progress payment, contractor's non-performance and lack of communication between parties which may cause disputes will be settled through arbitration process. For these circumstances, it necessitates having a competent third party that can settle the disputes easily without going to court. By negotiation with all parties in the project will reduce cost of conflict and come to consciences to achieve stated objective.

Time is factor that is very essential in all activities of contract. For specific project time phase is given to deliver the project deliverables. If the time is being exceeded more money is often spent which could lead to increase in final cost of project and wastage and under-utilization of manpower and resources. The client's capital must be withheld due to non-completion of the project which could result into dispute, arbitration and litigation among the workers and management. Also delay can lead to reduced profit for contractor and abandonment of building project by the client (Owolabi *et al.* 2014).

#### **2.2.4.5 Litigation**

Based on Murali *et al.*, (2007) when the delays caused by client related, contract related, labor related and external related factors such as delay in payment for completed works, problems with site conditions and less labor supply where eventually rise the disputes to be settled by the litigation process. The parties involved in the construction projects use litigation as a last alternative to settle the disputes.

According to Ashraf and Ghanim (2016) effect of litigation was caused by client, contractor, consultant and external related causes. However, client related causes were taken major responsibility for this effect. From this we can understand that client related causes such as financial issue, change orders by owner during construction, slow decision making, and low level of technical experience were caused litigation in Jordan construction projects.

#### **2.2.4.6. Total abandonment**

The most critical adverse effect of delays in construction projects is abandonment that could be temporary or in worse condition for permanent duration (Abedi, Fathi, & Mohammad, 2011). The major causes of client related, consultant related, contractor related and external related may lead to project abandonment that will lead to delays in construction projects.

Total abandonment to project means resources are cut off from the project or are no longer provided to the project. It is starved prior to completing all the requirements, and stakeholders that involved in construction of project left with an unfinished project on their hands. Starvation can happen for any number of reasons such as any other projects come about and take precedence over the current project, thereby cutting the funding or resources for your project, the customer curtails an order, the project budget is reduced, and key resource quits ((PMBOK, 2009).

According to Scott (1993) admitted that some delays have much greater financial implications on the completion cost, though it's dependent on who is seen to be responsible for such delays.

The effects therefore range from an agreed extension to the project time with payment of the Contractor's overhead costs, to the deduction of liquidated and ascertained damages by the contractor (Scott S, 1993).

#### **2.2.5 Mitigation Measure of Construction Delays**

When construction delay occurs, there is no question that the owner suffers financially, but the extent which the owner can recover its loss of income from the contractor, and more importantly minimizing the risk that such delays will occur, depends largely on how the

construction contract was drawn up. Based on several studied of projects success factors and ratifications of delays in construction projects, a total of 11 methods have been identified as follows:

There are different perceptions of major parties involved in construction projects of the causes of delay. But there is very strong agreement between the contractor and the consultant for some of the most significant causes of the delay (Faridii & El-Sayegh, 2006). Acceleration of site activities with improved clients'project management procedure and inclusion of appropriate contingency allowance in pre contract estimate should assuage the adverse effect of construction delays (Aibinu & Jagboro, 2002).

Table 2 Methods of minimizing Construction Delays

1	Effective strategic planning ( Majid,2006)
2	Use of up- to- date technology( Majid,2006)
3	Accurate initial cost estimation ( Majid,2006)
4	Proper material procurement ( Majid,2006)
5	Proper emphasis on past experience ( Majid,2006)
6	Accurate cost initial estimates ( Majid,2006)
7	Sit management and supervision ( Long ,2008)
8	Sit management and supervision (Long,2008)
9	Proper planning and scheduling of project( Majid,2006)
10	Complete and proper design and specification of projects at right time ( Assaf ,2006)
11	Frequent coordination between parties involved ( Majid,2006)

### 2.3. Empirical Review

Prakash and Joseph, (2014) in their study about cause of delay in Indian construction industry mentioned that 7 groups contributed to the construction delay. These are the client, contractor, consultant, material, equipment, labor, and external factor.

Among those the top three most vital reasons that contributed to the causes of delays were late in revising and approving design documents, delays in sub-contractors work and poor communication and coordination change orders by owner during construction. Contractor related delays were ranked the most significant group that cause delays, followed by client related delays and consultant related delays.



The most common causes of delay in various countries are similar to that of UAE like unrealistic contract duration imposed by the client, incomplete design at the time of tender, too many scope changes and change orders, inadequate planning and scheduling, and poor project planning and control (mpofu et al., 2017).

Accordingly, major causes and effects of construction project delays in Nigerian construction industries are identified as, Insufficient number of equipment, inaccurate time estimate, interim payment difficulties, change orders, inaccurate cost estimate, poor site management and supervision, inadequate modern equipment, shortage of construction materials, incompetent project team, improper project planning and scheduling and contractors' financial difficulties. Obodoh D.A & Chikasi Obodoh,(2016)

Wateno (2015) result of regression analysis indicates that owner related causes have significant influence on dependent variable which is delay in construction project. The source of project owner having strongest correlation and has significant influence on delay in construction project of Nigeria. The cause of delay of project owner is due to delayed in decision making and lack of expertise and the governmental financial policy. Results identified by Endale (2016) in construction of 40/60 saving houses projects indicated that most frequent significant causes of delay were problem of general environment factors like electric supply and problem of water supply result in different finding with (Wateno, 2015).

Ashraf and Ghanim (2016) conducted a quantitative analysis of construction delays by examining the records of 130 public building projects constructed in Jordan during the period of 1990-1997. The researcher presented regression models of the relationship between actual and planned project duration for different types of building facilities. The analysis also included time extensions for the different causes of delays. According to the study, the significant variables of delay in construction projects were relate to designers, user changes, weather, site conditions, late deliveries, economic conditions, and increase in quantities. From this result in the above stated period we can understand that both internal and external causes have major influence for delay of public building projects.

Werku Koshe & K. N. Jha. (2016) on the investigation of causes of construction delay in Ethiopian Construction Industries identified 88 key delay causing factors, the most common and critical factors of construction delay were evaluated and identified to be; difficulties in financing project by a contractor, escalation of the materials price, ineffective project planning, scheduling or resource management, delay in progress payments for completed works, insufficient data collection and survey before design, lack of skilled professionals in the field of construction management in the organization, and inadequate and seasonal

availability of experienced labor .Most of the time in any kind of project the effects caused by the delays are almost similar, the major ones are time overrun & cost overrun followed by dispute, arbitration, litigation and total abandonment (Sambasivan & Soon, 2007).

Kikwasi (2013) for example, identified cost and time overrun, compromised quality, arbitration, disputes, litigation, low profit margin or financial loss, revocation of contract, total abandonment of project, loss of wealth and capacity as some of the resulting effects of delays.

Study results of Owolabi et al. (2014) shows that time overrun and final cost of project were affected delay at 87%. Time in every phase of project is essential, when a contract is done, the effect of delay really affects time and time is money.

According to Yogita et al. (2015) most of the causes and effects are correlates linearly to each other. From the results of the study, that the effects of delays happen in the project have linear relationship with the causes of delays, for example the higher the causes by the contractor, the higher time overrun happen on the construction.

James et al., (2014) studied the cause and effect of delay on project construction delivery time. The identified effect of the delay were: Time overrun, increase in final cost of project, tying down of client capital due to non-completion of the project, wastage and under-utilization of man-power and resources, abandonment of building the project, reduce profit, disputes between parties involved, litigation and arbitration.

Delay in construction can have a number of consequences in a project, such as late completion, lost productivity, acceleration, consequential damages, increased cost and contract termination. When projects are delayed, they are either accelerated or have their duration extended beyond the scheduled completion date. The subject of delay has been addressed by several researchers and they found that delay always led to the negative effects.

## **2.4. Conceptual Framework**

The conceptual framework shows the variables and the correlation between the causes of delays by category with the effects of delay .This framework tries to show correlation of causes of delay in construction related to contractor and causes related to labor with the time overrun of the project. Causes related to contractor with the disputes and negotiations occurred among the parties participating in the project. Material-related causes with effects of cost and time overruns in construction projects. So many other links can connect between other causes and items of performance. Time and cost overruns can be linked with material related causes. The causes related to labor can relate to disputes and negotiation.

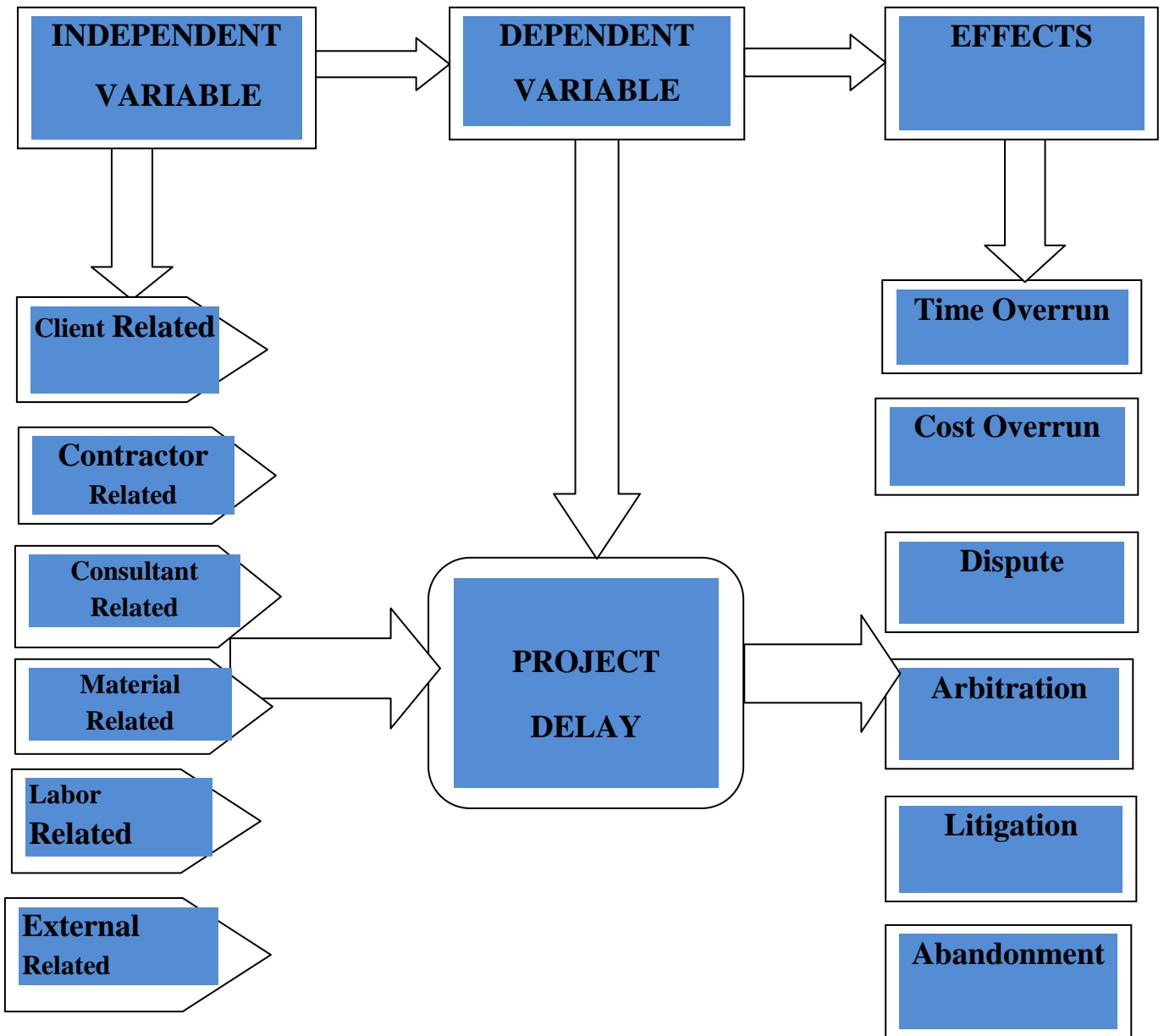


Figure 2.1: Conceptual Frame work

# **CHAPTER THREE**

## **RESEARCH METHODOLOGY**

### **INTRODUCTION**

On this chapter discusses the cause and effects of delay on condominium housing construction on Project 08 Branch office, and presents type of research, sources of data, population, sample size, sampling techniques, data collection tools and procedures, presentation and processing methods as well as gathering necessary data that important for answer the research questions. It also describes the variable and indicators, hypothesis, validity and reliability of the study.

### **3.1. Research Approach**

The researcher used the mixed approach which includes both qualitative and quantitative techniques. The qualitative technique helps in-depth understanding of an individual's insight and their suggestions, but the quantitative approach assistances the reader to comprehend improved as it delivers numerical data that can be observed and associated. Tashakkori and Teddlie (2003) described a mixed-method delivers the chances to find and gain in-depth evidence and answer to the elevated issue or research question.

### **3.2. Research Design**

Among numerous investigation methodologies, in order to achieve the planned purposes of the study, the study used descriptive and explanatory examination design. As specify in the outline the central objective of this study is to examine the cause and effects of delay on condominium housing construction on project 08 Branch Office.

This study adopted a descriptive research design which is used to provide quantitative or numerical description of attitude, or opinions of participants to evaluate the perception of parties involved in the condominium construction process.

According to Loeb, *et al.*,(2017). Descriptive analysis characterizes the world or a phenomenon answering questions about who, what, where, when, and to what extent. Whether the goal is to identify and describe trends and variation in populations, create new measures of key phenomena, or describe samples in studies aimed at identifying causal effects, description plays a critical role in the scientific process in general and education research in particular. Whereas explanatory parts of study explaining and understanding the relationship between variables cause and effects of delay on condominium housing construction in Project 08 Branch office inferential ways.

### 3.3. Data type and sources

The research has used primary data and secondary data collection methods to capturing most important information for the cause and effects of delay on condominium housing construction on Project 08 Branch Office. The study adopted primary and secondary data collecting tools which are suitable for descriptive research design. Primary data were collected from the staff of project and secondary data were collected from different sources existing in the office documents. It includes reports, contractual agreements, published and unpublished documents related to the project and other materials related to the cause and effects of delay on condominium housing construction on Project 08 Branch Office.

### 3.4. Target population

Target population is a set of individual units in a population including those in the sampling frame about which the research inferences and generalization is made. The selection and inclusion of potential participant samples determined by several factors such as the research questions, design and the availability of adequate number and type of participants (Geoffrey, DeMatteo & Festinger 2005).

The target population of this study is the major stakeholders of the Condominium construction project 08 branch offices such as contractor consultants, clients, Micro and Small Enterprises (MSEs) and currently involved on project 08 branch office.

### 3.5. Sample size determination

According to Gay and Airasian (2003) when the population is less than 1000, we can take a sample of 30% of the total population. If the population is greater than 1000, a sample size of 10-20% can be a representative of the population. The total population size of this research is 380. Therefore, based Gay and Airasian (2003) Study on the sample size with the formula would be:

$$n = N * 0.3 \text{ ----- (3.1)}$$

Where

n is the sample size of the study,

N is the population size and team members

0.3 represent 30% of population size.

When this is applied to equation (3.1)

$$n = 380 * 0.3 = 114$$

**Table 3.5 .Sample size determination**

No	Respondent	Target Population	Sample size
1	Clients	108	32
2	Consultants	52	16
3	Contractor	96	29
4	MSEs	124	37
	Total	380	114

The study of sample size is 114 of respondents that determined in the above stated a formula of (Gay and Airasian, 2003).

### **3.6. Data Collection and Tools**

For this research the data collection conducts through document review, interview questionnaires. Questionnaires use to collect data from contractors, Micro and Small Enterprise (MSEs), consultants, clients, Professionals, inspectors and questionnaires would advance to assess the cause and effects of delay in condominium houses construction project 08 branch offices.

The questions are designed related to the research objectives especially on the causes and effects of construction delays. The Survey is designed based to use Likert Scale on the objective of the study to find out the causes of delays in the Condominium construction projects 08 branch office and effect of the delays on overall project. The Survey was framed in such a way that the personal view of different people involved in projects 08 branch offices is collected and analyzed.

Questionnaires used to collect data from contractors, Micro and Small Enterprises (MSEs), consultants, clients, Professionals, inspectors. The questioner was developed using factors that have an effect in the delay on condominium housing construction on project as identified from the available literature. They would also have two parts. Part one contains demographic information of each respondent and part two would constitute sub sections with closed ended items which reflect the identified factors. The interview was done after the

questionnaire and the interview was face to face it helped the researcher to get more information and its effectiveness depends on how it is structured and standardized the overall organization.

### **3.7. Methods of Data Analysis**

Data collected through questionnaire was analyzed and interpreted quantitatively which was more organized and care for with different statistical techniques. Descriptive statistics, such as frequency count, percentages, mean and standard deviation were calculated in order to determine demographic characteristics, to identify CAUSES AND EFFECTS OF CONSTRUCTION DELAY". Based on the respondents the data was entered into SPSS (statistical packages of social science) version in order to draw simple tabulations to describe the demographic characteristics of the respondents.

Inferential statistics used such as Pearson's correlation was employed in order to explain the relationship between the variables, dependent (delay on condominium housing construction project) and the independent (Contractor, client, consultant, material, labor, corruptions). Pearson's correlation allows us how well variables are related, their strength and direction of the linear relationship and regression analysis was conducted to assess the cause and effects of construction delay.

### **3.8. Reliability and Validity of Instruments**

#### **3.8.1. Validity**

Validity concerns the extent to which a measurement actually measures those feature the investigator wishes to measure and provided information that is relevant to the question being asked. The measurements are accurate if they are relatively free from systematic errors. Validity was ensured by making sure the sampling techniques were free from bias by giving each subject an equal opportunity to score. The Validity is also improved through operationalization of variables. The questionnaires are comprehensive to cover all the variables being measured. Comparison was doing between the conceptual frame work (own variables) and theoretical framework (what has being said by others) for validation.

#### **3.8.2. Reliability**

To measure the reliability of the data collection instruments an internal consistency technique Cronbach's alpha was computed using SPSS. The pilot study involve

questionnaires from 25 respective program staffs (contractors, MSEs, consultants, clients, Professionals, inspectors).

The data obtained from these respondents was analyzed using SPSS Cronbach's alpha. According to Zinbarg, (2005) Cronbach's alpha is a coefficient of reliability that gives an unbiased estimate of data generalizability. The reliability coefficient of 0.7 and above is recommended. Reliability analysis through SPSS yielded a Cronbach alpha greater than 0.7 for the five research objectives. This implies that the research instrument was reliable.

**Table 3.8.2. Reliability test**

Variables	Cronbach's Alpha if Item Deleted	No of items
Contractor related causes	.806	4
Owner/client related causes	.841	4
Consultant related causes	.945	5
Materials related causes	.847	4
Labor related causes	.811	5
External Related Causes	.808	3
TOTAL	.873	25

### 3.9. Model specification with variables

The researcher used Regression model with SPSS (Statistical Package for the Social Sciences) to define mathematically the relationship between independent variable and the dependent variable. The following Multiple linear regression equation was used for this study.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \epsilon$$

Where:

Y is delay on condominium housing construction project 08 Branch office,

$\alpha = \alpha$  is the regression constant,

$\beta_1$  = slope (regression coefficient) for variable X1,

$\beta_2$  = slope for variable X2,

$\beta_3$  = slope for variable X3,

$\beta_4$  = slope for variable X4,



$\beta_5$ =slope for variable X5,

$\beta_6$ =slope for variable X6

$\varepsilon$ = error (or residual) value.

X1 is Contractor,

X2 is client,

X3 is consultant

X4 is material

X5 is labor and

X6 is External Related Causes

Generally, the co-efficient was found using the SPSS 20 version and further result showed in the data analysis part of study.

### **3.10. Variable Specification and Hypothesis**

The dependent variable ( $Y_i$ ) is delay in construction: It refers to the time during which some Part of the construction project has been extended or not executed (Sunjka and Jacob, 2013).

Construction delay of Project 08 branch office was hypothesized to be influenced by a combined causes and effect of various factors. The causes are contractor related, owner/client related, consultant related, materials related, labor related, and general environment related.

The effects are time overrun, cost overrun, abandonment, arbitration, litigation and dispute between parties were included in the model based on the brief literature review as follows:

**H1: contractor related causes have positive effect on project delay.**

**H0: Contractor related causes negative effect on project delay:** This variable is a continuous variable. Financial problems, shortage of materials, poor site management practices, inadequate experience and poor subcontractors 'Managements were considered the top and frequent factors for contractors related causes of delay in construction. It was measured in percent.

**H1: client related causes have positive effect on project delay**

**H0: Client related a cause has negative effect on project delay:** This variable is a continuous variable. Delayed payments, slow decision making, frequent change orders, bid award for lowest price and contract scope changes refer to the most common causes of client in construction.

**H1: Consultant related causes has positive effect on project delay**

**H0: Consultant related causes have negative effect on project delay:** It is a continuous variable. Provision of incomplete design, poor supervision, slowness to give instructions and lack of experience are the most common causes of consultant in construction delay. Poor management of consultant related causes would increase Occurrence of construction delay.

**H1: material related causes has positive effect on project delay**

**H0: material related causes has negative effect on project delay**

**H1: Labor related causes have positive effect on project delay**

**H0: Labor related causes have negative effect on project delay**

It is a continuous variable and measured by shortage of skilled personnel and low productivity in Project 08 Branch Office. Labor related causes delay accomplishment of the day-to-day duty to achieve goal of the project.

**H1: External related causes have positive effect on project delay**

**H0: External related causes have positive effect on project delay**

## **CHAPTER FOUR**

### **DATA ANALYSIS AND DISCUSSION**

This chapter presents the analysis of the data gathered in the survey using the questionnaire. It discussed the questionnaire response rate, general information of respondents, the major causes of delay in construction projects in Addis Ababa Condominium Housing Construction Project 08 Branch office. This section also presents the interpretation and discussion of the results pertaining to the findings and its effect on the construction.

Descriptive statistics were used for demographic factors and correlation and regression analysis were conducted for scale and ordinal typed questionnaires. The entire questionnaires used are attached at the back. Finally, the chapter concludes by putting forward an analysis causes and effect of delay in construction projects in Addis Ababa Condominium Housing Construction Project 08 Branch office. Therefore, this section is mainly concerned with presenting a descriptive and frequency analysis of the sample to provide an overview of the respondent characteristics and the diagnostics test results of multi co-linearity.

#### **4.1 Response Rate**

A total of 114 questionnaires were distributed to contractors, Micro and Small Enterprise (MSEs), Consultants and Client in project 08 staff. Out of which 111 questionnaires were properly filled and returned back to the researcher which means the overall response rate of the study was 97.37%. Only 3 were unable to respond to the researcher. Table 4.1 shows the profile of the respondent's gender, education background, designation, experience and organization respectively.

**Table 4.1. Demographic Characteristics of respondents**

Demographic Type	Variables	Frequency	%
(I). Gender	Male	82	73.87
	Female	29	26.13
	Total	111	100
(II). Educational background	Diploma	20	18.02
	Bachelor's	83	74.77
	Masters	8	7.21
	Phd	0	
	Total	111	100
(III). working experience in the project	<5	40	36.04
	6-10	54	48.65
	11-15	10	9
	>16	7	6.31
	Total	111	100
(IV). Respondent designation/title in the company	Project Engineer	12	10.81
	Project Coordinator	7	6.31
	Forman	34	30.63
	Office Engineer	30	27.03
	Site Supervisor Engineer	28	25.22
	Total	111	100
(V). Which organization do you represent?	Client	32	28.83
	consultant	16	14.41
	Contractor	29	26.13
	MSEs	24	21.62
	Others	10	9.01
	Total	111	100

*Source: Owen Survey (February, 2022)*

Table 4.1 item (I) shows that only 82(73.87%) of respondents were male and 29(26.13%) respondents were female. The result shows that the numbers of male respondents were relatively higher than female respondents. That means that that number of female in construction of condominium is too small in the two project site.

Regarding the educational background of respondents, Table 4.1 item (II) above shows that 20(18.01%) of them completed at most college diploma, 83(74.7%) of respondent's educational background were BSC/BA degree and the remaining 8(7.2%) of respondent's educational background were master's degree and none of respondent's educational background with PhD in the project. The result showed that the majority of respondent's educational backgrounds were BSC/BA degree and master degree. this means around 74.7% out of the total respondents. This is also another opportunity to enhance construction project of the condominium.

The data in Table 4.1 item (III) shows that 40(23.8%) of respondents work experience in construction site were less than 5years, 54(32.1%) of respondents work experience were between 6-10 years, 10(6%) of respondents work experience in construction were between 11-15 years and the remaining 7(4.2%) of respondents work experience in construction site were greater than 16 years. The result indicated that the majority of respondents work experience in construction was between 6-10 years. This implies the majority of our participants for the survey were well experienced and professionals in the construction industry. This shows that the results we obtain are valid.

The result in Table 4.1 item (IV) shows that 7(6.31%) of respondents are project Coordinator, 12(10.81%) of respondents are Project Engineer and 29(27.03%) of respondents are office engineers and the remaining 27(25.22%) and 34 (30.63%) of respondents are Site Supervisor Engineer and Forman respectively. The result indicated that the majority or around 29.7% of respondents are Forman and next managerial level of the construction projects.

Table 4.1 item (V) shows out of the total respondents, 29(26.1%) of respondents are contractors 16 (14.41%) of respondents were consultants, 32(28.83%) of respondents were client staff, 24(21.62%) of respondents were MSEs and the remaining 10(9.01%) were other like others (senior finance, human resource, senior purchaser and audit). The result indicated that the majority of respondents were client staff.

## **4.2. Causes of delay in Construction**

According to Syed M Ahmed and Salman Azhar, there are two kinds of causes of delays in construction projects 08: internal and external causes. Internal causes of delays consist of the causes, which come from four parties involved in the project: client, designer, consultant and contractors. Other delays, which do not come from these four parties, are based on external

causes for instance from the government, weather, material suppliers, (Aftuck,1999). Delays can occur in any and all activities, and these delays can concurrently or simultaneously cause delays in the project completion. In other words, a project delay is the accumulated effect of the delay s in individual activities (Jonathan Jingsheng Shi, 2001).

To measure causes of delay in project 08 branch office six variables (i.e. Contractor related causes, Owner/client related causes, Consultant related causes, Materials related causes, Labor related causes, External Related Causes) were included on the survey questionnaire.

Analysis in this respect is helpful to identify the strongest and weakest contributors of the causes of delay in project 08 branch office. It helps to review the causes of delay in condominium construction housing project and enhance its contribution, the study used the following table as summarized below: -

**Standard for this descriptive statistics summary**

Mean score	Standard
below 3.39	Low
From 3.40 up to 3.79	Moderate
Above 3.8	High

In order to see the general perception of the respondents regarding the selected causes of delay in construction projects, the researcher has summarized the measures with the respective means and standard deviations. Thus, the mean indicates to what extent the sample group averagely agrees or does not agree with the different statements. The lower the mean, the more the respondents disagree with the statements. The higher the mean, the more the respondents agree with the statement. On the other hand, standard deviation shows the variability of an observed response from a single sample Marczyk, Dematteo and Festinger (2005). According to Zaidation and Bagheri (2009), the mean score below 3.39 is considered as low, the mean score from 3.40 up to 3.79 is considered as moderate and mean score above 3.8 is considered as high.

**4.3. Descriptive Statistics for causes of delay in construction**

The research also found out that in the process of causes of delay in construction projects in Addis Ababa Housing Condominiums Construction Project 08 Branch office, the mean score of all indicators was found to be above average and consistence with the finding from the key questionnaires analysis.

**Table 4.3. Aggregated Mean score of the indicators for causes of delay in construction**

Descriptive	Mean	Std. Deviation	Rank	N
Contractor related causes	2.37	.700	3	111
Owner/client related causes	2.89	.532	2	111
Consultant related causes	1.49	.645	6	111
Materials related causes	3.24	.442	1	111
Labor related causes	2.08	.791	4	111
External Related Causes	2.11	.835	5	111

*Source: Owen Survey (February, 2022)*

As portrayed in table 4.2 the causes of delay in Project 08 Branch Office are ranked according their level of influence based on their mean score. As a result, with the mean score of those independents variables This means those Indicator conforms low influence on delay in construction projects because the value of those mean score low or have less than of the minimum standard of 3.39.

The aggregated Mean score of the indicators for causes of delay in construction points or above were found to be very significant influencing factor for the causes of delay in construction projects. Materials related causes ranked at the top with 3.24 mean score. Owner/client related causes also ranked second with a mean score 2.89 on the cause of delay in construction, whereas Contractor related causes Ranked thirdly on delay housing construction project External Related Causes, labor related cause and Consultant related causes were ranked fourth, fifth and six with the mean score 2.11 ,2.08, and 1.49 respectively.

### **4.3. Descriptive Statistics for causes of delay in construction**

In order to see the general perception of the respondents regarding the selected organizational culture in the subject organization, the researcher has summarized the measures with the respective means and standard deviations. Thus, the mean indicates to what extent the sample group averagely agrees or does not agree with the different statements. The lower the mean, the more the respondents disagree with the statements. The higher the mean, the more the respondents agree with the statement. On the other hand, standard deviation shows the variability of an observed response from a single sample Marczyk, Dematteo and Festinger (2005).

#### 4.3.1. Descriptive Statistics for Contractor related causes

The result also showed, contractors bought vehicles for their personal use and asked for additional loan for working capital. In addition, it indicates that contractor related causes were frequent delay factors in this project. The result of this study was like the findings of Stephen et al. (1996), on the delays in house project in Thailand and Wateno (2015), on causes of project delays in Indonesia

**Table 4.3.1. Mean score of the indicators for Contractor related causes**

<b>Descriptive Statistics</b>			
Items	Mean	Std. Deviation	N
1.Improper planning	2.32	.955	111
2.Inefficient site management practice	1.86	.830	111
3.Inadequate experience	2.35	1.291	111
4.Financial problem of contractor and sub-contractor(s)	3.57	1.392	111
5.Inability of coordination	4.01	.977	111
6.Poor communication	1.79	1.001	111
7.Mistake during work	2.32	.955	111
8.Rework due to error	1.86	.830	111
9.Delay of work without reason	2.33	1.281	111
10.Mistake during work	1.79	1.000	111
11.Less sense of ownership	2.31	.951	111
12.Corruption	1.85	.823	111
<b>Total mean</b>	<b>2.37</b>	<b>.700</b>	

*Source: Owen Survey (February , 2022)*

Table 4.3.1 indicates that the mean of respondents to contractor related causes of total value of mean score 2.37 and standard deviation 0. 7 were contractor related causes were range from 1.79 up to 4.01. As per the above item out of the total respondents were Inability of coordination, Financial problem of contractor and sub-contractor(s) are scored highly scored on cause of delay for delay of Project 08 Branch office.



Result of Table 4.3.1 showed that most of the respondents agreed that delay of work without reason, less sense of ownership, improper planning and financial problem of contractor and subcontractor), Delay of work without reason, Mistake during work, Inefficient site management practice, Corruption were major contractor related causes for delay in Project 08 Branch Office.

From The interview result of indicated that most contractors received finance in advance from client and they miss utilized the resource. From the perspective of the architects and engineers, cash problems during construction, the relationships between subcontractors and the owner's slow decision- making were the main causes of delay. And also the finishing works are done by Micro and Small Enterprises (MSE's) such as sanitary, electrical, doors, tiles and the like. Due to their late performance the contractors were unable to complete the construction of the main building. According to the researcher observation due to lack of coordination and poor communication many AAHDC exhibited many rework.

Delay in payment leads to negative impact of contractors' performance and wastage of time. This may also lead to disagreements between Housing Development Corporation (HDC) and contractor. This problem would affect the overall performance of project.

#### 4.3.2. Descriptive Statistics for Owner/client related causes

The descriptive analysis on the structure Owner/client related causes were found to be above average compared to the finding. The mean score regarding the practice of Owner/client related causes was found to be 2.89 points, indicating that it was practiced for the cause of delay Project 08 Branch office.

**Table 4.3.2. Mean score of the indicators for Owner/client related causes**

<b>Descriptive Statistics</b>			
Items	Mean	Std. Deviation	N
1.Financial constraint	2.33	1.281	111
2.Frequent change of orders during construction	2.32	.955	111
3.Slow decision making	1.86	.830	111
4.Low level of technical expertise	2.35	1.291	111
5.Delayed release of payment	3.57	1.392	111
6.Bid award for lowest price	4.09	.987	111
7.Lack of communication	4.00	.751	111
8.Unnecessary interference	3.82	.896	111
9.Corruption in awarding	3.45	1.204	111
10.Less sense of ownership	3.22	1.082	111
11.Poor monitoring and evaluation	3.36	1.102	111
12.Poor follow up of progresses	2.31	.644	111
<b>Total mean</b>	<b>2.89</b>	<b>.532</b>	

Source: Owen Survey (February, 2022)

Table 4.3.2 indicates that the mean of respondents to Owner/client related causes of total value of mean score 2. 89. This implies that majority of respondents agreed these causes of constriction delay through Owner/client related causes.

Table 4.3.2 indicates less sense of ownership, delayed release of payments, lack of communication and slow decision making Delayed release of payment, bid award for lowest price, Unnecessary interference, Corruption in awarding were major client-related causes of constriction delay. Moreover, from the interview result causes of construction delay were bureaucratic payment approval system, timely communication gap, shortage of agro stone, shortage of construction materials, lack of training on accrual accounting system form head office, poor in organizing finical data, absence of disposal of waste metals, lack of stable and correct standards have been mentioned as causes for the project delay. The result of this study was similar to the findings of Yahya et al. (2013), on major causes of delays in construction projects of Pakistan and Endale (2016), on identification of the major causes to the delay in the construction of 40/60 saving houses project in Addis Ababa.

From the interview result client was unable to pay to progress payments according to their agreement to contractors, the contractors might not able to recruit daily laborers and unable to rent materials and equipment's and finally it pose significant effect on the construction schedule.

In addition, the interview candidate project delay in because client related cause might be Poor communication and coordination the project performance was constructed behind the schedule. On construction project many project parties were participating, the client was not project Delays in deliveries to construction sites, approval of design documents, and progress payments are delay factors caused by owners properly communicating and coordinating them its significantly affect the project schedule.

### **4.3.3. Descriptive Statistics for Consultant related causes**

The descriptive analysis on Consultant related causes of the actual practice delay construction projects in Addis Ababa Housing Construction Project 08 Branch Office was found to be less impact with the finding compared to other independent variables. This result contradicts with Endale (2016), on the major causes to the delay in the construction of 40/60 saving houses project in Addis Ababa and Tsegay and Hanbin (2017), on analysis of delay impact on construction project in Ethiopia. Detail of the scores against the six indicators used to measure the influence of Consultant related causes.

**Table 4.3.3. Mean score of the indicators for Consultant related causes**

Descriptive Statistics			
Item	Mean	Std. Deviation	N
1.No enough employee assigned	.45	.941	111
2.Inadequate experience	.35	.746	111
3.ncomplete design	.45	1.051	111
4.Poor coordination	.86	1.752	111
5.Slow to give instruction	3.78	1.022	111
6.Poor inspection and audit	3.89	.867	111
7.Poor cost estimation	2.86	1.257	111
8.Poor project planning	3.46	1.197	111
9.Lack of proper cooperation of work	3.12	1.227	111
10.Unrealistic time schedule	.41	.718	111
11.Failure to update schedule when the need arises	.57	1.015	111
<b>Total mean</b>	<b>1.49</b>	<b>.645</b>	

*Source: Owen Survey (February, 2022)*

According to the Table 4.3.3 above poor communication and coordination of consultant has been ranked in first position by all respondents. This implies that the consultant lack inefficient communication and coordination with project parties and it is regarded as the major problem of consultants and lead to delay in construction. If consultants do not efficiently communicate and give appropriate decisions to both client and contractors it will significantly affect the construction schedule and lead to late construction project completion. Next, unclear and inadequate details in Poor project planning have been cause as delay by all respondents. This factors are the most causes of delay in construction of condominium projects in Addis Ababa. If Poor project planning completeness and if some elements are missed in the planning it will affect the construction schedule and lead to late completion and it will take to revise time and reapprove the drawing by the client.

From the interview result the interviewee said that The cause of consultant delays that has been established due to defects in design, Changes in drawings and specification, mistake in design, incomplete document/drawing, slow inspection of completed works, inadequate supervision to contractor, late preparation of interim valuation, late valuation work, late issue of instruction and Delay of work approval

#### **4.3.4 Descriptive Statistics for Materials related causes**

Table 4.5. Below item that 3.2 of the mean score that respondent attested to the fact that there were constraints in delivery of construction materials (inputs). As discussed in the

theoretical part of this thesis, there are a number of constraints that can affect the construction projects; these constraints forced that hinders the growth of projects. Therefore, constraints should be assumed, identified, and analyzed as much detail as possible during the planning phase of the project, so that awareness of them and their potential impact can be managed. This also includes understanding the changing aspects of the project environments.

**Table 4.3.4. Mean score of the indicators for Materials related causes**

<b>Descriptive Statistics</b>			
Item	Mean	Std. Deviation	N
1.Scarcity in material	.47	.840	111
2.Late procurement of materials	.52	1.060	111
3.Poor material management	1.07	1.872	111
4.Fluctuation in price of building materials	1.79	1.001	111
5.Delaying delivering material onsite	2.32	.955	111
6.Equipment breakdowns	1.90	.831	111
7.Scarcity of equipment	2.35	1.373	111
8.Low level of equipment operators 'skills	4.09	1.066	111
9.Low productivity and efficiency of equipment	1.79	1.001	111
10.Lack of equipment accessibility	2.32	.955	111
<b>Total mean</b>	<b>3.24</b>	<b>.442</b>	

*Source: Owen Survey (February , 2022)*

As per Table 4.3.4 result, respondents agreed that for the cause of delay construction Condominium housing were, Low level of equipment operators 'skills poor material management, Lack of equipment accessibility , Delaying delivering material onsite ,material scarcity and late material procurement were major material related causes for delay in Project 08.

From the interview, it was found out that types of construction materials have been used on this project. Those materials were procured by Government Procurement and Property Administration Agency (GPPAA) at a central level. Addis Ababa Housing Development Corporation Office (AAHDCO) first collected purchase request from all projects branch office and asked for GPPAA to purchase the required material for construction. Furthermore, GPPAA announced both international and national bid to provide the construction materials for all projects branch office. Most of the time,central procurement policy got postponed due to bid cancelation, bid failure, failed to fulfil specification and long process and procedures of government procurement. Central procurement policy has big contribution for late procurement of materials which was a critical and major cause for project delay.

In addition, the interviewee says that materials related cause heavily affects constructing of houses. In Project 08 office sites suffered with shortage resources, because there is inadequate financial availability to funding construction expenses. In addition, inadequate construction material availability is a key cause as the risk of the projects by escalation of material prices, which affects the cost performance of project.

#### 4.3.5 Descriptive Statistics for Labor related cause

With mean score of 2.08 out of 6 independent variables, Labor related cause construction projects in Addis Ababa Housing Construction Project 08 branch office condominium found to be the fourth ranking on the cause of Housing Construction Project. However, the respondents indicated the importance of Labor related cause is very essential for construction projects

**Table 4.3.5 Mean score of the indicators for Labor related cause**

Indicator	Mean	Std. Deviation	N
1.Labor strikes	1.86	.830	111
2.Labour absenteeism	2.35	1.291	111
3.Low productivity	1.79	1.001	111
4.Unqualified work force (Shortage of skilled labor)	2.32	.955	111
<b>Total mean</b>	<b>2.08</b>	<b>.791</b>	

*Source: Owen Survey (February , 2022)*

As indicated in the Table 4.3.5 major labor related causes in this project was low productivity, unqualified work force (Shortage of skilled labor) describes that there was relatively wider and more variety of professionals with good work experience in construction sectors were involved in Project 08 Branch Office. However, there was low productivity also implies that Project 08 Branch Office had a rate of poor performance.

The interview result shows that late payments and poor safety on the work area had been contributed for Labor absenteeism then for low productivity those cause led for delay of constricting the project.

#### 4.3.6 Descriptive Statistics for external Related Causes

As portrayed in table 4.3.6 the cause external Related Causes of construction projects in Addis Ababa Housing Construction Project 08 Branch Office are ranked the fifth according their level of influence based on their mean score

**Table 4.3.6 Mean score of the indicators for external Related Causes**

Item	Mean	Std. Deviation	N
1.Weather effect on construction	1.86	.830	111
2.Regulatory changes	2.35	1.291	111
3.Unforeseen site condition	2.35	1.291	111
4.Accident during construction	1.79	1.001	111
5.Problem of electric supply	2.32	.955	111
6.Shortage water supply	1.86	.830	111
7.Unforeseen ground and geological conditions.	2.35	1.291	111
8.Fluctuations in cost/ currency	1.79	1.001	111
9.Local political instability	2.32	.955	111
10.Right of way problem	1.86	.830	111
11.Lack of infrastructure (road, water, electric supply, etc.)	2.35	1.291	111
<b>Total mean</b>	<b>2.11</b>	<b>.835</b>	

*Source: Owen Survey (February, 2022)*

As Table above item that 2.11 of the mean score that respondent attested to the fact that there were constraints in delivery of external Related Causes such as (Weather effect on construction, Regulatory changes, Unforeseen site condition, Accident during construction, Problem of electric supply, Shortage water supply, Unforeseen ground and geological conditions, Fluctuations in cost/ currency, Local political instability, Right of way problem and Lack of infrastructure (road, water, electric supply, etc.)).As discussed in the theoretical part of this thesis, there are a number of constraints that can affect the construction projects; these constraints forced that hinders the growth of projects. Therefore, constraints should be assumed, identified, and analyzed as much detail as possible during the planning phase of the project, so that awareness of them and their potential impact can be managed. This also includes understanding the changing aspects of the project environments.

From the interview result the candidate say that Project o8 office condominium housing occur through infrastructure development, rainy weather condition, Government regulation, slow process of Building permit, exchange rates and price fluctuation or inflation.

#### **4.4. Descriptive Statistics for Effects of Delay in Construction of Condominium**

The impact or consequences of delay in project completion is termed as the effect of project Delay .Several factors cause the overall delay in the construction project such as some within contractor’s liability and some are within client liability and some are within consultant’s responsibilities and liability (Haseeb et al, 2011). It is hard to distinguish due to overlapping nature of the events that which party or parties are responsible and what

ingredients causes of the delay. It is mostly seen that delay problems are caused due to dispute, negotiation, lawsuit, total desertion, litigation and abandonment. We can say that the parties included in contract through claims agree on the additional capital and extra time linked with construction delay. The consequences of delay are different for different parties. The general consequences are the loss of wealth, time and capacity. For owner, delay means the loss of income and unavailability of facilities. For contractor, delay means the loss of money for extra spending on equipment and materials and hiring the labor and loss of time (Haseeb et al, 2011). The following effect are caused due to the delay of construction project in AAHC the case of Project 08 Branch Office.

**Table 4.4. Mean score of the indicators for Effects of Delay in Construction of Condominium**

Descriptive Statistics			
Item	Mean	Std. Deviation	N
1.Time overrun	4.20	1.001	111
2.Cost overrun	2.32	.955	111
3.Dispute between parties involved	1.86	.830	111
4.Reduced profit	2.35	1.291	111
5.Arbitration	3.72	1.055	111
6.Litigation and court case	3.84	1.072	111
7.Abandonment	3.32	.804	111
8. Slowing do wither growth of Housing construction sector.	1.79	.818	111
9.Bad relationship with end users	4.13	1.105	111
10..Mistrust on owner of the project	4.09	.987	111
<b>Total mean</b>	<b>3.16</b>	<b>0.965</b>	

*Source: Owen Survey (February, 2022)*

Table 4.4 results above indicated that, time overrun had been ranked in first position by all respondents as the major outcome of construction delay. This indicated that projects were delayed beyond the schedule time it would cause time overrun. The major effects of delay in construction lead to time overrun, this intern lead to late completion of the projects out of the schedule. If projects delay beyond the scheduled time it will significantly affect the completion of time and it will consume more time.

The second most effect of delay in construction is Bad relationship with end users, it had been ranked in second position by all respondents. This was another outcome of construction delay in AAHDC. If projects do not complete on time it will also significantly affect the construction cost and leading to disagreement between Bad relationships with end users.

Parties and later it may affect the future work environment and may lose trustworthiness among the project parties. If the contractor is not able to construct according to the scheduled time and cost the client may not give additional work in the future.

Litigation had been ranked in fourth position by all respondents. If disputes were not solved on time the case would be brought to court and the court would give decision based on the legal procedures. This will also affect the future relationship between project parties. Therefore, to avoid this project parties should seat and discuss the issue and resolve the problem before it goes to the court because it will damage future relationship.

Arbitration has been ranked in fifth position by all respondents. If project parties do not reach an agreement and one party may be violated the agreement the two parties may negotiate and compensate the victim party and it will also cost one party.

Total abandonment had been ranked in sixth position all respondents. If projects do not run according to the schedule the project parties may reach an agreement on total abandonment. This may create huge loss for both parties for client and contract. It is waste of many, reduced profit, slowing do wither growth of Housing construction sector, Cost overrun, time and overall loss for both parties and it will develop negative attitude in their future performance.

From the interview result the effect of project delay lead to influencing cost overruns are inflation thus, material cost increase, incorrect material assessment and degree of complexities with respect to its availability and scarcity. Time overrun, budget (cost) overrun and disputes and claims, generally the Time overrun and cost overrun are the two most important effect of delay in Malaysian construction projects

#### **4.5. Correlation Analysis**

Correlations are perhaps the most basic and most useful measure of association between two or more variables (Marczyk, Dematteo & Festinger, 2005). As per Marczyk, Dematteo and Festinger, (2005) correlations of .01 to .30 are considered small, correlations of .30 to .70 are considered moderate, correlations of .70 to .90 are considered large, and correlations of .90 to 1.00 are considered very large. Accordingly, the below Pearson correlation coefficients shows that the six factors measuring causes of the delay in the construction of condominium house Project were all positively related with the delay in the construction of condominium house Project within the range of 0.023 to 0.973, all are significant. The correlation analysis was done to analyze the relationship between the delay in the construction of condominium house Project and causes of the delay in the construction of condominium house Project such



as), External Related Causes, Consultant related causes, Owner/client related causes, Materials related causes, Contractor related causes, Labor related causes to examine the relationship among these variables, Pearson correlation coefficients were calculated. In this section of the study, the analysis and interpretations of the correlation results between dependent and independent variables are presented.

**Table 4.5. Correlation between dependent and independent variables**

Correlations								
Indicator		Contractor related causes	Owner/client related causes	Consultant related causes	Materials related causes	Labor relatedcauses	External Related Causes	delay on condominium housing construction project
Contractor related causes	Pearson Correlation	1						
	Sig. (2-tailed)							
	N	111						
Owner/client related causes	Pearson Correlation	.579**	1					
	Sig. (2-tailed)	.000						
	N	111	111					
Consultant related causes	Pearson Correlation	.578**	.588**	1				
	Sig. (2-tailed)	.000	.000					
	N	111	111	111				
Materials related causes	Pearson Correlation	.698**	.673**	.428**	1			
	Sig. (2-tailed)	.000	.000	.000				
	N	111	111	111	111			

Labor relatedcauses	Pearson Correlation	.728**	.674**	.537**	.609**	1		
	Sig. (2-tailed)	.000	.000	.000	.000			
	N	111	111	111	111	111		
External Related Causes	Pearson Correlation	.476**	.862**	.559**	.556**	.564**	1	
	Sig. (2-tailed)	.000	.000	.000	.000	.000		
	N	111	111	111	111	111	111	
delay on condominium housing construction project	Pearson Correlation	.726**	.883**	.722**	.749**	.820**	.808**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	111	111	111	111	111	111	111

\*\* . Correlation is significant at the 0.01 level (2-tailed).

To determine whether the relationship between dependent variable (delay in the construction of condominium house Project) and the independent (External Related Causes, Consultant related causes, Owner/client related causes, Materials related causes, Contractor related causes , Labor related causes .A moderate correlation is observed among each of the variables representing the independent variable (External Related Causes, Consultant related causes, Owner/client related causes, Materials related causes, Contractor related causes , Labor related causes) and the dependent variable (delay in the construction of condominium house Project). Correlation results presented in Table 4.5 show that: -

1. There is significant positive relation between External Related Causes and delay in the construction of Project 08 branch office (sig=.000, r=. 808) which is between. correlations value of .70 to .90 are considered large.
2. There is significant positive relation between Owner/client related causes and delay in the construction of Project 08 branch office (sig=.000, r=. 883) which is between correlations of .70 to .90 are considered large,
3. There is significant positive relation between Materials related causes and delay in the construction of Project 08 branch office (sig=.000, r= . 749) which is between .70 to .90 are considered large correlated.
4. There is significant positive relation between Contractor related causes and delay in the construction of Project 08 branch office (sig=.000, r=. 726) which is between 70 to .90 are considered large correlated.
5. There is significant positive relation between Labor related causes and delay in the construction of Project 08 branch office (sig=.000, r=.820) which is between correlations of .70 to .90 are considered large,
6. There is significant positive relation between Consultant related causes and delay in the construction of Project 08 branch office (sig=.000, r=.722) which is between 70 to .90 are considered large correlated.

From the analysis, it is noted that cause delay in the construction of condominium house Project is positively correlated with delay in the construction of condominium house Project. With regard to the direction of the relationship both variables have a positive sign that dictates appositve change in the independent variable can result in a positive change in the dependent variables. When we assess the level of significance, there is significant relationship between the independent variable and dependent variable. This is witnessed by p values and  $p = 0.01$  level (2 tailed).

## 4.6. Regression Test of Assumption

Before apply regression analysis to test cause of delay in the construction of condominium house Project variable the analysis market must possible when there was no multi-collinearity problem in variables, the variables had linearly correlated, and residual variables must be normally distributed. In this section the above tests was conducted in the following manner. Some tests were conducted in order to ensure the appropriateness of data to assumptions regression analysis as follows:

### 4.6.1. Multi collinearity test

The researcher has used the Variance Inflation factor (VIF) to check the Multi collinearity among the independent variables. If there is a high degree of correlation between independent variables, we have a problem of what is commonly described as the problem of multi collinearity (Kothari,C.R. (2004). Multi collinearity analysis is the computation that used to identify whether there is occurrence of more than one variable in a multiple regression model that are found to be highly interrelated (Zikmund et al., 2010). Multi collinearity can be assessed by examining the tolerance and variance inflation factors (VIF) which are the two Collinearity diagnostics factors. According to Pallant (2010), tolerance is an indicator of how much of the variability of the specified independent is not explained by the other independent variables in the model, whereas VIF is the inverse of the tolerance effect. The larger the VIF above 10 and the lower the tolerance below 0.1 indicate the presence of multi collinearity (Pallant, 2010)

**Table 4.6.1. Multi collinearity test**

	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
Contractor related causes	.992	1.008
Owner/client related causes	.180	5.550
Consultant related causes	.603	1.657
Materials related causes	.500	2.000
Labor related causes	.473	2.113
External Related Causes	.251	3.984

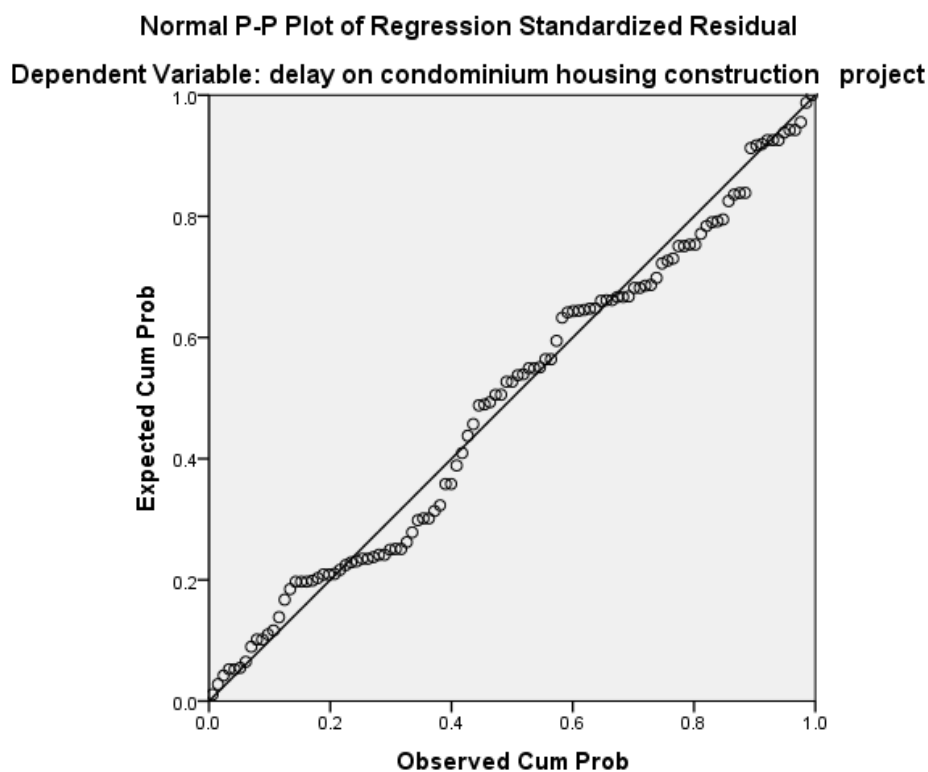
Source: own survey questionnaire, 2022

In the present study, bivariate correlation matrix was computed using Pearson's correlation. The results of the correlation matrix presented in Table 4.6.1 suggested that none of the bivariate correlation was above 0.90 (Tabachnick and Fidell, 2007; Hair, et al., 2010) for independent variables. The VIF and tolerance effect were computed using multiple

regression procedure with collinearity diagnostic option, as shown in Table 4.6.1. The VIF values were less than 10, which revealed the absence of multi collinearity with independent variables, while the tolerance showed values of above 0.1 which indicated the absence of multi collinearity. In this study, as shown in table 4.6.1, the variance inflation factor (VIF) value are ranges from 1.008 -5.550 and tolerance value ranges within the value of 0.180-0.901. According to this values both VIF and tolerance level indicate that for this analysis, there is no serious multi collinearity problem.

#### 4.6.2. Linearity Test

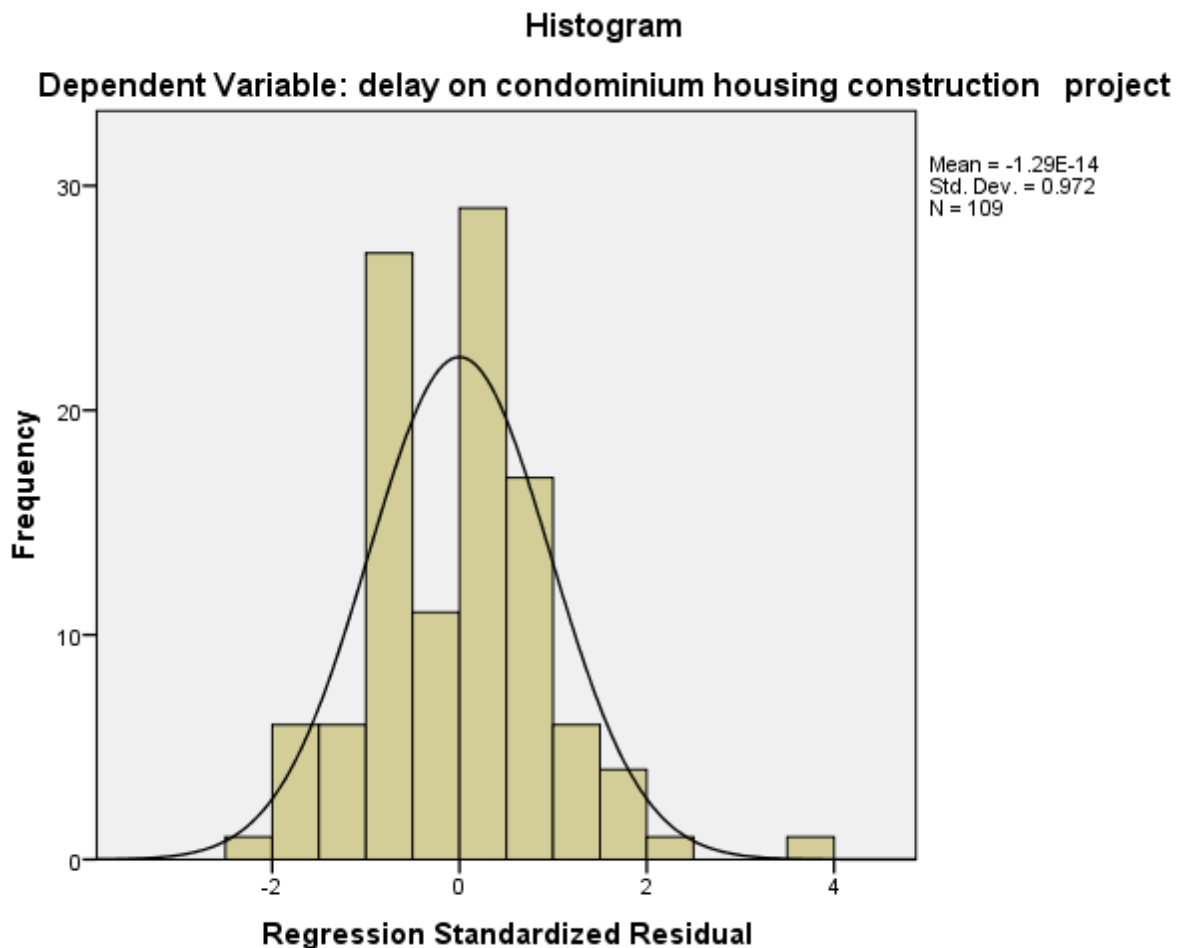
Linearity refers to the degree to which the change in the dependent variable is related to the change in the independent variables. To determine whether the relationship between dependent variable (delay in the construction of condominium house Project) and the independent (External Related Causes, Consultant related causes, Owner/client related causes, Materials related causes, Contractor related causes, Labor related causes). is linear; plots of the regression residuals through SPSS software had been used. Therefore, figure 4.6.2 showed the existence of linear relationship between the outcome variable and the independent variables.



*Source: Owen Survey (February, 2022)*

### 4.6.3. Normality Test

According to Hair, et al. (2010.), normality refers to the shape of data distribution for an individual metric variable and its correspondence to the normal distribution, the benchmark for statistical methods. In the case where data distribution is non-normal, it makes statistical tests invalid. Figure 4.6.3 shows the frequency distribution of the standardized residuals compared to a normal distribution. As you can see, although there are some residuals that are relatively far away from the curve, many of the residuals are fairly close. Moreover, the histogram is bell shaped which lead to infer that the residual or disturbance errors are normally distributed and when histograms are close to zero it is assumed that the data is normally distributed for the dependent variable. However, when skewness and kurtosis are not close to zero and the histogram does not appear to have a normal distribution (Osborne and Waters, 2002). Thus, the result assured that the distribution is normal for this study.



*Source: Owen Survey (February, 2022)*

## 4.7. Regression Analysis

This section of the study presents the results and discussions of the regression analysis. So far, the study established a framework of literature review and data analysis of descriptive Statistics and correlation analysis were established in order to identify the cause of delay in the construction of condominium house Project. To investigate the significant factors of the cause of projects delay that influence delay in the construction of condominium house at Project 08 branch office constructing condominium housing ordered log it regression model were computed.

**Table 4.7.1 Table Model Summary**

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.929 <sup>a</sup>	.863	.855	.209	1.736

a. Predictors: (Constant), External Related Causes , Consultant related causes , Owner/client related causes, Materials related causes, Contractor related causes , Labor related causes

b. Dependent Variable: delay on condominium housing construction project

**Source: Owen Survey (February, 2022)**

From table above, “R” has a score of .929 It is a multiple correlation coefficient between dependent (delay in the construction of condominium house) and independent (cause of delay in the construction of condominium house) variables of the study. “R” represents the value of the multiple correlation coefficients between the predictors and the outcome (Field, 2005). Here, this “R” value represents the simple correlation between), External Related Causes, Consultant related causes, Owner/client related causes, Materials related causes, Contractor related causes, Labor related causes, and delay on condominium housing construction project. General, they have strong correlation.

Again the table indicates = .863. R square is the correlation between the dependent and independent variable values of the study. Is also called the squared multiple correlation coefficient or the coefficient of determination, since = .863, So, table above with= .863 means that the total variation in the dependent variable i.e. delay on condominium housing construction project is explained or caused by 86.3 percent of the change increase in all independent variables: External Related Causes , Consultant related causes , Owner/client related causes, Materials related causes, Contractor related causes , Labor related causes, and delay on condominium housing construction project in connection with project at Project 08 Branch Office constructing condominium housing. In other words, 13.7 percent of the variation in delay on condominium housing construction in Project 08 Branch



Office cannot be explained by these six independent variables. So, there must be other factors that are not incorporated in the model to explain delay on condominium housing construction in project 08 branch office. The Adjusted R Square adjusts for a bias in as the number of variables increases which is having a value of .855 and the Std. Error of the Estimate is a measure of the variability of the multiple correlations which is having a value of 2.09.

#### 4.7.2. ANOVA (Analysis of Variance)

The ANOVA table 4.7.2 below tells about the story of how the regression equation accounts for variability in the response variable, which is the dependent variable delay on condominium housing construction in project due to a change in the independent variables (External Related Causes , Consultant related causes , Owner/client related causes, Materials related causes, Contractor related causes , Labor related causes).

**Table 4.7.2 Table 4.7.2. ANOVAa**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.745	6	2.791	128.667	.000 <sup>b</sup>
	Residual	2.212	102	.022		
	Total	18.958	108			
a. Dependent Variable: delay on condominium housing construction project						
b. Predictors: (Constant), External Related Causes , Consultant related causes , Owner/client related causes, Materials related causes, Contractor related causes , Labor related causes						

From ANOVA test in table 4.7.2 shows that the Sig. Value 0.01 is greater than the calculated value 0.000. It reflects there was a statistically significant correlation between dependent variable and independent variable at 1% significant level. Which means the independent variables; External Related Causes, Consultant related causes, Owner/client related causes, Materials related causes, Contractor related causes, Labor related causes has great contribution to improve delay on condominium housing construction Project. But it does not mean that all these factors have equal significant correlation with delay on condominium housing construction project.

**Table 4.7.3 Coefficients’ of Multiple Regressions**

Model		Un standardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.711	.128		5.542	.000
	Contractor related causes	.429	.102	.386	2.241	.027
	Owner/client related causes	.639	.054	.811	11.897	.000
	Consultant related causes	-.038	.026	-.051	-1.468	.145
	Materials related causes	.678	.064	.714	10.585	.000
	Labor related causes	.294	.186	.558	1.584	.116
	External Related Causes	-.506	.144	-.101	-3.518	.001

a. Dependent Variable: delay on condominium housing construction project

**Source: Owen Survey (February, 2022)**

Based on the above table using “ $\beta$ ” value (standardized) coefficients, the regression result is discussed as follow.

According to the above table of Coefficients’ on Multiple Regressions, the first independent variable that is Owner/client related causes has .811 effects on delay on condominium housing construction project at  $p < 0.01$  value. it refers that one percent (one standard deviation) increase in Owner/client related causes, keeping other variables constant, results in 81.1 percent change increase in delay on condominium housing construction project and vice versa, With regard to Materials related causes 0.714 cause on dependent variable at  $p < 0.001$  value. That means on percent increase in Owner/client related causes (i.e., 1 standard deviation), brings about 71.4 percent increase on delay on condominium housing construction project. The independent variable, which is Labor related causes has .558 effect on cause of delay on condominium housing construction project at  $p < 0.01$  value. It indicates one percent increase in Labor related causes results in 55.8 percent increase delay on condominium housing construction projects and vice versa. The independent variable, which is Contractor related causes has .386 effect on cause of delay on condominium housing construction project at  $p < 0.01$  value. It indicates one percent increase in Labor related causes results in 38.6 percent increase delay on condominium housing construction projects and vice versa. On the contrary, Consultant related causes and External Related Causes ( $\beta = -.051$  sig .145  $p < 0.05$ ) and ( $\beta = -.1015$ , sig. .001  $p < 0.05$ ) they are insignificant and positive value could able to accountable for the increase in of delay on condominium housing construction project performance by -5.1% and -10.1%, respectively. This may indicate that their level of impact on delay condominium housing construction project was somewhat weak in the context of in project 08 branch office constructing condominium housing as compared to the other four variables, Monitoring and feedback, communication channels weak. However, Materials related causes and Owner/client Related

Causes were the big impacts on of delay on condominium housing construction project with the value of  $\beta = 0.811$  and  $\beta = 0.714$  respectively. So that the coefficients are significant and therefore the multiple regression equation would be:

$$Y = .711 + 0.8111X_1 + 0.714X_2 + 0.558X_3 + 0.386X_4 - 0.051X_5 - 1.015X_6$$

## **CHAPTER FIVE**

### **CONCLUSION AND RECOMMENDATION**

This chapter includes the summary of major findings, conclusions and recommendations that would help in timely delivery of the future condominium houses to satisfy stakeholders. Furthermore, it suggests lessons to be learned for future similar projects. Besides, it provides actionable recommendations for parties which are involved in construction of condominiums. These include the client, contractors, material, external, labor and consultants about causes and effects of project delay.

#### **5.1 Summary**

The major causes of delay in Construction of Condominium Project in AAHDC at Project 08 Branch Office based on the research objective and questions was generally found to be effective in terms of completing projects with the approved budget and time as per their project agreement with aid group.

The result of mean score analysis was found to be very important for indicating the causes of delay in Construction of Condominium Project. Materials related causes ranked at the top with 3.24 mean score. Owner/client related causes also ranked second with a mean score 2.89. Contractor related causes also ranked the third with a mean score of 2.37, External Related causes also ranked fourth with a mean score 2.11 while Labor related Causes and Consultant related causes ranked fifth and six with mean score of 2.08 and 1.49 respectively.

Results of the descriptive analysis revealed that Out of the top six major causes of delay in construction 3.24 of problems were materials related causes, 2.89 of problems were client related causes and 2.37 of problems were Contractor related problems. This indicated that the majority of construction delay occurred due to materials, client and contractor related causes.

The result showed that delay of work without reason, improper planning, less sense of ownership, inefficient site management practice and corruption were contractor related causes and they affected Project 08 office. Where as Client/owner related causes also positively affected delay of this project and the major causes were slow decision making, less sense of ownership and delayed release of payment.

The analysis reports that consultant related causes were lack inefficient communication and coordination , unclear and inadequate details in Poor project planning determining the causes

for delay in this project. material related causes positively affected the delay and major material related causes were late procurement of materials, scarcity in material, and poor material management.

The result of mean score analysis were found to labor related causes low productivity, Unqualified work force (Shortage of skilled labor) describes that there was relatively wider and more variety of professionals with good work experience determining the causes for delay in this project.

External Related Causes such as (Weather effect on construction, Regulatory changes, Unforeseen site condition, Accident during construction, Problem of electric supply, Shortage water supply, Unforeseen ground and geological conditions, Fluctuations in cost/ currency, Local political instability, Right of way problem and Lack of infrastructure (road, water, electric supply, etc.)

The analysis of mean score under the effect of project delay where through Time overrun and cost overrun were positive effects of delay in Project 08 Branch Office. However, litigation and disputes were not significant effects for this project. Mistrust on owner of the project was found negative effect of delay in Project 08 Branch Office .

The major effect of delay in construction project at AAHDC the cases of site where time overrun, cost overrun (price inflation), disputes among project parties, total abandonment and arbitration.

The effect of construction result shown positive and direct correlation with client, contractors, consultants, materials, labor and external related causes. Effect of delay had a statistical significant relationship with each variables and shown strong relationship with client related causes, contractors, consultants, materials related causes of delay, effects of delay had moderate correlation with and labor related causes of delay and it had low correlation with external causes of delay in construction project in Addis Ababa Housing Construction project the case of project at Project 08 branch office.

The overall model result indicated that 88.3% of the variance on effect of construction delay had been significantly explained by client, contractor, consultant, materials, equipment's, labor and external related causes of construction delay in AAHDC the case of project at Project 08 constructing condominium housing.

## **5.2 Conclusion**

The study concluded that factors for delay of Project 08 branch office such as: contractor related causes, client related causes, material related causes, labor related causes and external related are found to be the causes that delay timely delivery of construction of Project 08 branch office. That means results of the descriptive analysis revealed that Out of the top six major causes of delay in construction 3.24 of problems were materials related causes, 2.89 of problems were client related causes and 2.37 of problems were Contractor related problems. effect of project delay where through Time overrun and cost overrun were positive effects of delay in Project 08 Branch Office. However, litigation and disputes were not significant effects for this project.

The research established that material related, client related causes and contractor related causes increase were the most significant influencing factor for the causes of condominium housing construction project 08 branch offices.

The study findings have also concluded that time overrun and Bad relationship with end users ,cost overrun and mistrust on owner of the project are the most significant effect of delay in this project 08 branch office.

## **5.3. RECOMMENDATION**

Based on the above mentioned results and findings of this study, the following points can be recommended as ways to minimized and control delay in condominium construction projects.

The study recommends that improve the supply of and delivery of construction materials by anticipating the construction demand and schedule. In order to improve the delivery system the project office should estimate the tender procurement process like tender duration, the lead time and the consumption rate and improved the supply system, always keep maintain the minimum and maximum stock level, and order based on the bill of quantities.

The researcher recommends that Client should have adequate finances in order to pay timely to the contractors after completion of the work. Therefore, client should work closely with the financing bodies and institutions to release the payment on schedule.

It also arranges quick payment mechanism and minimize rigid in payment issue; that minimize unnecessary and excessive administrative procedures in the client organization.

Client should have accomplished contractual responsibilities, especially as concerns to payment of contractor's works accordingly implemented.

Client should manage and produces its own materials required for construction. Consequently, Client should transfer the procurement of construction materials for contractors. These will help to curb the problem associated with shortage of construction materials.

It is advisable for contractors to prepare proper plan and achievable schedule by using the appropriate scheduling tool and techniques, train their employees to increase their productivity and revise their human resource policy to improve benefit package for recovering sense of ownership

And also Contractors have to provide safe work environment to create conducive work area to improve less sense of ownership, prepare standards for work and pay attention on monitoring and evaluation as well as follow up.

The client is advisable to make timely decisions as much as possible to avoid cost and time overruns. Accordingly, good governance and sound financial management procedure should be properly implemented.

To solve delayed payment release, the client needs has strong financial management and reporting system for project. Stakeholders discussion needed on the challenges of payment procedure with all parties involved in construction.

the organization create good communication and coordination among project parties like client, contractors, consultants and other stakeholders like Ethiopian Power and Electric Authorities, Water and Sewerage Authorities, Addis Ababa Road Construction Authorities. Better if they can set meeting schedule to regularly discuss about how to improve construction performance on the site.

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**Questionnaires**  
**St. Mary's University**  
**School of Graduate Studies**  
**DEPARTMENT OF PROJECT MANAGEMENT**

**Dear respondents**

This is academic research which aims to assess the causes and effects of delay in construction of condominium house particularly Project 08 Branch Office are delayed.. Through this study, I would like to investigate the cause and effect of delay factors that currently existing the construction of condominium house of Project 08 Branch Office.

To give the way forward and lesson to be learned in future condominium construction.

All the information you provide will be kept in strict confidentiality and it will be only used for academic research. Please answerer acquisition carefully. There is no right or wrong answer. If you are unsure of an answer, please respond with your best estimate.

**General Instructions**

- There is no need of write your name.
- In all cases where answer options are available please tick (✓) in the appropriate box.
- If you any query please do not hesitate to call with this phone number (+251-91-1832186) and put any supportive idea on this Email ( [simeoneabera@gmail.com](mailto:simeoneabera@gmail.com))

## Part 1: General information

Company Name-----

1. Which organization do you represent?

Client [Owner]  Consultant  Contractor  Others

3. Gender: Male  Female

4. What is your education level?

Diploma  BA/BSc degree  MSc  PhD

1. Work Experience in this project?

< 5  6-10  11-15  >16

6. Respondent designation/title in the company

Project Engineer  Project Coordinator  Forman

Office Engineer  Site Supervisor Engineer  Others

7. Which organization do you represent?

Client [Owner]  Consultant  Contractor  MSEs  Others

## PART 2. Causes of Delay in Construction of Condominium

Please show causes of delay below by using a tick (✓) symbol. The five-point clearages from 1 to 5.

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

Causes of Delay		1	2	3	4	5
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Contractor related causes	Improper planning					
	Inefficient site management practice					
	Inadequate experience					
	Financial problem of contractor and sub-contractor(s)					
	Inability of coordination					
	Poor communication					

	Mistake during work					
	Rework due to error					
	Delay of work without reason					
	Less sense of ownership					
	Corruption					
Owner/client related causes	Financial constraint					
	Frequent change of orders during construction					
	Slow decision making					
	Low level of technical expertise					
	Delayed release of payment					
	Bid award for lowest price					
	Lack of communication					
	Unnecessary interference					
	Corruption in awarding					
	Less sense of ownership					
	Poor monitoring and evaluation					
	Poor follow up of progresses					
Consultant related causes	No enough employee assigned					
	Inadequate experience					
	incomplete design					
	Poor supervision					
	Slow to give instruction					
	Poor inspection and audit					
	Poor cost estimation					
	Poor project planning					
	Lack of proper cooperation of					
	Corruption					
	Unrealistic time schedule					
	Failure to update schedule when the need arises					
Materials related causes	Lack of provision of quality					
	Scarcity in material					
	Late procurement of materials					
	Poor material management					

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

If you have any additional comment regarding the causes of delay of project 08 branch office please specify them here. -----

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**Part 3: Effects of Delay in Construction of Condominium**

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

If you have any other additional effects of delay of Project 08 Branch Office, please specify here.

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**Interview**

Interview guide lines to collect data from construction of Project 08 Branch Office condominium house development,

1. How do you evaluate the planning, scheduling and controlling process of this project?
2. What is the reason for not executing this project on time?
3. What was the allocated capital budget for this project?
4. What are the major causes for delay of construction in this project?
5. What are the major effects of delay in this construction project?
6. What are the factors contributing for major cause of delay in this project?
7. What are the factors contributing for major effects of delay in this project?
8. How do you see the participation of parties involved in this construction project?



## APPENDICES

### i. Reliability Test

**Reliability Statistics**

Cronbach's Alpha	N of Items
.873	6

<b>Variables</b>	<b>Cronbach's Alpha if Item Deleted</b>	<b>No of items</b>
<b>Contractor related causes</b>	<b>.806</b>	4
<b>Owner/client related causes</b>	<b>.841</b>	4
<b>Consultant related causes</b>	<b>.945</b>	5
<b>Materials related causes</b>	<b>.847</b>	4
<b>Labor related causes</b>	<b>.811</b>	5
<b>External Related Causes</b>	<b>.808</b>	<b>3</b>
<b>TOTAL</b>	<b>.873</b>	<b>25</b>

### II. Correlation between dependent and independent variables

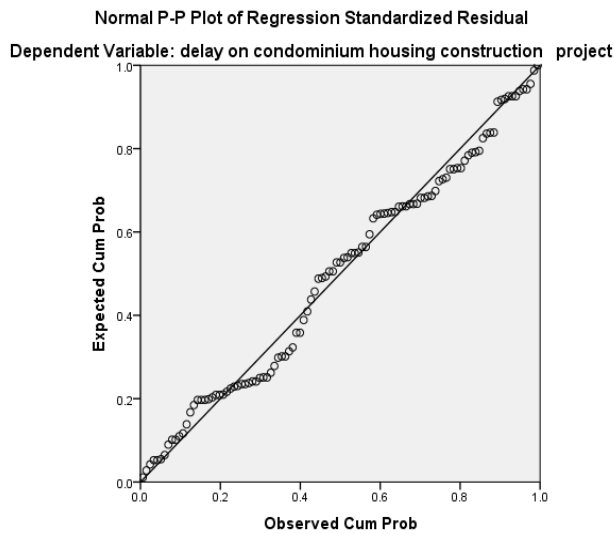
<b>Correlations</b>		contractor related causes	Owner/client related causes	Consultant related causes	Materials related causes	Labor related causes	External Related Causes	delay on condominium housing
Contractor related causes	Pearson Correlation	1	.579**	.578**	.698**	.728**	.476**	.726**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	111	111	111	111	111	111	111
Owner/client related causes	Pearson Correlation	.579**	1	.588**	.673**	.674**	.862**	.883**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	111	111	111	111	111	111	111
Consultant related causes	Pearson Correlation	.578**	.588**	1	.428**	.537**	.559**	.722**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	111	111	111	111	111	111	111
Materials related causes	Pearson Correlation	.698**	.673**	.428**	1	.609**	.556**	.749**

	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	111	111	111	111	111	111	111
Labor relatedcauses	Pearson Correlation	.728**	.674**	.537**	.609**	1	.564**	.820**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	111	111	111	111	111	111	111
External Related Causes	Pearson Correlation	.476**	.862**	.559**	.556**	.564**	1	.808**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	111	111	111	111	111	111	111
delay on condominium housing construction project	Pearson Correlation	.726**	.883**	.722**	.749**	.820**	.808**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	111	111	111	111	111	111	111
**. Correlation is significant at the 0.01 level (2-tailed).								

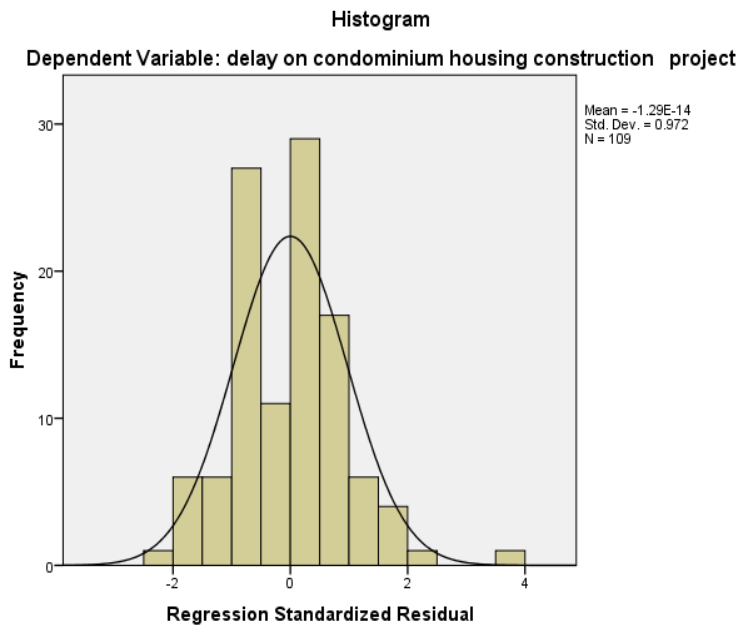
### III. Multicollinearity test (Only Independent Variables)

	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
Contractor related causes	.992	1.008
Owner/client related causes	.180	5.550
Consultant related causes	.603	1.657
Materials related causes	.500	2.000
Labor related causes	.473	2.113
External Related Causes	.251	3.984

## Linearity of dependent and independent variables



## V. Normality Test (Frequency Distribution of Standardized Residual)



## VI. Regression Analysis

### Model Summary<sup>b</sup>

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.929 <sup>a</sup>	.863	.855	.209	1.736

a. Predictors: (Constant), External Related Causes , Consultant related causes , Owner/client related causes, Materials related causes, Contractor related causes , Labor related causes

b. Dependent Variable: delay on condominium housing construction project

*Source: Owen Survey (February , 2022)*

### ANOVAa

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	16.745	6	2.791	128.667	.000 <sup>b</sup>
Residual	2.212	102	.022		
Total	18.958	108			

a. Dependent Variable: delay on condominium housing construction project

b. Predictors: (Constant), External Related Causes , Consultant related causes , Owner/client related causes, Materials related causes, Contractor related causes , Labor related causes

### Coefficients' of Multiple Regressions

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.711	.128		5.542	.000
	Contractor related causes	.429	.102	.386	2.241	.027
	Owner/client related causes	.639	.054	.811	11.897	.000
	Consultant related causes	-.038	.026	-.051	-1.468	.145
	Materials related causes	.678	.064	.714	10.585	.000
	Labor related causes	.294	.186	.558	1.584	.116
	External Related Causes	-.506	.144	-.101	-3.518	.001