



**ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES
SCHOOL OF BUSINESS**

**CAUSES AND EFFECTS OF DELAY IN CONSTRUCTION OF
CONDOMINIUM HOUSES IN ADDIS ABABA:
PROJECT 17 HOUSING DEVELOPMENT CONSTRUCTION IN FOCUS**

BY

TIGIST TASSEW

DECEMBER 2018

ADDIS ABABA, ETHIOPIA

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BY

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ID No. SGS/0418/2009A

**A THESIS SUBMITTED TO ST. MARY'S UNIVERSITY, SCHOOL OF
GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN
PROJECT MANAGEMENT**

Advisor: Misganaw Solomon (PhD)

DECEMBER 2018

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DEDICATION

This thesis is dedicated to my husband Addis Yohannes for taking care of my lovely daughter Marsus during my absence and to his mother Tsehay Ketema.

DECLARATION

I, the undersigned, declare that this MA thesis entitled **Causes and effects of delay in construction of condominium house in Addis Ababa: Project 17 housing development construction in focus** is my original work, prepared under the guidance of **Misganaw Solomon (PhD)**. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for earning any degree.

December 2018

St. Mary's University, Addis Ababa

ENDORSEMENT

This MA thesis entitled **Causes and effects of delay in construction of condominium house in Addis Ababa: Project 17 housing development construction in focus** conducted by **Tigist Tassew** has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a university advisor.

Name -----

St. Mary's University, Addis Ababa

Signature

December 2018

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ACRONYMS

AC	Actual cost
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+	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
Std. Dev.	Standard Deviation
TIBPI	Transparency International's Bribe Payers Index
UAE	United Arab Emirates
UN	United Nation
VIF	Variance Inflation Factor

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ABSTRACT

The main objective of this study was to identify the causes and effects of the delay in the construction of condominium house Project 17. Among 18 projects of condominium houses in Addis Ababa, Project 17 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 51 months with 62.83% performance. Mixed method research approach was used to capture both qualitative and quantitative data for the study. Questionnaire and interview were used to identify the major causes and effects of delay. 37 project team members filled the questionnaire and 5 of them took part in the interview. For the data analysis, both descriptive statistics and multiple linear regression methods were used. Schedule performance index and cost performance index were computed to evaluate the performance efficiency of Project 17. The result revealed that this project had poor performance but utilized above budget and has negative cost variance. A total of eleven explanatory variables were considered in the multiple linear regression model out of which eight variables significantly influenced the level of delay. A combined causes and effects included in the model revealed that about 99.60% of delay of Project 17 was due to contractor related causes, client related causes, material related causes, and labor related causes, corruption and effects of time overrun, cost overrun, and mistrust on owner of the project. Delay in Project 17 was significantly influenced by client related causes, material related causes, corruption, time overrun, and cost overrun at 1% level of significance and contractor related causes and mistrust at 5% level of significance. However, labor related causes affected delay in Project 17 at 10% level of significance. By contrast, consultant related causes, effect of dispute and litigation were insignificant for Project 17.

Keywords: *Project 17 condominium housing, delay in construction, causes of delay, effects of delay*

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Ethiopia is categorized as a developing country facing a number of problems. Housing problem is one. “Ethiopia’s urban centers are characterized by poorly developed economic bases, high levels of unemployment and incidence of poverty and slum habitation” (Integrated Housing Development Program [IHDP], 2008, p.2). This study indicates that nearly 40% of the nation’s urban dwellers live below the poverty line. An indicator of the magnitude of urban poverty is the proportion of the urban population that lives in slums which is about 70% of the urban population (IHDP, 2008), indicating that urban cities like Addis Ababa need segregated and integrated housing development programs like those of colonized towns such as Nairobi, Cape Town, Lagos, Accra and Freetown to alleviate urban housing problem by reducing slum habitation in urban center.

Creating access to housing for slum dwellers is a major challenge in Ethiopia. UN-HABITAT Study (2011) shows and concluded that in the last five years housing shortage was between 900,000 and 1,000,000 in urban centers. In addition, many Ethiopian existing houses are low quality standard and lack sufficient space, are very old, dilapidated, and highly congested in which infrastructure is overloaded or in deficit (Resom, 2010).

UN-HABITAT (2011) indicated, Addis Ababa is largely characterized by low provision of limited housing development, overcrowded housing that lacks basic services such as potable water, electricity, sanitation and do not meet minimum standards of living. To overcome the severe housing shortage of Addis Ababa, constructing cost efficient condominium houses, establishing fair housing transfer system and timely delivery of houses to enable residents was an option put in place.

The government of Ethiopia has, therefore, planned and started facilitation of condominium housing program in the city since 2003 and financial source of those condominium house projects

includes bank loan, city budget and down payments from beneficiaries of the project. The independent source of finance 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).

So, there is nothing to deny the housing development program's essentiality and the urgent need is to build and deliver condominium houses on time to users as soon as possible since the demand of those houses are significantly increasing. Until 2018 over 177,600 units of condominium houses were completed and transferred in the past 12 rounds but 276,634 units of additional houses have been under construction, delayed and not finished yet (AAIHDP Report, 2017/18).

Among other projects in AAIHDP, project 17 has been delayed when compared with base line plan. Project 18 and project 17 here started during the same period. Project 18 was started in July 2006 to construct 50 blocks each having G+4 stories and 69 blocks each with G+7 stories then 96.23% of construction is completed. In addition, this project was planned to finish the construction and transfer the houses to beneficiaries in November 2018. However, construction delay has been observed in Project 17. This project was also started in July 2006 to construct 44 blocks each having G+4 stories and 80 blocks each with G+7 stories. While the plan was to finish them within 18 months, they have taken 51 months and the construction performance was 62.83%. It was reported to have delayed around 3 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.

Such delays negatively affect project stakeholders such as client, contractors and consultants. To the client, it causes expense and loss of revenue. On the other hand, to contractors, it causes higher overhead costs, higher material and labor costs. On top of that, it causes disbelief on the part of consultants because of the project taking longer time than it was planned (Keane &Caletka, 2015).

Due to construction delay observed in Project 17, it was not possible to deliver the project on time. Hence, it is necessary to address the problem of construction delay to minimize the negative effects. The purpose of this study was, therefore, to identify the causes and effects of delay that stood as stumbling blocks to the timely completion. In addition, there was no study done to

investigate the reasons for the delay. This is the other reasons that triggered this research.

1.2. Statement of the Problem

Ethiopia is one of the fastest growing developing countries using house construction program as an input for growth, employment opportunity and infrastructure expansion (UN-HABITAT, 2011). Mahamid (2013) stated construction industry is very large, complex, and requires huge capital investments. Public construction projects in Ethiopia are parts of the country's development initiative. It shares considerable amount of the country's scarce financial resources. In Ethiopia, the construction industry is the highest recipient of government capital budget in terms of government development and investment program. Consequently, public construction projects consume an average annual rate of nearly 60% of the government's capital budget (Ministry of Works and Urban Development [MoWUD], 2006). Addis Ababa City Administration has allocated 10 billion Ethiopian Birr for the finalization of condominium houses being constructed under the 20/80 housing scheme (Fana Broadcasting Corporate, 2017).

Yet, the contribution to the development of the country has not been as desired due to various problems, limitations, and draw backs (Tregay, 2017). Impact of delay in housing project is a frequent and major problem. Delays in construction projects are one of the most chronic problems in the construction industry and has costly, risky disputes and adverse relationships among project participants and undesirable consequences on project success in terms of time, cost, quality (Sunjka and Jacob, 2013; Worku and Jha, 2016).

Worku and Jha (2016) also noted that construction delays are frequent problems within projects in Ethiopia. According to Tekalign (2014), 79.06% of public construction projects failed to meet their objective in Ethiopia and resulted in average of 26.2% delay. Abdo (2006) states 94% of the public building projects have encountered delays. Moreover, the delays extended three times than actual plan and the average delay is found to be 89.9%. Similarly, WorkuandJha (2016) show that, in Ethiopia, only 8.25% construction projects have been finished in the original targeted completion date. The remaining 91.75% delayed three times than targeted contractual time.

Among 18 projects in AAIHDP (2018) Project 17 housing development construction is one and it was started in July 2014. This project was to construct 44 blocks with G+4 stories and 80 blocks

with G+7 stories. Although they were planned to be completed in 18 months, 51 months elapsed with 62.83% performance. This delay is three times than schedule baseline. From 18 housing construction projects in Addis Ababa, Project 17 was chosen purposively for this study because it is the most delayed project when compared to its baseline plan (AAIHPO, 2018).

From this, one can argue that project delay has negative implication on economy since they share significant amount of scarce resource of the country. Project 17 housing development construction shares considerable amount of the project's scarce resources. According to AAIHDP (2018) capital budget of project 17 is Birr 175,741,578.05. But with this specified budget construction of this condominium house project is delayed three times than baseline plan. If the causes for the delay of such a project are not identified and the corrective project management decisions are not taken in time, the project may incur extra cost and extension of project time, which gives rise to dissatisfaction to all the parties involved which nowadays is becoming a serious problem. Project 17 housing development construction cannot be an exception.

Although the cause of delay varies from project to project, since every project has its own unique characteristics; the multiple effects seem to be time overrun, budget overrun, poor quality, bad public relation, arbitration, litigation, disputes and claims and total abandonment. Therefore, this research intended to identify the real causes and effects of delay in Project 17 housing development construction.

Many studies have been done in this regard with a tool of Relative Importance Index (RII), Frequency Index (FI), and Severity Index (SI). However, relationship or correlation of causes and effects on delay of construction of condominium projects were uncovered. Therefore, this study covered this with a tool of regression analysis. Besides, this research also studied the extent of the causes and effects on delay of housing construction project.

1.3. Research Questions

This study attempted to answer the following questions.

1. What were the factors contributing to the delay of construction of Project 17 condominium housing development in Addis Ababa?

2. What were the effects of the delay in Project 17 in Addis Ababa?
3. What were the correlation of those causes and effects on delay in this project?
4. To what extent did causes and effects affect the delay in Project 17?

1.4. Research Objectives

1.4.1. General Objective

The main objective of this study was to identify the causes and effects of the delay in construction of condominium house of Project 17.

1.4.2. Specific Objectives

The specific objectives of the study were:

1. To find out the causes of delay in condominium house of Project 17.
2. To assess the effects of delay in condominium house of project 17.
3. To evaluate the relationship between causes and effects of delay in Project 17.
4. To examine the extent the causes and effects had on the delay of condominium house of project 17

1.5. Significance of the Study

This research identified the causes and effects of the delay which hindered the timely delivery of the house. It is also hoped that the study would document lesson to be learned for future similar projects. It provides information about the causes and effect of project delay for parties involved in construction of condominium house projects in the future like client, consultants and contractors.

Besides, the results of this study could be used as an input to design policies and strategies in construction of condominium houses. Moreover, it contributes to the literature by giving information to enable researchers to modify and redirect research to develop new insights towards the problem to improve performance of condominium house construction.

1.6. Scope of the Study

This study was delimited geographically in Addis Ababa, Ethiopia, more specifically on Project 17 housing development construction, which is located southern part of Addis Ababa form eastern side of Akaki Kaliti sub city. 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, 51 months elapsed with 62.83% performance. This delay is three times than schedule baseline.

1.7. Limitation of the Study

The study should be understood in consideration of the following limitations. Some of the respondents were not willing to reveal correct information needed for the study for fear of any adverse consequence.

The financial report utilized from this project was not fully complied. Although financial statements do not reveal all the information related to the performance and cost efficiency of the Project. Hence, the reliability of schedule and cost performance index depends on the accuracy of financial report.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

INTRODUCTION

One of the most important and prerequisite steps in research undertaking is reviewing the critical points of current knowledge on the topic and formulation of research problems. The purpose of this chapter is to identify the major causes and effects of delay in construction projects by looking into previous studies made on the subject. This investigation was important as it provides substantial part of the inputs for the lists of factors to be considered for the research. This chapter covers different literature related to causes and effects of construction delay on previous studies in different world countries including Ethiopia to review significant factors and also to present comprehensive review of empirical study.

This study will expect to fill the literature gap of Ethiopian construction project specifically housing project of condominium which would show the causes and effects of project delay. Studies conducted in Ethiopia focus on ranking the causes of delay with tool of Relative Importance Index (RII) in road, building of public and housing construction projects. It looks that there is little done on the relationship or correlation and extents do causes and effects on delay in construction projects were uncovered but this study will cover this with a tool of regression analysis.

2.1. Theoretical Literature Review

The execution of a project is said to be successful when it is completed within the scheduled time, without exceeding the agreed budget, and according to the specified quality and standards. There are many causes and effects for delay of construction projects and several studies have pointed out various causes and effects based on a project type, specific location or to a particular project size.

Even though owners strive to avoid delays in construction and to minimize the time and costs

associated with the delays, they often find it difficult to control the circumstances causing delays. Delays occur in every construction project though the magnitude varies considerably from project to project. Some projects are only a few days behind the schedule; some are delayed over year. The complexity of projects, complicated schedules and coordination contribute to the necessity for this attention to time.

According to Palles (1998), delay and additional cost in a construction projects create an inevitable consequence of the risk and uncertainty associated with the execution of any construction project.

Delay, therefore, needs important attention in construction industry. Investigation in to this problem is needed in order to better manage delay situations and to mitigate their consequences. So, it is essential to define the actual causes and effects of delays to minimize and avoid the delays in construction projects. Assessing the actual causes and effects of delay, the extent does causes and effects on delay and the relationship of causes and effects of delay can provide insights for early planning to control projects delay and improve project performance.

2.1.1. Definition of Construction Delay

Different researchers defined construction delays differently on their own as per their research findings. According to Sunjka and Jacob (2013), delay in construction is defined as the time during which some part of the construction project has been extended or not executed owing to an unexpected event. On the other hand, Worku and Jha (2016) described delay as slowing down of a work without stopping it entirely. Mahamid (2013) defined delay as an act or event which extends the required time to perform or complete work of the contract itself as additional days of work.

Construction delay is defined as the times overrun either ahead of end date specific in a contract. If a project takes more than intended time and slipping more than its plan it is said to be delayed. Less productivity, rentable gap or reliance on current facilities will create loss of profit to the owner due to delay in construction. Longer work period creates delay in construction that affect contractor through higher overhead costs, higher material and increases labor costs through price rises (Assaf and Al-hejii, 2006).

Aibinu and Jagboro (2002) described delay as circumstances when the contractor and the project

owner together have a say to the non-completion of the project inside the original or the fixed or agreed contract period. In the construction management context, the simplest definition of delay is made by Sikwei (2010) as the late completion of work compared to the planned schedule or contract schedule. Similarly, according to Pickavance (2005), the word delay is defined as beyond the date that the parties agreed upon for the delivery of a project.

According to Assaf& Al-hejii (2006) delay refers to making something happen later than expected or to not act timely. In another study, Mohammed (2012) defined delay of construction projects as the late in progress or actual completion of work compared to the baseline construction schedule or contract schedule.

Generally, the above definitions of delay can be summarized as time extension, slowing down of a work, project slipping, beyond completion date, beyond date of agreement and late in progress over its planned schedule compared to the baseline.

2.1.2. Causes of Delays

There are several factors that cause delay in construction projects. All the causes are internal and external. The internal causes of delay include causes that come from the owner, designers, contractors, and consultants. The external causes of delays originate from outside of construction projects such as utility companies, government, subcontractors, suppliers, labor unions, nature, etc. Delays are internal since parties involved in construction projects can control the delay with correction and improvement of errors whereas delays are said to be external when delays are beyond the control of parties who are involved in construction.

Delay may be caused by clients, users, consultants, designers, owners, contractors and suppliers (Alhaji & Danladi, 2012). Similarly, Ahmed, Azher, Castillo & Kappagantula, (2002) states significant factors that cause delay of construction projects are classified into four major factors. These are contractor factor, consultant factor, client factors and external factors. According to this study, client related factors included delayed payments, slow decision-making, frequent change orders, bid award for lowest price and contract scope changes. Factors caused by consultants were provision of incomplete design, poor supervision, slowness to give instructions and lack of experience. External causes identified included shortage of materials availability, poor site

conditions and lack of equipment and tools in the market.

According to Assaf & Al-hejii (2006) the most top factors for causes of delay in large construction projects are financial problems, shortage of materials and poor site management practices.

In a related study of the causes of delay in Malaysia construction industry Hamzah, Khoiry, Arshad, Tawil and Che (2011) found poor site management, inadequate experience and poor subcontractors among the main causes of time delays on construction projects.

Ashraf & Ghanim (2016) studied causes and effects of delay in public construction projects in Jordan and the survey result indicated that contractors, consultants, owner, inadequate contractor experience, financing, payments, labor productivity, slow decision making, improper planning, and sub-contractors are among the top ten significant factors for causes of delay in public construction.

Assaf & Al-Hejji (2006) determined the causes of delay as owner, consultant and contractors related. In this study, it is indicated that the major frequent cause of delay acknowledged by every one of the three parties is “change order”. This survey result show that 70% of projects practiced time overrun and found that 45 out of 76 projects considered were delayed.

This result shows that change order or scope change will result in time overrun, cost overrun and quality defect because these three (scope, time and cost) are the triple constraints or iron triangle for project success. Since the iron triangle have equal in all side change in one side will affect all major project management body of knowledge. Therefore, to end up with project success the major attention should give for this iron triangle and also should manage change to reduce scope creep (PMBOK, 2013).

Neal (2007) states in his study that 40% of the construction projects in UK are time over-run than their original contract period. Stephen, Krit and Vithool (1996) studied the delays in house project in Thailand and argued that the troubles of the construction industry in developing economies could be nested in three layers: (1) difficulty of shortages or inadequacies in industry infrastructure, mainly supply of resources; (2) Problems caused by Clients and Consultants; and (3) Problems caused by incompetence of Contractors.

Stephen et al. (1996) identified 10 major significant causes of delay from a list of 28 diverse causes and 6 diverse effects of delay. Ten mainly vital causes were (1) contractor's inappropriate

planning, (2) contractor's poor site management, (3) insufficient contractor experience, (4) too little client's finance and expenditure for finished work, (5) troubles with subcontractors, (6) lack of material, (7) labor supply, (8) equipment accessibility and failure, (9) lack of communication between parties, and (10) mistakes during the construction stage.

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 because delays include: the vagueness of policies and procedures, slow decision-making, unnecessary interference, delay of the work without reason, inability to coordinate, many meetings do not produce decisions, and others that influence the construction project delays.

Yahya, Saiful and Muhammad (2013) conducted a study on delays in construction industry of Pakistan. Causes of delay were found to be change orders, labor productivity issues, poor site management and supervision, inspections/audits, poor cost estimation and control, inadequate project scheduling, defective design, inefficient construction methods, delayed payments, and incomplete construction drawings.

Yahya et al. (2013) states that the overall percentage of delay in construction projects of Pakistan was contractors (48.75%), consultants (17.5%), owners (16.25%), government (8.75%), and shared (8.75%). With this result the major causes of delays in construction projects of Pakistan are contractors, consultants and owners.

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 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.

Ahmed et al. (2002) state that construction delays in Florida were identified by six most critical causes of delays those are changes in specifications, inspections, incomplete drawings, changes in drawings, change order, building permits approval.

Owolabi et al. (2014) identified causes and effect of delay in Nigeria those were lack of funds to finance the project to completion, changes in drawings, lack of effective communication among the parties involved, lack of adequate information from consultants, slow decision making and contractor's insolvency, variations among others. This study states that project management problem, mistake and discrepancies in contract document, equipment availability and failure, mistakes during construction, bad weather, fluctuation in prices of building materials, inappropriate overall organizational structure linking to the project and labour were also the major causes of delay in construction.

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.

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. Robel 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.

In Ethiopia, construction projects of different regions that were completed between a year of 1985 and 1995 Abraham (2008) showed that 13 projects were delayed and most of the projects range between twice and five times than the original contract time.

The construction industry has an international character for corruption, asset misappropriation and bribery. Transparency International's Bribe Payers Index (TIBPI) continually reveals corruption to be greater in construction than in any other sector of the economy. Corrupt practices can be found at every phase in construction projects. For example, in the planning stage, the awarding of construction contracts as well as the operation and maintenance of projects after construction is finished (Rodriguez, Waite & Wolfe, 2005).

Certain characteristics make the construction sector close to corruption: competition; a large number of small-scale subcontractors; numerous approvals and permits; the uniqueness of many projects making it difficult to compare pricing; the opportunities for delays and overruns; and the fact that it is possible to conceal the quality of work (Stansbury, 2005).

According to DFID (2002) corruption in the construction industry often results from a combination of the highly competitive nature of the construction tendering process, a lack of transparent selection criteria for many projects, tight margins, close relationships between contractors, subcontractors and (sometimes) project owners, and cronyism in the industry, poorly trained, under supervised and unregulated work as well as the inadequate training of engineers and builders.

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).

Yahya et al. (2013, p. 88-90) mentioned the possible following factors causing delays in construction projects in Pakistan:

Contractor related causes	<ul style="list-style-type: none"> Improper planning Inefficient site management Inadequate experience Financial problem of contractor and sub-contractor Rework due to error Poor communication
Owner/ client related causes	<ul style="list-style-type: none"> Financial issue Change orders by owner during construction Slow decision making Low level of technical experience
Consultant related causes	<ul style="list-style-type: none"> Less employee Inadequate experience
Materials related causes	<ul style="list-style-type: none"> Quality of material Scarcity in material Late procurement of materials Poor material management
Labor - relate	<ul style="list-style-type: none"> Shortage of labours (skilled, semi-skilled and Low productivity of labors
General environment	<ul style="list-style-type: none"> Weather effect on construction activities change in rules and regulation Unforeseen site condition Natural disaster Obtain license from municipality Accident during construction Audit and certificate Shortage in providing services from utilities (Such as water, electricity, telephone.) Rise in prices of materials

2.1.3. Effects of Delays

The impact or consequences of delay in project completion is termed as the effect of project delay. Effect of delay is a change or impact due to delay (Sunjka and Jacob, 2013).

A study by Aibinu and Jagboro (2002) reveals six effects of delay on project delivery in Nigerian construction industry which are: time overrun, cost overrun, dispute, arbitration, total abandonment and litigation. Hamzah et al. (2011) disclose the same effects of delay in Malaysian construction industry. Yahyaet al. (2013) identifies effects of delays in Pakistan construction industry as clash, claims, total desertion and slowing down the growth of the construction sector. The desire to finish a project on time, under the planned budget, and with the highest quality is common goals for all contracting parties, including the owner, contractor and consultant. Delay usually result in losses of one form or another for everyone (Murali, Sambasivan and Yau,2007). The six effects of delay identified were: time overruns cost overrun, dispute, arbitration, litigation and abandonment.

Aibinu and Jagboro(2002) stated that in addition of the above six effects, poor quality of finished projects and bad public relations are effects of delay in construction.

According to Ahmed et al.(2002) delays on construction project is a worldwide phenomenon. Their effects are regularly accompanied by cost overruns, adversarial relationships, mistrust, litigation, arbitration, and cash-flow problems. A project may be considered as a successful endeavor until it satisfies the cost, time, and quality limitations applied to it.

In Ethiopian vital effects of delay investigated are cost overruns, time overrun, termination of contract, arbitration, and litigation sequentially (Endale, 2016; Tsegay and Hanbin, 2017).

Shaikh Asif (2009) indicated that the effects of construction delays are not confined to the construction industry only but influence the overall economy of a country like UAE, where construction plays a major role in its development and contributes 14% to the GDP. Thus, it is essential to define the most significant causes of delay in order to avoid or minimize their effects on construction projects.

Delays influence negatively on the contractor's performance and contribute to adverse impacts in construction projects such as contract disputes, low efficiency and enlarge in construction costs as

well pressure on the prearrangement of construction project objectives (Ahmed, et al. 2002).

According to different authors the six major effects will be discussed in detail.

2.1.3.1. Time overrun

Time overrun is slowdown of a work when compared to the plan without stopping it entirely. Also, it is defined as late in progress or actual completion of work compared to the baseline schedule or contract schedule.

Time overrun affects project negatively by increasing the planned 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).

The time overrun affects project negatively by increasing costs. The associated increases costs incurred by the client are 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).

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)

2.1.3.2. 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 (PMBOK, 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).

Cost overrun in Ethiopia, according to Worku and Jha (2016), were caused by three main factors that were contractor related problems, material-related problems, and owners' financial constraints, whereas Tsegay and Hanbin (2017) indicated that the most major factors included: high inflation/increased material price, design change by client, error in design, delayed payment on contracts and defective construction work.

Robel (2015) states that cost overruns have clear effects for the key stakeholders, and on the construction industry in general.

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 noncompletion, 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.

Owolabi et al. (2014) identifies major effects of cost overruns as follows: company or firm liability to insolvency and bad debt, under-utilization of man-power resources, plants and equipment, increased project cost due to extension of time which then increases the project costs and project abandonment.

2.1.3.3. Disputes

Murali et al. (2007) refers that disputes are the effects of major causes of delays in construction projects such as causes of client related, contractor related, and consultant related and external related that may be arisen during the construction projects among the project parties.

Lack of communication may also lead 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 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 easily it can lead to arbitration or litigation (Murali et al. 2007).

Project managers spend most of their time in communicating with team members and other project stakeholders, whether they are internal or external to the organization. Effective communication creates a bridge between diverse stakeholders who may have different cultural and organizational backgrounds, different levels of expertise, and different perspectives and interests, which impact or have an influence upon the project execution or outcome (PMBOK, 2013 p.313).

Project Manager required communication skill to communicate with team members and other project stakeholders to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.

Owolabi et al. (2014) also justify the above statement by approving that lack of effective communication among the parties involved in construction projects will induce delay.

2.1.3.4. Arbitration

According to Muraliet 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).

According to Ashraf and Ghanim(2016) effect of arbitration was caused by client, contractor, consultant and external related causes. However, external causes such as utility companies, government, subcontractors, suppliers and labour unions were taken major responsibility for this effect.

2.1.3.5. 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.

2.1.3.6.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.

Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigerian construction industry. They identified total abandonment as one of the major effects of delay.

All projects or phases must be closed out under which they stop, terminated, or completed. Projects come to an end for several reasons whether they are completed successfully, they are

cancelled or killed prior to completion or they evolve into ongoing operations and no longer exist as 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 (Project Management Fundamentals, 2009).

According to Sunjka and Jacob (2013, p.641), effects of project delays concluded as the follows:

Effect	Description
Time overrun	When the stipulated completion time is pushed forward, the project is said to have experienced time overrun.
Budget overrun	When a project is completed at a cost higher than what was budgeted, it is said to experience a budget overrun.
Poor quality completed project	Inferior workmanship and/or inferior quality materials can lead to issues of poor quality
Bad Public Relations	When projects are delayed, contractors, consultants and clients could put their public reputations at risk
Litigation	Disputes can lead to court cases for resolution especially when large penalties are at stake
Arbitration	The cost and time related to the engagement of professional
Disputes and claims	Disputes and claims arise against for the losses incurred through
Total abandonment	Delays in project execution could lead to total abandonment if issues leading to the delays are not resolved timely

Generally, relationship between causes and effects are of two types. These are direct and indirect relationships (Ashraf and Ghanim, 2016). In their study material-related causes with effects of cost and time overruns in construction projects. Their study also connected the causes related to contractor and causes related to labour with the time overrun of the project.

2.2. Empirical Review

Yahya et al. (2013) explored that the factors related to contractor, client, consultant, material and equipment have significant impact on delay in construction project whereas labor and general environment factors found to have no effects on delay of construction project in Pakistan. Whereas study conducted in Ethiopia by Abdo (2006) contradicts with Pakistan by indicating general environment factor such as material and labor price escalation were the most frequent causes of delay of construction in Ethiopia. Nevertheless, this study has similar result with Endale (2016) and Yahya et al. (2013) on causes related to delayed payments, scarcity of materials, late material supply, changes in design, unrealistic time schedule, poor site management and failure to update schedules on time.

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.

The result of Jordan construction conducted by Ashraf and Ghanim (2016) showed similarity with Worku and Jha (2016) which described delay of Ethiopian construction projects was mostly occurred by the difficulty in financing by contractors, escalation of materials price, ineffective project planning, scheduling and resource management.

From this result we can conclude that most causes of delay in Ethiopia were internal factors but in Jordan both internal and external factors. Similarly, Robel (2015) concluded that construction delay in Ethiopia is mostly caused due to financial problem, managerial problem or local contractor's limited capacity and ability.

Renuka et al. (2017) conducted an analysis of multiple linear regressions to develop a relationship between the dependent variable which is delay in construction and independent variables are manpower, material, equipment, finance and scheduling and control related problems. The result showed that groups like manpower, material, equipment, finance and scheduling and control related problems have the significant value less than 0.05. There is a significant contribution of all the six groups in the causes of delay in construction projects. So there is a casual relationship between the groups and the causes of delay.

Abisuga (2014) claimed that the effects of construction delays were significant at 1% in time overrun, dispute and 5% level of significant on cost overrun and 10% in project abandonment. From the above list, it is shown that the effects of construction delays were significant at different level and effect of construction delay such as time overrun, dispute, cost overrun, and project abandonment were strongly correlated.

The survey results of Wuhan (2011) indicated that most delay factors are significant at 1% level to client related factor. This result shows that 99% of delay was caused by client related factors. To reduce delay that caused due to client related factors, client should have strong economical ability and financial arrangement for project, correct decision on timely manner; improve level of technical experience and manage scope of project on construction project and tacking appropriately time decision. Whereas result of Wuhan (2011) was different from Abdo (2006) that contractors were responsible for 38.5% of the causes of delays in public building projects of Ethiopia and consultants for the 25%, clients for the 18.2 %, government for the 9.1%, designers for the 4.6 %, and the rest 4.6 % shared by the stakeholders.

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. Time affects every other factor, the increase in final cost; more money must be spent.

Dispute among parties involved, litigation and arbitration were also effects of delay in construction at 77%, 72% and 70%, respectively. There is a close correlation among these effects that were shown in Nigeria construction projects. Dispute among parties involved can induce litigation and arbitration and if the decision of the arbitration panel is not acceptable to either of the parties involved, this can lead to big time legal battle which can shorten the progress of the work.

To evaluate the empirical relationship between the categories of causes and effects of delays in Jordan public building Ashraf and Ghanim (2016) used correlation analysis. The results of the analysis show that effect of time overrun is correlated with client, contractor, consultant and external causes by 0.564, 0.457, 0.682 and 0.778 respectively. This result indicates that external causes were strongly correlated with time overrun in Jordan public projects. This study also noted cost overrun is correlated with client, contractor, consultant and external causes by 0.224, 0.548, 0.604 and -0.109 respectively from this result one can conclude that consultant is highly correlated with cost overrun however, external causes are negatively correlated with cost overrun. From this one can understand that utility companies, government, subcontractors, suppliers, labor unions, nature and other external causes are not cause for cost overrun and have no any effect on cost overrun. Disputes were negatively correlated with contractor in this study by -0.184 this indicates that disagreement in Jordan construction projects are not due to contractors' responsibility.

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. The study carried out by Owolabi et al. (2014) states that causes related to contract correlated positively with the disputes and negotiations occurred among the parties participating in the project.

Time and cost overruns were correlated positively with the finance related causes and material related causes this result has differences with study of Yogita et al. (2015). However, these two studies have similar result of causes related to labor or finance was positively correlated with disputes and negotiation. Also, this study shows causes related to finance and external factors were correlated with time overrun and abandonment of the project.

2.3. Conceptual Framework

The conceptual framework shows the variables and the correlation between the causes of delays by category with the effects of delay. The arrows show the causes and effects of delay in project 17. 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. This all relationship is showed in below diagram by using Fish Bone diagram.

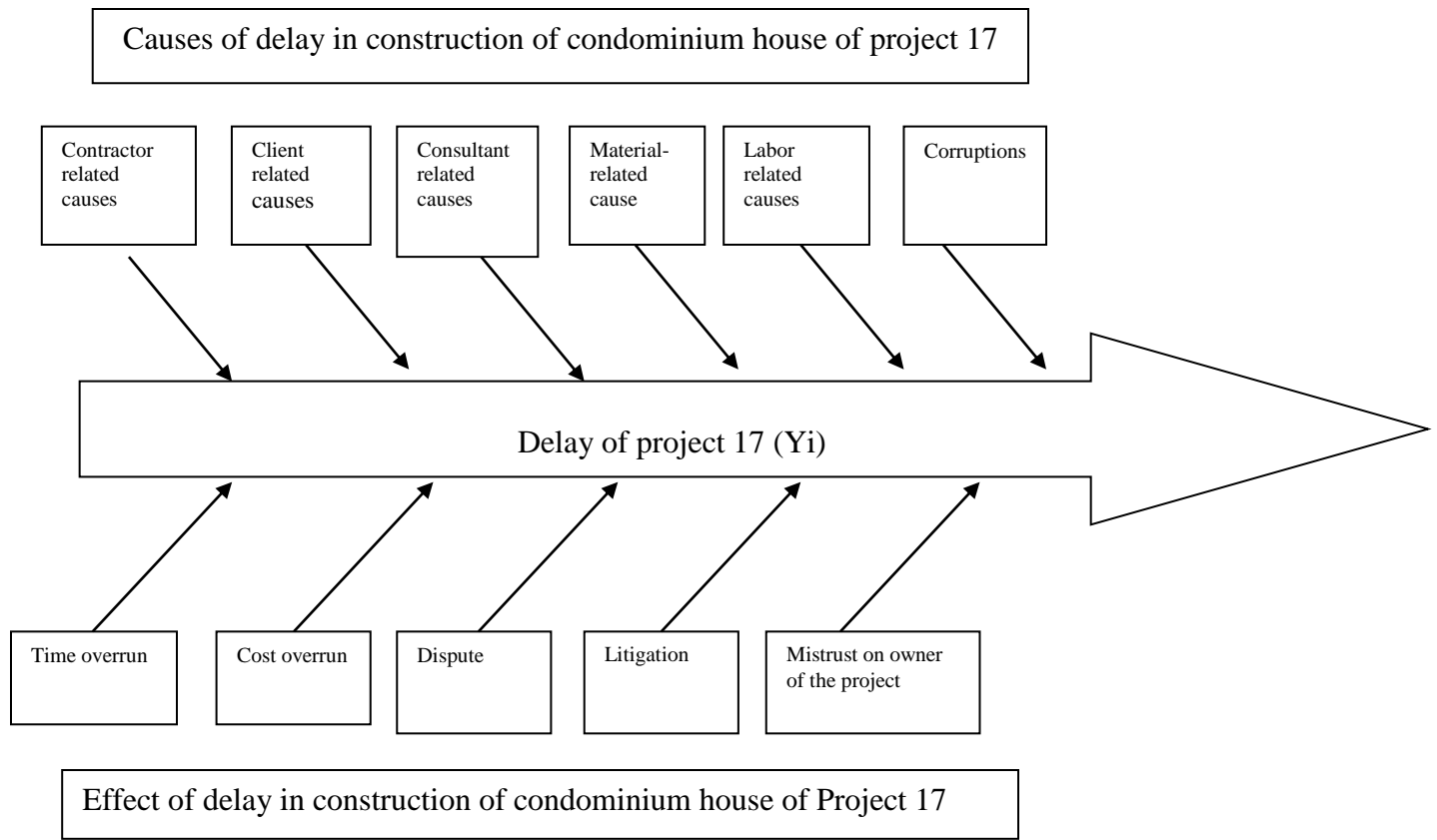


Figure 2.1 Based on Fish-Bone Diagram, causes and effects of the construction delays of project 17

The dependent variable is delay of project 17. The independent variables are contractor related causes, client related causes, consultant related causes, material related causes, labor related causes, corruptions, time overrun, cost overrun, disputes, litigation and mistrust on owner of the project.

Fish bone diagram was used for this conceptual frame work because it is best to show the cause and effect relation. Although the fishbone diagram identifies many possible causes for an effect or problem.

Summary

This chapter reviewed different literatures from different countries perspective including Ethiopia and saw definition, classification and causes and effects of delay of construction projects in detail. Accordingly, from the referred literatures variables which are related to contractor, owner/client, consultant, materials, equipment, labor and general environment are identified as causes and discussed in detail.

Moreover, from different literature effects of delay are also discussed in detail. This are time overrun, cost overrun, disputes, arbitration, litigation and total abandonment. Further empirical review was done through presenting different countries findings and experiences including Ethiopia by showing the similarities, differences and contradictions among findings. Conceptual framework is designed to show the concept of the paper, relationship and correlation of causes and effects of construction delay of project 17 by using Fish-Bone or Ishikawa diagram.

CHAPTER THREE

RESEARCH METHODOLOGY

INTRODUCTION

The purpose of the study was to identify the causes and effects of the delay in construction of condominium house of Project 17. This chapter presents the methods, approaches and designs. It also includes sources and types of data, target population and sample, sample size determination and sampling selection procedures.

Methods of data collection and the tools, methods of data analysis, variable specification and hypothesis, test of assumptions of multiple linear regression and ethical consideration are also discussed in this chapter.

3.1. Research Approach and Design

In this study, mixed method research approach was used to capture both qualitative and quantitative data. The qualitative method was used to support the quantitative data. This method was used for triangulation of qualitative with quantitative methods and to increase the perceived quality of the research.

According to Cooper (2014) any researcher can use diverse strategies in his/her research or more than one design at a time. This means different research designs can employ at a time, in single study. This research employed two types of designs such as descriptive and mainly explanatory design.

3.2. Sources and Types of Data

Primary and secondary data were used for the causes and effects of delay in construction of Project 17. The primary data represents firsthand information obtained from respondents who works for the teams of client, contractors and consultants. The primary data were collected through

questionnaire and interview. This data helped to find out what caused the delay and what effects the delay have brought about and the extent to which the causes and effects had on delay of condominium house of Project 17. Primary data also helped the researcher to evaluate the relationship of causes and effects of delay in Project 17. This study used the primary sources obtained from the client, contractor and consultant of Project 17.

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. Secondary data was used to investigate and identify major causes and effects of delay in construction projects by seeing major problems in execution the project on actual time.

3.3. Target Population and Sample

3.3.1. Target population

Target populations of this study were team members of Project 17 housing construction development. The population of the research consists of the contractor, consultant and client currently working on construction of Project 17 in Addis Ababa and total population were 122 project team members.

3.3.2. Sample size determination

From 18 housing construction projects in Addis Ababa, Project 17 was chosen purposively for this study because it is the most delayed project when compared to its baseline plan.

The sample size was determined using statistical formula put hereunder. This was considering the population to estimate the number of questionnaires to be distributed to respondents to consider the response rate.

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 (Gay and Airasian, 2003). As stated earlier, the total population of this study was 122. Therefore, the sample size of the study was determined hereunder with the formula of Gay and Airasian (2003).

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

Where

- ❖ n is the sample size of the study,
- ❖ N is the population size and team members who were working as consultant, contractor and client in Project 17 housing development construction and
- ❖ 0.3 represent 30% of population size.

When this is applied to equation (3.1)

$$n = 122 * 0.3 = 37$$

Table 3.1: Sample size summary of each group

Stakeholders			
No	Participating	tin Total employees	Sample
Project 17			
1	Consultant	12	4
2	Contractors	72	22
3	Client	38	11
Total		122	37

The sample size of this study is 37 project team members determined by a simplified formula suggested (Gay and Airasian, 2003). This sample size was determined for a data tool of questionnaire and some of the respondents who were in the management position also used for the purpose of interview.

3.3.3. Sampling selection procedure

Stratified sampling procedure was applied to separate the experts and management of client, consultants and contractors in the project team. From those strata of experts and management sampling frame of the study was selected by using simple random sampling. This means, each member of the strata has an equal chance of being included in a sample by using probability

proportionate that have worked directly in the project construction. Stratified sampling was selected because there were different characteristics among teams of client, contractors and consultant. However, there were similarities between each team members in the strata.

3.4. Data Collection and Tools

The required data were collected by using a questionnaire. A questionnaire was developed to assess the causes and effects of delay in construction of condominium houses in Project 17. 37 structured questionnaire was prepared in English and translated to Amharic to collect the required information. The questionnaire was divided into three parts. The first part consisted of questions about the general profile, information and background of the respondents. The second part comprised of questions regarding the major and important causes of construction delay. The third part focused on the most important and major effects of construction delay. The questionnaire was designed to be close ended questions. These types of questions had a number of choices of possible answers and the respondents to select whatever they feel was most appropriate.

The reason for selecting a questionnaire in this research was because it has a merit of giving adequate time for informants to respond. It also allowed easily approaching respondents and reaching them conveniently and it is economical. Similarly, the closed ended questions were also selected because they were easier to assess and help them answer considering how busy the respondents were.

In addition, unstructured one-to-one interview was conducted with five purposely selected participants from sample size of the study. The respondents of interview were major contracting parties from consultant, contractor sand client who participated at different responsibility levels in the construction of Projects 17. Interview participants were drawn from those who filled in the questionnaire for the reason of triangulating the data and to collect reliable and firsthand information. They assumed management positions. The interview was done after the questionnaire. Since the interview was face to face it helped the researcher to get more information about Project 17. The researcher had enough time to work on the questionnaire until the members of management confirmed their availability.

3.5. Methods of Data Analysis

Methods of data analysis used in this research include both descriptive statistics and multiple linear regression analysis, as discussed hereunder to achieve the specific objectives of the study. Descriptive design was used to describe the analysis of the collected data while explanatory design was concerned to test objectives and the research hypothesis, since one of the aims of this research was to find relationships between various causes and effects of delay in Project 17.

3.5.1 Descriptive Analysis

Descriptive statistics such as mean, which explains the analysis of average causes and effects of delay of Project 17 was used. Standard deviation was also used to describe to what extent the causes and effects deviated from the mean and ratios were computed. Schedule performance index (SPI) and Cost Performance Index (CPI) ratios measuring time efficiency of schedule and cost efficiency of budgeted resources respectively were computed from annual report of Project 17 housing development construction in 2010 EC fiscal year.

Ratio analysis

Schedule Performance Index (SPI) was used to measure time efficiency of schedule. It measures how efficiently the project team was using its time. Ratios were used as one tool in identifying areas of strengths and weakness in the project. SPI ratios enable to make comparison whether the project gets completed within the planned schedule or not.

Earned value (EV) and Planned value (PV) were used from annual reports of Project 17 housing development constructions to know efficiency of schedule. The SPI were calculated using ratios that allow judgment about the schedule efficiency of the project.

Schedule performance index: is a tool used to measure time efficiency of schedule and expressed as a ratio of earned value to planned value. It was used to measure how efficiently the project team used its time (PMBOK, 2013).

$$\text{Schedule performance index} = \frac{\text{Earned Value}}{\text{Planned Value}} \quad (3.2)$$

Cost performance index: is a tool to measure cost efficiency of budgeted resources for the work completed and expressed as a ratio of earned value to actual cost (PMBOK, 2013).

$$\text{Cost performance index} = \frac{\text{Earned Value}}{\text{Actual Cost}} \quad (3.3)$$

3.5.2. Multiple Linear Regression Analysis

Multiple linear regression analyses were employed to test some specific objectives and the research hypothesis since one of the specific objectives of this research was to examine the extent to which the project was delayed and its effect and to find out the correlation between the causes and effects of delay in this project.

The dependent variable was delay in construction of Project 17 housing development. Independent variables were causes of contractor related, owner/client related, consultant related, materials related, labor related and general environment. Effects of delay included time overrun, cost overrun, abandonment, arbitration, litigation and dispute between parties.

The dependent variable was continuous in nature representing the delay in construction of Project 17. The value of this delay was expressed by actual figure which is measured by months. Therefore, a multiple linear regression model was employed to know the extent to which the causes and effects have affected delay in this project and helped to identify the correlation of causes and effects in this project.

Multiple linear regression analysis was done by using Stata Windows, Version 13 to archive the objective of the study. According to Greene (2012), the multiple linear regression model's formula was specified as:

$$Y_i = \beta_i x_i + \varepsilon_i \quad (3.4)$$

Where: Y_i represents the delay in construction of Project 17, β_i represents a vector of independent variables, x_i represents a vector of parameters to be estimated and ε_i is the error term. Several

causes and effects were regressed upon delay in construction of Project 17 to identify significant causes and effects of delay, the extent does causes, and effects have affected delay and correlation of each.

3.5.3. 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).

To measure the level of delay in construction of Project 17 the study has recognized the base line plan that was undertaken to complete the project. Construction delay of Project 17 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:

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

Hypothesis 1: contractor related causes have positive effect on project delay.

Client related causes: 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.

Hypothesis 2: client related causes affect delay in construction positively.

Consultant related causes: 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 the

occurrence of construction delay. Therefore, consultant related causes would be expected to have positive impact on level of construction delay in Project 17.

Hypothesis 3: consultant related causes would be expected to affect delay of project 17 positively.

Material related causes: It refers to the availability of material and equipment in construction projects. This is a continuous variable. If the project gets shortage of material in construction, it would result in delay of construction.

Hypothesis 4: material related causes were expected to influence level of delay in construction of Project 17 positively.

Labor related causes: It is a continuous variable and measured by shortage of skilled personnel and low productivity in Project 17. Labor related causes delay accomplishment of the day-to-day duty to achieve goal of the project.

Hypothesis 5: labor related causes were expected to influence level of delay in construction of project 17 positively.

Corruptions: It refers to the perception of team members in abuse of entrusted power for private gain. Corruption has corrosive impact on construction, which affects the performance through income inequality distribution and affects the overall governance and construction environment. According to Tsegay and Hanbin (2017), if there were as high degree of corrupt in construction; efficiency, transparency and accountability would not have a good attitude towards the projects. Therefore, this variable is expected to have negative impact on level of construction delay of project 17.

Hypothesis 6: corruption was expected to have negative impact on level of construction delay.

3.5.4. Test of Assumptions of Multiple Linear Regression

Detection of multicollinearity: Multicollinearity may cause lack of significance of individual independent variables, while the overall model may be strongly significant. It may also result in wrong signs and magnitudes of regression coefficient estimates and consequently incorrect conclusions about relationships between independent and dependent variables (Maddalla, 1977).

Variance inflation factor was employed to detect the existence of multicollinearity among explanatory variables.

$$VIF_i = 1 / (1 - R_i^2) \quad (3.5)$$

Where R_i^2 is the coefficient of multiple determinations between X_i and other explanatory variables, for each selected variables (X_i) were regressed on all other continuous explanatory variable. The coefficients of determination (R_i^2) were constructed for each case. The larger the value of R_i^2 can result in the higher the value of VIF that caused higher multicollinearity problems among the variable X_i . If the value of VIF is 10 and above the explanatory variables have high multicollinearity problems (if the value of R_i^2 is 1), it results in higher VIF and cause perfect collinearity. The explanatory variables that have a value of VIF 10 and above are excluded from model.

Detection of heteroscedasticity: Heteroscedasticity occurs when the error term has non-constant variance but all other assumptions of the classical linear regression model are satisfied, then the consequences of using the OLS estimator to obtain estimates of the population parameters are: still unbiased, OLS estimator is inefficient (it is not BLUE), the estimated variances and covariance of the OLS estimates are biased and inconsistent and hypothesis tests are not valid. The result estimates are not even consistent in other word the regression coefficient is upward biased. This study tested the existence of hetroskedasticity by employed Breusch-Pagan test using STATA command *hettest* and the remedies for hetroskedasticity is robust the model.

Detection of specification error: Functional form and hypothesis testing are directed towards improving the specification of the model or using that model to draw generally narrow inferences about population. Specification of the functional form is important, because a correct explanatory variable may well appear to be insignificant or to have an unexpected sign if an inappropriate functional form is used. There are numerous types of errors that one might make on the specification of the estimated equation. Perhaps the most common ones are the omission of relevant variables and inclusion of redundant variables. This can be detected by *ov* test through STATA command (Gujrati, 2003). No rule of thumb for specification error, the only means is trial and error until included relevant variables which omitted before and excluding redundant variables in the model.

3.6. Ethical Consideration

Obeying ethical rules is vital in conducting research. The researcher received a letter of introduction from the St. Mary's University. This letter enabled the researcher to carry out the research and approach the informants. Participant of the study was informed about the objectives of the study emphasizing that the data were used only for the intended academic purpose. Careful attention was given, regarding respecting the rights, needs and values of the study subjects, and maintaining confidentiality of the data and acknowledging sources of information.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter deals with the empirical findings and discussions of the results obtained by using descriptive and multiple linear regression analysis. It has five major parts. In the first part, the characteristics of team members of Project 17 such as response rates by sector organization, respondents' designation/title and experience of project team member are discussed. In the second part, analysis of average causes of delay in Project 17 results is presented. In the third part, the effects of delay in Project 17 were analyzed and discussed. In the fourth part, performance and cost efficiency of Project 17 was analyzed by using schedule performance index and cost performance index from yearly financial report of the project. Finally, multiple linear regression models were employed to examine the extent and correlation between causes and effects on delay of condominium house of Project 17. In addition, hypotheses testing were done by using STATA software version 13 whose results are discussed in this chapter.

4.1. Characteristics and Description of Team Members of Project 17

A total of 37 questionnaires were distributed among the respondents of different backgrounds working on Project 17. The distribution mainly focused on the people working in project owners, contractors and consultants. All (100%) of the questionnaires were returned. When we see the distribution in terms of respondents, 11 questionnaires were filled out by project owners or professionals from client side, 22 by contractors and their key staff and four by consultants. Table 4.1 shows the profile of the respondents' designation and experience, respectively.

Table 4.1 Respondents' designation and mean of their experience

Respondents' designation in the company			Mean of respondents' Experience in
Designation	Number	percentage	
Project Engineer	6	16.22	7.5
Project Coordinator	3	8.11	13
Office Engineer	7	18.92	9
Site Supervisor Engineer	6	16.22	7
Forman	11	29.73	3.7
Others (senior finance, human resource, senior purchaser and audit)	4	10.81	6.5
Total	37	100	

Source: own computation from survey results, 2018

As can be seen in Table 4.1, respondents were drawn from different divisions of professionals who were involved in the project and most of them have more than five years of work experience in their respective professions. The percentage of respondent's designation in this project were (6) 16.22% project engineer, (3) 8.11% project coordinator, (7) 18.92% office engineer, (6) 16.22% site supervisor engineer, (11) 29.73% Forman and (4) 10.81% others like senior finance, human resource, senior purchaser and audit involved expertise in construction. The result revealed that the average experience of project engineers, project coordinators, office engineers, site supervisor engineers, Forman and others had 7.5, 13, 9, 7, 3.7 and 6.5 years, respectively. This result shows that relatively wider and more variety of professionals with good work experience in construction sectors were involved in Project 17 which is relevant to construction of housing projects like this.

4.2. The Analysis of Average Causes of Delay in Project 17

The first objective of this study was addressed by using descriptive statistics to find out the causes of construction delay in condominium house of Project 17. These delay causes had a five- point scale ranged from 1 to 5 from strongly disagree to strongly agree. The following table shows the mean and standard deviation of causes of delay in Project 17.

Table 4.2. Mean and standard deviation comparison for causes of delay in Project 17

Delay caused by	Respondents	Mean	Std. Dev.	Min	Max
Contractor related	37	4.05405	2.329711	1	9.5
Client related	37	4.32	1.98	1.93	19.6
Consultant related	37	2.70721	2.161815	1.3	2.83
Materials related	37	4.77838	1.122778	1	17.2
Labor related	37	4.1027	1.011184	1	5.2
Corruption related	37	4.38624	1.443739	2	7.33642

Source: own computation, 2018

Contractor related causes: Table 4.2 indicates that the mean of respondents to contractor related causes were 4.05 with standard deviation of 2.32. The minimum and maximum contractor related causes were 1 and 9.5, respectively. As per the above table out of the total respondents, only one respondent strongly disagreed while ten respondents strongly agreed that contractors were the major causes for delay of Project 17. Voice of majority of respondents agreed that contractor related causes were major causes for delay of Project 17.

Table 4.3 Respondents' response to contractor related causes

Respondents response	Strongly Disagreed	Disagreed	Neutra	Agreed	Strongly Agreed
Improper planning	2	6	2	22	5
Inefficient site management	3	1	13	16	4
Inadequate experience	5	8	4	16	4
Financial problems	1	6	0	21	9
Incompetent coordination	2	6	7	17	5
Poor communication	1	6	6	16	8
Mistake during work	0	2	4	16	15
Rework due to error	1	7	5	7	17
Delay of work without reason	2	7	2	20	6
Less sense of ownership	1	4	4	20	8
Corruption	1	7	4	17	8

Source: own computation, 2018

Result of Table 4.3 showed that more than twenty respondents agreed that delay of work without reason, less sense of ownership, improper planning and financial problem of contractor and sub-contractor) were major contractor related causes for delay in Project 17. The interview result of code 01, 02, 04 and 05 indicated that most contractors received finance in advance from client and they miss utilized the resource. 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.

Client related causes: The mean of respondents for this causes were 4.32. This implies that majority of respondents agreed these causes of constriction delay (see Table 4.2) with standard deviation of 1.98. The minimum and maximum client related causes were 1.93 and 19.6. Out of the total respondents, only two respondents disagreed whereas twenty respondents strongly agreed that clients were the major causes for delay of Project 17.

Table 4.4 Respondents' response to client related causes

Respondents response	Strongly Disagreed	Disagreed	Neutral	Agreed	Strongly Agreed
Financial constraint	4	14	0	15	4
Frequent change orders during construction	4	9	6	12	6
Slow decision making	4	0	0	23	10
Low level of technical expertise	5	4	8	14	6
Delayed release of payment	1	5	7	18	6
Bid award for lowest price	4	8	12	10	3
Lack of communication	11	2	0	22	2
Unnecessary interference	0	9	12	12	4
Corruption in awarding contract	1	5	12	9	10
Less sense of ownership	0	6	4	17	10
Poor monitoring and evaluation	3	5	7	12	10
Poor follow up of progress	2	6	5	15	9

Source: own computation, 2018

Table 4.4 indicates less sense of ownership, delayed release of payments, lack of communication and slow decision making were major client-related causes. Moreover, from the interview result of code

01, 02, 03, 04 and 05 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.

Consultant related causes: Table 4.2 illustrates, the minimum and maximum consultant related causes were found 1.3 and 2.83, respectively. From the total respondents,33 disagreed this cause for project delay. Mean and standard deviation of respondents for consultant related causes were 2.70 and 2.16, respectively. 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.

Material related causes: As can be seen in Table 4.2, the mean of respondents for material related causes were 4.77 with standard deviation of 1.12. The minimum and maximum material related causes were 1.00 and 17.2, respectively. Out of the total respondents,19 agreed as well as 17 strongly agreed that material related causes were reasons for delay in this project. However, only one respondent strongly disagreed.

Table 4.5 Respondents' response to material related causes

Respondents response	Strongly	Disagre	Neutr	Agreed	Strongly
Lack of provision of quality material	2	3	5	10	17
Scarcity in material	1	2	1	11	22
Late procurement of materials	1	2	3	7	24
Poor material management	0	2	2	12	21
Fluctuation in price of building materials	3	2	7	8	17
Delay in delivering material on site	1	2	0	15	19

Source: own computation, 2018

As per Table 4.5 result, more than 20 respondents agreed that poor material management, material scarcity and late material procurement were major material related causes for delay in Project 17.

From the interview, it was found out that 528 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 Project Office (AAHDPO) 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.

As per the interview results of code 01, 02, 03, 04 and 05 due to late procurement and bid failure, project 17 was quit for seven months. Central procurement policy has big contribution for late procurement of materials which was a critical and major cause for project delay.

The result of this study was like the findings of Abdo (2006) on delays of public building construction projects in Ethiopia, Robel (2015) on schedule delay in Addis Ababa’s light rail transit construction and Endale (2016) on the major causes to the delay in the construction of 40/60 saving houses project in Addis Ababa.

Labor related causes: As Table 4.2 illustrates, the mean of respondents for labor related causes were 4.10, with standard deviation of 1.01. The minimum and maximum labor related causes were 1 and 5.2, respectively. From the total respondents, 31 agreed that labor related causes were delay factor for Project 17. However, only one respondent strongly disagreed, and five respondents strongly agreed that labor was the major cause for delay.

Table 4.6 Respondents' response to labor related causes

Respondents response	Strongly Disagreed	Disagreed	Neutral	Agreed	Strongly Agreed
Shortage of skilled personnel	4	2	11	11	9
Low productivity	5	4	3	5	20

Source: own computation, 2018

As we can see from Table 4.6 major labor related causes in this project was low productivity. Section 4.1., describes that there was relatively wider and more variety of professionals with good work experience in construction sectors were involved in Project 17. However, there was low productivity. The result of SPI indicated in section 4.4.1., also implies that Project 17 had a rate of poor performance. This is impact of low productivity. The interview result of code 02, 03, 04 and 05 shows late payments and poor safety on the work area had been contributed for low productivity. The result of this study was similar to the findings of Worku and Jha (2016), on investigating causes of construction delay in Ethiopian construction industries.

Corruption: As we can see from Table 4.2 the mean of respondents for corruption in Project 17 was 4.38 with standard deviation of 1.44. Out of the total respondents, 28 agreed that corruption was the major cause for delay. On the other hand, only two respondents disagreed.

The interview result of code 01, 02, 03, 04 and 05 were depicts that corruption related causes were occurred in awarding of construction contracts and lack of transparent selection criteria for sub-contractors. This result is similar to the findings of Rodriguez et al. (2005), on the global corruption report and Tsegay and Hanbin (2017), on analysis of delay impact on construction project in Ethiopia.

4.3. The Analysis of Average Effects of Delay in Project 17

The second objective of this study was addressed by using descriptive statistics to assess the effects of construction delay of Project 17. These effects of delay had five-point scale ranged from 1 to 5 and the results of the questionnaire and interview were presented and discussed accordingly.

Table 4.7 Mean and standard deviation comparison test of effects in delay of Project 17

Effects of Delay	Respondents	Mean	Std. Dev.	Min	Max
Time overrun	37	4.86	1.08	1	18
Cost overrun	37	4.09	2.435077	1	14
Dispute	37	3.54594	1.082331	1.8	5
Litigation	37	2.25405	1.52727	1	3
Mistrust on owner of the project	37	4.75945	1.509131	1	5

Source: own computation, 2018

Time overrun: As indicated in Table 4.7 the mean of respondents for effect of time overrun were 4.86 with standard deviation of 1.08. Out of the total respondents, only one respondent strongly disagreed even though eighteen respondents strongly agreed that time overrun was the major effects of delay in Project 17. As a result, majority of respondents agreed time overrun was effects of delay in this project. The interview result of code 01, 02, 03, 04 and 05 also shows that time overruns in Project 17 were caused by the client and contractor rather than consultant.

The result of this study was similar to the findings of Aibinu and Jagboro (2002), on the effects of construction delays on project delivery in Nigerian and Tsegay and Hanbin (2017), on analysis of delay impact on construction project in Ethiopia.

Cost overrun: As can be seen from Table 4.7, mean of respondents was 4.09 with standard deviation of 2.43. Twenty-two respondents agreed cost overrun was effects of delay in the project, fourteen respondents strongly agreed and only one respondent strongly disagreed. The interview result of code 01, 02, 03, 04 and 05 indicates that poor projection of project cost and inflation of materials was major causes for cost overrun. The result of this study was similar to the findings of Tsegay and Hanbin (2017), on analysis of delay impact on construction project in Ethiopia and Worku and Jha (2016), on investigating causes of construction delay in Ethiopian construction industries.

Disputes: Table 4.7 depicts mean of respondents for dispute of Project 17 was 3.54 with standard deviation of 1.08. According to the result, only two respondents disagreed, five respondents strongly agreed, and thirty respondents were neutral. As per the findings, disputes were not

considered as effect of delay in the project. The result of this study contradicts from findings of Owolabi et al (2014), on causes and effect of delay on project construction delivery time in Nigeria.

Litigation: As can be seen in Table 4.7 mean of respondents for litigation was 2.25 with standard deviation of 1.52. Out of the total respondents, majority of thirty-three respondents were disagreed that the litigation was effects of delay in project 17. The result of this study contradicts from findings of Ashraf and Ghanim (2016) on Causes of delay in large construction projects.

Mistrust on owner of the project: Table 4.7 shows the mean of respondents for effect of mistrust on owner was 4.75 with standard deviation of 1.50. Thirty-one respondents agreed that mistrust on owner of the project was effects of delay in project 17. The minimum and maximum mistrust on owner of the project were 1 and 5, respectively. This result was like the findings of Ahmed et al. (2002), on empirical study of construction delays in Florida.

4.4. Performance and Cost Efficiency of Project 17

Performance and cost efficiency of the Project 17 was analyzed by using Schedule Performance Index (SPI) and Cost Performance Index (CPI) from yearly financial report of the project is presented as follows.

4.4.1. Schedule Performance Index (SPI)

SPI is accepted by most projects when more work was completed than was planned. If SPI is greater than 1.00 expected performances is better. However, as indicated in Table 4.8 SPI for

Project 17 indicates for the year of 2009, 2010 and first quarter of 2011 E.C were 0.284, 0.358 and 0.447, respectively. This implies that Project 17 had a rate of poor performance and only progress at 28%, 35% and 44% of the rate planned in the stated years respectively. This indicates that less work was completed than was planned. Even if SPI was less than 1.00 and indicates time overrun for work completed but it also shows some improvement of the project teams inefficiently using its time.

The interview result of code 01, 03, 04 and 05 also shows because of time overrun, client incurred high cost of payment for head office follow-up and compensation to the contractor due to late procurement of material. Contractors incurred overhead costs, cost of extension of performance due to delay of construction.

4.4.2. Cost Performance Index (CPI)

Most projects prefer cost under run plus when CPI is greater than 1.00. It indicates better performance than expected. However, as depicted in Table 4.8 CPI of Project 17 were 0.716, 0.837 and 0.557 in the years 2009, 2010 and 2011 E.C, respectively. This result implies that Project 17 had a rate of poor performance and utilized above the budget and has a negative cost variance.

As the result indicated in Table 4.7 for the year 2009 to 2010 and first quarter of 2011, investing additional one birr has a loss of Br 0.716, 0.837 and 0.557 respectively. Even if CPI of this project was less than 1.00 there was some improvement in utilizing budget allocated from year to year in the project.

According to the interview result, the project loses the abovementioned Birr because of contractual claims (extension of time with cost), weak of cost planning, lack of monitoring of resources and additional works.

Table 4.8 Schedule and cost performance index of project 17

Financial Performance/year	Planned Value (PV) in Birr	Work Performed	Earned Value (EV) in Birr	Actual cost (AC) in Birr	SPI= EV/PV	CPI= EV/AC
2009	326,106,298.00	28.36%	92,483,746.11	129,219,721.00	0.284	0.716
2010	471,163,587.09	35%	168,440,982.38	201,219,721.93	0.358	0.837
2011	28,337,232.00	44%	12,678,077.60	22,744,013.92	0.447	0.557

Source: own computation, 2018

4.5. Correlation of causes and effects of delay in Project 17

The third objective of this study was addressed by using correlation to examine the relationship of causes and effects of Project 17. The variables of causes and effects have different relationship. In view of this, efforts were made to show correlation of significant variable on causes and effects of delay in construction of project 17 housing development.

Table 4.9 Correlation of causes and effects on delay of construction of Project 17

Correlation of causes and effects of delay	Contractors related causes	Client related causes	Material related causes	Labor related causes	Corruption related causes	Time overrun related causes	Cost overrun related causes	Mistrust on owner of the project
Contractors related causes	1.0000							
Client related causes	0.9065	1.0000						
Material related causes	0.5336	0.5273	1.0000					
Labor related causes	0.4197	0.4019	0.9063	1.0000				
Corruption related causes	0.3440	0.2780	0.2903	0.2498	1.0000			
Time overrun related causes	0.7876	0.7879	0.4987	0.4066	0.2934	1.0000		
Cost overrun related causes	0.2599	0.2460	0.1164	0.0930	0.8520	0.1994	1.0000	
Mistrust on owner of the project	-0.4544	-0.5762	0.1044	0.2485	-0.0740	-0.4479	-0.0883	1.0000

Source: Owen computation, 2018

As indicated in Table 4.9; contractors related causes, client related causes, material related causes, labor related causes, corruption, effects of time overrun and cost overrun were positively correlated variables in this project. However, contractors related causes, client related causes and corruption related causes have negatively correlated with mistrust on owner of the project. Although, effect of time overrun and cost overrun have negatively correlated with mistrust on owner of the project as indicated in Table 4.9.

The result indicates that as contractors related causes, client related causes and corruption related causes increase; due to this fact the project become more delayed than actual plan. Because of this end users of the project will mistrust the government to get condominium house. The result also indicates, as the project takes more time to deliver the condominium houses to the end users; it will incur additional costs and this also resulted in mistrust on owner of the project.

4.6. Causes and Effects of Project 17 Delay and Hypotheses Testing

The fourth objective of this study were addressed by using multiple linear regressions to examine the extent do causes and effects have on delay and to evaluate the relationship of causes and effects on delay in Project 17. This project was delayed by various causes and has different effects. In view of this, efforts were made to include variables found relevant to the model in order to estimate the hypothesized explanatory variables on causes and effects of delay in construction of project 17 housing development.

The three most important diagnostic tests were, heteroscedasticity, multicollinearity and specification, were conducted. The Variance Inflation Factor (VIF) values were ranging between 1.75 and 11.26 and the mean VIF value was 5.89(Appendix Table2).These results indicated the absence of serious multicollinearity problem among the independent variables. The heteroscedasticity tests were performed and there was no heteroscedasticity problem (Appendix Table 3). Similarly, omitted variable test result also showed that there was no specification error (Appendix Table4).

As can be seen in Table 4.9, a total of 11 explanatory variables were considered in the multiple linear regression model, out of which 8 variables significantly influence the level of delay in Project 17. This result showed a combined causes and effects included in the model indicated that about 99.60% of delay of Project 17 are due to contractor related causes, client related causes, material related causes, labor related causes, corruption, time overrun, cost overrun and mistrust on owner of the project.

Table 4.9 showed that delay in Project 17 were significantly influenced by client related causes, materiel related causes, corruption, time overrun, and cost overrun at 1% level of significance and contractor related causes and mistrust at 5% level of significance. Although labor related

Table 4.10 Causes and effects of delay in construction of Project 17

Causes and Effects of delay	Coefficients	Standard errors	t-value	p-value
Constant	64.420	179.927	0.360	0.723
Contractor related causes	56.185**	25.591	2.200	0.038
Client/owner related causes	74.251***	4.585	16.190	0.000
Consultant related causes	6.391	12.851	0.500	0.623
Material related causes	166.911***	50.126	3.330	0.003
Labor related causes	-98.028*	55.771	-1.760	0.091
Corruption	-163.691***	34.406	-4.760	0.000
Time overrun	6.546***	0.398	16.450	0.000
Cost overrun	20.465***	6.466	3.160	0.004
Dispute	30.915	37.670	0.820	0.420
Litigation	-42.017	28.441	-1.480	0.152
Mistrust on owner of the project	-63.065**	30.569	-2.060	0.050
Number of respondents	37			
R-squared	0.9972			
Adjusted R ²	0.996			
Multicollinearity test, <i>VIF</i>	5.89			
Test for omitted variables, Pr>F	0.234			
Heteroscedasticity test, Prob>x ²	0.1057			

*, **, *** Significant at 10%, 5% and 1% level respectively

causes affected delay in Project 17 at 10% level of significance.

Source: Owen computation, 2018

Contractor related causes: As can be seen in Table 4.9, contractor related causes affects positively delay of Project 17 at 5% level of significance. Furthermore, the P value of the relationship was 0.038 and significant at 95% level of confidence. This result indicates that contractor related causes increase level of delay of Project 17 by 56.1% which also showed a positive relationship between the delay of Project 17 and contractor related causes. Hence hypothesis 1 was accepted. The result of this study was similar to the findings of Worku and Jha (2016), on investigating causes of construction delay in Ethiopian construction industries and Robel (2015), on schedule delay identification and assessment on Addis Ababa's light rail transit construction.

Client/owner related causes: According to the result of Table 4.9, the P value is 0.000 and significant at 99% level of confidence. The result tells that for each increase in causes of client, 74.2% increase in level of construction delay which indicates a positive relationship between the delay of Project 17 and client related causes. Hence the hypothesis 2 was accepted. This suggests that client related causes have huge capacity to delay construction of this project. Similar results were found by Wateno (2015), on delay of construction projects in multistoried buildings in East Java of Indonesia and Wuhan (2011), on problems of projects and effects of delays in the construction industry of Pakistan. Whereas, these results were different from findings of Abdo (2006), on delays in public building construction projects and their consequences in Ethiopia. With Abdo's study contractor related causes takes major responsibility for delay of project rather than the client.

Consultant related causes: Table 4.9, consultant related causes had no relationship with delay of Project 17. The relationship was not significant. The P value stands at 0.623. Therefore, the cause was not significant which leads to the rejection of the hypothesis 3. However, 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.

Material related causes: The results of Table 4.9 showed that the P value of material related causes were 0.003 and significant at 99% level of confidence. It was positively affected delay of Project 17 at 1% level of significance. This result indicates that material related causes for each late procurement of materials and poor material management increases level of delay of Project 17 by 166.9% which indicates hypothesis 4 has been accepted. The result of this study was similar to the findings of Renuka et al. (2017), on a model to estimate the time overrun risk in construction projects in the case of India.

Labor related causes: As indicated in Table 4.9, labor related causes were negatively determining the causes for delay in this project at 10% level of significance. It shows significant at 90% level of confidence. Moreover, the P value was 0.091. Yet, it negatively influenced the level of delay in construction of Project 17 which leads to the rejection of the hypothesis 5. The result tells that for each increase in labor related causes, 98% reduced in delay of construction in Project 17. The study result was contradicted with the study of Renuka et al. (2017), on a model to estimate the time overrun risk in construction projects in India.

Corruption: As can be seen in Table 4.9, corruption was negatively affected the delay of Project 17 at 1% level of significance. The coefficient was -163.6 and p value stands at 0.000. The relationship was significant at 99% confidence level. It was found that for perception of team members in abuse of entrusted power for private gain worsen delay in Project 17 by 163.6%. As corruption habit expands in this project it affects the performance negatively. Therefore, the project will be more delayed than plan which leads to the acceptance of hypothesis 6. Similar result was found by Tsegay and Hanbin (2017), on empirical study on the analysis of delay impact on construction project in Ethiopia.

Time overrun: As indicated in Table 4.9, time overrun was positive effect of delay in Project 17 at 1% level of significance. Also, the P value of the relationship was 0.000. It was significant at 99% level of confidence. Delay in this project increased effect of time overrun by 6.5%. Because of increasing time overrun, there was also increase in costs of the project. This result is also comparable with the result of schedule performance index which illustrated in section 4.2.1. The result of this study was like the findings of Abisuga(2014), on construction delay in Nigeria and Owolabi et al. (2014), on causes and effect of delay on project construction delivery time in Nigeria.

Cost overrun: It was found to have positive effect at 1% level of significance as indicated in Table 4.9. Likewise, the P value was 0.004 and significant at 99% level of confidence. Because of delay in construction of Project 17, there was 20.4 % increase in cost overrun. The possible reason is that over finance or over budget of work compared to the cost baseline of the project. This result is comparable with the result of cost performance index which illustrated in section 4.2.2. This result affects Project 17 negatively because this project is running over budget since cost is part of iron triangle. This will affect scope as well as the quality of the project. This study result was similar with the finding of Abisuga (2014) on construction delay in Nigeria but in the study of Abisuga (2014) cost overrun was 5% level of significant.

Litigation: As stated in Table 4.9, it was found no relationship with delay of Project 17. The result indicated that the P value was 0.152. Therefore, the effect was not significant. As per the result litigation has no effect on delay of Project 17. However, 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.

Disputes: Table 4.9, indicate disputes had no relationship with delay of Project 17. The relationship was not significant. The P value stands at 0.420. Therefore the effect was not significant. This result contradicts with Murali et al. (2007), on the causes and effects of delays in Malaysian construction industry.

Mistrust on owner of the project: Table 4.9 indicated that it was found negative effect of delay in Project 17 at 5% level of significance. Besides, the P value of the relationship was 0.050 significant at 95% level of confidence. The result showed that for each additional month of delay in Project 17 reduced trust on owner of the project by 63%. Because of this, end users of condominium houses become desperate and give up their vision to be house owner. Due to this fact, the project office would lose their reputation. However, vision of the project office was to construct standard house with reasonable price for low- and middle-income households to be house owner. The result of this study was similar to the findings of Aibinu and Jagboro(2002) on the effects of construction delays on project delivery in Nigeria.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

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 and consultants about causes and effects of project delay.

5.1. Summary

The main objective of this study was to identify the causes and effects of the delay in construction of condominium house of Project 17. Among 18 projects of condominium houses in Addis Ababa, Project 17 housing development construction was chosen purposively for this study whose delay is more observable than the other project and it is the most delayed project when compared to its baseline plan. This project was planned to be completed in 18 months, but 51 months have elapsed with 62.83% performance. This delay is three times more than schedule baseline.

Mixed method research approach was used to capture both qualitative and quantitative data for the study. Questionnaire and interview were used to identify the major causes and effects of delay in construction of this project. For the data analysis, both descriptive statistics and multiple linear regression methods were used.

Performance efficiency of the Project 17 was analysed by using schedule performance index, which indicates a rate of poor performance. Performance of this project for the years 2009, 2010 and first quarter of 2011 E.C was 28%, 35% and 44%, respectively. This implies that less work was completed than was planned.

Cost efficiency of the Project 17 was analysed by using cost performance index. The ratio result depicts that on the years 2009, 2010 and 2011 first quarter E.C were 0.716, 0.837 and 0.557, respectively. This indicates that Project 17 has a rate of poor performance, utilized above the budget and has a negative cost variance. As per the finding, at the end of each year the project was losing Birr 0.716, 0.837 and 0.557, respectively, for every Birr invested on this project due to contractual claims (extension of time with cost), weak of cost planning, lack of monitoring of

resources and additional works.

Contractors related causes, client related causes, material related causes, labor related causes, corruption, effects of time overrun and cost overrun were positively correlated. However, contractors related causes, client related causes and corruption have negatively correlated with mistrust on owner of the project. Although, effect of time overrun and cost overrun have negatively correlated with mistrust on owner of the project

A total of eleven explanatory variables was considered in the multiple linear regression model out of which eight variables significantly influenced the level of delay in Project 17. A combined causes and effects included in the model revealed that about 99.60% of delay of Project 17 due to contractor related causes, client related causes, material related causes, and labor related causes, corruption and effects of time overrun, cost overrun, and mistrust on owner of the project.

Delay in Project 17 were significantly influenced by client related causes, materiel related causes, corruption, time overrun and cost overrun at 1% level of significance and contractor related causes and mistrust at 5% level of significance. Labor related causes affected delay in Project 17 at 10% level of significance. However, consultant related causes, effect of dispute and litigation were insignificant for Project 17.

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 17 positively. 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 not significant. But material related causes positively affected the delay and major material related causes were late procurement of materials, scarcity in material, and poor material management. However, labor related causes and corruption were negatively determining the causes for delay in this project. Corruption related causes were occurred in awarding of construction contracts and lack of transparent selection criteria for sub-contractors.

Time overrun and cost overrun were positive effects of delay in Project 17. 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 17.

5.2. Conclusions

The study concluded that factors for delay of Project 17 such as: contractor related causes, client related causes, material related causes, labor related causes and corruption are found to be the causes that delay timely delivery of construction of Project 17. That means all the variables tested are significant which strongly influence the delay of Project 17 housing construction. However, consultant related causes, effect of disputes and effect of litigation were insignificant. In addition, each of these causes of delay has significant positive relation with delay of Project 17 except labor related causes and corruption.

The study concluded that contractors related causes, client related causes and corruption related causes increase delay in this project. Because of this end users of the project will mistrust the government to get condominium house.

The regression findings concluded that materiel related causes and corruption that are the most significantly contributing causes of delay of Project 17 followed by client related causes, cost overrun and time overrun to influence the timely delivery of Project 17 housing construction.

The study findings have also concluded that cost overrun and mistrust on owner of the project are the most significant effect of delay in this project followed by time overrun. However, effect of mistrust on owner of the project has been influencing delay negatively.

5.3. Recommendations

The following recommendations were forwarded based on the research findings and conclusions.

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.

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.

To properly utilize advance payments and to manage misutilization of resources, contractors have to prepare accurate budget schedule management.

The client have to improve the audit support and follow up, implement proper and sound financial management system and also give due attention for time value of money.

It is recommendable that contractors create transparent and accountable selection criteria for sub-contractors and integrate them with the client to reduce time and cost overrun.

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.

The client and its project team have to own the project to maximize sense of ownership that would improve and facilitate construction in timely delivery of the projects to satisfy stakeholders and end users.

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.

Client has to improve the communication and coordination between the stakeholders.

The client has to have proper budget allocation, apply proper material procurement system and revise central procurement policy. Good material management practice must be in place.

In time and long-term material demand forecast has to be implemented.

Transparent and accountable award of contracts must be there from client side.

Client is advisable to follow up the implementation of plans and schedules. Also, should build strong cooperation with contractors to ensure timely delivery of the project.

Client has to implement performance and experience-based salary increment and on time salary payment to solve labor related problems.

Client has to apply semi-annual and annual performance evaluation system. Client must improve on job training and fulfill safety materials to improve productivity of employees.

The government should consider a cost compensation for covering over budget utilization of resources.

Regulatory bodies require setting measures against to non-performance and default of contractors. Regulatory changes have to be discussed among all concerned stakeholders for timely delivery of the project. Although, policy makers have to revise changes in construction industry.

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APPENDICES

Appendix 1 Table 1: OLS result from STATA

Source	SS	df	MS	Number of obs= 37		
				F (11, 25) =		820.31
Model	143645029	11	13058639	Prob>F =		0.0000
Residual	397976.841	25	15919.0736	R-squared =		0.9972
				Adj R-squared =		0.9960
Total	144043006	36	4001194.6	Root MSE =		126.17

SPI	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
Contractor	56.18575	25.59159	2.20	0.038	3.478872 108.8926
Client	74.25139	4.585477	16.19	0.000	64.80742 83.69536
Consultant	6.391704	12.85113	0.50	0.623	-20.07569 32.8591
Material	166.9119	50.12612	3.33	0.003	63.67519 270.1485
Labor	-98.02849	55.77112	-1.76	0.091	-212.8913 16.83427
Corruption	-163.6916	34.40633	-4.76	0.000	-234.5528 -92.83046
Time	6.546244	.3980419	16.45	0.000	5.726461 7.366026
Cost	20.46557	6.466584	3.16	0.004	7.147393 33.78375
Dispute	30.91598	37.67062	0.82	0.420	-46.66812 108.5001
Litigation	-42.01742	28.44145	-1.48	0.152	-100.5937 16.55884
Mistrust	-63.06554	30.56991	-2.06	0.050	-126.0254 -.1056251
cons	64.42059	179.9274	0.36	0.723	-306.1468 434.988

Source: own computation (2018).

Appendix 1 Table 2: Multicollinearity diagnosis test

Variable	VIF			1/VIF
Client	11	26	0	.08879
Contractor	8	04	0	.12439
Labor	7	19	0	.13903
Material	7	16	0	.13960
Cost	6	73	0	.14862
Corruption	5	58	0	.17921
Mistrust	4	81	0	.20776
Litigation	4	27	0	.23435
Time	4	20	0	.23820
Dispute	3	76	0	.26600
Consultant	1	75	0	.57292
Mean VIF	5	89		

Appendix 1 Table 3: Heteroscedasticity diagnosis test

```
. hettest
```

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity Ho: Constant variance
Variables: fitted values of SPI

```
chi2(1)          =      2.62  
Prob> chi2 =      0.1057
```

Appendix 1 Table 4: Specification test

```
. ovtest
```

Ramsey RESET test using powers of the fitted values of SPI Ho:
model has no omitted variables

```
F(3, 22) =      1.53  
Prob> F =      0.2340
```

Appendix 2.

ቅድስት ማርያም ዩኒቨርሲቲ

ድህረ ምረቃ ትምህርት ቤት

ቢዝነስ ት/ት ቤት

ለፕሮጀክት 17 የጋራ መኖርያ ቤቶች ግንባታ ተሳታፊ ድርጅቶች እና ሰራተኞች የተዘጋጀ መጠይቅ

ውድ የፕሮጀክቱ የስራ አባላት:- በቅድሚያ ለቃለ መጠይቁ በመተባበርዎ ከፍተኛ ምሰጋና አቀርባለሁ።

የዚህ መጠይቅ ዋና ዓላማ የፕሮጀክት 17 የጋራ ቤቶች ግንባታ መዘግየት ምክንያትና ውጤቶች ዘርፍ ጥናት ለማካሄድ ሲሆን ለቀጣይ በጋራ ቤቶች ግንባታ ዘርፍ ትምህርት ለመውሰድ እና ሊሻሻሉ የሚገቡ ጉዳዮችን በመለየት መፍትሄ ሊሆኑ የሚችሉ ምክረ ሀሳቦችን ለማቅረብ ነው። ስለሆነም የዚህ ጥናት ውጤት እርስዎ በሚሰጡን መረጃ የሚወሰን ይሆናል። የሚሰጡን መረጃ ምስጢራዊነቱ የተጠበቀ እንደሚሆን ላረጋግጥሎት እወዳለሁ። የሚሰጡትም መረጃ ለዚህ ጥናት ዓላማ ብቻ የሚውል መሆኑን እገልጻለሁ።

ያመኑበትንና ትክክለኛ ነው የሚሉትን መረጃ ስለሚሰጡን በድጋሚ አመሰግናለሁ። ተጨማሪ ጥያቄ ካልዎት ከታች በተገለጸው አድራሻ የምገኝ መሆኑን በትህትና እገልጻለሁ።

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ክፍል 1: አጠቃላይ መረጃ

1) የሚሰሩበት ድርጅት ስም-----

2) ወክሎ የቀረቡት ድርጅት የትኛው ነው? እባክዎ ጥያቄዎቹን ሲመልሱ ይህን ✓ ምልክት ይጠቀሙ::

የፕሮጀክቱ ባለቤት የአማካሪ ድርጅት ተቋራጭ ሌላ

3) የትምህርት ደረጃዎ የትኛው ነው?

ዲፕሎማ ዲግሪ ማስትሬት ዶክትሬት

4) የስራ መደብዎ?

ፕሮጀክት መሀንዲስ ፕሮጀክት አስተባባሪ መሀንዲስ

የሳይት ቁጥጥር መሀንዲስ ፎርማን ሌሎች

5) በዚህ ፕሮጀክት ውስጥ ምን ያህል ጊዜ ሰርተዋል? _____

6) በግንባታ ስራዎች ላይ ምን ያህል ጊዜ ሰርተዋል? _____

ክፍል 2. የኮንዶሚኒየምቤቶች ግንባታ መዘግየት ምክንያቶች

እባክዎ ከዚህ በታች ከ 1 እስከ 5 በተጠቀሱት መስፈርቶች መሰረት ለግንባታው መዘግየት ምክንያቶች ናቸው የሚሉትን በዚህ ምልክት ✓ ያሳዩ፡፡

1= በጣም አልስማማም 2= አልስማማም 3= ገለልተኛ 4= እስማማለሁ 5= በጣም እስማማለሁ

የግንባታው መዘግየት ምክንያቶች		1	2	3	4	5	
		በጣም አልስማማም	አልስማማም	ገለልተኛ	እስማማለሁ	በጣም እስማማለሁ	
ከተቋራጮች ጋር የተያያዙ ምክንያቶች	ያልተስተካከለ ዕቅድ						
	የሳይት አመራር ልምድ ማነስ						
	በቂ ያልሆነ የስራ ልምድ						
	የተቋራጮች እና አነስተኛ ተቋራጮች ገንዘብ ውስንነት						
	የማስተባበር ብቃት ማነስ						
	ደካማ የግንኙነት ሂደት						
	በስራ ላይ የሚፈጠሩ ስተቶች						
	በስህተቶች ምክንያት ስራዎችን መድገም						
	ስራዎችን ያለ ምክንያት ማጓጉት						
	በስራው ላይ የኔነት ስሜት አለመኖር						
ከፕሮጀክቱ ባለቤት ጋር የተያያዙ ምክንያቶች	መስኖ						
	ከአማካሪዎች	የገንዘብ እጥረት					
		በግንባታ ሂደት ተደጋጋሚ የትእዛዝ ለውጥ					
		የዘገየ ውሳኔ መስጠት					
		ዝቅተኛ የቴክኒክ ዕውቀት					
		ክፍያዎችን ማዘግየት					
		ዝቅተኛ ዋጋ ላቀረበው ተወዳዳሪ የጨረታ አሸናፊነትን መስጠት					
		ደካማ የግንኙነት ሂደት					
		አላስፈላጊ ጣልቃ ገብነት					
		ውል በመስጠት ሂደት የሚሰራ መስኖ					
በስራው ላይ የኔነት ስሜት አለመኖር							
ከፕሮጀክቱ ባለቤት ጋር የተያያዙ ምክንያቶች	የቁጥጥርና ግማገማ ማነስ						
	የክትትል ሂደት ማነስ						
ከአማካሪዎች	በቂ የሰው ኃይል ያለመመደብ						

ጋር የተያያዙ ምክንያቶች	በቂ የስራ ልምድ አለመኖር						
	ያልተሟላ ንድፍ						
	ዝቅተኛ ቁጥጥር						
	መመሪያዎችን ለመስጠት መዘግየት						
	ደካማ ቁጥጥርና ክትትል						
	ዝቅተኛ የዋጋ ግምት						
	በሚገባ ያልታሰበበት ዕቅድ						
	ስራዎችን በሚገባ አለማስተባበር						
	ሙስና						
	ነባራዊ ሁኔታን ያላገናዘበ የጊዜ ሰሌዳ						
ከግብዓት ጋር የተያያዙ ምክንያቶች	የስራ እቅዶችን ለውጦች ሲኖሩ በቶሎ ወቅታዊ አለማድረግ						
	ጥራት ያለው የዕቃ አቅርቦት ችግር						
	የግብዓት እጥረት						
	የግብዓት ግዥ መጓተት						
	የንብረት አስተዳደር ችግር						
	የግንባታ ግብዓቶች ዋጋ መዋዠቅ						
	በተገቢው ጊዜ እቃዎችን ሳይት ላይ አለማቅረብ						
	ከመሳሪያ ዕቃዎች ጋር የተያያዙ ምክንያቶች	የመስሪያ እቃዎች መሰበር					
		የመስሪያ ማሽኖች እጥረት					
		የቴክኒክ ሙያ ሰራተኞች የሙያ ክህሎት ማነስ					
የመሳሪያዎች ምርታማነት እና ብቃት መቀነስ							
የመስሪያ ማሽኖች አነስተኛ አቅርቦት							
ከሰራተኞች ጋር የተያያዙ ምክንያቶች	የባለሙያዎች እጥረት						
	የሰራተኞች ውጤታማ አለመሆን						
ከውጫዊ ሂደቶች ጋር የተያያዙ ምክንያቶች	የአየር ሁኔታ አመቺ አለመሆን						
	የመንግስት የቁጥጥር መመሪያዎች በየጊዜው መቀያየር						
	ያልተጠበቁ የስራ ቦታ አደጋዎች						
	በግንባታ ሂደት ላይ የሚደርሱ አደጋዎች						
	የሀይል አቅርቦት ችግር						
የውሀ አቅርቦት እጥረት							

እባክዎ ስለፕሮጀክት 17 መዘግየት ምክንያት ተጨማሪ አስተያየት/ሀሳብ ካለዎት ከዚህ በታች ይገለጹ፡፡

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ክፍል 3. የጋራ መኖርያ ቤቶች ግንባታ መዘግየት ውጤቶች

እባክዎ ከዚህ በታች ከ 1 እስከ 5 በተጠቀሱት መስፈርቶች መሰረት የግንባታው መዘግየት ውጤቶች ናቸው የሚሉትን በዚህ ምልክት ✓ ያሳዩ፡፡

1= በጣም አልሰማም 2= አልሰማም 3= ገለልተኛ 4= እሰማለሁ 5= በጣም እሰማለሁ

የግንባታው መዘግየት የሚያመጣው ውጤት	1	2	3	4	5
	በጣም አልሰማም	አልሰማም	ገለልተኛ	እሰማለሁ	በጣም እሰማለሁ
ከዕቅዱ የዘገየ የስራ አፈፃፀም					
የወጪ መጨመር					
ስራውን በሚያከናውኑት አካላት መካከል የሚፈጠር ግጭት					
የትርፍ መቀነስ					
ግጭቶችን ወደ ፍርድ ቤት ሳያመሩ በሶስተኛ ወገን ለመፍታት ድርድር ውስጥ መግባትን					
የህግ ክርክር ማስነሳት					
ስራዎችን በጊዜያዊነት/በቋሚነት ማቋረጥ					
የቤቶች ግንባታ ዘርፍ እድገትን ማዘግየት					
በአሰሪው አካል/በመንግስት ላይ አመኔታ ማጣት					

እባክዎ የፕሮጀክት 17 መዘግየት ውጤቶችን በሚመለከት ተጨማሪ አስተያየት/ሀሳብ ካለዎት ከዚህ በታች ይግለጹ፡፡

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Appendix 3
St. Mary's University
School of Graduate Studies
School of Business

**Causes and Effects of Delay in construction of Condominium House:
Project 17 Housing Development Construction in Focus**

Questionnaire

Dear respondents,

This is academic research which aims to assess the causes and effects of delay in construction of condominium house particularly Project 17 housing development construction. Through this study, I would like to investigate the cause and effect of delay factors that currently exist in the construction of condominium house of Project 17 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 answer each question carefully. There is no right or wrong answer. If you are unsure of an answer, please respond with your best estimate.

I value your participation and thank you for the commitment of time, energy and effort. If you have any further questions, I can be reached at the address below.

Sincerely,

TigistTassew

Postgraduate student specializing in Project Management

SCHOOL OF GRADUATE STUDIES

ST. MARY'S UNIVERSITY

Email:titv.marsus@yahoo.com

+251-91-1066968

Part 1: General information

1) Company Name-----

2) Which organization do you represent? Please answer the following questions by using ✓ symbol

Client [Owner] Consultant Contractor Others

3) What is your education level?

Diploma BSc MSc PhD

4) Respondent designation/title in the company

Project Engineer Project Coordinator Forman

Office Engineer Site Supervisor Engineer Others

5) Work Experience in this project _____

6) What is your work experience (in year) in Building Construction? _____

PART 2. Causes of Delay in Construction of Condominium

Please show causes of delay below by using a tick (✓) symbol. The five-point scale ranges 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 contract					
	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 work					
	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					
	Delay in delivering material on site					
Equipment related causes	Equipment breakdowns					
	Scarcity of equipment					
	Low level of equipment operators' skills					
	Low productivity and efficiency of equipment					
	Lack of equipment accessibility					
Labor related	Shortage of skilled personnel					
	Low productivity					
General	Weather effect on construction					
	Regulatory changes					

environment	Unforeseen site condition					
	Accident during construction					
	Problem of electric supply					
	Shortage water supply					

If you have any additional comments regarding the causes of delay of Project 17, please specify them here.-----

Part 3: Effects of Delay in Construction of Condominium

Please indicate the effects of delay below by ticking (✓).The five-point scale ranges from 1 to 5.
 1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

Effects of delay	1	2	3	4	5
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Time overrun					
Cost overrun					
Dispute between parties involved					
Reduced profit					
Arbitration					
Litigation and court case					
Abandonment					
Slowing down the 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 17, please specify here.

Appendix 4

Interview

Dear Interviewee

At present, I am working on a research titled “Causes and Effects of Delay in construction of Condominium House: Project 17 Housing Development Construction in Focus” for the partial fulfillment of the requirements for the degree of Master of Art (MA) in St. Mary’s University, School of Business.

The main objective of this research is to assess the causes and effects of delay in construction of condominium house particularly Project 17 housing development construction. To meet this research objective, it is necessary to have the response of contractors, client and consultants currently working on this project and hence you are one of the members engaged to respond this interview. In fact, I conducted questionnaire on this project and came up with findings. Now, I need to gather detailed information about these causes and effects of delay to enhance the research findings through interview. I confirm that your response will be kept confidential and will be used only to this research.

With Regards,

TigistTassew

Advisor: - Misganaw Solomon (PhD)

Thank you very much for your cooperation!

Interview guide lines to collect data from construction of project 17 condominium house development,

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