St. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

MASTER OF PROJECR MANAGEMENT PROGRAM

Assessing the causes of delay in building construction: in the case of Addis Ababa Grade one building Contractors (BC1)

BY

Tewodros Beyene

JANUARY, 2025

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THESIS TITLE

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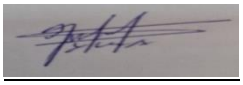
Yilkal Wassie (Asset Prof)		_____
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Declaration

I am Tewodros Beyene hereby declare that the thesis in titled Assessing the causes of delay in building construction: in the case of Addis Ababa Grade one building Contractors (BC1) has been carried out under the guidance and supervision of TEMESGEN BELAYNEH (PHD).

This thesis original and has not been submitted for the award of any degree or diploma to any university and institution.

Name: Tewodros Beyene

Date: _____

Signature: _____

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Above all I would like to thank the almighty GOD for his help in every aspect of my life. Without his help I would not have been here. I would like to forward my deepest gratitude to my advisor Temesgen B. (PhD) who has provided me with valuable guidance and direction diligently.I am also very thankful to my beloved family and friends for being there for me whenever I need them and for their unconditional support and encouragement through my education. Finally I also show appreciation to grade 1 building contractors in Addis Ababa and public relation department of Ministry of urban development and construction for their hospitality and cooperation.

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Acronyms

BC1 Grade one building contractor

CCM Critical Chain Method

CPM Critical Path Method

EVM Earned value Management

MUDCO Ministry of Urban Development Construction

PDM Precedence Diagramming Method

PERT Program Evaluation and Review Technique

PMBOK Project Management Body of Knowledge

RII Relative importance index

WBS Work Breakdown Structure

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Abstract

Construction industry is one of the significant contributors to the economic growth and development of Ethiopia. However problem of delays in the construction sector is a global phenomenon and the construction sector in Ethiopia is no exception. Therefore, the aim of this study was to assess the main causes of construction project delay in building construction of grade one building contractors in Addis Ababa. A questionnaire survey was used for data collection and fifty-six (56) questionnaires were completed and analyzed. Using a simple ordinal scale, based on a 5-point Likert Scale, professionals, contractors and consultants expressed their views on the relative importance of thirty-six (31) pre-selected factors on construction project delays. Feedback from a survey administered to, contractors were analyzed using Relative Importance Index (RII). According to the results, inadequate site management, contractor financial difficulties, inefficient scheduling, and construction errors. From the top 10 delaying factors, causes those are related to consultant and significantly affect the completion time of building construction project are mistake in design document and poor communication with the design engineer. Client related factors those are included in the most frequent factors are slow decision making, improper feasibility study and interference during actual construction work. In Addis Ababa, the primary cause of construction project delays for grade one building contractors is the scarcity of materials, which is the only external issue listed in the top ten delaying factors. Association result shows that Contractor related factors played the major role in delaying construction; the second one is client related factor. Then consultant related factor follows as third factor. The fourth and final factor is external factors. Construction frontline players are recommended to put their efforts on the identified key factors in relation to their magnitudes of influence. By doing so, the causes of project delays in Addis Ababa building construction could be significantly reduced or controlled, which will ultimately lead to the on time and within budget completion of projects.

Key words: Construction delay, clients and contractors, Delay Causes, Top-Ten Delay Factor

CHAPTER ONE: INTRODUCTION

1.1 Background

A nation's socioeconomic growth process benefits greatly from the construction industry. Its direct and indirect effects on all economic activities are a major factor in its significance. It boosts the growth of other sectors and adds to the national output through a complex web of connections (United Nations Environmental Program, 1996). One-sixth to one-half of the world's energy, water, minerals, and wood are consumed by the industry. It generates income for the populace, helps create jobs, and has multiple effects on the economy (United Nations Environmental Program, 1996).With numerous experts collaborating on a project, and the construction business is a sizable and constantly expanding sector. Construction firms create a lot of jobs in emerging nations, and their work is project-oriented.

The construction sector is evolving in terms of scale, technological complexity, interdependencies, and client needs. The GDP contribution of the built environment gives a sense of the sector's significance. One important component and indicator of project success is frequently the timely fulfillment of tasks. Projects have garnered more attention as building blocks for strategic management in businesses in recent years (Weiss, T & Potts, V. 2012). Any project's success is mostly determined by how long it takes to complete from beginning to end and deliver results. This directly affects management choices on standards, targets, and budgets (Seddon, J. 2008).Construction projects go through several stages, each with a variety of tasks, from inception to completion.

The construction enterprise is one of the important sectors that offer crucial function for the development of an economic system of a country. However, it is becoming more complex due to the sophistication of the development manner itself and the large number of parties involved within the construction process: which includes clients, contractors, consultants, users, designers,subcontractors, regulators, and suppliers. These circumstances eventually lead to delay in thecompletion of the projects as well as affecting all societies used the project.

According to A. Assaf and Al Hejji (2006), delay is defined as the time over run either beyond completion date specified in a contract or beyond the date that the parties agree upon for delivery of a project. Delay in construction projects is one of the common problems causing a multitude effect on the project and its participating parties. Delays in construction can cause a number of changes in a project such as late completion, lost productivity, acceleration, increased costs, and contract termination Ministry of Urban Development and construction is a big structured office within the construction enterprise managing all nearby regional states under it, also provides licenses for construction projects in Ethiopia. There are 98 Grade 1 Building contractors (BC1) registered by the bureau. From the total of 98 contactors 80 of them are registered in Addis Ababa.

In this research, the major causes of building construction delay of BC1s in Addis Ababa, are investigated by categorizing as contractor related, consultant related, client related and external factors.

1.2 Statement of the problem

During the constructing phase, construction endeavors encounter numerous challenges that result in needless delays that prevent the project from meeting its schedule. It is not uncommon for individuals to hold one party accountable—the contractor, consultant, or client—without properly taking into account all of the stakeholders engaged in the specific project. Thus, it is important to fully grasp the issues that arise during the construction process for all parties involved in order to make sure that public construction efforts may proceed without any delays (Abdul-Rahman 2006).

Ethiopian construction projects undergo a problem of not delivering a project in a timely manner. This scenario cause high economic loss on the country. Public construction projects in Ethiopia are parts of the country‘s development initiatives. It shares considerable amount of the country‘s scarce financial resources. In Ethiopia, the construction industry is the highest recipient of government budget in terms of government development program. Consequently, public construction projects consume an average annual rate of nearly 60% of the government‘s capital budget as reported by Ministry of Works and Urban Development (MoWUD, 2006).The rapid growth of population in Addis Ababa, presents extraordinary pressure on the existing housing policy and on the entire infrastructure like- water, electrical power supply, drainage and road.

Addis Ababa, the capital city of Ethiopia, is now on the way to prosperity. Construction of buildings is in every corner of the city. However, we observe that most of the buildings delay from their scheduled completion date. According to research published in the journal of Legal, Building, and Environment Engineering by Worku Koshie, only 8.25% of Ethiopian projects have been delivered by the initial the due date, with the remaining 91.75% having been delayed by 352% of their contractual time. Most construction companies do not finish the project inside the contract body, corresponding to the research, which was based on the initial assessment. Based on the investigation, it was identified that consultant, contractor and other external factors are the most common causes of delay.

Moreover, based on informal interview held with some selected project manager, the total delays ranges from 200% to 329% of the initial contract times excluding the time required to complete the projects. Many studies were conducted on construction-related aspects of the country. However, the studies conducted did not sufficiently deal with and included some key factors causing time overrun of construction projects in Addis Ababa city. Besides, the studies conducted by researchers like Shambel and Dixit, (2005) did not address the adverse impact of some newly emerging challenges and causes of construction projects’ delay as a result of rapid change in the dynamics of the city’s growth in recent years. Shambel and Dixit, (2005) in the study on Assessment of Time Overruns in Construction Projects in the city identified twenty-one factors causing time delay under four different groups (contractor, consultant, client, and external environment-related factors) according to their similarity in origin. However, not all factors encountered in the study domain were dealt with in the study and hence there were so many

factors that remained not accessed. For instance, he did not consider the material-, labor-, equipment-, financial- , government authorities-, and social and economic-related factors despite their adverse impact on influencing projects' time performance. Besides, the study conducted by Siraw Ebohon et al,(2016) accessed only about twenty-nine factors causing project time delay, the factors were not screened according to their similarity, and hence, it was difficult to know the group-wise severity of the factors. Like the study conducted by Shambel and Dixit, (2005) which was carried out on construction projects in the city, the work of Siraw(Ebohon et al,2016) lacked inclusiveness. Hence, the current study aimed at identifying both the existing and newly emerging factors potentially causing time overrun of construction projects in the city. The most influential factors contributing to the stated problem are also identified and ranked based on their severity level. Lastly, applicable and feasible remedial measures are proposed so as to lessen the precarious consequences of time overrun on the overall performance of construction projects in the city.

As a result, the researcher is eager to determine the most frequent causes of project completion time delays.

1.3 Research Questions

The study aims to address the following research questions:

1. What are the primary causes of delays in building construction projects managed by Grade One Building Contractors (BC1) in Addis Ababa?

2. How do contractor-related factors contribute to construction delays?

3. What is the role of client and consultant-related factors in causing construction delays?

4. How do external factors, such as regulatory and environmental issues, impact construction timelines?

5. What strategies can be employed to mitigate delays in building construction projects?

1.4 Objective of the study

1.4.1 General Objective

The general objective of this research was to assess the major causes of delay on the building construction of grade 1 building contractors in Addis Ababa.

1.4.2 Specific Objectives.

The specific objectives of this study are:

1. To identify the key causes of delays in building construction projects undertaken by Grade One Building Contractors (BC1) in Addis Ababa.

2. To examine the impact of contractor-related factors, such as resource management and technical expertise, on project delays.

3. To analyze the influence of client and consultant-related factors on the timely completion of projects.

4. To investigate the effect of external factors, such as government regulations, market conditions, and environmental challenges, on construction delays.

5. To propose strategies and recommendations for minimizing construction delays and improving project delivery timelines.

1.5 Significance of the study.

This study is significant for several reasons:

1. Contribution to Knowledge: By identifying and analyzing the causes of delays in building construction projects, the study will provide valuable insights into the challenges faced by Grade One Building Contractors (BC1) in Addis Ababa.

2. Practical Implications: The findings will help contractors, clients, and consultants understand the root causes of delays and implement effective mitigation strategies to enhance project efficiency.

3. Policy Development: The research outcomes can assist policymakers and regulatory bodies in formulating guidelines to address systemic issues and improve the overall construction industry performance in Addis Ababa.

4. Economic Impact: By reducing delays, the study contributes to cost savings and resource optimization, ultimately benefiting the economy by ensuring timely project delivery.

5. Future Research: The study will serve as a reference point for future research on construction delays, particularly in the Ethiopian context, encouraging further exploration of related topics.

The other importance of the study was for researchers, they can use this study as a source of

information plus understanding the possible causes of delay and by identifying which causes

deserve more attention they can came up with a solution and imply their own method to

minimize the delay.

1.6 Scope of the study

The scope of this study is as follows:

1. Geographical Scope: The study focuses on building construction projects located in Addis Ababa, Ethiopia.

2. Target Group: The research specifically examines the practices and challenges faced by Grade One Building Contractors (BC1).

3. Thematic Scope: The study investigates the causes of delays in building construction projects, with a focus on contractor, client, consultant, and external factors.

4. Timeframe: The study will analyze data from ongoing and recently completed projects within the past five years to ensure relevance and accuracy.

1.7 Organization of the paper

The study is organized into five chapters. Chapter one presents introduction of the study. Chapter two presents the literature review. Chapter three presents the research methodology. Chapter four presents the results and discussion. Chapter five presents the conclusions and recommendations.

Finally, the references used in the study are listed at the end. Questionnaire use is also included in the Appendix part.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

This chapter of the thesis focuses on theoretical, empirical studies and conceptual framework to examine the meaning, delay causing factors on construction projects. It presents the major factors which cause delay in construction projects.

2.1 Theoretical framework

2.1.1 Construction

The construction industry plays a major role in development of any nation. Physical infrastructures, such as buildings, roads and bridges can be used to measure the economic growth of any nation (Fugar et l, 2010). In construction project development numerous parties are involved, various processes, different stages and steps of work and a great deal of input from both the public and private sectors, with the major objective of bringing the project to a successful conclusion (Wang, 1994). Quality of the managerial, financial, technical and organizational performance of the respective parties measures success in carrying out construction project development, while taking into consideration the associated risk management, the business environment, and economic and political stability (Duncan .M, 1990). According to Wang (1994), as construction is becoming more complex, a more sophisticated approach is necessary to deal with initiating, planning, financing, designing,approving, implementing and completing a project.

According to(Duncan.M, 1990),Contractors play major role in construction projects and their achievement. Their main duties start when the project reaches the execution stage where the actual work of the project is accomplished. Project performance is a critical matter when it comes to construction industry. Timely completion and client satisfaction are often used as indexes to determine success. The ability of the construction project manager to effectively perform his job functions with the intended efficacy hinges the success of construction projects (Baker, 1983). Evaluation of project performance can be based on project management actions, project related factors, external environment, project procedure and human related factors which has more sub factors under them.

The common assessment of the success of construction projects is that they are delivered on time, to budget, to technical specification and meet client satisfaction (Baker et al., 1983; Slevin and Pinto, 1986; Morris and Hough, 1987; Turner, 1993). However, the criteria for success are in fact much wider, incorporating the performance of the stakeholders, evaluating their contributions and understanding their expectations (Atkinson et al., 1997; Wateridge, 1998)

A stakeholder is ―an individual or group, inside or outside the construction project, which has a stake in, or can influence, the construction performance‖. Construction projects potentially can

have different sets of stakeholders and, for the purpose of this paper; they are limited to contractor. (Azeb G. 2016)

According to Atkinson, et al., (1997), successful construction project performance is achieved, when stakeholders meet their requirements, individually and collectively. However, in order to meet their requirements and continual participation, it is important for the stakeholders to address and distinguish the three orientation criteria that exist in the life cycle of a project: the procurement‘, the process‘ and the result‘ orientation.

2.1.2 Project

As Project management guide defines a project is a series of activities that need to be completed in order to reach a specific outcome. ―A project is often defined as a unique piece of work with predefined start and end dates, objectives, scope, and budget, performed by a temporary organization. A project can be any new structure, plant, process, system or software, large or small, or the replacement, refurbishing, renewal or removal of an existing one(International project Management journal, 1999).

Since it is an investment of resources to produce goods or services, project costs money. The cost of a project is of high concern to those who are involved in the construction industry as it is one of the most significant criteria to its success. For investing in a project goods or services has to be produced and that the goods or services produced has to be more valuable than the predicted cost of the project.

A project usually has a defined date for completion to get value from the investment. The work for a project is a period of intense engineering and other activities, but is short in its duration relative to the subsequent working life of the investment.

2.1.3 Project Management

Standing from the oldest achievement of builders of the pyramids, the architect of ancient cities,the masons and craftsman of great cathedrals and mosques, and of the might of labor behind the Great Wall of China and other wonders of the world it is logical to conclude that Managing projects is one of the oldest and most respected accomplishments of mankind. For clients project success is fundamental issue (Pmbok, 2016).

The three factors that play important roles in planning and controlling of construction projects are quality, time and cost. Quality outputs standards, meeting time and budget objectives reflect success of project.

The definition of project management branches from the definition of project, and infers some form of control over the planned progress of explicit change. Project management is the application of resources in order to meet or exceed project goals and stakeholder needs and

expectations from a project. In order to do so balancing competing demands is required. ―Project management is the art of leading and coordinating resources through the life of a project by using modern management technique to achieve predetermined goals of scope, cost, time, quality and participant satisfaction(Pmbok, 2016). Project management ranges from projects fordeveloping a new good or a service, projects for developing or modifying a social organization to projects for relating a technical system to a natural setting. A project can be set up to produce or modify infrastructures, factories or buildings, or to bring new business processes into existence.

This variety makes it difficult to describe projects in a way that is sufficiently wide to be inclusive, yet focused enough to be useful. To further complicate the defining process, project environments can quickly get caught up in rapid change processes. (International project Management journal, 1999).

Project management is the management of planned change, such that from the initial concept, the change is directed towards the unique creation of functioning system. In contrast, general or operation management also involves the management of change, but their purpose is to minimize and control the effect of change in an already constructed system. Therefore, project management directs all the elements that are necessary to reach the objective, as well as those that will hinder the development. It should not be forgotten that projects are managed with through people. Project management must look ahead at the needs and risks, communicate the plans and priorities, anticipate problems, assess progress and trends, get quality and value for money, and change the plans if necessary to achieve the objectives (International project Management journal, 1999).

Project management needs depend upon the relative size, complexity, urgency, importance and novelty of a project. The needs are also greater where projects are independent, particularly those competing for the same resource. (José R. San Cristóbal,1 Luis Carral,2 Emma Diaz,3 José A. Fraguela,2 and Gregorio Iglesias4 2018)

As project Management hand book states project has four processes such as

- Initiation Process: - authorization
- Planning Processes: - action to attain the objectives.
- Controlling Processes: - monitoring and measuring process regularly to identify variance from plan so that corrective action can be taken when necessarily.
- Closing Processes: - formalizing acceptance of the project or phase and bringing it to an orderly end.

Project management knowledge areas, describe project management knowledge and practice in terms of their component progress. As per project management book of knowledge the process has been organized into nine knowledge areas: Project integration management: - ensure that the

various elements of the project are properly coordinated. It consists of project plan development, project plan execution, and integrated change control.

Project scope management: - ensure that the project includes all the work required to complete the project successfully. It consists of initiation scope planning, scope definition, scope verification and scope change control.

Project Time Management: - ensure timely completion of the project. It consists of activity definition, activity sequencing, activity duration estimating, schedule development, and schedule control.

Project Cost Management: - ensure that the project is completed within the approved budget. It consists of resource planning, cost estimating, cost budgeting and cost control. Project Quality Management: - ensure that the project will satisfy the needs for which it was undertaken. It consists of quality planning, quality assurance and quality control.

Project Human Resource Management: - describes most effective use of people involved with the project. It consists of organizational planning, staff acquisition, and team development.

Project Communication Management: - ensure timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information. It consists of communication planning, information distribution, performance reporting, and administrative closure.

Project Risk Management: - is concerned with identifying, analyzing, and responding to project risk. It consists of risk management planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk response planning and risk monitoring and control.

Project Procurement Management: - processes required acquiring goods and services from outside the performing organization. It consists of procurement planning, solicitation planning, solicitation, source selection, contract administration and contract closeout.

2.1.4 Project Time

Sunny and K. Baker, (2003) define project time as the duration that is needed to finish the work starting from site hand over until finished. ―Duration‖ is the time, usually in days, taken to complete the entire project from starting the first task to finishing the last one estimating the duration of duties is the most important. It is also defined by Clough, (2000) as duration of the project on the date stated in the contract, or provisional completion dates required for phases of the work. There may be many reason both predictable and unforeseeable, for non-completion of housing project on time .In order to finish a project within the required time and budget it is necessary that each phase of its preparation and execution, starting with the assessment of feasibility and terminating with the handing over of the completed project by the contractor to

the client, be formulated with accuracy in order to limit delays, disputes and unexpected additional costs (Fidic, 2005)

2.1.5 Project Time Management

According to PMBOK (2004) Project time management explained as the effective and efficient utilization of time to aid the execution of project, which begins from planning, scheduling and controlling to accomplish the project time objectives. Degoff and Friedman (1999) also defines project time management as the development of a project time schedule, to manage that schedule, and to ensure the project completes within the approved time schedule. Therefore, schedule is essential to manage time, which occupies defining project activities, ordering the activities, intensifying the schedule, executing the schedule and controlling the plans during project implementation. Project time management includes the processes required to ensure timely completion of the project (Duncan, 1990) Overviews of the major processes in project time management according to PMBOK are as follows. Plan Schedule Management: is the process of establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule. The key benefit of this process is that it provides guidance and direction on how the project schedule will be managed throughout the project.

Define Activities: is the process of identifying and documenting the specific actions to be performed to produce the project deliverables. The key benefit of this process is to break down work packages into activities that provide a basis for estimating, scheduling, executing, monitoring, and controlling the project work.

Sequence Activities: is the process of identifying and documenting relationships among the project activities. The key benefit of this process is that it defines the logical sequence of work to obtain the greatest efficiency given all project constraints.

Estimate Activity resources: is the process of estimating the type and quantities of material, human resources, equipment, or supplies required to perform each activity. The key benefit of this process is that it identifies the type, quantity, and characteristics of resources required to complete the activity which allows more accurate cost and duration estimates.

Estimate Activity durations: is the process of estimating the number of work periods needed to complete individual activities with estimated resources. The key benefit of this process is that it provides the amount of time each activity will take to complete, which is a major input into the Develop Schedule process.

Develop Schedule: is the process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model. The key benefit of this process is that by entering schedule activities, durations, resources, resource availabilities,

and logical relationships into the scheduling tool, it generates a schedule model with planned dates for completing project activities.

Control Schedule: is the process of monitoring the status of project activities to update project progress and manage changes to the schedule baseline to achieve the plan. The key benefit of this process is that it provides the means to recognize deviation from the plan and take corrective and preventive actions and thus minimize risk.

2.1.6 Project Management Tools and Techniques

Project management methods are essentially designed for the application of knowledge, skills,tool and techniques to manage activities so as to meet the project objectives (Pmi, 2013). The importance of project management techniques and tools in achieving the project objectives and expectations has been widely reported in literature (Milosevic, 2003, Murphy and Ledwith, 2007). For instance, the applications of the principles of project management have been considered to be very efficient in the management and control of project activities (Murphy and Ledwith, 2007). Some of tool and techniques are listed and explained below.

Precedence diagramming Method (PDM) From the definition of PMBOK (2004), the precedence diagramming method (PDM) is a technique used for constructing a schedule model in which activities are represented by nodes and are graphically linked by one or more logical relationships to show the sequence in which the activities are to be performed. Activity-on-node (AON) is one method of representing precedence diagram.

Critical Path Method (CPM) is a method used to estimate the minimum project duration and determine the amount of scheduling flexibility on the logical network paths within the schedule model. This schedule network analysis technique calculates the early start, early finish, late start, and late finish dates for all activities without regard for any resource limitations by performing a forward and backward pass analysis through the schedule network. (Pmbok, 2004)

Critical Chain Method (CCM) is a schedule method that allows the project team to place buffers on any project schedule path to account for limited resources and project uncertainties. It is developed from the critical path method approach and considers the effects of resource allocation, resource optimization, resource leveling, and activity duration uncertainty on the critical path determined using the critical path method (Pmbok, 2004)

Program Evaluation and Review Technique (PERT) is a process of Uses sequential network logic and weighted average duration estimate to calculate project duration. Although there are surface differences, PERT varies from CPM primarily in that uses the distributions mean (expected value) as an alternative of money likely estimate originally used in CPM (PMBOK,2004)

2.1.4 Definition of Construction Delay

Construction delays can be defined as the late completion of work compared to the planned schedule or contract schedule (Kang sikwei (2010). Pickavance Keith (2005) defines the word delay‘ as something happening at a later time than planned, expected, specified in a contract or beyond the date that the parties agreed upon for the delivery of a project.

Delay is defined as a time overrun beyond the project completion date agreed by the parties agreed up on for delivery of project. (Assaf & Al-Hejji, 2006). Delay may also be defined as act or event, which extends required time to deliver work of the contract, manifests itself as additional days of work (Zack, 2003).

Frank D.K, Fugar and Adwoa .B, Agyakwah-Baahdefine delay as an event that causes extended time to complete all or part of a project. Delay may also be defined as the time overrun, either beyond the date for completion specified by the contract or beyond the extended contract period where an extension of time has been granted. Delay could be defined as the time overrun either beyond completion date specified in a contract or beyond the date that the parties agree upon for delivery of a project. (Divya & Ramya2015)

2.1.7 Classification of Delay

2.1.7.1 Excusable Delay

Excusable delays, also known as ―force majeure‖ delays, these delays are commonly called ―acts of God‖ because they are not the responsibility or fault of any particular party. Most contracts allow for the contractor to obtain an extension of time for excusable delays, but not additional money (Alaghbari, 2005).

According to Trauner and Theodore, 2009 an excusable delay in general, is a delay that is due to an uncontrollable event beyond the contractor‘s or the subcontractor‘s control. Normally, based on common general provisions in public agency specifications, delays resulting from the following events would be considered excusable: General labor strikes, Fires, Floods, Owner-direct changes, Errors and omissions in the plans and specifications, Differing site conditions or concealed conditions, Unusually severe weather, Intervention by outside agencies and Lack of action by government bodies, such as building inspection. These conditions may be reasonable, unforeseeable and not within the contractor‘s control (Trauner and Theodore, 2009), and the analyst will conclude that a delay is excusable based solely on the preceding definition.

Decisions concerning delay must be made within the context of the specific contract. The contract should clearly define the factors that are considered valid delays to the project and that justify time extensions to the contract completion date (Trauner & Theodore, 2009) Excusable delays are divided into two: compensable and non-compensable delays. Compensable delays are caused by the owner or the owner's agents. While non-compensable delays are caused by third

parties or incidents beyond the control of both the owner and the contractor. These delays are commonly called ―acts of God‖ because they are not the responsibility or fault of any particular party. (Wa'elAlaghbari 2007; Saleh Al Hadi Tumi 2009). According to W. Koshe and K. N. Jha, 2016, Excusable with compensable delays are delays or interruptions to all or part of the work caused by an act or failure to act by the owner resulting from owner's breach of an obligation, stated or implied, in the contract. While excusable without compensable delays are delays caused by factors that are not foreseeable, beyond the contractor's reasonable control and not attributable to the contractor's fault or negligence.

2.1.7.2 Non Excusable Delay

A non-excusable delay is delay caused by the contractor or its suppliers, through no fault by the owner. The contractor is generally not entitled to relief and must either make up the lost time through acceleration or compensate the owner. (Saleh Al Hadi Tumi 2009). Therefore, non-excusable delays usually result in no additional money and no additional time being granted to the contractor. According to W. Koshe and K. N. Jha, 2016, Non-excusable delays are delays, which the contractor either causes or assumes the risk for.

Basically, these delays are caused by contractors or subcontractors or materials suppliers, through no fault of the owner. The contractor might be entitled to compensation from the delaying subcontractor or supplier, but no compensation is due from the owner. Therefore, non-compensable delays usually result in no additional money and no additional time being granted to the contractor (Alaghbari, 2005)

Again, the contract is the controlling document that determines if a delay would be considered non-excusable. For example, some contracts consider supplier delays excusable if the contractor can prove that the materials were requisitioned or ordered in a timely manner, but that the material could not be delivered due to circumstances beyond the control of the contractor. Other contracts may not allow such delays. The owner and the designer or drafter of the contract specifications must be sure that the contract documents are clear and unambiguous. Similarly, before signing the contract, the contractor should fully understand what the contract defines as excusable and non excusable delays (Trauner & Theodore, 2009).

2.1.7.3 Concurrent Delay

Concurrent or parallel delays occur when there are two or more independent delays during thesame time period. Concurrent delays are significant when one is an employer risk event and theother a contractor risk event, the effects of which are felt at the same time. When two or more delay events arise at different times, but the effects of the mare felt (in whole or in part) at the same time, this is more correctly termed _concurrent effect' of sequential delay events. (Kane and Caletk, 2008).

If only one factor is delaying construction, it is usually fairly easy to calculate both the time and money resulting from that single issue. A more complicated but also more typical situation is one in which more than one factor delays the project at the same time or in overlapping periods of time. These are called concurrent delays (Alaghbari, 2005)

2.1.8 Stakeholders of Construction Sector

Construction Industry involves many people, organization, agencies, ministries, designers, contractors, project managers, equipment suppliers, material suppliers, testing Laboratories, etc. the contractual stakeholders are client, consultant and contractor.

Employer/Client FIDIC, 2005 defines client as the initiator and owner of the project (it can be public or private client). And also the client is the most important party who is active from inception to completion and event to post-occupancy maintenance. According to Getaneh k. 2015 Duties of the client encompass checking the availability and cost of land, deciding the location & accessibility of the site, fulfilling the required infrastructure, preparation of site (right of way), studies current & future development soil characteristics of land. FIDIC, 2005 defines consultant as a person or firm appointed or designated by owner from time to time to inspect the progress of the construction of the improvements and the conformity of construction with the plan, specification, budget and the project schedule. The main role of the consultant is to interpret the client‘s project requirement into a specific design and possibly the supervision. The consultants‘ team shall ascertain, interpret and formulate the client‘s requirement into an understandable project. Design the project to much requirements and constraints (imposed by statutory obligations, technical feasibility, environmental factors, site conditions, cost, etc) Assess client‘s cost limit to decide on materials & the like. Prepare contract documents. Supervise the project and constantly inform the client on the progress Approve payments resolve contractual disputes Issue provisional and final acceptance certification. (Getaneh, 2015)

Contractors are groups established mainly as commercial companies, that contract to construct development projects (FIDIC, 2005). Responsibility of contractors are carry out a full site investigation prior to submission of tender, submit tender, plan the schedule, program the tasks, control the construction process. Notify the consultant about delays, discrepancies, effect all payments to his employees, suppliers, subcontractors, Rectify all defects on completion of works Provide post occupancy repair and maintenance if required (Getaneh ,2015)

2.2 Empirical framework

A plenty number of delay factors can be mentioned a failed construction project from its completion time. These factors can be categorized into four different sources.

2.2.1 Related to Contractor

Among all the construction parties, a contractor has the major responsibility to carry out most of the project activities. Similarly, if the project is not finished on time and within the allocated budget then the contractors is criticized. In reality, the contracting business is a challenging and demanding profession that contains many complex activities, and, to avoid project delays, the main contractor often holds full responsibility for the work of sub-contractors as well as his own. Basically, how the contractor deals with particular situations depends on the nature of the work and the type of contract (Shi & Arditi, 2001) One of the contractor‘s responsibilities in contract is to complete the work in the date specified in the contract documents, but if he fail to complete the work by his default, he would be responsible to compensate the owner as liquidated damage. (Frics, 1995)

According to Abdella and Hussien (2002) Contractor related factors including site management, improper planning, inadequate contractor experience, mistake during construction, improper method and delays caused by subcontractors. Delays caused by sub-contractors are included among the contractor‘s factors because the latter is fully responsible for the delays caused by his sub-contractors are the factors from contractor side.

Ahmed et al. (2003) and Alaghbari (2005) mentioned the possible following factors causing delays related to contractor in construction projects. These are delay in delivery of materials to site, shortage of materials on site, construction mistakes and defective work, poor skills and experience of labor, shortage of site labor, low productivity of labor, financial problems, coordination problems with others, lack of subcontractor‘s skills, lack of site contractor‘s staff, poor site management, equipments and tool shortage on site.

Factors related to contractor that are raised by Daba1 and Pitroda(2018) are Dishonesty/problems in funding by contractor, ineffective site supervision, ineffective scheduling ,revise due to mistakes during work ,sub-contractors work related delay, poor experience of the contractor, delay in site arrangement, delay in preparation of working drawing and sample of material, delay in payment of executed work for a contractor by the owner, slow decision-making ,late approving design documents ,variation by owner, delay in procurement of materials, mistakes in design documents, recurrent changing of subcontractors, poor methods of construction, unskilled project crew, poor technology, poor coordination and communication between them, ineffective contractor‘s policies, unskilled sub-contractors, ineffective economic control on site, inadequate procurement of construction materials, improper equipment, frequent equipment breakdowns ,shortage of equipment, subcontractor turnover ,lack of labor, slow mobilization of labor, ineffective equipment ,slow equipment deliver, materials damage, strike, conflict between labor and client

2.2.2 Related to Consultant

According to Daba1 and Pitroda (2018) Lack of experience ,disagreement with a design engineer, delay in approving project scope ,delay in performing inspection and testing, poor site investigation, unskilled project management assistance, delay in approving and checking design documents, inadequate coordination and communication between project holders and developers, recurrent change of contractors and sub-contractors, kind of project award and bidding ,variation during construction by owners, unfavorable weather condition during construction work, poor experience of consultant and contractors, delay in checking working drawing, error in design documents and discrepancies, less brief specifications in drawings ,quality pledge are factors related to consultant

According to Abdella and Hussien (2002) Consultant related factors include contract management, preparation and approval of drawings, quality assurance/control and long waiting time for approval of tests and inspection. Ahmed et al. (2003) and Alaghbari (2005) mentioned the possible following factors causing delays related to consultants in construction projects are absence of consultant‘s site staff, lack of experience on the part of the consultant, lack of experience on the part of the consultant‘s site staff; (managerial and supervisory personnel), delayed and slow supervision in making decisions, incomplete documents and slowness in giving instructions.

According to Odeh & Battaineh, 2002, consultant related factors of delay are poor qualification of consultant engineer‘s staff assigned to the project, delay in the preparation of drawings, delay in the approval of contractor submissions by the consultant, poor communication between the consultant engineer and other parties involved, poor planning and coordination by the consultant engineer with other parties involved, delays in performing inspection and testing by the consultant engineer, slow response from the consultant engineer to contractor inquiries, Inadequate design specifications and poor contract management.

2.2.3 Related to Client

Odeh & Battaineh, (2002), stated some factors that are related to client, and these are delay in furnishing and delivering the site to the contractor, unrealistic contract duration, delay in the settlement of contractor claims by the owner, suspension of work by the owner‘s organization, delay in issuing of change orders by the owner, slow decision-making by the owner‘s organization, interference by the owner in the construction operations, uncooperative owner with the contractor complicating contract administration, delay in progress payments by the owner, owner‘s poor communication with the construction parties and government authorities, owner‘s failure to coordinate with government authorities during planning, poor coordination by the owner with the various parties during construction and excessive bureaucracy in the owner‘s administration.

Daba and Pitroda (2018) also stated some causes of delay regardless to client. Corruption ,intermittent termination of variation while project is ongoing, less on-time payment for developers, variation of specifications and material type during construction work, delay in checking contract document, variation of project scope, poor coordination with other stakeholders, slow decision-making ,inadequate information during project feasibility study ,delay in site delivery, lack of motivations for contractor to finish ahead of schedule ,ineffective representative, poor experience, interference during actual project work, joint-owners disagreement, improper feasibility study ,poor coordination and communication, interruption of work ,slow document approve ,nature bidding and award ,impractical contract duration and unrealistic delay penalties are the factors.

According to Abdella and Hussien (2002) Client related factors include finance and payment of completed work, owner interference, slow decision making and unrealistic contract duration imposed by owners.

Ahmed et al. (2003) and Alaghbari (2005) the possible following factors in related to client. Lack of working knowledge, slowness in making decisions, lack of coordination with contractors, contract modifications (replacement and addition of new work to the project and change in specifications) and financial problems (delayed payments, financial difficulties, and economic problems)

2.2.4 External Factors

There are several external factors that make a construction projects delay. Some researchers listed the following factors as a cause for building postponement. Ahmed et al. (2003) and Alaghbari (2005) mention lack of materials on the market, lack of equipment and tools on the market, poor weather conditions, poor site conditions (location, ground, etc.), changes in laws and regulations, transportation delays and external work due to public agencies (roads, utilities and public services) as an external factor. Daba1 and Pitroda (2018) also listed the following external factors for delay, Claim, unexpected natural disasters ,accidents at the site, social and environmental factors, escalation of local material prices and global economic rise, price rise on the international market ,Unreliable suppliers, public enemy ,war, and conflict, delay in obtaining permits from local authority, geopolitical stability, variation in government regulations ,late access to the site (like electricity, road , water) ,neighbors problems, delay by traffic restriction and control ,corruption, social factors, cultures, government policy and its commitment ,late certification from 3rd party, lack of communication ,thieves, international economic crisis, time delay by traffic restriction at the place of work, raw materials unavailability.

According to Odeh &Battaineh, (2002) unforeseen ground conditions, unexpected geological conditions, problems with neighbors, unusually severe weather, conflict, war, and public enemy,

poor weather conditions on the job site, traffic control and restrictions on the job site and rises in the price of materials are cause for the delay of construction.

As we have seen from the above researchers stated many facts of delay for construction project from different literature and from there point of perspective, therefore for this particular study I will summaries causes of delay by the context of Addis Ababa building construction in the table below. Selection of factors is depends on informal interviews and observation from different projects.

Table 1 .Summarized causes of delay

Related to	Causes of delay
Contractor	• mistake during construction • Subcontractor delay • Poor skill and experience of labor • Financial problem • Poor site management • Ineffective scheduling • Poor method of construction • Conflict between contactor and labor • Turnover of subcontractors
Consultant	• Poor communication with the design engineer • Delay in approval for progress • Poor site investigation • Delay in performing inspection and testing • Lack of experience • Preparation and approval of drawing • Mistake in design document
Client	• Unrealistic contract duration • Slow decision making • Delay in progress payment • Interference during actual construction work • Improper feasibility study • Poor communication with government authorities • Financial problem • Delay in preparation of the site
External factor	• Lack of material, tool, Equipment • Poor weather condition • Change in law and regulation • Socio political and economical factor • delay in obtaining permits from local authority • poor site location • Unreliable suppliers • External work due to public agencies (road, utility, public service)

2.3 Conceptual Frame Work

The aim of this section is to summaries the overall causes of delay. Based on the theoretical and empirical investigation made, the researcher conceptualized the possible causes of delays at a fairly general level and is depicted in Figure 1.

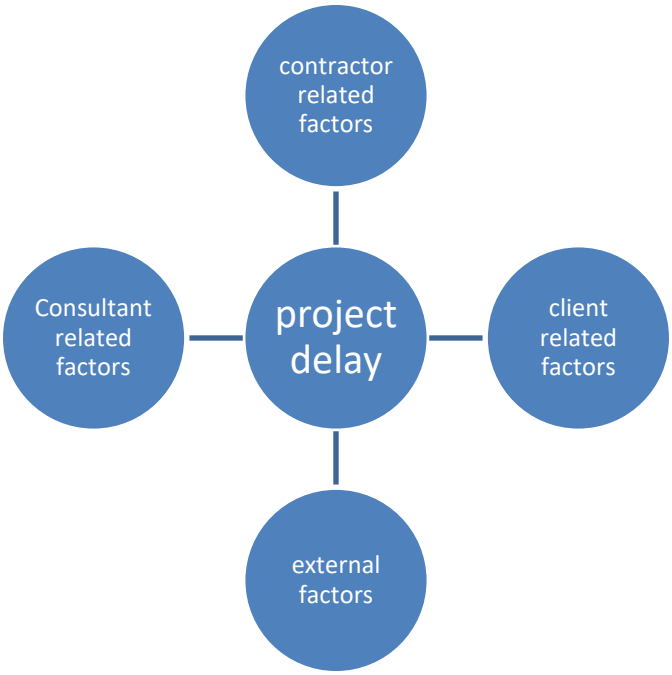

Figure 1. Conceptual frame work

CHAPTER THREE: RESEARCH METHODOLGY

3.1 Introduction

It is important to have a well-designed research methodology as the degree of accuracy and usefulness of a research is directly affected by the methodology. Research methodology is an important part for research study. Therefore, this topic discusses how the research is carried out. It includes research design, Population and Sampling Techniques, Types of Data and Tools/Instruments of Data Collection, Procedures of Data Collection and Methods of Data Analysis The methodology considered and adopted for this research work focus on literature review and, structured questionnaire survey was designed and employed to assess the knowledge and practice on the cause and effects of delays in the construction projects.

3.3 Research Approach

The researcher used quantitative research approaches for this study. Creswell (2009) stated that a quantitative research approach is a research methods dealing with numbers and anything that is measurable in a systematic way of investigation of phenomena and their relationships. It also refers to the type of data being collected (quantitative data involve numeric scores, metrics, and so on, and analyzed.

The reason why the researcher chose to use quantitative research approach is because the main objective of the reason is to evaluate the major causes of delay on the building construction of grade 1 building contractors in Addis Ababa and in order to do so it is essential and ideal to use number based approached.

3.2 Research Design

According to W. Creswell, (2014) definition, Research approaches are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis. It involves the intersection of philosophical assumptions, designs, and specific methods. And research designs are types of inquiry within qualitative, quantitative, and mixed methods approaches that provide specific direction for procedures in a research study. The purpose of this study was particularly intended to evaluate the major causes of delay on building construction projects of grade 1 building contractors in Addis Ababa. For this objective descriptive survey design was adopted with a view to provide descriptions with regard to evaluating the causes of project delay.

3.4 Sampling Design

3.4.1 Target Population

In order to undertake any construction work in Ethiopia, Construction firms must be registered and licensed by the Ministry of Urban Development and Construction (MUDCO). The Ministry has placed the basic human and equipment requirements to attain different licenses with different grades and only when these conditions are fulfilled the qualified firms people or companies be allowed to participate in the industry. Construction firms are classified based on trend of work as follows. General Contractors (GC), Building Contractors (BC) and Road Contractors (RC). Each category classified into 10 levels (Grades) based on their capital of work and equipment they possess requirements set by (MUDCO). Accordingly there are 98 grade 1 building contractors renewed their license for the current budget year. From these contractors 18 are located at different regions of Ethiopia. Therefore 80 BC1 are engaged at Addis Ababa. Since the scope of the study is limited to Grade 1 building contractors in Addis Ababa, the target populations are these 80 grade one building contractors.

3.4.2 Sample Size and Sampling Technique

The primary focus of this study is to evaluate the major delay factors in the building construction projects of grade 1 building contractors in Addis Ababa, from the total of 80 contractors 63 contractors are actively working. Since the population is manageable size the research adopted census method. A census method is a method intended to count everyone in a population rather than a fraction of the population. A census is a study of every unit, everyone or everything in a population. It is known as a complete enumeration which means a complete count. According to Kish (2011) census method is suitable where the universe is not vast or large quantity. Individuals within the 63 companies to complete the questioner were selected using purposive. This is because the researcher wants to select appropriate person who is working in the project and have complete information. Finally the questionnaires were collected accordingly.

3.5 Type and Source of Data

The Researcher used both primary and secondary data sources. The primary data refers to the first-hand information gathered by the researcher. The information was collecting in the survey by making use of questionnaires. The questionnaires were hand delivered or sent via email to respondents and collected same wise after being filled. The secondary data was gathered through review of literatures, from the Ministry of Urban Development and Construction (MUDCO) documents, Quarter & annual performance reports and individual file of different sites.

3.6 Data Collection Method

List of all BC1 contractors had been prepared, communicated physically and through different means of communications (email, telegram etc.) to fill the questioner. For those companies which were located in ideal location from where the researcher live & work, questionnaires were hand delivered. For the other companies email and phone numbers were collected from the public relations department of Ministry of Urban Development and Construction (MUDCO) and from a website (ethiopiaconstruction.com) and sent through accordingly.

3.6.1 Development of questionnaire

A questionnaire survey was designed based on the objectives of the study. A questionnaire of questions of causes with responsible parties for the causes carefully will design from literatures conducted in construction projects.

Causes of project implementation Delays

This section is designed to evaluate the factor that contributes to the causes of Project implementation delays from the previous literature review. There will be 31 factors of delay which categorized in four groups as stated in the chapter two, table 1The questionnaire is based on Likert Scale of five ordinal measures from one (1)to five (5) according to level contributing. 1 = very law, 2 = low, 3 = moderate and 4 = high 5= very high

3.6.2 Ethical Consideration

The researcher used the data from customers collected through questionnaire; permission must be obtained from the customers. To maintain the confidentiality of the information provided by the respondents, the respondents will instructed not to write their names on the questionnaire and assured of that the responses would be used only for academic purpose and kept confidential. Finally, respondents will include in the study based on their free will.

3.6 Data Analysis Technique

The data analysis is determined to establish the relative importance of various factors that contribute to causes of construction delays. Analysis of data consists of calculating the Relative Importance Index (RII) and Ranking of factors in each category based on the Relative Importance Index (RII)

$$RII = \frac{1\,n1 + 2n2 + 3n3 + 4n4 + 5n5}{A * N}$$

Where

RII= Relative Importance Index

n1, n2, n3, n4, n5 = Number of respondents answer each factor

1, 2, 3, 4, 5 = weight given for each factor (ranging from 1 to 5)

A = highest weight (i.e. 5 in our case)

N = total number of respondents

The importance index was calculated for all delay causes and the delay causes were ranked accordingly. In order to identify how project delay can be mitigated, it is important to identify the responsible party. Therefore, the responsibility of the delay causes is illustrated in the factor or category column.

The range of RII was from 0 to 1 (0 not inclusive). The higher the value of RII the more frequent and influential factor is as cause of delays.

3.7 Reliability and Validity Test

Ensuring validity in behavioral research is very important but it is a complicated and challenging exercise. Measuring and evaluating the questionnaire consider some specifications for measuring tools, such as the validity of questionnaire. The validity of a measuring tool means that it can measure the relevant specification not any other variable. Content validity was used for measuring the validity of the questionnaires of this research. For this purpose, the content of the questionnaire was prepared by referring to scientific texts, theories and the model relevant to the subject and the questions of the research. After doing amendments by advisor the content validity and face, validity of the questionnaire was approved.

Table 2.reliability and validity test

Questions 31	31
Sum of items variance	36.32045
Variance of total score	183.5896
Cronbach‘s alpha	0.828904

Source: excel shit

In the study the testing result for the entire questionnaire was 0.824, the result depicted that Chronbach's Alpha equals 0.824 for the entire questionnaire that means the questionnaire is a good reliability. If Chronbach's Alpha result is below than 0.7 the questionnaire showed is rejected (Tavakol & Dennick, 2011). Thereby, it can be said that it is proved that the questionnaire is valid, reliable, and ready for distribution for the population sample.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETAION

4.1 Introduction

This chapter presents the data analysis and discussions based on the questionnaire survey. It discussed the questionnaire response rate, general information of respondents, the major causes of delay in construction projects in Addis Ababa building construction in the case of grade one building contractors. The collected data were analyzed using the method as mentioned in Chapter Three and the findings also outlined based on specific objectives of the study. A total of 31 potential delay causes were selected from previous studies and grouped in four categories: client related factors, contractor related factors, consultant related factors and external factors. Thus, respondents were asked to rank delay causes factors in a five-point scale range from 1 to 5 based on frequency of occurrence from rarely to greatly often.

A total of sixty three set of survey questionnaire was distributed and sixty three were collected and used in order to identify the most important factors that cause delays. The survey questionnaires were distributed to the owners, project managers, site Engineers and site supervisors that work in grade one building contractors in Addis Ababa. Out of sixty three questionnaires, seven questionnaires are incomplete and not filled by respondents because due to temporary abandonment of sites & works are temporary suspended, respondent absence and hectic. There for a total of fifty six questionnaires are successfully filled by respondents which makes the response rate 88.8%

4.2 Demographic Characteristics of Respondents

Demographic characteristics of the respondents of this research include respondent‘s level of experience, educational level, Designation in the company and at building construction.

Table 3.reliability and validity test

Respondent’s work experience	Frequency	Percentage
0 – 4years	12	21.4%
5 – 10	39	69.9%
10 and above	5	8.9%

Source: survey 2024

Table 4. respondent’s educational level

Educational level	Frequency	Percentage
Diploma and less	5	58.9%
BSC/BA degree	37	66.1%
Masters and above	14	25%

Source: survey 2024

Table 5.respondent's designation

Designation	Frequency	Percentage
Owner	2	3.57%
Project Manager	12	24.3%
Sit Manager	14	25%
Resident Engineer	17	30.35%
Sit Supervisor	5	8.9%
Other	6	10.71

Source: survey 2024

Based on Table 3, regarding the experience of respondents, the majority of them 39(69.6%) were with 5-10 years' experience and 12(21.42%) of respondents were with years' experience while the remaining 5(8.9%) were with experience greater than 10 years. This means the majority of respondent were well experience and deep understanding about the nature of study area.

Regarding the education level, the majority of the respondents 37 (66.1%) are degree graduates 14(25%) are master's degree holders while the remaining 5(8.9%) are master's degree holders. Based on table 4.3 17(30.35%) of respondents are resident Engineers, 14(25%) are site Engineers, 12(24.3%) are project manager, 2(3.57%) are owners and the remaining 6 (10.71%) are other which is most of them have the basic information about the projects.

4.3 Data Analysis

The objective of conducting the analysis for this section is to establish the factors under the groups of causes identified from the literature review and the ranking according to their significant influence towards a project delays. A ranking method was used to achieve this objective and the significant of using these methods is revealing the most influential factors within each category of causes. In this respect the respondents were asked to rank the importance of delay causes using five points' scales as explained in chapter three. The importance and ranking of delay causes resulted by the research methodology of questionnaire survey and evaluated by statistical formula for each factor group are shown below.

From Table 7 the results show that the respondent ranked the most frequent contractor related delay causes in the construction of building projects were ineffective scheduling (RII=0.9), financial problem (RII=0.821), Poor site management (RII=0.75), mistake during construction (RII= 0.71), subcontractor delay (RII=0.689), conflict between contactor and labor (RII= 0.63) poor skill and experience of labor (RII= 0.61), and turnover of subcontractors (RII= 0.58). These results indicate that the most frequent and influential contractor related factor is ineffective scheduling. Next to that financial problem, poor site management and mistake during construction significantly affect the project schedule. The remaining contractor related factors, subcontractor delay, conflict between contactor and labor, poor skill and experience of labor and turnover of subcontractors moderately cause delay on building construction in Addis Ababa.

Table 6.evaluation of contractor related factors.

Contractor related factor	RII	Rank
mistake during construction	0.742857	4
Subcontractor delay	0.689286	5
Poor skill and experience of labor	0.617857	7
Financial problem	0.821429	2
Poor site management	0.75	3
Ineffective scheduling	0.9	1
Conflict between contactor and labor	0.632143	6
Turnover of subcontractors	0.585714	8

Source: survey 2024

As shown on the table 7 below, the most important and highly ranked consultant related delaycauses in Addis Ababa building construction projects, are delay caused by mistake in designdocument (RII=0.846), poor communication with the design engineer (RII=0.753), delay inapproval for progress (RII=0.675), preparation and approval of drawing (RII=0.639), lack ofexperience(RII=0.578), poor site investigation (RII=0.571) and delay in performing inspectionand testing(RII= 0.532). These results indicate that mistake in design document is the mostfrequent consultant related factor. Poor communication with the design Engineer is the secondmost frequent factor. Delay in approval for progress and preparation and approval of drawing arethe 3rd and 4th significant factors by the respondents. The other factors those are related to consultant, lack of experience, poor site investigation and delay in performing inspection and testing are less frequent when compared to the above factors.

Table 7.evaluation of consultant related factors

Consultant related factors	RII	Rank
Poor communication with the design engineer	0.753571	2
Delay in approval for progress	0.675	3
Poor site investigation	0.571429	6
Delay in performing inspection and testing	0.532143	7
Lack of experience	0.578571	5
Preparation and approval of drawing	0.639286	4
Mistake in design document	0.846429	1

Source: survey 2024

According to table 8 the most important and highly ranked client related delay causes in Grade one building construction projects in Addis Ababa are financial problem of consultant (RII=0.821), poor communication with government authorities (RII=0.732), slow decision making (RII=0.721), interference during actual construction work(RII=0.703), improper feasibility study (RII=0.71), delay in progress payment (RII=0.71), unrealistic contract duration (RII=0.639) and delay in preparation of the site (RII=0.607). Here we can clearly see that from the listed elements of client related factors financial problem of consultant takes the first place and poor communication with government authorities takes the next rank. Then slow decision making, interference during actual construction work, improper

feasibility study, delay in progress payment and unrealistic contract duration will follow consecutively. The last one from the list is delay in preparation of the site.

Table 8.Evaluation of Client related factors

Client related factors	RII	Rank
Unrealistic contract duration	0.639286	7
Slow decision making	0.721429	2
Delay in progress payment	0.707143	5
Interference during actual construction work	0.714286	4
Improper feasibility study	0.717857	3
Poor communication with government authorities	0.703571	6
Financial problem of consultant	0.821429	1
Delay in preparation of the site	0.607143	8

Source: survey 2024

According to table 9 the most important and highly ranked external related delay cause in Grade 1 building construction project in Addis Ababa are lack of material, tool and equipment (RII=0.725), delay in obtaining permits from local authority (RII=0.653), unreliable suppliers. (RII=0.6), poor site location, (RII=0.59), poor weather condition (RII= 0.589), external work due to public agencies (road, utility, public service) (RII= 0.571)and change in law and regulation (RII= 0.46). The first rank and main one from external factor is lack of material, tool and equipment. Next is delay in obtaining permits from local authority. Unreliable suppliers are the third ranked element. The forth and the fifth are poor site location and poor weather condition following by one another. Then external work due to public agencies (road, utility, public service) and change in law and regulation are the last ones.

Table 9.Evaluation of external factors

External Factor	RII	Rank
Lack of material, tool, Equipment	0.725	1
Poor weather condition	0.589286	5
Change in law and regulation	0.460714	8
Socio political and economical factor	0.542857	7
delay in obtaining permits from local authority	0.653571	2
poor site location	0.592857	2
Unreliable suppliers	0.6	3
External work due to public agencies (road, utility, public service).	0.571429	6

Source: survey 2024

4.4 Top 10 Delay Causes

Table 10.top ten delay factors

Top ten delay factors	RII	Related to
Ineffective scheduling	0.9	Contractor
Mistake in design document	0.846	Consultant
Financial problem of contractor and client	0.821	Contractor and Client
Poor communication with the design engineer	0.753	Consultant
Poor site management	0.750	Contractor
mistake during construction	0.742	Contractor
Lack of material	0.725	External
Slow decision making of client	0.721	Client
Improper feasibility study	0.717	Client
Interference during actual constructin work	0.714	Client

Source: survey 2024

In Table 10 above, as ranked by the respondent, 10 most important factors causing delay in construction project are summarized and presented. Ineffective scheduling RII=0.9 is suggested as the most important factor causing delay on building construction projects. This is closely Top ten delay factors RII Related to Ineffective scheduling 0.9 Contractor Mistake in design document 0.846 Consultant Financial problem of contractor and client 0.821 Contractor and Client Poor communication with the design engineer 0.753 Consultant Poor site management 0.750 Contractor mistake during construction 0.742 Contractor Lack of material 0.725 External Slow decision making of client 0.721 Client Improper feasibility study 0.717 Client Interference during actual construction work 0.714 Client followed by mistake in design document with RII=0.846. Financial problem of contractor and client with RII=0.821 comes third followed by Poor communication with the design engineer with RII=0.753. Poor site management and mistake during construction with RII value of 0.75 and 0.742 ranked as 5th and 6th respectively. Lack of material, tool, Equipment ranked 7th with RII=0.725 and Slow decision making of client 8th with value of RII=0.721 Improper feasibility study 9th with RII=0.717 followed by interference of client during actual construction work with RII=0.714.

4.4.1 Discussion on top 10 factors

4.4.1.1 Ineffective scheduling (RII= 0.9)

The most significant factor responsible for project delays of building construction projects in Addis Ababa on this research is an ineffective or impractical project scheduling with RII value of 0.9. Ineffective scheduling arises from the acceleration in the project schedule due to the delays in the construction activities and may increase the expectations on labor performance and may cause frequent disruptions in site management due to the delays in tools, equipment and material supply. High expectation on labor performance, which can be referred to working overtime, can cause the following problems: labor‘s physical fatigue, which ultimately will demotivate due to

poor mental attitude of the workforce. Eventually, all of this will not only be affecting labor performance level, but also quality level of output due to the poor workmanship, which is therefore rework, project time and cost overruns. This result agrees with the findings of several researches conducted in different countries to evaluate the most significant causes of project delays (Frimpong, Oluwoye, & Crawford, 2003). A. M. Odeh and H. T. Battaineh, (2000) found in their research work Ineffective planning and scheduling by contractors is the significant causes of delay in construction project

4.4.1.2. Mistake in design document (RII= 0.846)

The second most significant factor is mistake in design document. Design error and change orders result from many factors such as insufficient preliminary study, lack of information, inexperience or incompetence of design staff, negligence and mistakes of design staff, lack of coordination between the various design disciplines, incomplete design effort, improper staffing of the design team, and lack of a quality control plan from the design firms. Numerous revisions of the drawings and plans and new instructions cause delay in the scheduling and planning of the project. The consultant gives new plan and instructions even after completion of the task. This issue causes wastage of time and money due to rebuilding of the structure. Consequently, there is an increase in project cost, wastage of material, and wastage of time that causes delay in the project.

4.4.1.3. Financial problem of both contractor and client (RII=0.821)

Rapid and economical completion of projects largely depends upon the availability of timely funds. Allocating sufficient budget before starting the project can solve many problems in this regard. Results of this research indicate that financial problems are the most important delay causing factor (RII= 0.821). By considering the literature review, it can be seen that financial problems are one of the most important problems in construction projects. Respondents indicated financial problems occur due to insufficient preliminary study, inflation, and limited budgets and financial resources. Problems in sourcing financial credit for projects is a general problem that client faces every year especially at the beginning and end of a year. These problems have direct effect on contractors and causes delay in performance of work. Financial problems of clients during the execution phase of a project lead to problems for contractors such as paying the wages of workers.

4.4.1.4. Poor communication with the design engineer (RII= 0.753)

The result indicated the lack of communication as well as coordination among the project parties substantially affects the construction scheduling, also implying one of the primary reasons of put off in construction of building construction projects. This is an important factor to enhance the construction performance and avoid miss understanding among the project parties like client, contractors, consultants and subcontractors. If there is poor communication and coordination it will significantly affect the construction project and the construction schedule. Chan and

Kumaraswamy (2002) remarked that effective communication, fast information transfer between project participants and stakeholders help to accelerate the project performance

4.4.1.5. Poor site management (RII= 0.75)

Site management has an important role in the decline of construction problems. Respondents claimed that excessive workload from the site manager and the project manager causes the managers to not be able to do their duties properly. Project problems that arise for site managers that waste their time are as follows: Being under stress from the employees and the workers for the payment of wages and salaries, having financial problems with subcontractors, material‘s suppliers and owners of equipment and machinery, having problems in obtaining necessary licenses, and having conflict with the exploiter for the tasks that should be done in exploitation sites.

4.4.1.6. Mistake during construction (RII = 0.742)

The sixth most frequent factor by the respondents is mistakes during construction. Most of errors or mistakes during construction can be formed by the lack of experience of labors. A contractor who does not possess requisite experience usually makes construction errors. These errors lead to alterations and delays in activities. Generally Construction activities are required to be carried out using best practices and tools. When the procedures are not followed, errors occur, leading to rework and delays as well as cost overrun.

4.4.1.7. Lack of material (RII= 0.725)

Respondents ranked the shortage of materials on site and late delivery of material as the seventh most influential cause responsible for project delay among the thirty-one factors. This outcome substantiates the findings of Fugar and Agyakwah-Baah (2010), which ranked the aforementioned factors as one of the most influencing causes of construction project delay in Ghana. This is not surprising because Addis Ababa construction industry is dependent on the export materials (i.e. cement, reinforcement) mainly from China, Turkey and other countries, which occasionally may cause material shortage on market and ultimately the availability of materials on site. In addition, in order to supply construction material on time, providence of material plays a significant role.

4.4.1.8. Slow decision making of client (RII= 0.721)

The eighth delay causing factor according to the respondents is slow decision making, which is related to client. The management ability of the project‘s owner is the second important factor causing delay in construction projects. All the respondents seem to agree that ―slowness in making decision‖ on the part of the owner of the project is an important factor that causes delays in construction projects.

4.4.1.9. Improper feasibility study (RII=0.717)

One of client related factor, improper feasibility is ranked as ninth from top ten delay causing factors. Investment in construction project is able to give higher benefit beside of its high uncertainty. The uncertainty depends on many risk factors. According to the respondents the feasibility study is neglected part in Addis Ababa building construction projects. Due to the fact that its neglected, changes that are created by uncertainty leads to cost and time over runs, the environment impact has negative impact on the time and cost of the project which lead to increase the time and the cost both System dynamic technique approved to be a significant in the analysis of the impact of the feasibility study and should be used in these studies in order to simulate the impact of unsuitably feasibility study.

4.4.1.10. Interference during actual construction work (RII=0.714)

The factor interference during actual construction is ranked as the tenth factor that cause delay on building construction. Client interference in this research context, relates to all those acts or omissions made by the client which adversely affect the project and hamper the project‘s performance and can be defined as ―involvement in the activities and concerns of the other people when your involvement is not wanted‖ (Merriam Webster Dictionary application, 2020).

This type of interference often causes delays to the date of practical completion and in turn, results in budget and cost overruns. A major implication of this type of interference is that, more often than not, it does not create any added value to the project, and only represents itself as being an inconvenience to the client‘s agents and the contractor.

The discussion of client interference as a factor causing delays in building construction is a critical aspect of project management, as it addresses the dynamics between clients, contractors, and project teams. Recognizing client interference as the tenth-ranked factor indicates that, while it may not be the most significant delay factor compared to others (such as resource availability or weather conditions), it plays a notable role in undermining project efficiency and effectiveness.

Client interference can manifest in various ways, including last-minute changes in project scope, indecisiveness regarding design or operational decisions, frequent interruptions in communication, or even direct involvement in tasks best suited for contractors or project managers. These actions can disrupt the planned workflow, leading to interruptions in construction activities, misalignment of project goals, and confusion among team members.

To mitigate the negative consequences of client interference, it's essential to establish clear communication channels and delineate the roles and responsibilities of all parties at the project's onset. Setting boundaries and fostering an understanding of the client's role versus the contractor’s expertise can help enhance project performance. Additionally, employing effective project management strategies, such as regular updates, clearly defined change management

processes, and utilizing stakeholders' input at appropriate times, can significantly minimize impacts caused by client interference.

Ultimately, fostering a collaborative and respectful environment between clients and contractors is crucial, as it can enhance project delivery, maintain budget integrity, and ensure the final quality of the construction meets the expectations of all stakeholders involved.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter presents the summery, conclusion and recommendation of the study. The conclusion of this study was based on the summary of research findings and the recommendations provided based on the conclusions.

5.1 Summary of Findings

The results of the data collected by using the devised questionnaire survey, which was distributed among professionals working in the construction industry of Addis Ababa City, is presented and discussed in this section. The main objectives of this survey, which analyses data and answer the research question.

This study comes with the main significant causes of delay in construction industry. The most common causes of delay which related to contractors are Ineffective scheduling, financial problem of contractor, poor site management and mistake during construction. From the top 10 delaying factors, causes those are related to consultant and significantly affect the completion time of building construction project are mistake in design document and poor communication with the design engineer. Client related factors those are included in the most frequent factors are slow decision making, improper feasibility study and interference during actual construction work. The only external factor that is included in the top ten delaying factors is lack of material. Ten out of thirty-one delay factors revealed that they significantly affect the schedule of constructing building project in Addis Ababa. Ranking of these factors was made according to the importance indices in the four groups. From these most frequent factors contractor related factors takes 37.64% delay causing factors. On the other hand client related factors cover the second highest percentage, 34.83% from the most influential factors. 18.73% of most significant factors are consultant related factor. Only one factor that is grouped in external factors covers 8.49% from the total.

5.2 Conclusion

A comprehensive literature review was carried out to evaluate the causes of delay specified in the literature. The literature review and the pilot study revealed 31 delay causes were distributed. The questionnaire sets were distributed to grade one building contractors that are participating in building constrictions in Addis Ababa .Number of participants responded to the survey were 63 contractors. The paper presented the most significant factors causing the delay to the four groups. This is bases on the importance indices for the delay factors. Construction delay is a common phenomenon in many countries and situations. To avoid construction delays, it is very important for stakeholders and project participants. First of all identify the possible major factors that can cause delay and label them as critical success factors. Once these factors have been identified,

suitable preventive measures can also be put in place to avoid the negative effects that may arise as a result of their occurrence. The identified delay factors can then be traced to their possible causes that are due to contractor, consultants, and clients.

From this research, contractor related factors which are Ineffective scheduling, financial problem of contractor, poor site management and mistake during construction played the major role in delaying construction; the second one is client related factors such as slow decision making, improper feasibility study and interference during actual construction work. Then consultant related factors which are mistake in design document and poor communication with the design engineer follows as third factor. The fourth and final factor is external factor is lack of material

5.3 Recommendation

Based on the survey results and literature review, the researcher lists some key points to mitigate the building construction project delay in Addis Ababa.

5.3.1 Recommendation for Contractor related factors

- Contractors are provide proper planning, time table for the clients, and manage to make sure the subcontractors, materials, labor and equipment‘s are sufficient enough to start the project. A good and detailed work plan should be prepared and shared with the client. This work plan should include not only detailed project steps but also schedules dedicated to procurement of material and equipment, financing, and human resources.
- There are certain project management tools and techniques that can be utilized to warrant efficient planning and scheduling of public building projects in Addis Ababa. They include critical path method (CPM), work breakdown structures (WBS), critical chain method (CCM), Precedence Diagram Method (PDM), Gantt charts and Program Evaluation Review Technique (PERT) (PMI, 2013). Equally important, ensure proper project controlling and monitoring during the project lifecycle. These would potentially overcome these issues in the Addis Ababa building construction projects.
- Contractors are have enough money based on the cash flow to start the project in order to run the project smoothly.
- Involving Project Management with the construction projects in Addis Ababa would reduce the delays caused by poor site management as the processes get standardized and monitored regularly; tools and techniques such as project performance reports, (EVM), monitoring controlling tools, periodic review of the progress could help to avoid numerous problems confronting projects (PMI, 2013). Contractors should apply effective site management system for different activities of the project so as to avoid rework of activities and low labor productivity that will result time and cost overruns.
- In order to minimize mistakes during construction, improve skills of labors on construction site by providing appropriate training for the personnel to avoid rework on

construction. Either the contractors or the client should provide the desired trainings which fulfill their skill gap and improve their construction performance.

5.3.2 Recommendation for Consultant related factors.

- Conducting proper investigation and giving adequate time in the design and preparation of documents. Conducting design reviews by highly qualified and experienced group of professionals. Constructability reviews and value engineering studies on the final design must be conducted before going to tendering. These review tasks can also be given to the design review consultant if there is lack of qualified in-house staffs. Making sure that the contract documentation is free of ambiguous terms of contract; errors and omissions; plans and specifications are adequately referenced and coincide with the terms of references before entering in to contract. Design consultants‘ liability has to include fitness for the purpose of the design work.
- There has to be good communication and coordination among project parties like client, contractors, consultants and other stakeholders. Avoid unclear and inadequate drawings during design phases by consultant. Consultants should produce clear and complete drawings and regularly revise the drawings before they implement it. In order to improve the communication between all parties standard reporting systems must be followed in reporting progress report and periodical meetings must be organized to facilitate the communication between all parties involved.

5.3.3 Recommendation for Client related factors

- Project cost management would ensure that work in progress can be estimated and payments be released according to schedule to ensure the smooth progress of the project. Clients should have guaranteed enough financial resources before the execution of project so that payment to the contractors is not delayed which in turn results with large time overruns.
- Owners should be informed about their role and the effect scope changes. The culture of thinking to change while the construction is on process must be avoided by effectively utilizing the design stage to eliminate future changes. Preparation of 3D models must be encouraged to clearly see the design out puts and to accommodate change if necessary.

5.3.4 Recommendation to External Factors

- Advance the procurement of materials systems, the procurement department should be equipped and apply modern procurement systems in the organizations to increase the procurement process. The procurement depart also should purchase according to the construction schedule and anticipate the demand, and when the material will be needed. Avoid overage and shortage of materials

5.3.5 Recommendation for future studies

- ✓ Additional studies on construction delays should be conducted in order to develop a guideline as well as methods to minimize the effects of construction delays in Ethiopia. Furthermore, parallel research should be performed in various provinces or cities. In order to establish a legit reliable data, it is required to carry out studies for each specific type and level of construction projects, including highways, dam construction projects, utilities and etc.

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APPENDIX A: QUESTIONNAIRE

ST.MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

DEPARTMENT OF PROJECT MANAGEMENT

Research Questionnaire

This Questionnaire is prepared to collect the necessary data on the evaluation of the possible causes of delay in building construction in the case of Addis Ababa Grade 1 building Contractors (BC1). In the completion Masters Degree in Project Management at St. Mary's university. Your genuine voluntary response has significant value for the completion of this thesis the information you provide will be only used for the purpose academic study and will be kept strictly confidential and anonymous. No personally identifiable information will be collected and all information wil l be analyzed and reported in aggregate. Finally, thank you for taking the time to respond to the Questionnaires.

Sincerely yours

Tewodros Beyene

If you have any questions, please don't hesitate to contact: +251-912952821 or Kingtewodros576@gmail.com

PART ONE

Respondents Background; Please add (√) in the box below as appropriate

1. **Educational Background**

a)Diploma and less□ b) BSC/BA degree □ c) Masters Degree and above□

2. **Respondent Designation in the Company**

a)Owner□ b)Project Manager □ c) Site Manager □ d) Resident Engineer□ e)Site Supervisor Others□

3. **Years of Work Experience (General)**

a) 0 to 5 years□ b) 6 to 10 years □ c)11 and above years□

PART TWO

Numbers of causes of delay in the construction projects are listed below. From your experience please rank the delay causing factors below in what you consider to be encountered in a project based on the frequency of occurrence and the influence towards the delay of a project

NO.	Related to	Causes of Project Delays	Very low	Low	Medium	High	Very high
1	Contractor	mistake during construction					
2		Subcontractor delay					
3		Poor skill and experience of labor					
4		Financial problem					
5		Poor site management					
6		Ineffective scheduling					
7		Conflict between contactor and Labor					
8		Turnover of subcontractors					
9	Consultant	Poor communication with the design engineer					
10		Delay in approval for progress					
11		Poor site investigation					
12		Delay in performing inspection and testing					
13		Lack of experience					
14		Preparation and approval of Drawing					
15		Mistake in design document					
16	Client	Unrealistic contract duration					
17		Slow decision making					
18		Delay in progress payment					

19		**Interference during actual construction work**					
20		**Improper feasibility study**					
21		**Poor communication with government authorities**					
22		**Financial problem**					
23		**Delay in preparation of the site**					
24	**External factor**	**Lack of material, tool, Equipment**					
25		**Poor weather condition**					
26		**Change in law and regulation**					
27		**Socio political and economical Factor**					
28		**delay in obtaining permits from local authority**					
29		**poor site location**					
30		**Unreliable suppliers**					
31		**External work due to public agencies (road, utility, public service)**					

If you have another factor that is not listed above please mention it

If you have any suggestion with the study area please specify here

Thank you for your

cooperation and patience!