# ST. MARY'S UNIVERSITY
# SCHOOL OF GRADUATE STUDIES
# DEPARTMENT OF PROJECT MANAGEMENT

# FACTORS OF DELAY AFFECTING BUILDING CONSTRUCTION: THE CASE OF ZEMEN BANK HQ BUILDING CONSTRUCTION PROJECT

**By**
**Kalkidan Tesfahun**

**Jun, 2024 G.C**
**Addis Ababa; Ethiopia**

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**Kalkidan Tesfahun**

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**A Thesis Submitted to the School of Graduate Studies in Partial Fulfilment of the Requirements for the Award of Master of Arts (MA) Degree in Project Management**

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# ACRONYMS

| | |
|---|---|
| SPSS | Statistical package for social sciences |
| RII | Relative Importance Index |
| HQ | Head Quarter |
| DB | Design and Build |
| LC | Letter of Credit |
| ITP | Inspection Test Plan |
| CM | Construction Management |

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## *ABSTRACT*

*The Zemen Bank HQ Building Constructions is the one among high rising banks' HQ building construction projects in Addis Ababa city which the shareholders of the bank's, the staffs and the public was anticipating to see its completion on time. The project is undertaken by China Wu Yi. Co LTD one of the top 250 international contractors. Zemen Bank HQ building construction project was launched in 2017 and planned to complete within five years in 2022. This study was conducted to reveal the determinant factors that caused the delay of the project. It draws on various literatures conducted on delay of project progress. A descriptive research design was followed to quantitatively find the causes and rank them as per their importance. Data were gathered both from primary and secondary sources through a questionnaire survey, semi-structured interview and documents' scanning. In the survey stratified 33 respondents were participated representing the three major stakeholders: the client, the consultant and the contractor. The study used the Relative Importance Index (RII) for ranking the causes of the delay of the project. The survey findings indicated that the top ten factors that caused the project's delay are: (1) Delays in payments of completed work by owner, (2) Inflexibility of consultant, (3) Financial Constraint, (4) Late Delivery because of late LC approval, (5) Slowness in approving drawing & material samples by the consultant, (6) Space limitations at site for temporary & permanent equipment, (7) Escalation of material prices, (8) Slow process of material selection, (9) Communication barriers faced by consultant and (10) Total quality management by consultant. As a result of the study all major project stakeholders involve in the causes of delay of the projects specially the most significant and influential factor that causes project delay was payment for completed works. Finally, based on the findings of the study, recommendations were made for all major stakeholders of the project for their experience to other future projects. Hence the influential factor is associated with payment for completed works the client, consultant and contractor should give prior concern to improve the fast effectiveness of payments for completed works.*



***Key Words:*** *Delay, Delay factors, Project, Client, Consultant, Contractor and Zemen HQ building construction project*

# CHAPTER ONE
# INTRODUCTION

The study assessed the factors of delay in building construction that affect project performance and success and how they might be avoided, managed or controlled. This chapter presents the background of the study, statement of the problem, research questions, objectives (general and specific), significance of the study and scope and limitation of the study.

## 1.1 Background of the Study

The term project has been defined by different scholars in a variety of ways. project is defined as "A project is a temporary endeavor undertaken to create a unique product, service, or result" (Görög, 2013). A project is a one-time, unique, multitask job with a definite starting point, definite ending point, a clearly defined scope of work, a budget, and usually a temporary team. In addition, projects need capital and commitment of other resources and most of the time involve conflict. A project is completed when its goals and objectives are accomplished to the satisfaction of the stakeholders and when objectives are attained (Görög, 2013). The success of a project depends on the foremost efficient programming, scheduling and control of obtainable resources and project activities by keeping its time, cost and quality values at the highest. However, alongside cost and quality, project schedule is considered the foremost important aspect of the development management life cycle and together of the most drivers of the project success (Durdyev, et al., 2017).

The construction industry in Ethiopia is considered as one of the most important economic sectors. It plays a great role in the economic development of a nation. Construction projects includes building constructions, transport infrastructure, road construction, railway and energy projects, real estate and industrial parks. The current practice of the construction projects faces a lot of problem and a rare event are completed on the scheduled time, budget and desired quality of the stakeholders. A construction project will be successful, when it is completed on schedule with in the agreed budget, expected quality level according to the specification. Almost all projects suffer many deficiencies among them is time overrun (project delay) being a critical issue affecting project performance and success. (NBE. Annual Report; 2021)

The most important factor for the success of construction project is finishing the project on time. However, the problem of delay in construction projects is a global phenomenon. Delay could be defined as prolonging the time duration in completion of the project. One of the most important aspects of construction projects is project management which includes proper scheduling, controlling and implementing the activities. There should be proper arrangement of activities and a proper plan for good construction projects. The plan plays a vital role in specifying the budget of the project. Delays can lead to disruptions, loss of productivity, increased costs, and contract termination. Delays may be site dependent and vary in severity for different project activities. However, one can find out ways to minimize such delay by identifying the causes and effects of delays. Previous research on project delays has provided varying findings due to different contexts and perspectives.

In our country many Chinese companies are undertaking different large projects. Among them this study investigated, evaluated and described the delay factors and how to manage the identified delay factors during the execution period of Zemen Bank HQ Building Construction Project which is undertaken by one of the top 250 international construction companies in the world and have a branch here in Ethiopia namely China Wu Yi Co. LTD Construction.

China Wu Yi Co. LTD Construction was established in 2016 in Ethiopian Market as a grade I construction company in the country of Peoples and Republics of China. Over the years China Wu Yi Co. LTD Construction has grown to be a very competitive Contractor and now becomes one of the top 250 international contractors in the world. It has many branches all over the world including our country Ethiopia. Currently, the company is undertaking different construction works in high rising building construction projects, road construction projects and other infrastructure construction projects.

## 1.2 Statement of the Problem

Many projects in Ethiopia are suffering in performance of delivery. Project time performance in particular would have a major impact on construction project as it would lead into the failure of other major success factor of the project like cost overrun, quality failure and client satisfaction. Chaingz, (2019) Poor time performance would lead to cost overrun Atkinson,et al., (1997) cited by Takim and Kintoye, (2002: 551) revealed that client will not be satisfied if the product fails to meet their price, time frame and functionality.

Projects can be delayed for a large number of reasons. Ethiopian construction industry is well known for failing to meet the project performance requirement. It doesn't need any scientific proof to conclude that almost all of the construction projects in the country facing fell in performance specially in terms of project time and cost performance as it is open fact to anybody in the sector. The reason behind is adhered to a wide range of problems depending on the project characteristics, level of complexity, geographical location of the project, condition of the major project stakeholders and so on.

Among many building construction projects; nowadays banks are constructing their high rising buildings in the capital of the country. Zemen Bank's high rising HQ building is undertaken by the Chinese construction company; China Wu Yi Co. LTD. As expected form international construction company and invited to undertake the projects; it was believed that the success rate of delivery will be much better than the local contractors may perform. But the success rate of delivery was much below what was planned to accomplish with regard to project completion time. Zemen Bank HQ building is 3B+G+33 and was completed with 7 years; which has 2 years' time over run. This shows the project experienced time over run with the planned schedule which intern be highly influence the project cost variation and also believed to cause quality compromise than any other factors to be considered in a given construction project. Accordingly; the main aim of this research was to investigate and define the most critical delay factors in China Wu Yi Co. LTD; Zemen Bank HQ Building construction project according to professionals who were working in the project.

## 1.3 Basic Research Questions

1) Which were the major project stakeholders related delay factors that cause delay in the successful completion of Zemen Bank HQ Building Construction Project?
2) Which were the resource related delay factors that cause delay in the successful completion of Zemen Bank HQ Building Construction Project?
3) Which were the project related delay factors that cause delay in the successful completion of Zemen Bank HQ Building Construction Project?
4) Which were the external related delay factors that cause delay in the successful completion of Zemen Bank HQ Building Construction Project?

5) Which were the major effects of project progress delay in the successful completion of Zemen Bank HQ Building Construction Project?

## 1.4 Research Objectives

### 1.4.1 General Objective

The General objective of the study is to assess the causes and effects of project progress delay in the successful completion of Zemen Bank HQ Building Construction Project.

### 1.4.2 Specific Objectives

1) To assess major project stakeholders related delay factors that cause delay in the successful completion of Zemen Bank HQ Building Construction Project.
2) To assess resource related delay factors that cause delay in the successful completion of Zemen Bank HQ Building Construction Project.
3) To assess project related delay factors that cause delay in the successful completion of Zemen Bank HQ Building Construction Project.
4) To assess external related delay factors that cause delay in the successful completion of Zemen Bank HQ Building Construction Project.
5) To assess the major effects of project progress delay in the successful completion of Zemen Bank HQ Building Construction Project.

## 1.5 Significance of the study

The purpose of this study is to identify the most significant delay determinant factors and their major effects from the perspective of project stakeholders; clients, contractors and consultants who were participating in the construction of Zemen Bank HQ Building Construction Project. The paper will play its own roles for the company in finding out the major issues that make the company not efficient in managing the project's time. And also, the findings and recommendations of the study will be used for those concerned bodies to find out more effective solutions to respond in controlling the impact of delay causing factors on the project time performance. It will be hoped that the paper will give awareness on the significant delay causing factors and their effects and initiated the professionals currently working in the company to undertake deep analysis in responding to the problems of the project delay causing factors to develop sound solution in

managing the influence. Specifically, the study will be used for China Wu Yi Co. LTD construction as one of the basic source to analyzing and respond to delay causing factors in its future projects.

## 1.6 Scope of the study

Even though the mentioned Chinese construction company is undertaking some high rising building construction projects; the study was limited to a specific project among the company undertaking in Addis Ababa city; namely Zemen Bank HQ building construction project. The study focused on identifying delay determinant factors and their effects by evaluating the level of their significance from client, contractor and consultant perspective in the case of the mentioned project.

## 1.7 Limitation of the Study

The major challenge of this study was on the data collection process that the respondents took so much time because they were busy on filling the questioners. Some respondents were hesitant to tell the truth and were not fully cooperative in sharing the causes of delay in the mentioned construction project. This leads to took more time to analyze the given data of the respondents.

## 1.8 Organization of the Paper

This study is organized into five chapters. The first chapter deals with introduction part reflecting on the background of study, statement of the problem, objectives of the study, research question, significance of the study, scope of the study and organization of the paper. The second chapter presents related review of literature which are relevant to this study and in this chapter the theoretical and conceptual frame works of the study was carefully assessed and presented. The third chapter deals with the research methodology and methods of conducting the study. The collected data from the subject of the study was carefully analyzed and interpreted under the fourth chapter. And the last fifth chapter presents the summary, conclusions and recommendations on the findings of the study. At last references and appendix that includes questionnaire, interview questions and the targeted company's profile are the part of the paper.

# CHAPTER TWO
# REVIEW OF RELATED LITERATURE

## 2.1 Introduction

In this section the literature was reviewed that is already in existence concerning the factors leading to delay in construction projects in the world and Ethiopia with specific accent on the construction projects. It presents an overview of previous work on related topics that provide the essential background for the purpose of this study. It further organizes the work into various topics and sub-topics under theoretical review and conceptual review that are strongly guided by the four objectives of the research.

## 2.2 Theoretical Review

### 2.2.1 Construction Projects

According to the PMI, 2013; "Project is defined as a temporary endeavor undertaken to create a unique product or service. Temporary; means that every project has a definite beginning and a definite end. Unique; means that the product or service is different in some distinguishing way from all similar products or services."

The construction industry plays a vital role to improve the human lifestyle and sustainability. Last past decades many researcher has investigated the area of delay, as each site has unique reasons of delay.

Construction projects more often are facing with unpredictable delays and it is one of the biggest challenges to mitigate such delays. Delays are nothing but prolonging the time duration of the project that results into compromising the profit by client. Sometime project doesn't start with adequate planning that turns the project to delay, else sometime due to uncertain events or unexpected things that turn the project into delay.

The process of construction can be divided into three distinct and significant phases; the project conception phase, project design phase and the project construction phase. In a vast majority of project, delay occurs during the construction phase where many unforeseen circumstances and factors occur. Completing a construction projects within the estimated time and cost is an indicator of efficiency, but the process of construction is subjected to many unpredictable and changing

factors that comes from different sources. These sources include performance of parties, resource availability, environmental conditions, and involvement of other parties and contractual relations, thus the completion of the project within the estimated time is rare.

Delays are usually accompanied by cost overruns. When this occur, it will have a debilitating effect on contractors and consultants in terms of growth and adversarial relationship, mistrust, litigation, Arbitration, cash flow problems and a general feeling of trepidation towards shareholders. In addition, delay of construction projects cause dissatisfaction to all parties involved, and the primary role of the project manager is to ensure that projects are completed within the estimated time and cost. Projects stakeholders need to develop the capacity to foresee potential problems likely to affect their current and future projects. Identification of these common problems encountered on past projects in the construction industry is an excellent option to mitigate the factors that cause delay and their effects. However, construction project success can be defined as the completion of a project within the estimated time and cost. But it is rather unfortunate that projects successes are not frequent in the construction industry, especially in the developing countries and third world countries. This could be due to inadequate expertise, finance, and environmental uncertainties and also the inadequate supply of materials. From several studies and empirical evidence, it is clear that projects overruns comprise both delays and cost overruns occur during the construction phase.

Therefore, scholars, researchers and professionals have been motivated to take steps to meet these challenges. Construction project delay is a worldwide phenomenon that affects not only the construction industry but the overall economy of countries as well. It often involves multiple complicated issues all of which are invariable critical to recovering the cost of delay or the necessity to prolong the project with the consequential entitlement to recover the costs of adjusting to the contract schedules. When delay arises, there is always a question as to the causes of the delay and the opportunity of blames, which most of the times will result in disputes and litigation. Currently stakeholders in the construction industry are increasing their concerns about the duration of the construction projects because of rising interests, inflation, commercial pressures and of course it's potential to lead to disputes and claims resulting to Arbitration and Litigation.

### 2.2.2 Project Delay

A project delay refers to an unforeseen circumstance that causes a setback in the planned schedule of a project. This could mean tasks and milestones are not completed within the established deadlines, leading to an overall extension of the project's timeline beyond what was originally forecasted. It is an unplanned and unexpected deferment of a project because of some event or occurrence that impedes the project's commencement or continuation. It is the length of time that extends the project duration and causes a disruption in the delivery of project goals and objectives.

Project delays are often caused by circumstances that create barriers to launch and further implementation of project activities. Rarely a delay can be caused by a request of the customer, sponsor, or other stakeholders have enough authorities on their project.

When project delays are unexpected, they are uncontrollable and have rather a negative impact on project activities and results. An unexpected delay extends the overall duration of project activities and entails an increase in project costs. It generates time-associated cost effects that increase resource consumption and require more time for reaching project success.

In order to prevent the negative impact of project delays, it is reasonable to establish delay allowance at the very beginning of a project. Delay allowance is the length of time included in the project schedule in advance to cover unpredictable contingencies and expected minor delays. It is a mechanism of increasing project safety through preventing activity disruptions and creating time buffers.

### 2.2.3 Classification of construction projects' delays

Many factors can cause construction projects. (Ahmed, 2003) classified delay into two groups:

**The internal causes** which arise from within the project stakeholders (clients, contractors and consultants).

**External factors** which occur as a result of unforeseen factors. These factors arise not from the project participants. They can be termed act of God and may include the followings; weather conditions, natural disasters, government actions and material supplies.

Moreover, construction delay was also classified into three categories by (Bolton,1990). These include:

**Excusable but non-compensable:** This is caused by circumstances not attributed to the project stakeholders or participants.

**Compensable delay:** This occurs as a result of acts or omissions of a client or someone for whose actions the owner is liable to.

**Inexcusable delays:** This results from contractors' fault or his subcontractors or materials. This may sometimes be due to lack of experience.

On the other hand, delay was classified into five categories. These include:

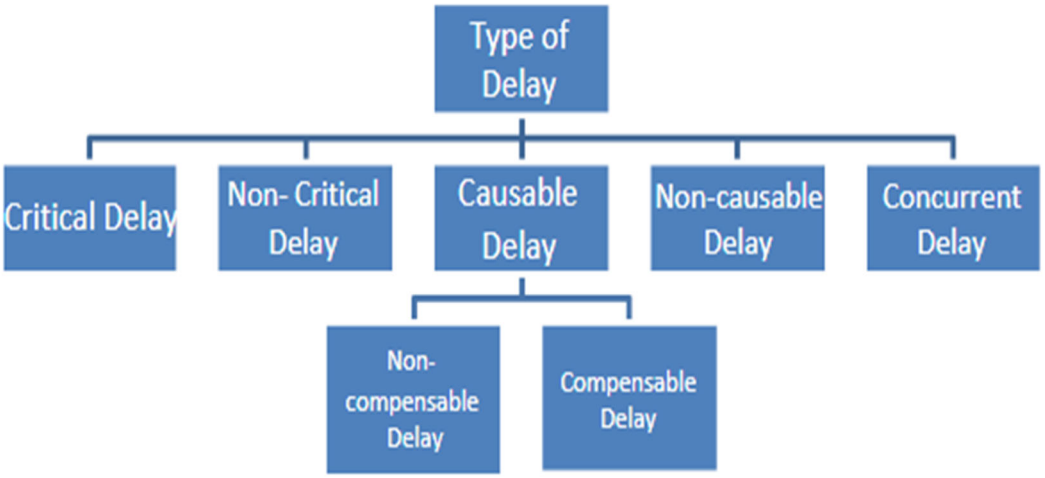


Figure 2.1: **Types of Construction Delay**

**Critical Delay:** It is the type of delay that affects the project completion time or date. This type of delay happens in critical activity (critical path) in CPM scheduling. It foils the contractor from completing the work in the scheduled completion time as the parties agreed upon in the contract.

**Non-Critical Delay:** It is the type of delay that does not affect the completion date of the project because this type of delay happens in non-critical activity in CPM scheduling, but it affects the progress of the activities.

**Excusable Delay:** It is the type of delay that occurs due to an unexpected event which can be controlled neither by the contractor nor the subcontractor. The following events are responsible for excusable delay (Flood, Fire, Acts of God, General labor strikes, usually severe weather, etc.). The analyst should consider the documents of the contract before she/he draws any conclusion about the excusable delay based on the preceding definitions. The contract should clearly state the project possible delay factors to justify extension of time (Ahmed, 2015). Under this type of delay,

there are two sub-types.

**Compensable Delay:** Compensable delays are caused by the proprietor or the proprietor's agents. The contract identifies carefully the types of delays which are compensable delay, so for that types the contractors are entitled to extension of time (EOT) and to additional compensation.

**Non-Compensable Delay:** This type of delays is caused by other party. Neither the contractor nor the client's fault, no one is responsible for this type of delays. The contract identifies carefully the types of delays which are non-compensable so for that types the contractor is entitled to get extension of time only without any compensation for delay harms.

**Non-excusable Delay:** Non-excusable delay is the foreseeable events which are under the contractor's control. There are some examples for this type of delays:

a) Late of materials delivery by supplier.
b) Late of works execution by sub-contractors.
c) Execution of work in wrong ways by contractor or sub-contractor.
d) Shortage of labor and equipment.
e) Labors strike due to the contractor's intention to delay or stop their wages.

**Concurrent Delay:** Concurrent delay is when two or more delay events happen either at the same time or different times but their effects is felt simultaneously (Hastak, 2015). "True concurrent delay is the occurrence of two or more delay events at the same time, one an Employer Risk Event and the other a Contractor Risk Event. The effects can be felt at the same time. For instance, the Owner fails to offer access to the site, and the Contractor has no resources mobilized to implement any work "(SCL, 2016).

### 2.2.4 Factors causing construction projects' delays

Today in construction industry several challenges are faced by construction projects. Many of them directly affect the construction operation concluding the delay in project or affecting the performance of project. This construction delay factors can generate problems in developing economies. The wealth of any nation is gauged by its performance in infrastructure provision through its construction industry. The construction industry is large, volatile, and requires tremendous capital outlays.

To understand the success factors of construction project, it is important to elaborate the causes of these delays. The researchers have studied the many causes of delay in construction industry such as shortage of labor supply, delay in progress payment, poor site management and supervision etc. Some of the studies are summarized below in Table 2.1. Project can success or fail independently of the project management process as it is affected by many other factors outside the direct control of the project manager.

Table 2.1: **Major causes of delay from different researchers' point of view (Ashwini Arun Salunkhe & Rahul S. Patil 2014)**

| Searchers | Major causes of Delay |
|---|---|
| Assaf et al. (1995) | Slow preparation and approval of shop drawings<br>Delays in payments to contractors<br>Changes in design/design error<br>Shortage of labor supply<br>Poor workmanship |
| Assaf & Al-Hejji (2006) | Change in orders by the owner during construction<br>Delay in progress payment<br>Ineffective planning and scheduling<br>Shortage of labor<br>Difficulties in financing on the part of contractor |
| Tommy Y., Ivan W. and Karen C. (2006) | Unforeseen ground conditions<br>Poor site management and supervision<br>Client variation<br>Inexperienced contractor<br>Slow co-ordination and seeking of approval from concerned authorities<br>Inadequate contractor resources |
| Sweis, Hammad & Shboul (2007) | Financial difficulties faced by the contractor<br>Too many change orders by the owner<br>Poor planning and scheduling of the project by the contractor<br>Shortage of manpower |
| Saleh, Abdelnaser & Abdul (2009) | Improper planning<br>Lack of effective communication<br>Shortage of supply i.e. steel, concrete etc<br>Design errors<br>Slow decision making<br>Financial issues<br>Shortage of material |

| | |
|---|---|
| Wei K. S. (2010) | Late in revising and approving design documents<br>Delays in sub-contractor's work<br>Poor communication and coordination change orders by owner during construction |

Organizing and planning was perceived to be the most important factor contributing to the success while considering the importance weights of the factors. Project is running on many numbers of factors & Participants. These are having individual causes for the construction delay. But the important participants like owner, contractor, and consultant have more influence on project performance. 116 critical delay factors are selected and grouped under seven parameters based on literature review as well as interviews. These critical delay factors included in questionnaire are being concise according to previous studies and factors suggested by local experts, which are as follows:

## Owner/Client Related Delay Factors

The most critical delay factors related to project owner/client are: Is there trust, understanding & owner decision making authority among & between the owner & lead contractor's teams, late revising & approving relevant documents by owner, changes by owner during construction, delays in payments of completed work by owner, lack of communication & co-ordination by owner, conflicts in joint ownership, suspension of work due to owner and misunderstandings in technical dealing with vendors & contractors.

## Consultant Related Delay Factors

The most critical delay factors related to project consultant are: Slowness in approving drawing & material samples by the consultant, less authority given to consultant to take decision, total quality management by consultant, mistakes in consultant's drawings, consultant's less experience, financial difficulties to the consultant, modification in contract, lack of practical (working) knowledge to the consultant, lack of co-ordination of consultant with contractor, consultant's ability of leadership, inflexibility of consultant, conflicts of consultant with design engineer, changes in specification during construction by consultant, inadequate site information given to consultant, delay in handover of site to contractor, conflicts between consultant & contractor, complexity of project design faced by consultant, difficulties in receiving payments from agencies faced by consultant, communication barriers faced by consultant and all design changes being

identified & discussed with vendors & contractors by consultant.

### Contractor Related Delay Factors

The most critical delay factors related to project contractor are: Contractor's inadequate planning & scheduling, lack of experience of contractor for decisions, contractor's slowness in site mobilization, contractor's slowness in preparation of documents & material samples, contractor's Poor site management & supervision, conflicts with sub-contractor, rework in construction faced by contractor, is contractor compatible with new technology, compatibility of contractor with new software's, poor understanding of accounting & financing project, poor managerial skills in contractor, inadequate handling of project progress by contractor, risk analysis & management by contractor, availability of & systems document of the project to the entire team, regular updating in execution plan including team RACI charts of all team members/contractors, no changes are picked up for all relevant & latest documents and source updating in the design engineering documents & related.

### Material Related Delay Factors

The most critical delay factors related to material are: Shortage of material, changes in quality of material, frequently unexpected modifications in specification of material during construction, slow process of material selection, poor material management, material damage in storage, escalation of material prices, late in finalizing finishing material due to availability of varieties in market, insufficient turnover & startup resources make project slow, lack of site receiving inspection system, materials not in right and untimely delivery.

### Labor and Equipment Related Delay Factors

The most critical delay factors related to labor and equipment are: Poor labor supply & labor productivity, disputes in labor, labor strikes, unavailability of equipment, delay in equipment delivery, shortage of recent technology equipment, large or long lead-time equipment been received as requested, no use of checklist, unavailability of equipment lists & related design data, seasoned operators, space limitations at site for temporary & permanent equipment, manpower loading accessible from the available supervision & skilled tradesmen pool, lack of safety and effective inspection & expediting visits.

### Project Related Delay Factors

The most critical delay factors related to project are: Traffic control at site, changes in site conditions, unforeseen ground conditions, insufficient data collections & survey, changes in site topography after design, restricted access, accidents on site, problems due to existing structures, unavailability of utilities in site area, change in economic conditions & increase in quantity of material, rework due to error in construction and issue & implementation of quality plans & inspection test plans ITP's.

### External Related Delay Factors

The most critical delay factors related to external environment are: Inclement weather effects, inaccurate cost estimates, restriction due to site location and changes in government regulation & laws.

## 2.2.5 Effects of Construction Project Delay

When construction projects are delayed, the effects are often injurious to the stakeholders. When projects are delayed, they are either accelerated or have their duration extended beyond the scheduled completion date. Delays are usually accompanied by cost increases. The subject of delay has been addressed by several researchers and they found that delay always led to negative effects (Jacob, 2013). Many researchers discovered six possible common effects arising in most countries as a result of the delay. These effects were; cost overrun, time overrun, disputes, Arbitration and litigation and total abandonment of the project.

## Cost Overrun

This refers to the excess of the actual cost that was planned or budgeted for the project from the conception phase to the construction and finishing phase. It can be referred to sometimes as cost escalation, cost increase or budget overrun. It can also be explained as the difference between the actual cost of the project and the initial cost budgeted.

Cost overruns can sometimes be attributed to political factors. Politicians lie by either underestimating or exaggerating the benefits of projects to make it saleable and for their interests. When construction projects are delayed, the specific and overall cost of the project will

undoubtedly increase. This is because the prices of materials in the market fluctuate over time. Thus the amount that was budgeted for materials may increase when a delay occurs. Also, exchange rates will affect the prices of materials purchased from other countries, an increase in the cost of labor.

Moreover, if the delay is as a result of changes in the design, then the cost of the project will increase because the new design will be more expensive than the initial. And finally, the evolution of government policies over time will also lead to a cost increase of the projects mainly due to the rise in tax rates. However, the above mention points will be valid and feasible if the project is delayed for one year and above.

## Time overrun

This is one of the most common issues in the construction industry. It can be defined as the failure to complete a project within the estimated time (Ahmed et al., 2012). It can be used as a tool for qualifying a project as a failure. The most significant factors were design changes, poor labor productivity, inadequate planning and resource shortages.

When the issue of time overrun occurs, the project completion time will be further extended beyond that which was estimated. The tendency is that it will lead to dissatisfaction by the owner or the clients. Sometime the contractor may lose the project as he will be seen as incompetent.

## Arbitration and Litigation

Litigation is a court case that occurs amongst project stakeholders or participants in an attempt to settle an existing dispute. On the other hand, Arbitration occurs when in an attempt to settle a dispute amongst project participants, a third party known as an arbitrator is involved without going to the court. According to these two phenomena are inevitable and seem to be part of construction projects. These phenomena often come into play when there is a delay in the project, and there is a dispute as to the cause of the delay and who to assume the responsibility and claim charges. If any one of the stakeholders is not satisfied, then he will be forced to file a suit against others. The overall effect is that it will further delay the project more and increase the cost, including the cost of hiring an arbitrator or an Attorney. (Ashwini Arun Salunkhe & Rahul S. Patil 2014)

## Project Abandonment

Project abandonment can be referred to as putting a stop or an end to an ongoing project due to many difficulties and constraints or problems faced during the phases of the project life cycle such that it becomes impossible to continue at that time. Many construction and non-construction projects have been abandoned at various stages of their life cycle, thus causing a significant amount of loses to the stakeholders. To the owner or client loses in terms of capital and other resources, including time. To the contractors and consultants loses in terms of time and wastage of expertise - usually, most projects abandoned as a result of the too much-prolonged delay. The contractors, consultants or owner can leave the projects. Project abandonment often results from inadequate planning, inadequate finance, inflation, delayed payments, political factors, incompetent management, wrong estimates, design and poor cost control and above all dispute amongst stakeholders.

### 2.2.6 Mitigating Construction Delay

As earlier mentioned above, a construction project is commonly classified as successful when the objectives of the project are attained that is the project is efficiently and effectively completed within the specified time and budget without compromising quality. Mitigation or elimination of construction projects delays implies minimizing or eradicating those unfavorable or negative factors that can hinder or pose as threats which will interfere with the project completion within the allocated time and budget and quality as well.

Researchers cited that implementation of adequate planning during the inception and design phases of the project can be a strong measure of avoiding delay during the construction phase. In another survey was conducted by (Nguyen, 2004) in an attempt to establish measures to minimize delay in large construction project in Vietnam. He recommended five important measures were; **availability of sufficient resources**, **multidisciplinary or competent project team**, **competent project managers**, **accurate first cost estimates** and **accurate initial time estimates**. In addition, it was also found out two major ways of avoiding construction delays (time overrun) to be **acceleration of site activities** and **contingency allowances**. The enforcement of liquidated damages and offering of incentives for early completion were also strong measures suggested to improve construction project situations. The researchers pointed out the following measures,

sufficient and readily available financial resources until completion of the project, selecting highly skilled consultant and reliable and competent contractors to carry out the project.

## 2.3 Overview of Construction Project Delay Studies

### 2.3.1 International Construction Projects Delay Studies

Le-Hoai, L et al, in (2008) studied problems related to delays and cost overruns in Vietnam large construction projects and they identified that the cause for construction delays and cost overruns in overall context are poor site management and supervision, poor project management assistance, financial difficulties of owner, financial difficulties of contractor and design changes are the five most frequent, severe and important causes (Le-Hoai, L et al, 2008).

Borhan Ghasemzadech also investigated top causes of delays in Iranian construction projects. The study was conducted based on the responses of 32 experts that were actively involving in Iranian construction projects. The researcher used mean and standard variation of each individual delay factors to assess overall ranking. The researcher categorized a total of 36 delay factors in six major groups: client, contractor, consultant, public authorities, contractual relationship and external parties related factors. The study claims client related factors followed by contractor related factors takes the highest contribution for construction delays in Iranian construction projects (Borhan Ghasemzadech, 2014).

Meena & Suresh studied the trend of delays in Indian construction projects. 35 construction projects were surveyed in the study. 31 respondents that are taking part in those 35 construction projects were asked to rate 67 delay factors that were categorized under 9 groups (project team, owner, contractor, consultant, architect, material, labor, equipment and external party related). The researchers deployed the relative importance index to identify major causes of delay. The findings of the research showed that lack of funds to finance the projects to completion, labor shortage, material shortage, lack of effective communication, lack of supervision and frequent design changes to be the major causes of delays in Indian construction project under the study (Meena & Suresh, 2018).

Assaf, S. A. and S. Al-Hejji in (2006) conducted a time performance survey of different types of construction projects in Eastern Province of Saudi Arabia to determine the causes of delay and

their importance according to each project participant (owner, consultant, and contractor). It was concluded that 70% of projects experience time overrun. The survey was conducted with 23 contractors, 19 consultants and 15 owners. They identified seventy-three (73) causes of delay and grouped them into nine classes during the research. The most common cause of delay identified by all three parties was “change of order”. The overall results are stated that the factor related to labor, contractor, project owner and consultant are in the highest rank (Assaf, S. A. and S. AlHejji, 2006).

In (2000) Al-Momani conducted a quantitative analysis of construction delays by examining the records of 130 public building projects constructed in Jordan during the period of 1990-1997. The researcher presented regression models of the relationship between actual and planned project duration for different types of building facilities. The analysis also included the reported frequencies of time extensions for the different causes of delays. The researcher concluded that the main causes of delay in construction projects relate to designers, user changes, weather, site conditions, late deliveries, economic conditions, and increase in quantities (Al-Momani, 2000).

(Odeh, 2002) The survey stated that the most significant cause of delay in the traditional type of contract, in perspective of contractor and consultant. It is also stated that to impart the economic feasibility of the capital project, extensive delays provide a fertile ground for costly disputes and claims. The result indicated the contractor and consultant agreed that owner interface, inadequate contractor experience, finance and payment, labor productivity, slow decision making, improper planning, and subcontractor are among the top ten important factors (Odeh, 2002).

### 2.3.2 Construction Projects Delay Studies in Ethiopia

One of the most delayed construction projects in Ethiopia; the Addis Ababa 40/60 housing project was studied by Molaye Takele and Endale Mamuye in separate studies. The former let 99 respondents representing client, contractors and consultants participate in his survey. In his study 20 major causes of delay were identified based on a Relative Importance Index from a list of 70 possible causes of delay. The findings of his research indicated that delivery of materials by the client, difficulties in financing projects by contactors, improper contractor selection, slow decision making by the client and obsolete technology used by contractors were some of the most dominant delay factors. The researcher added that for the top 20 delay factors a number of another root

causes were identified for their occurrence. The cumulative effects of those varieties of causes for the incidence of major delay factors contributed a great role on the project timely completion failure and the project is delayed by more than 150%. From the investigated major causes of delay, client sourced and contractor sourced delay factors were the major bottlenecks of progress. The researcher also implied the impacts of the delay of the projects. According to Mollaye, cost-overrun, time-overrun, increased unemployment rate, client loses time value of money, the government mistrusted by the people and reduce the quality of construction were some of the most severe effects of delay (Molaye Takele, 2020).

Abdo (2006) conducted a research on delays in public building construction projects and their consequences in Ethiopia. 52 public building projects constructed by local contractors in the years between 1995 and 2005 were surveyed in the study. In the study a questionnaire survey was used to collect data on delays, and 62 responses from contractors, consultants, public owners and construction professionals were analyzed using mean score method. The researcher grouped 80 causes of delay into six categories which included design related, management related, construction related, finance related, code related, and force majeure related causes of delay. Of these groups of delay causes, design related causes of delay were to be the most frequent ones followed by management related delay causes. The study also lists 10 critical causes of delay in public building construction projects in Ethiopia which included scarcity of material in the market, late material supply, delayed payments to contractors, unrealistic performance schedule, change in subsurface conditions, client's finance shortage, adverse weather condition, less emphasis to planning, material and labor price escalation, and variations (Abdo, 2006).

Abdurezak Mohammed and Neway Seifu (2019) carried out a research on Causes of Delay in Public Building Construction Projects: A Case of Addis Ababa Administration, Ethiopia and revealed the top ten factors that cause construction delays in the public building construction projects in Addis Ababa. These are: difficulty in project financing, poor project management system, delay in issuance of designs and working drawings, shortage of availability of imported construction materials and goods on market, design errors and complexity of designs, delay in progress payments for completed works, late start and resource mobilization to site, financing problems, inaccurate site investigation report and price inflation (Abdurezak Mohammed and Neway Seifu, 2019).

## 2.4 Research Gap

High rising building construction projects become the major investment projects in Ethiopia specially in Addis Ababa. However, few studies were conducted whether they have been completed as per the contract agreement or not. Construction project delay is a very critical factor in Ethiopia which consumes enormous resources. The factors of construction delay are many and differs from project to project as per the researches obtained internationally and nationally. The case of Zemen Bank Head Quarter Building Construction Project which is undertaken by international construction company is also prone to such an issue as to the researcher's knowledge. The researcher could not find any study conducted on this case specific project construction delay factors. As it is stated on the problem statement the researcher added some new cause factors which were not referred before to see the level of influence of such added factors on the delay of those construction projects. Taking the above facts in to consideration, the intention of the research is to examine and point out some issues that need attention and improvement while undertaking such projects with international contractors.

## 2.5 Conceptual Framework

A lot of studies have been carried out on construction delays and their consequences. For this study, the reasons for project delays are divided into four categories which have a potential to affect the performance of projects. If the performance of projects affected negatively the project will face progress delay.

The conceptual framework used in this study for the causes of project delay are listed in three categories and outlined in a concise figure hereunder in Figure 2.2 For the purpose of this study the factors were rather grouped into four groups.

These are: 1) Major Stakeholders (Client, Consultant & Contractor) Related Delay Factors

2) Resource (Material, Labor & Equipment) Related Delay Factors

3) Project Related Delay Factors

4) External Related Delay Factors

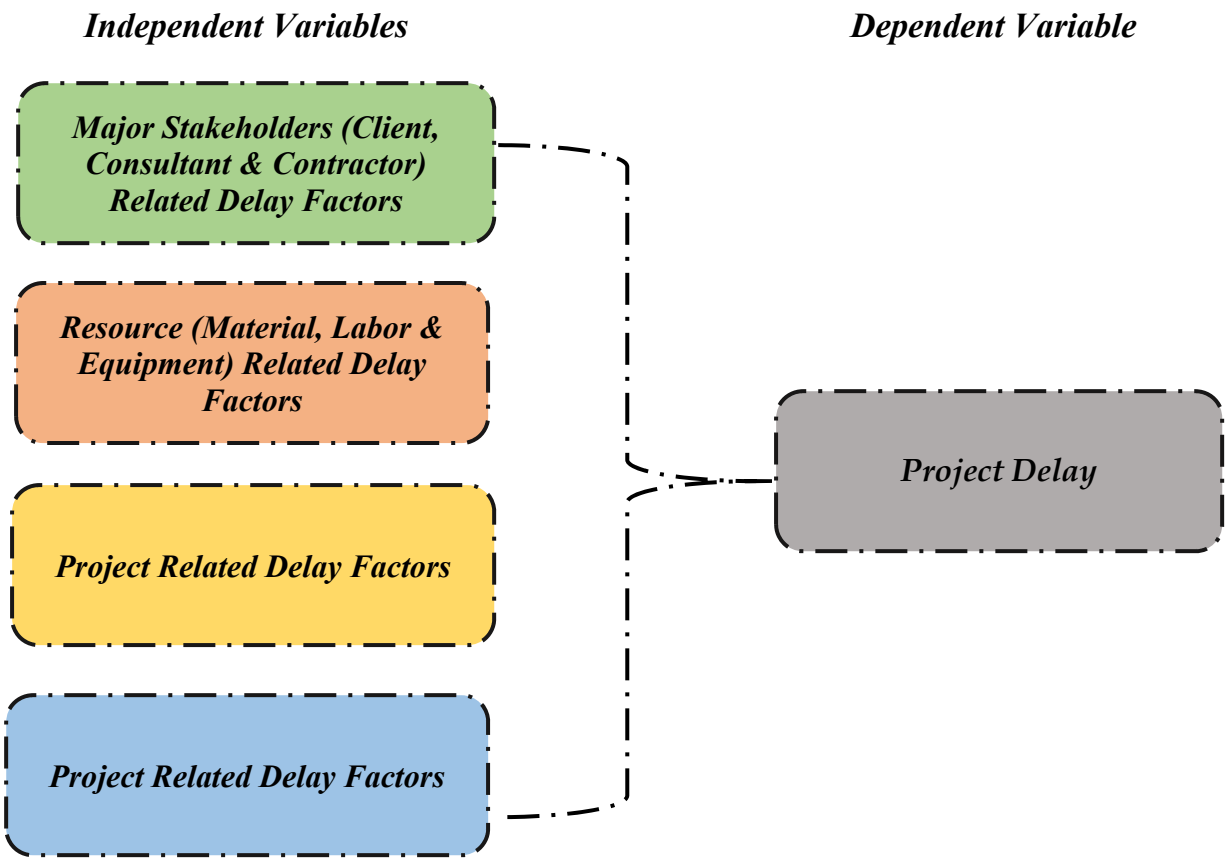


Figure 2.2 **Conceptual framework of the study**

**Source:** Conceptual framework of the study on the cause and effect of project progress delay from researcher based on the objectives of study and theoretical literature.

# CHAPTER THREE
# RESEARCH DESIGN AND METHODOLOGY

## 3.1 Introduction

This chapter deals with all detail information regarding the methodology and procedures that were followed to determine the approaches, techniques and methods of collecting information and data from the study population. It gives detail information on research design, data type and research population, sampling technique and instrument, data analysis and presentation and ethical considerations of the study.

## 3.2 Research Design

Research design is the back bone of research as it provides the components and plan for the success in carrying out the study and creates framework upon which answers to research questions can be sought (Trochim 2005). Denzin and Lincoln (1998), defined research design as the core method that is utilized in conducting research.

Burns and Grove (2003:195) also stated that a research design is a plan based on which information is gathered by having control over conditions that may interfere with the credibility of findings. According to Denzin and Lincoln (1998), a research design is defined as the core method that is utilized in conducting research.

Kumar (2011:94) described a research design as a procedural plan adopted by a researcher to answer questions validly, objectively, accurately and economically. As per Bridge Center's (2015) definition, research design is a framework or plan for a study that is used as a guide in collecting and analyzing the data which is a blueprint for collection measurement and analysis of data that is followed in completing a study.

This research's design is a descriptive type; which was described the major causes of delay on China Wu Yi Co. LTD Construction; Zemen Bank HQ Building Construction project located at Addis Ababa. According to Kothari (2008); "descriptive research design is used to describe an event or a feature of things as it exists at present and is appropriate when the study is concerned in specific predictions, narrative of facts and characteristics concerning individuals or situations."

Kothari (2004) defines descriptive research study as "Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group". According to Orodho (2003) descriptive survey is defined as a method of collecting information by interviewing or administering questionnaires to a sample of individuals.

Goddard and Melville (2001) argued that descriptive or case-study research is a research in which a specific situation is studied either to see if it gives addition to any general theories, or to see if existing general theories are borne out by the specific situation.

"A descriptive study is concerned with finding out the what, where and how of a phenomenon." Saunders et.al (2009). Hence, a descriptive research will enable us to answer the questions of who, what, when, where and how details of the causes of delay of the mentioned company projects'. By doing this, this study will also be building a profile about causes of delay.

The research approach for this study is mixed approach. The basis for selecting a mixed approach for this study is because of the nature of the research problem required both qualitative and quantitative data sets.

## 3.3 Data Type and Source

Using a combination of qualitative and quantitative data will improve an evaluation by ensuring that the limitations of one type of data is covered by the strengths of the other. The distinction between the two is that quantitative methods produce numerical data and qualitative methods result in information which can best be described in words. (Casley and Kumar 1989).

According to Creswell (2002); quantitative research is the process of collecting, analyzing, interpreting, and writing the results of a study, whereas qualitative research is the approach to data collection analysis, and report writing differing from the traditional, quantitative approaches. The quantitative method was used to produce numerical data which is statistically manipulated to meet required objectives through descriptive statistics (frequencies and percentages).

According to Leedy (1993) qualitative research is based on the belief that first-hand experience provides the most meaningful data. Qualitative data, that is believed to give large volumes of quality data from a limited number of people is aimed at understanding the world of participants

from their frame of reference, (Walker1985). Qualitative research as research that begins with assumptions, a worldview, the possible use of a theoretical lens and the study of research problems inquiring into the meaning individuals or groups ascribe to a social or human problem (Creswell 2007).

Both Primary and secondary data were used in this research study. The primary data were attained directly from key informants which included Project Managers, Office Engineers, Project Coordinators, Resident Engineers and Follow-up Engineers by employing both questionnaire and key informant interview. Secondary data were collected by detailed reviewing related literature; i.e. books, articles, journals, other relevant written publications and records of the company's reports which are related to delay factors.

## 3.4 Research Population

Population is defined as any group of individuals who have one or more characteristics in common that are of interest to the researcher (Best 2007). Salkind (2008), defined population as the entire of some groups. Population is further defined as entire group of people the researchers want to investigate (Sekaran & Bougie 2010).

The target group of this research was forty-one in number who are the participants of the projects observing and assessment process of the company, which include the Resident Engineers, Project Managers, Office engineers Site Engineers and Project Engineers. The number of key informants for this research was manageable, so a census method of sampling technic will be employed.

Table 3.1: **Composition of the Population**

| No. | Composition of the Population | Quantity |
|---|---|---|
| 1 | From Projects Owners/Clients Side | 7 |
| 2 | From Projects' Consultant Side | 10 |
| 3 | From Projects' Contractors Side | 24 |
| | Total | 41 |

Source: **Own Survey Data (2024)**

## 3.5 Sampling Technique and Instruments

Sampling Technique is the process of selecting a sufficient number of elements from a population (Raval 2009). Sampling refers to the process through which the sample is obtained from a population. According to Alvi (2016), Sampling techniques are classified into probability and non-probability.

In this research non-probability purposive sampling was adopted. Deliberate sampling, also called non-probability or purposive sampling method consists of purposive selection of particular items of the universe to represent a sample (Mishra and & 2017). Purposive sampling involves selecting certain number of informants based on the nature of their qualification and designation.

According to Neuman (2006), purposive sampling is when the researcher specifically targets certain people due to their knowledge about the research subject. Purposive sampling is especially exemplified through the key informant technique and the researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience (Bernard 2002).

This method was appropriate because the selected sample comprised of informed persons who possessed fundamental data that was sufficiently enough to give a better insight into the research questions. Data collection methods are ways through which the researcher gets data needed from the respondents (Patten and Newhart) expressions, tone of voice, gestures, feelings and attitudes.

Data collection instrument, both the questionnaire and semi structured interview questions were developed. The questionnaire was distributed to the respondents with a short oral briefing about the objective of the assessment. According to Russell and Joseph (2012) questionnaire surveys are less time-consuming and give the respondents the freedom to answer the way they feel most comfortable. Secondary data collection involved documentation review through internet, publications, articles, Project and donor reports, and books. A research study that raises questions that require interviewing and questionnaires for data collection should use a survey design (Kombo and Tromp 2009).

The questionnaire totally was focused on the causes and effects of construction project delay. Its statements which were developed by the researcher to answer the research questions and objective

were evaluated on a 1-5 Likert scale, where 1 - indicates Strongly Disagree with the statement, 2 - Disagree, 3 - Neutral, 4 - Agree and 5- refers to Strongly Agree with the statement.

Similarly, person to person informal interview with key informants were undertaken. The interview guide was developed by taking the research questions and the objectives of the study into considerations. All relevant variables were included to help in identifying as well as conclude the problems and to provide appropriate recommendations. The main reason for using semi-structured open-ended interview was that the interviewee can elaborate more on issues that require additional explanation. “The primary advantage of interview is that the respondents provide much more detailed information than data collected via other data collection methods such as survey.” Carolyn and Palena (2006).

The necessary secondary data was also obtained from the company’s recorded documents by participatory observation method of data collection. Observations enable the researcher to describe existing situations using the five senses, providing a "written photograph" of the situation under study (Erlandson, Harris, Skipper, and Allen 1993).

Kawulich (2005) argued that participant observation, has been used in a variety of disciplines as a tool for collecting data about people, processes, and cultures in qualitative research. According to DeWalt (2002), the goal of designing a research using participant observation as a method is to develop a holistic understanding of the phenomena under study that is objective and accurate given the limitation of the method.

Since the sampled respondents are professionals; the language of communication was English and thus the questionnaire and interview questions were constructed in English.

## 3.6. Data analysis and presentation

According to Cooper and Schindler, 2008; “This was the process of collecting, modeling and transforming data in order to highlight useful information, suggesting conclusions and supporting decision making. Analysis refers to breaking a whole into its separate components for individual examination Grbich (2007). In addition, Shamoo & Resnik (2003), stated that data analysis is the systematic approach of using logical and statistical techniques as a means to describe and assess the gathered data.

Quantitative data was analyzed using descriptive statistics including frequencies and percentages; while qualitative data was analyzed using content analysis by counting various aspect of the content. Qualitative data was transformed into quantitative data and was analyzed by using Statistical Package for Social Science (SPSS) in accordance with the main objectives of the study. The data is then presented using frequency tables.

## 3.7 Validity and Reliability

The researcher attempted to design the instruments using reliable sources such as published books, articles, and previous research in the field to ensure the validity and reliability of the data used in this study. Furthermore, the researcher received feedback on the questionnaire from the research advisor in order to reduce instrument errors.

## 3.8 Ethical Considerations

According to Shah (2011) and Akaranga et al. (2013), ethics refers to the moral beliefs or philosophy and sometimes ways of life, social norms for conduct that differentiates between acceptable and unacceptable behavior. Fulfilling the ethical duty of confidentiality was essential to the trust relationship between researcher and participants, and to the integrity of the research project. Respondents was respectfully requested their willingness to participate in this study. Also to protect the information from unauthorized access, use, disclosure, modification, loss or theft, appropriate cautions will be taken. Each respondent was coded appropriately to increase the confidentiality of their responses.

# CHAPTER FOUR

# DATA PRESENTATION, ANALYSIS AND INTERPRETATIONS

## 4.1 Introduction

This part of the research presents the data collected from the target respondents and major interpretations and discussions also forwarded accordingly. As per the methodology 45 questionnaires were distributed to respondents and only 33 questionnaires were returned completely and accurately. The response rate is 73.33%. Hence it is enough to continue the data analysis and interpretation. SPSS and Microsoft excel were used to analyze the data. The analysis consists four major sections. The first section deals with the introduction part, the second section deals with the response rates of the respondents and the third section presents the profiles of the respondents. The fourth section deals with data presentation and analysis on the causes and effects of delay by rankings of delay factors and effects by regrouping the total data in different classifications. In the process how each stakeholder ranks those delay factors based on their Weight/Importance on the projects' delay has been presented. In addition, the total data were shown to reveal the rankings of those delay factors in the combined data. The relative importance index (RII) method of ranking for the project delay contributing factors together with the 5-point Likert scale was consistently used throughout the second fourth analysis. The fifth section presents methods of minimizing delay and the final section of the analysis part has tried to describe the results of document analysis.

In each stage of the analysis the delay factors were grouped under the following seven major groups. Relative Importance Index for each delay factor has been calculated considering the answers of all respondents' main participant parties and in combined. The result from the RII has been used to show the degree of importance each factor has on the total delay time of the project. As it was mentioned already in the second chapter those delay factors were categorized into seven groups. These are:

1) Client/Owner Related Causes of Delay
2) Consultant Related Causes of Delay
3) Contractor Related Causes of Delay
4) Material Related Causes of Delay
5) Labor & Equipment Related Causes of Delay

6) Project Related Causes of Delay
7) External Related Causes of Delay

These were the cause groups of the delay factors. In other words, these were the categories to which the delay factors belong to. The purpose of classifying the delay factors based on their cause group was to associate the cause group's responsibility to the delay of these construction projects. The analysis described the ranking of each delay factor based and the cause groups.

## 4.2 Response Rate

A total of 45 questionnaires were distributed to potential respondents. Of which 12 questionnaires were not returned. Hence response rate was:

$$RR = 33/45 * 100\% = 73.33\%$$

As the major challenge of the research was that the respondents took so much time because they were busy on filling the questioners only those 33 questionnaires were properly answered no invalid questionnaire were found. According to Mugenda & Mugenda (1999), a response rate of 50% is adequate for analysis and reporting; a rate of 82.10% is excellent while a response rate between 70% and 82% is good; therefore, this response rate was good for analysis and reporting.

## 4.3 Respondents' Profile

The background information of respondents has included gender, age, work experience and level of education. Profiles of the respondents who participated in this study are shown below.

### 4.3.1 Respondents' Gender

In the study there were 33 respondents and the results showed that out of them, 26 respondents (78.78%) were males and 7 respondents (21.21%) were females. This indicated that male respondents were more during the study than the female.

Table 4.1: **Respondents' Gender**

| Gender | Frequency | Percentage (%) |
|---|---|---|
| Male | 26 | 78.78 |
| Female | 7 | 21.21 |
| **Total** | **33** | **100** |

Source: **Own Survey Data (2024)**

### 4.3.2 Respondents' Age Distribution

Four (4) respondents (12.12%) were between the age of 25-35 years, twenty (20) respondents (60.60%) were between the age of 36-45 years, seven (7) respondents (21.21%) were between the age of 46-55 years and two (2) respondents (6.07%) were above 55 years. This implies that those respondents in the age group of 36-45 years made the majority during the study carried out. These findings reveal that the respondents' age is in productive age group and are matured people who has enough maturity and knowledge to respond the questionnaire of project progress delay.

Table 4.2: **Respondents' Age Range**

| Respondents' Age Range | Frequency | Percentage (%) |
|---|---|---|
| 25-35 years | 4 | 12.12 |
| 36-45 years | 20 | 60.60 |
| 46-55 years | 7 | 21.21 |
| Above 55 years | 2 | 6.07 |
| **Total** | **33** | **100** |

Source: **Own Survey Data (2024)**

### 4.3.3 Respondents' Level of Education

Two (2) respondents (6.06%) were at Masters level and Thirty-one (31) respondents (93.93%) were at undergraduate level. This indicates that the majority of the respondents had first degree and they had the knowledge and skills about project progress delay.

Table 4.3: **Respondents' Level of Education**

| Respondents' Level of Education | Frequency | Percentage (%) |
|---|---|---|
| Masters Level | 2 | 6.06 |
| Undergraduate Level | 31 | 93.93 |
| **Total** | **33** | **100** |

Source: **Own Survey Data (2024)**

### 4.3.4 Respondents' Level of Work Experience

From the Thirty-three (33) respondents; Twelve (12) respondents (36.36%) had 5-10 years' work experience, fifteen (15) respondents (45.45) had 10-15 years' work experience and six (6) respondents (18.18) had above 15 years' work experience at construction projects. The result

shows that the majority respondents had 10-15 years' work experience and they were well familiar with the concept of project progress delay factors.

Table 4.4: **Respondents' Level of Work Experience**

| Respondents' Level of Work Experience | Frequency | Percentage (%) |
|---|---|---|
| 5-10 years | 12 | 36.36 |
| 10-15 years | 15 | 45.45 |
| Above 15 years | 6 | 18.18 |
| **Total** | **33** | **100** |

Source: **Own Survey Data (2024)**

The respondents have different positions and work experience in the client, consultant and contractor side during the execution of Zemen Bank HQ Building Construction Project. All the respondents were key staffs involved in management activities and highly concerned on the progress of the projects.

## 4.4 Data Presentation and Analysis on the Causes and Effects of Delay

In order to analyze the causes of delays of Zemen Bank HQ Building Construction Project a five point Likert scale ranging from Strongly disagree to Strongly agree was applied. The feedback from the respondents had been manipulated using SPSS and Microsoft Excel application to determine frequency and Relative Importance Index. Basically Relative Importance Index (RII) analysis was selected in this study to rank the causes and effects of delay according to their relative importance.

### 4.4.1 Client/Owner Related Causes of Delay

One of the factors which causes delay on construction project's progress emanated from the owner/client of the project. With this respect the respondents were asked to rank the influencing causes of project delay using five points scale strongly disagree (1), disagree (2), neutral (3), agree (4) and strongly agree (5). The following table clearly presented the Relative Importance Index (RII) of owner/client related causes of project delay based on the respondents' feedback in the target area.

Table 4.5: **Respondents' Ranked Owner/Client Related Causes of Delay**

| No | Client/Owner Related Causes of Delay | (5) | (4) | (3) | (2) | (1) | RII | Position |
|---|---|---|---|---|---|---|---|---|
| 1 | Is there trust, understanding & owner decision making authority among & between the owner & lead contractor's teams. | 0 | 5 | 11 | 16 | 1 | 0.5212 | 9 |
| 2 | Late revising & approving relevant documents by owner | 2 | 4 | 19 | 0 | 8 | 0.5515 | 8 |
| 3 | Frequent Changes by owner during construction | 0 | 0 | 4 | 7 | 22 | 0.9455 | 14 |
| 4 | Financial Constraint | 27 | 4 | 1 | 1 | 0 | 0.9455 | 2 |
| 5 | Delays in payments of completed works by owner | 30 | 2 | 1 | 0 | 0 | 0.9758 | 1 |
| 6 | Awarding bid with lowest price with respect to the current market price | 8 | 2 | 18 | 0 | 5 | 0.6485 | 6 |
| 7 | Lack of communication & co-ordination by owner (Late or slow decision making) | 5 | 13 | 0 | 9 | 6 | 0.6121 | 7 |
| 8 | Suspension of work due to owner | 14 | 9 | 2 | 0 | 8 | 0.7273 | 4 |
| 9 | Unnecessary or informal interference | 3 | 4 | 4 | 11 | 11 | 0.4606 | 10 |
| 10 | Less sense of ownership | 0 | 0 | 2 | 19 | 12 | 0.3394 | 13 |
| 11 | Poor Monitoring and Evaluation | 13 | 5 | 5 | 2 | 8 | 0.6788 | 5 |
| 12 | Lack of closely, regularly and formal follow-up | 16 | 6 | 1 | 9 | 1 | 0.7636 | 3 |
| 13 | Misunderstandings in technical dealing with vendors & contractors | 3 | 8 | 0 | 4 | 18 | 0.4424 | 11 |
| 14 | Low level of technical expertise | 0 | 4 | 4 | 19 | 6 | 0.4364 | 12 |

Source: **Own Survey Data (2024)**

As shown on the above table, the respondents' indicate that the most highly ranked influential delay factor which is project owner related cause of delay in the construction of the bank's HQ building is delays in payments of the completed works (RII = 0.9758). Financial constraint is the secondly pointed cause of delay by the owner of the project (RII = 0.9455). Lack of closely, regularly and formal follow-up by owner and suspension of work due to owner have the third and the fourth place with (RII = 0.7636) and (RII = 0.7273). Poor M&E of the client is the last from the top five influential factor that cause delay on the project with (RII = 0.6788).

In the construction industry payments for the completed works is the backbone for the effective sustainability of the project. If payments will not be effective as per the terms and conditions of

the contract; the project will face financial constraint to run the project. Accordingly; subcontractors' payments will be delayed, material purchases and other project procurement will be delayed. The consequence will result in affecting the project's schedule and the scheduled time performance and actual time performance cannot be matched.

### 4.4.2 Consultant Related Causes of Delay

Table 4.6: **Respondents' Ranked Consultant Related Causes of Delay**

| No | Consultant Related Causes of Delay | (5) | (4) | (3) | (2) | (1) | RII | Position |
|---|---|---|---|---|---|---|---|---|
| 1 | Slowness in approving drawing & material samples by the consultant | 0 | 0 | 0 | 4 | 29 | 0.2242 | 19 |
| 2 | Less authority given to consultant to take decision | 0 | 0 | 0 | 2 | 31 | 0.2121 | 20 |
| 3 | Total quality management by consultant | 15 | 11 | 3 | 2 | 2 | 0.8121 | 4 |
| 4 | Mistakes in consultant's drawings | 0 | 0 | 0 | 5 | 28 | 0.2242 | 18 |
| 5 | Consultant's less experience | 11 | 14 | 2 | 6 | 0 | 0.7818 | 6 |
| 6 | Financial difficulties to the consultant | 0 | 2 | 26 | 3 | 2 | 0.5697 | 13 |
| 7 | Modification in contract | 5 | 13 | 0 | 9 | 6 | 0.6121 | 12 |
| 8 | Lack of practical (working) knowledge to the consultant | 9 | 13 | 4 | 2 | 5 | 0.7152 | 10 |
| 9 | Lack of co-ordination of consultant with contractor | 16 | 11 | 2 | 4 | 0 | 0.8364 | 2 |
| 10 | Consultant's ability of leadership | 8 | 3 | 14 | 5 | 3 | 0.6485 | 11 |
| 11 | Inflexibility of consultant | 27 | 4 | 2 | 0 | 0 | 0.9515 | 1 |
| 12 | Conflicts of consultant with design engineer | 18 | 6 | 1 | 7 | 1 | 0.8000 | 5 |
| 13 | Changes in specification during construction by consultant | 7 | 4 | 3 | 1 | 18 | 0.4848 | 15 |
| 14 | Inadequate site information given to consultant | 0 | 4 | 6 | 13 | 10 | 0.4242 | 16 |
| 15 | Delay in handover of site to contractor | 0 | 8 | 11 | 9 | 5 | 0.5333 | 14 |
| 16 | Conflicts between consultant & contractor | 10 | 13 | 5 | 4 | 1 | 0.7636 | 7 |
| 17 | Complexity of project design faced by consultant | 0 | 4 | 0 | 18 | 11 | 0.3818 | 17 |
| 18 | Difficulties in receiving payments from agencies faced by consultant | 13 | 9 | 6 | 2 | 3 | 0.7636 | 7 |
| 19 | Communication barriers faced by consultant | 17 | 9 | 2 | 4 | 1 | 0.8242 | 3 |
| 20 | All design changes being identified & discussed with vendors & contractors by consultant | 12 | 11 | 0 | 8 | 2 | 0.7394 | 9 |

Source: **Own Survey Data (2024)**

As shown on table 4.6, the most highly ranked consultant related causes of delay in the construction of the bank's HQ building is inflexibility of consultant (RII = 0.9515). Lack of co-ordination of consultant with contractor (RII = 0.8364), communication barriers faced by consultant (RII = 0.8242), total quality management by consultant (RII = 0.8121) and conflicts of consultant with design engineer (RII = 0.8000) are sequenced influential factors that causes delay related to the consultant. Most of the above indicated delay factors related to consultant are communication barriers. Building team sprint and work for the goal of the project is helpful in achieving the common project goal.

### 4.4.3 Contractor Related Causes of Delay

Table 4.7: **Respondents' Ranked Contractor Related Causes of Delay**

| No | Contractor Related Causes of Delay | (5) | (4) | (3) | (2) | (1) | RII | Position |
|---|---|---|---|---|---|---|---|---|
| 1 | Contractor's inadequate planning & scheduling | 14 | 11 | 2 | 4 | 2 | 0.7879 | 2 |
| 2 | Lack of experience of contractor for decisions | 0 | 0 | 1 | 2 | 30 | 0.2242 | 17 |
| 3 | Slowness in approving drawing & material samples by the contractor | 25 | 4 | 0 | 4 | 0 | 0.9030 | 1 |
| 4 | Contractor's slowness in site mobilization | 13 | 11 | 5 | 2 | 2 | 0.7879 | 2 |
| 5 | Contractor's slowness in preparation of documents & material samples | 0 | 0 | 1 | 29 | 3 | 0.3879 | 12 |
| 6 | Contractor's Poor site management & supervision | 0 | 4 | 4 | 21 | 4 | 0.4485 | 10 |
| 7 | Conflicts with sub-contractor | 2 | 9 | 8 | 13 | 1 | 0.5879 | 7 |
| 8 | Rework in construction faced by contractor | 1 | 6 | 1 | 22 | 3 | 0.4788 | 8 |
| 9 | Incompatibility of contractor with new technology | 0 | 0 | 0 | 1 | 32 | 0.2061 | 18 |
| 10 | Compatibility of contractor with new software's | 0 | 0 | 1 | 8 | 24 | 0.2606 | 15 |
| 11 | Poor understanding of accounting & financing project | 0 | 0 | 0 | 14 | 19 | 0.2848 | 14 |
| 12 | Poor managerial skills in contractor | 0 | 0 | 3 | 9 | 21 | 0.2909 | 13 |
| 13 | Inadequate handling of project progress by contractor | 1 | 5 | 1 | 17 | 9 | 0.4303 | 11 |
| 14 | Risk analysis & management by contractor | 9 | 16 | 0 | 2 | 6 | 0.7212 | 6 |
| 15 | Availability of & systems document of the project to the entire team | 7 | 0 | 0 | 15 | 11 | 0.4606 | 9 |
| 16 | Regular updating in execution plan | 10 | 10 | 8 | 1 | 4 | 0.7273 | 5 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 17 | No changes are picked up for all relevant & latest documents | 0 | 0 | 0 | 7 | 26 | 0.2424 | 16 |
| 18 | Source updating in the design engineering documents & related | 20 | 4 | 2 | 0 | 7 | 0.7818 | 4 |

Source: **Own Survey Data (2024)**

As shown on the above table's illustration, the most highly ranked first to third position contractor related causes of delay in the construction of the bank's HQ building are slowness in approving drawings & material samples by the contractor (RII = 0.9030), contractor's slowness in site mobilization (RII = 0.7879) and contractor's inadequate planning & scheduling (RII = 0.7879). Source updating in the design engineering documents (RII = 0.7818) and regular updating in execution plan (RII = 0.7652) are the fourth and fifth influential delay factors. These all are the top five (5) scored contractor related causes of delay and the remaining are ranked respectively by their result of RII. Drawings are the key part of the contract document and without early approval of them there will not be any probability of starting any activity of the project. And also on the other hand if the material samples are not approved, the procurement schedule will be affected. The other factor of delay on the project is inadequate planning and scheduling. A project without schedule means without road map will not know how the goal of the project will be achieved. Where and how to go to achieve the project should be clearly indicated and be the part of the project document.

### 4.4.4 Material Related Causes of Delay

Table 4.8: **Respondents' Ranked Material Related Causes of Delay**

| No | Material Related Causes of Delay | (5) | (4) | (3) | (2) | (1) | RII | Position |
|---|---|---|---|---|---|---|---|---|
| 1 | Shortage of material | 1 | 5 | 1 | 24 | 2 | 0.4727 | 7 |
| 2 | Changes in quality of material | 0 | 0 | 0 | 15 | 18 | 0.2909 | 13 |
| 3 | Frequently unexpected modifications in specification of material during construction | 0 | 2 | 6 | 11 | 14 | 0.3758 | 10 |
| 4 | Slow process of material selection | 20 | 7 | 2 | 3 | 1 | 0.8545 | 3 |
| 5 | Poor Material management | 7 | 12 | 2 | 3 | 9 | 0.6303 | 4 |
| 6 | Material damage in storage | 5 | 2 | 9 | 15 | 2 | 0.5576 | 5 |
| 7 | Escalation of material prices | 22 | 8 | 0 | 1 | 2 | 0.8848 | 2 |
| | Late in finalizing finishing material due to | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8 | availability of varieties in market | 0 | 0 | 4 | 12 | 17 | 0.3212 | 12 |
| 9 | Insufficient turnover & startup resources make project slow | 3 | 5 | 10 | 6 | 9 | 0.5212 | 6 |
| 10 | Lack of site receiving inspection system | 0 | 0 | 7 | 19 | 7 | 0.4000 | 9 |
| 11 | Materials not in right | 1 | 0 | 0 | 18 | 14 | 0.3333 | 11 |
| 12 | Untimely delivery | 2 | 8 | 4 | 4 | 12 | 0.4667 | 8 |
| 13 | Late delivery of materials because of late LC approval | 23 | 8 | 2 | 0 | 0 | 0.9273 | 1 |

Source: **Own Survey Data (2024)**

According to the above table illustration, the most highly ranked material related causes of delay in the construction of the bank's HQ building is late delivery of materials because of late LC approval (RII = 0.9273). As it is well known that our country has a shortage of foreign currency, approval of LC at banks will take much time and will affect the master schedule of the project. It is very difficult to fully manage it but early request for approval by the contractor and coordination of the consultant and the client it will be managed partially. Escalation of material prices (RII = 0.8848), slow process of material selection (RII = 0.8545), poor material management (RII = 0.6303) and material damage in storage (RII = 0.5576) are indicated second to fifth position by the respondents. The market is exposed to inflation and deflation. In our country context the country's market is exposed to inflation. In order to avoid delay related to inflation it is better to properly manage project schedule. Material procurement process which start from the selection to material storage and utilization should be administered with coordinated procurement team in order to manage such delays that arise from material related factors of delay.

### 4.4.5 Labor & Equipment Related Causes of Delay

Table 4.9: **Respondents' Ranked Labor & Equipment Related Causes of Delay**

| No | Labor & Equipment Related Causes of Delay | (5) | (4) | (3) | (2) | (1) | RII | Position |
|---|---|---|---|---|---|---|---|---|
| 1 | Poor labor supply & labor productivity | 11 | 6 | 1 | 13 | 2 | 0.6667 | 2 |
| 2 | Disputes in labor | 0 | 3 | 3 | 17 | 10 | 0.3939 | 6 |
| 3 | Labor strikes | 0 | 2 | 4 | 9 | 18 | 0.3394 | 11 |
| 4 | Unavailability of equipment | 0 | 0 | 2 | 14 | 17 | 0.3091 | 12 |
| 5 | Delay in equipment delivery | 0 | 0 | 1 | 16 | 16 | 0.3091 | 12 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6 | Shortage of recent technology equipment | 0 | 0 | 0 | 0 | 33 | 0.2000 | 14 |
| 7 | Large or long lead-time equipment been received as requested | 0 | 1 | 8 | 11 | 13 | 0.3818 | 7 |
| 8 | No use of checklist | 2 | 5 | 2 | 13 | 11 | 0.4424 | 4 |
| 9 | Unavailability of equipment lists & related design data | 0 | 0 | 10 | 7 | 16 | 0.3636 | 9 |
| 10 | Seasoned operators | 1 | 1 | 4 | 18 | 9 | 0.4000 | 5 |
| 11 | Space limitations at site for temporary & permanent equipment | 19 | 13 | 0 | 1 | 0 | 0.9030 | 1 |
| 12 | Manpower loading accessible from the available supervision & skilled tradesmen pool | 1 | 2 | 4 | 7 | 15 | 0.3724 | 8 |
| 13 | Lack of safety | 5 | 8 | 1 | 8 | 11 | 0.5273 | 3 |
| 14 | Effective inspection & expediting visits | 2 | 1 | 1 | 14 | 15 | 0.3636 | 9 |

Source: **Own Survey Data (2024)**

As presented o table 4.9, the most highly ranked labor & equipment related causes of delay in the construction of the bank's HQ building is space limitations at site for temporary & permanent equipment (RII = 0.9030), poor labor supply & labor productivity (RII = 0.6667), lack of safety (RII = 0.5273), no use of checklist (RII = 0.4424) and seasoned operators (RII = 0.4000). These are the top five (5) scored labor & equipment related causes of delay and the remaining are ranked respectively by their result of RII.

### 4.4.6 Project Related Causes of Delay

Table 4.10: **Respondents' Ranked Project Related Causes of Delay**

| No | Project Related Causes of Delay | (5) | (4) | (3) | (2) | (1) | RII | Position |
|---|---|---|---|---|---|---|---|---|
| 1 | Traffic control at site | 0 | 0 | 6 | 14 | 11 | 0.3677 | 8 |
| 2 | Changes in site conditions | 2 | 5 | 4 | 5 | 17 | 0.4182 | 6 |
| 3 | Unforeseen ground conditions | 0 | 0 | 0 | 12 | 21 | 0.2727 | 11 |
| 4 | Insufficient data collections & survey | 15 | 9 | 2 | 4 | 3 | 0.7758 | 1 |
| 5 | Changes in site topography after design | 0 | 0 | 7 | 13 | 13 | 0.3636 | 9 |
| 6 | Restricted access | 5 | 8 | 2 | 10 | 8 | 0.5515 | 4 |
| 7 | Accidents on site | 0 | 0 | 3 | 6 | 24 | 0.2727 | 11 |
| 8 | Problems due to existing structures | 1 | 4 | 8 | 9 | 11 | 0.4485 | 5 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 9 | Unavailability of utilities in site area | 4 | 1 | 2 | 10 | 16 | 0.4000 | 7 |
| 10 | Change in economic conditions & increase in quantity of material | 9 | 3 | 11 | 6 | 4 | 0.6424 | 3 |
| 11 | Rework due to error in construction | 9 | 11 | 5 | 10 | 0 | 0.6909 | 2 |
| 12 | Issue & implementation of quality plans & inspection test plans ITP's | 1 | 0 | 0 | 11 | 21 | 0.2909 | 10 |

Source: **Own Survey Data (2024)**

As per the above table illustration, the most highly ranked project related causes of delay in the construction of the bank's HQ building is insufficient data collections & survey (RII = 0.7758), rework due to error in construction (RII = 0.6909), change in economic conditions & increase in quantity of material (RII = 0.6424), restricted access (RII = 0.5515) and problems due to existing structures (RII = 0.4485). Except the fifth factor of delay the top scored four delay factors are manageable factors but it will depend on the skills, knowledge and experience of the project staffs.

### 4.4.7 External Related Causes of Delay

Table 4.11: **Respondents' Ranked External Related Causes of Delay**

| No | External Related Causes of Delay | (5) | (4) | (3) | (2) | (1) | RII | Position |
|---|---|---|---|---|---|---|---|---|
| 1 | Inclement weather effects | 8 | 6 | 3 | 13 | 3 | 0.6182 | 3 |
| 2 | Inaccurate cost estimates | 14 | 13 | 1 | 3 | 2 | 0.8061 | 1 |
| 3 | Restriction due to site location | 7 | 9 | 7 | 2 | 8 | 0.6303 | 2 |
| 4 | Changes in government regulation & laws | 4 | 4 | 11 | 2 | 12 | 0.5152 | 4 |

Source: **Own Survey Data (2024)**

As of the above table illustration for the last group of delay causing factor, the most highly ranked external related causes of delay in the construction of the bank's HQ building is inaccurate cost estimates (RII = 0.8083), restriction due to site location (RII = 0.6303), inclement weather effects (RII = 0.6182) and changes in government regulation & laws (RII = 0.5152). External related causes of delay can be either manageable or not manageable by the project itself. As of the respondent's indication the delay factors that the project is suffering is beyond the control of the project. But it can be managed by compensating the time schedule variance.

### 4.4.8 Top Ten Ranked Causes of Delay

Table 4.12: **Respondents' Top Ten Ranked Causes of Delay**

| No | Top Ten Ranked Causes of Delay | (5) | (4) | (3) | (2) | (1) | RII | Position |
|---|---|---|---|---|---|---|---|---|
| 1 | Delays in payments of completed work by owner | 30 | 2 | 1 | 0 | 0 | 0.9758 | 1 |
| 2 | Inflexibility of consultant | 30 | 2 | 1 | 0 | 0 | 0.9758 | 1 |
| 3 | Financial Constraint | 27 | 4 | 1 | 1 | 0 | 0.9455 | 3 |
| 4 | Late delivery of materials because of late LC approval | 23 | 8 | 2 | 0 | 0 | 0.9273 | 4 |
| 5 | Slowness in approving drawing & material samples by the contractor | 25 | 4 | 0 | 4 | 0 | 0.9030 | 5 |
| 6 | Space limitations at site for temporary & permanent equipment | 19 | 13 | 0 | 1 | 0 | 0.9030 | 6 |
| 7 | Escalation of material prices | 22 | 8 | 0 | 1 | 2 | 0.8848 | 7 |
| 8 | Slow process of material selection | 20 | 7 | 2 | 3 | 1 | 0.8545 | 8 |
| 9 | Communication barriers faced by consultant | 17 | 9 | 2 | 4 | 1 | 0.8182 | 9 |
| 10 | Total quality management by consultant | 15 | 11 | 3 | 2 | 2 | 0.8121 | 10 |

Source: **Own Survey Data (2024)**

As mentioned on the above table, the top ten causes of delay in the construction of the bank's HQ building are ranked and summarized from the analysis of the data collected from the respondents' perception. Delays in payments of completed work by owner and inflexibility of consultant are suggested as the major delay causing factors (RII = 0.9758), Financial constraint is following as third major delay causing factor (RII = 0.9455), the fourth one is late delivery of materials because of late LC approval (RII = 0.9273) and the fifth is slowness in approving drawing & material samples by the consultant. Space limitations at site for temporary & permanent equipment, escalation of material prices, slow process of material selection, communication barriers faced by consultant and total quality management by consultant was ranked in the top ten delay causing factors from sixth to tenth positions.

According to the respondents' indication 30 (90.90%) of them strongly agreed that delays in payments of completed work by owner and inflexibility of consultant are the main influencing delay factors that cause major time delay on the project. 2 (6.06%) also agreed on the issues. The other 1 (3.03%) was neutral for the case. The third influential factor which is financial constraint

is the consequence of delay in approving payments. As payments are the key for the effectiveness of the project their delay may influence the project in suffering financial constraint that 27 (90.00%) of the respondents strongly agreed on, 4 (12.12%) were agreed and the remaining two professionals were disagreed and neutral to the case respectively. Inflexibility of consultant is a communication barrier between major project stakeholders. Communication is one of the ten major management knowledge areas which must be scientifically managed. It may result in confusion, misunderstandings, conflict, or failed collaboration. Ineffective communication can lead to decreased productivity, damaged relationships, and hindered progress. It often stems from a lack of attention to audience needs, insufficient feedback mechanisms, or cultural and language barriers.

In this study delay attributes there were four major groups (Clients, consultants, contractors and material) related causes of delay. Most of material and labor related causes are categorized under contractor related causes, and design related factors under consultant related causes. Therefore, according to this categorization, owner related causes placed on the first place, followed by consultant related, and then contractors related. The effects of delays in construction projects can be country specific" none of the studies is comparable to any other and each study has different rankings for the causes of delay and the groups as project characteristics are unique and may even be region specific. As project is unique endeavor, delay attributes to projects and their ranking may differ from country to country, region to region, even project to project.

### 4.4.9 Major Effects of Delay

Table 4.13: **Respondents' Ranked Major Effects of Delay**

| No | Major Effects of Delay | (5) | (4) | (3) | (2) | (1) | RII | Position |
|---|---|---|---|---|---|---|---|---|
| 1 | Cost overrun | 18 | 14 | 1 | 0 | 0 | 0.9030 | 2 |
| 2 | Time overrun | 25 | 8 | 0 | 0 | 0 | 0.9515 | 1 |
| 3 | Reduced Profit | 17 | 2 | 2 | 7 | 5 | 0.7152 | 3 |
| 4 | Reduced Quality | 3 | 1 | 9 | 15 | 5 | 0.4909 | 6 |
| 5 | Company's Bad Reputation | 2 | 2 | 10 | 18 | 1 | 0.5152 | 5 |
| 6 | Dispute between parties/stakeholders | 5 | 8 | 6 | 12 | 2 | 0.6121 | 4 |
| 7 | Arbitration | 0 | 0 | 3 | 26 | 4 | 0.3939 | 7 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8 | Litigation | 0 | 0 | 4 | 23 | 6 | 0.3879 | 8 |
| 9 | Abandonment | 0 | 0 | 7 | 19 | 7 | 0.2103 | 9 |

Source: **Own Survey Data (2024)**

As shown on table 4.13, the most highly ranked major effect of delay in the construction of the bank's HQ building construction project is Time overrun (RII = 0.9515), Cost overrun is the second major effect of delay (RII = 0.9030) and the third scored major effect of delay is Reduced Profit (RII = 0.7152). The remaining six major effects of delay; Dispute between parties/stakeholders, Company's Bad Reputation, Reduced Quality, Arbitration, Litigation and Abandonment are ranked fourth to ninth positions.

**Time overrun:** As indicated on the analysis of major effects of delay on table 4.7; 25 (75.75%) of the respondents strongly agreed and the remaining 8 (24.24%) agreed that the project faced time overrun that the effect of time overrun is the major prior effect that the project faced because of the influential delay factors. The interview result also shows that time overruns in the project were caused by the all the three major project stakeholders. The result of this study was similar to the findings of Aibinu and Jagboro (2002), on the effects of construction delays on project delivery in Nigerian and Tsegay and Hanbin (2017), on analysis of delay impact on construction project in Ethiopia.

**Cost overrun:** As can be seen from table 4.13, 18 (54.54%) respondents was strongly agreed cost overrun was effects of delay in the project, 14 (42.42%) respondents agreed and only 1 (3.03%) respondent neutral. The interview result indicates that poor projection of project cost and inflation of materials was major causes for cost overrun. The result of this study was similar to the findings of Tsegay and Hanbin (2017), on analysis of delay impact on construction project in Ethiopia and Worku and Jha (2016), on investigating causes of construction delay in Ethiopian construction industries.

**Reduced Profit:** As time and cost overruns definitely profit will be reduced. When time overruns the project will have a probability of facing inflation and such economic influences to make the project profit reduced. 17 (51.51%) respondents strongly agreed that the project's profit is reduced because of its delay. 7 (21.21%) was disagree, 5 (15.15%) was strongly disagree and the remaining

4 (12.12%) was agreed and neutral to the case resulting on the third position of effects caused by delay factors.

**Disputes:** Table 4.13 depicts 5 (15.15%) and 8 (24.24%) respondents were strongly agreed and agreed for dispute was happened on the project resulting from the causes of delay. 6 (18.18%) were neutral. According to the result, the remaining 12 (36.36%) and 2 (6.06%) was disagree and strongly disagreed. The result of this study contradicts from findings of Owolabi et al (2014), on causes and effect of delay on project construction delivery time in Nigeria.

## 4.5 Methods of Minimizing Delay

According to the respondents' suggestion the following are the major remedies to minimize delay on projects.

- Less time taking payment approvals for the contractor to the executed works.
- Early and less time taking LC approvals for delivery of construction materials as per the schedule.
- Applying structured planning, reporting, evaluation and monitoring team to the construction projects.
- Managing and promoting a good work relation among stakeholders specially between the contractor and consultant teams.
- Managing ineffective planning and scheduling.
- Managing change order during construction.
- Frequently supervising and checking the progress of the project from the procurement to project follow up and contract administration
- Selection of appropriate contractors and consultants who have a good work ethics and experience.
- Creating a system to control project scope and design change issues.
- Applying scientific Project Management activities.

## 4.6 Results of The Project's Document Analysis

From the projects document reviews some multiple set of drawbacks have been identified. The following drawbacks need the proper immediate improvement.

- The projects have weak structured project planning, reporting, monitoring and evaluation team. There were no documented progress status reports and evaluation documents.
- Request of Payments were late by the contractor and also the client and consultant was also late for the approval and majorly this causes financial constraint on the contractor leading many delay causing factors like suspension of work due to lack of capacity of the contractor to purchase materials, salary payment for workers and subcontractors.
- Office Engineers were engaged on site execution activities rather engaged in formal office activities like preparing schedules, collecting proper execution reports, following and monitoring progresses and evaluating the progress of the projects to check the progress status with respect to the master schedule and for further remedies.
- Both projects contract was DB and the contractor is obligated for the preparation and approval of drawings and it was not performed as per the contract schedule.
- Late approval of working and shop drawings made the contractor to face reworks and financial loss and time consuming.
- The contractor's local team was not enough and well experienced to properly perform scientific project management practices.
- The contractor is weak on preparation and submission of regularly updated schedules and progress reports.
- Material requests and LC approval requested was not performed as per the material delivery schedule and the follow-up for the approval of materials and LC was not satisfactory.
- Some correspondences shown that there is a communication gap between the contractor and consultant teams that arise from the unbalanced work experience of the two staffs.

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

This chapter presents the conclusions of the findings analyzed in chapter four with respect to the study objectives and the recommendations to the company.

## 5.2 Summary

The main objective of this study was to investigate the causes of project delays in China Wu Yi Co. LTD construction company. Specifically, the study attempted to examine the causes of project delay in Zemen Bank's HQ building construction project, i.e (financial constraint/interim payment related factors, late or slow material delivery related factors and project management related factors). The findings derived from the data analyzed by using descriptive statistics and RII are presented below.

Financial constraint/interim payment related delay factors scores of RII = 0.9758 has the first position, on the second place; late or slow delivery of material related delay factors has a score of RII = 0.9273 and project management related delay factors (slowness in approving drawing & material samples by the contractor) scores of RII = 0.9030 on the third place.

This study was aimed at finding the causes of delay in large building construction projects which are undertaken by foreign construction company; client/owner related causes of delay, consultant related causes of delay, contractor related causes of delay, material related causes of delay, labor & equipment related causes of delay, project related causes of delay and external related causes of delay.

The results revealed that the most important three factors that cause delay in both bank's HQs are financial related delay factors (late payment for completed works), late or slow material delivery because of late request and approval of LC and project management related factors; slowness in approving drawing & material samples by the contractor results from the document analysis of the contractor.

## 5.3 Conclusions

Based on the results of data analysis and interpretations the following conclusions are drawn.

The main determinant causes of delay are emanated from client/owner, consultant, contractor, material, labor & equipment, project and external factors. Among client related causes of delay; delays in payments of completed works, financial constraint and lack of closely, regularly and formal follow-up are the top casual factors. Suspension of work due to owner and poor monitoring and evaluation are also the main client/owner related causes of project delay in Zemen Bank HQ Building Construction Project.

The study has unveiled a number of major causes of the projects' delay from consultant' side. Inflexibility of consultant, lack of co-ordination of consultant with contractor, communication barriers faced by consultant, total quality management by consultant and conflicts of consultant with design engineer are the most determinant causes of delay from consultant' side.

Slowness in approving drawing & material samples by the contractor, Contractor's slowness in site mobilization, contractor's inadequate planning & scheduling, source updating in the design engineering documents & related and regular updating in execution plan are the major causes of delay emanated from contractors.

Late delivery of materials because of late LC approval, escalation of material prices, slow process of material selection, poor material management and material damage in storage are the most important material related causes of delay.

Space limitations at site for temporary & permanent equipment, poor labor supply & labor productivity, lack of safety, no use of checklist and seasoned operators are identified as the causes of delays from labor and equipment related factors.

Project related causes of delay are insufficient data collections & survey, rework due to error in construction, change in economic conditions & increase in quantity of material, restricted access and problems due to existing structures.

Inaccurate cost estimates and restriction due to site location are the most important causes of delay related to external factors.

As examined from the overall causes of delay, delays in payments of completed work by owner, inflexibility of consultant, financial constraint, late delivery of materials because of late LC approval and slowness in approving drawing & material samples by the contractor are the common causes of delay originated from all stakeholders

More over delays in payments of completed works and financial constraint causes of delay by client/owner takes the primary position for delay of projects. This is due to late request and approval of the payments. Hence finance specifically, the working capital collected from interim payments are the backbone of a project. Without payments the project will not only has progress delay; totally it will stop.

Slowness in approving drawing & material samples by the contractor the secondary position for delay of the projects. The bank's HQ project is DB contract and preparing and approving of drawings and material samples are the responsibility of the contractor. If these documents process is delayed the proceeding activities will be delayed leading the overall project to face delay.

The client and the contractor are mostly responsible for the delays of the bank's HQ building construction project. It was evident however that still the other two main factors in a construction project (consultants and material related factors) have their contribution for the projects' delay. Relatively the other remaining three factors have less impact for the delay as compared to causes emanated from clients, contractors, consultants and material related factors. This indicated the causes of the projects' delays are internal and manageable. Once those stakeholders look themselves internally, they can create a significant change.

Results of the study confirmed time overrun, cost overrun, reduced profit, dispute between parties/stakeholders and company's bad reputation; are the effects of the delay encountered so far in both projects. Besides all, other non-quantifiable delay damages that cannot be stated in terms of money such as the dissatisfaction of shareholder because of inability of looking their property by share contribution (their bank's HQ building) are also observed. Generally; the delay of the project's will also affect the urban development of and beautification of the city.

## 5.4 Recommendations

Many empirical as well as theoretical reviews of research results has indicated that, the causes of project delay are plenty and the assessment result on such factors have been given different conclusions based on the research environment and capacity of the project undertakings. They could not suggest one common causes of project delay for all projects. Based on this truth, the study would suggest what has been identified in the results of the study that have significant impact on the project delay.

All the independent variables that are identified in this study have significant impact in causing progress delays on the project. Therefore, the major stakeholders should work a lot to manage the delays in the progress payments for completed work, late approval of LCs, late delivery of materials, late preparation and approval of drawings and material samples and coordination and communication barriers. The major stakeholders should give great focus and work a lot at least on the followings major perspectives:

- The client/owner and the consultant should cooperate with the contractor to fast facilitation of progress payments for completed work and early approval of LCs' requests. Late approval of LCs' will make the material procurement and delivery schedule delayed that also leads the whole project's progress to be delayed.
- The consultant should promote flexibility and coordination in order to avoid conflicts and communication barriers to build team spirit and stand together for one common goal; that is the achievement of the goals of the project's.
- The contract of the project is DB so that the contractor should perform its duty of preparation and approval of drawings as per the contract time/schedule. Drawings are the major contractual documents that are priory needed on the execution activity of the project's.
- The contractor should prepare procurement schedules of resources specially imported materials for early request on approval by the client/owner and consultant. This also reduce the time consuming LC approval process.
- According to the document analysis result; the contractor has weak side in revising of working schedules, collection of data and preparation of routine reports to monitor and

conduct evaluation of the project's schedule (time schedule), physical and financial progress. These are the major management activities that has primary role to understand the position of the project's. The contractor should improve and work on its own planning, monitoring and evaluation practice.

- The contractor should properly administer the contracts of its project's. Weak contract management makes the contractor to face many more problems that result from the delay of the projects majorly cost overrun, reduced profit, inflation, suspension of the work by waiting to price adjustment etc.

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## Appendix A: Questionnaire

**St. Mary's University**
**School of Graduate Studies**
**School of Business**

**Factors of Delay Affecting Building Construction: The Case of Zemen Bank HQ Building Construction Project**

**Questionnaire for Data Collection**

**Dear respondents;**

I am undertaking a research survey on construction projects focusing on construction project delay factors in China Wu Yi Co. LTD Construction Company's Zemen Bank HQ Building Construction project which are located in Addis Ababa.

The research is an individual research project as part of my study for MBA Degree in Project Management at St. Mary's University.

The main purpose of the research questionnaire is to collect information regarding the major delay factors of the mentioned construction company's two selected high rising buildings construction progress. As a key staff you are invited to participate in this survey. The information you provide in response to the items in the questionnaire will be used as part of the data needed for the study.

All the information you provide will kept in strict confidentiality and it will be used only for academic research purpose. Please answer each question carefully and be sure that there is no right or wrong answer. If you are unsure of an answer, please respond with your best estimate. I value your participation and thank you in advance for the commitment of time, energy and effort. If you have any further question; I can be reach at the address below.

With Greatest Regards;

Kalkidan Tesfahun
Tel. +251-9-25 07 76 01
Email. kaletesf@gmail.com

**General Instructions**

- ❖ There is no need of writing your name.
- ❖ Write your opinion on space provided for those questions.
- ❖ In all cases were answers options are available; please tick (√) in the appropriate box.

**Part I**. General information of the respondents; please use (√) in the relevant box for your response.

1) Which stakeholder do you represent?

   Client/Owner ☐ Consultant ☐ Contractor ☐ Others ☐

2) Respondent designation/title in the company

   Project Manager ☐ Project Engineer ☐ Site Engineer ☐

   Office Engineer ☐ Site Inspector ☐ Resident Engineer ☐

   General Forman ☐ If Other; Please specify: _____

3) Gender: Female ☐ Male ☐

4) Age: 25 – 35 ☐ 36 – 45 ☐ 46 – 55 ☐ Above 55 ☐

5) Educational Background:

   PHD ☐ MA/MSC ☐ BA/BSC ☐ College Diploma ☐

   If Other; Please specify: _____

6) Total Work Experience:

   Less than 5 years ☐ 5-10 years ☐ 10-15 years ☐ Above 15 years ☐

   If Other; Please specify: _____

**Part II.** Listed below on this part there are questions that will examine the causes of project progress delay in a building construction project. Please read each question and give appropriate answer regarding the major causes of project delay of your project. Please use (√) in the relevant box for your response.

***SA – Strongly Agree  A – Agree  N – Neutral  D – Disagree  &  SD – Strongly Disagree***

| No | Questions Regarding Causes of Delay | SA | A | N | D | SD |
|---|---|---|---|---|---|---|
| **a) Client/Owner Related Causes of Delay** | | | | | | |
| 1 | Is there trust, understanding & owner decision making authority among & between the owner & lead contractor's teams. | | | | | |
| 2 | Late revising & approving relevant documents by owner | | | | | |
| 3 | Frequent Changes by owner during construction | | | | | |
| 4 | Financial Constraint | | | | | |
| 5 | Delays in payments of completed works by owner | | | | | |
| 6 | Awarding bid with lowest price with respect to the current market price | | | | | |
| 7 | Lack of communication & co-ordination by owner (Late or slow decision making) | | | | | |
| 8 | Suspension of work due to owner | | | | | |
| 9 | Unnecessary or informal interference | | | | | |
| 10 | Less sense of ownership | | | | | |
| 11 | Poor Monitoring and Evaluation | | | | | |
| 12 | Lack of closely, regularly and formal follow-up | | | | | |
| 13 | Misunderstandings in technical dealing with vendors & contractors | | | | | |
| 14 | Low level of technical expertise | | | | | |
| **b) Consultant Related Causes of Delay** | | | | | | |
| 1 | Slowness in approving drawing & material samples by the consultant | | | | | |
| 2 | Less authority given to consultant to take decision | | | | | |
| 3 | Total quality management by consultant | | | | | |
| 4 | Mistakes in consultant’s drawings | | | | | |
| 5 | Consultant’s less experience | | | | | |
| 6 | Financial difficulties to the consultant | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | Modification in contract | | | | | |
| 8 | Lack of practical (working) knowledge to the consultant | | | | | |
| 9 | Lack of co-ordination of consultant with contractor | | | | | |
| 10 | Consultant's ability of leadership | | | | | |
| 11 | Inflexibility of consultant | | | | | |
| 12 | Conflicts of consultant with design engineer | | | | | |
| 13 | Changes in specification during construction by consultant | | | | | |
| 14 | Inadequate site information given to consultant | | | | | |
| 15 | Delay in handover of site to contractor | | | | | |
| 16 | Conflicts between consultant & contractor | | | | | |
| 17 | Complexity of project design faced by consultant | | | | | |
| 18 | Difficulties in receiving payments from agencies faced by consultant | | | | | |
| 19 | Communication barriers faced by consultant | | | | | |
| 20 | All design changes being identified & discussed with vendors & contractors by consultant | | | | | |
| **c) Contractor Related Causes of Delay** | | | | | | |
| 1 | Contractor's inadequate planning & scheduling | | | | | |
| 2 | Lack of experience of contractor for decisions | | | | | |
| 3 | Slowness in approving drawing & material samples by the contractor | | | | | |
| 4 | Contractor's slowness in site mobilization | | | | | |
| 5 | Contractor's slowness in preparation of documents & material samples | | | | | |
| 6 | Contractor's Poor site management & supervision | | | | | |
| 7 | Conflicts with sub-contractor | | | | | |
| 8 | Rework in construction faced by contractor | | | | | |
| 9 | Incompatibility of contractor with new technology | | | | | |
| 10 | Compatibility of contractor with new software's | | | | | |
| 11 | Poor understanding of accounting & financing project | | | | | |
| 12 | Poor managerial skills in contractor | | | | | |
| 13 | Inadequate handling of project progress by contractor | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | Risk analysis & management by contractor | | | | | |
| 15 | Availability of & systems document of the project to the entire team | | | | | |
| 16 | Regular updating in execution plan | | | | | |
| 17 | No changes are picked up for all relevant & latest documents | | | | | |
| 18 | Source updating in the design engineering documents & related | | | | | |
| **d) Material Related Causes of Delay** | | | | | | |
| 1 | Shortage of material | | | | | |
| 2 | Changes in quality of material | | | | | |
| 3 | Frequently unexpected modifications in specification of material during construction | | | | | |
| 4 | Slow process of material selection | | | | | |
| 5 | Poor Material management | | | | | |
| 6 | Material damage in storage | | | | | |
| 7 | Escalation of material prices | | | | | |
| 8 | Late in finalizing finishing material due to availability of varieties in market | | | | | |
| 9 | Insufficient turnover & startup resources make project slow | | | | | |
| 10 | Lack of site receiving inspection system | | | | | |
| 11 | Materials not in right | | | | | |
| 12 | Untimely delivery | | | | | |
| e) **Labor & Equipment Related Causes of Delay** | | | | | | |
| 1 | Poor labor supply & labor productivity | | | | | |
| 2 | Disputes in labor | | | | | |
| 3 | Labor strikes | | | | | |
| 4 | Unavailability of equipment | | | | | |
| 5 | Delay in equipment delivery | | | | | |
| 6 | Shortage of recent technology equipment | | | | | |
| 7 | Large or long lead-time equipment been received as requested | | | | | |
| 8 | No use of checklist | | | | | |
| 9 | Unavailability of equipment lists & related design data | | | | | |
| 10 | Seasoned operators | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | Space limitations at site for temporary & permanent equipment | | | | | |
| 12 | Manpower loading accessible from the available supervision & skilled tradesmen pool | | | | | |
| 13 | Lack of safety | | | | | |
| 14 | Effective inspection & expediting visits | | | | | |
| f) **Project Related Causes of Delay** | | | | | | |
| 1 | Traffic control at site | | | | | |
| 2 | Changes in site conditions | | | | | |
| 3 | Unforeseen ground conditions | | | | | |
| 4 | Insufficient data collections & survey | | | | | |
| 5 | Changes in site topography after design | | | | | |
| 6 | Restricted access | | | | | |
| 7 | Accidents on site | | | | | |
| 8 | Problems due to existing structures | | | | | |
| 9 | Unavailability of utilities in site area | | | | | |
| 10 | Change in economic conditions & increase in quantity of material | | | | | |
| 11 | Rework due to error in construction | | | | | |
| 12 | Issue & implementation of quality plans & inspection test plans ITP's | | | | | |
| g) **External Related Causes of Delay** | | | | | | |
| 1 | Inclement weather effects | | | | | |
| 2 | Inaccurate cost estimates | | | | | |
| 3 | Restriction due to site location | | | | | |
| 4 | Changes in government regulation & laws | | | | | |

Please specify here any other additional comments regarding the causes of delay of your project.

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**Part III.** Listed below on part three there are questions that will examine the effects of project progress delay in a building construction project. Please read each question and give appropriate answer regarding the major effects of project delay of your project. Please use (√) in the relevant box for your response.

***SA – Strongly Agree  A – Agree  N – Neutral  D – Disagree  &  SD – Strongly Disagree***

| No | Questions Regarding Effects of Delay | SA | A | N | D | SD |
|---|---|---|---|---|---|---|
| ❖ **Major Effects of Delay** | | | | | | |
| 1 | Cost overrun | | | | | |
| 2 | Time overrun | | | | | |
| 3 | Reduced Profit | | | | | |
| 4 | Reduced Quality | | | | | |
| 5 | Company's Bad Reputation | | | | | |
| 6 | Dispute between parties/stakeholders | | | | | |
| 7 | Arbitration | | | | | |
| 8 | Litigation | | | | | |
| 9 | Abandonment | | | | | |

Please specify here any other additional comments regarding the effects of delay of your project.

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**Part IV.** Listed below on part four there are questions that will examine the mechanisms to minimize delay of building construction projects. Please read each question and give appropriate answer regarding the major mechanisms to minimize delay of your project. Please use (√) in the relevant box for your response.

***SA – Strongly Agree  A – Agree  N – Neutral  D – Disagree  &  SD – Strongly Disagree***

| No | Questions Regarding Mechanisms to Minimize Delay | SA | A | N | D | SD |
|---|---|---|---|---|---|---|
| ❖ **Major Mechanisms to Minimize Delay** | | | | | | |
| 1 | Proper project activity scheduling is a major mechanism to minimize delays in building projects. | | | | | |
| 2 | Properly managing the prepared activity schedule using tools like CPM, PERT, WBS… | | | | | |
| 3 | Managing shortage or late delivery of interim payments by client. | | | | | |
| 4 | Managing change orders during construction by all stakeholders. | | | | | |

Please specify here the current practices that are being implemented to minimize project delay in your project.

_____

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***Thank you!!***

## Appendix B: China Wu Yi Co. LTD Company Profile



中国武夷实业股份有限公司
CHINA WU YI CO., LTD.
CWYC

With the good reputation accumulated by China Wuyi in the African market for many years and the professional market operation ability, the company has made new breakthroughs in the Ethiopian market since 2016, successively winning the bid for the Zemen Bank Headquarters Building Project, AFDERA - JIDETI Road Project, Daye-Chini Nanxiaohe Road Project, Ayisel - Zuran - Angereb Road Project, Construction of Mixed Use Building for Amhara Credit and Savings Institute and Nyala Insurance Headquarters Building Project, etc. In line with the goal of building a first-class multinational enterprise, China Wuyi is willing to contribute to strengthening China-Egypt economic and trade cooperation with Chinese and Ethiopian enterprises.

China Wuyi Ethiopia Branch was incorporated in Ethiopia in December 2013. It has obtained the first-level contractor qualification certificate and real estate investment license issued by the Ethiopian government. It is mainly engaged in civil construction, highway bridges, municipal public utilities and electromechanical equipment installation, decoration and other business operations in Ethiopia.

China Wuyi Co., Ltd. is a large-scale multinational enterprise engaged in diversified business operations such as domestic and overseas construction, real estate investment and development, import and export trade, etc. It was successfully listed in Shenzhen in 1997. With great strength in the construction of civil buildings, highway bridges, municipal utilities, mechanical and electrical equipment installation, steel structure, decoration and other engineering projects, it has the competitive advantage of organizing and implementing EPC, BOT, PPP and other forms and whole process construction services. Since 1994, China Wuyi has been ranked among the world's largest 250 contractors in the US Engineering News-Record (ENR) magazine, ranking 181st in 2017.

**ZEMEN BANK HEADQUARTERS BUILDING PROJECT**

The project is located in the business center of Addis Ababa, adjacent to the bank headquarters building. The building has 2 floors underground and 23 floors above ground. The total construction height is 129 meters and the total construction area is 36,000 square meters. The project started in October 2016.

**AFDERA - JEDITI ROAD PROJECT**

The project is located in Afdera, in the northeastern part of Ethiopia. The line is about 80 kilometers long and the project started in May 2017.

**DAYE-CHINI NANXIHO ROAD PROJECT**

The project is located in the southern part of Ethiopia with a total length of approximately 73.77 km. The project started in June 2017.

**AYASEL - ZURAN - ANGEREB ROAD PROJECT, CONTRACT II: KM 69+600 - ANGEREB/ASHUBE**

The project is located in Amhara, Ethiopia, with a total length of 71.35 kilometers. The project started in June 2017.

**DESIGN & BUILD FOR OROMIA COOPERATIVE BANK TRANSITIONAL HEAD OFFICE BUILDING PROJECT**

The project is located on Bole Road, an important traffic commercial section of Addis Ababa. The building has 3 floors underground and 18 floors above ground with a total construction area of 13,988 square meters. The project started in March 2018.

**CONSTRUCTION OF MIXED USE BUILDING FOR AMHARA CREDIT AND SAVINGS INSTITUTE**

The project is located in the business center of Addis Ababa. The building has 4 floors underground and 27 floors above ground with a total construction area of 72,000 m2. The project started in March 2018.

**NYALA INSURANCE HEADQUARTERS BUILDING PROJECT**

The project is located on Bole Road, an important traffic commercial section of Addis Ababa. The building has 3 floors underground and 19 floors above ground with a total construction area of 18,500 m2. The project started in July 2018.

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