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**ST. MARY'S UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**PROJECT MANAGEMENT PROGRAM**

*AN ASSESSMENT OF THE CAUSES OF SCHEDULE DELAY AND COST  
OVERRUN: THE CASE OF BAMA CON ENGINEERING PLC*

**BY**

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**January, 2021**

**ADDIS ABABA, ETHIOPIA**

**St. Mary's University**  
**SCHOOL OF GRADUATE STUDIES**  
**PROJECT MANAGEMENT PROGRAM**

*An Assessment of the Causes of schedule delay and cost overrun: The Case of BamaCon Engineering Plc*

**BY**

**FISSEHA GEBRE**

**A Project Work Submitted to St. Mary's University**

**Graduate Studies Program in Partial Fulfillment of the  
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Management**

**ADVISOR**

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**January, 2021**

**St. Mary's University**

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# DECLARATION

I hereby declare that the study “An assessment of the causes of the schedule delay and cost overrun: the case of BamaCon Engineering Plc projects” is the results of my research and is my original work except for the literature which sources have clearly been stated and duly acknowledged. I have conducted the study independently with the guidance and comments of my research advisor. This study has not been presented for any degree in this university or any other university.

By- Fisseha Gebre

Signature

Date

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

## LETTER OF CERTIFICATION

This is to certify that Fisseha Gebre has carried out this research work on the topic entitled “An assessment of the causes of the schedule delay and cost overrun: the case of BamaCon Engineering Plc projects” under my supervision. This work is original in nature and suitable for submission in partial fulfilment of the requirements for the award of Master of Arts Degree in Project Management.

Advisor- Dr. Temesgen Belayneh

Signature

Date

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# Acronym

**BEP-** BamaCon Engineering Plc

**RII-** Relative Importance Index

**SPSS-** Statistical Packages for the Social Sciences

## Abstract

*The purpose of this study is to assess the causes of schedule delay and cost overruns in BamaCon Engineering Plc which has faced a marvelous 143% schedule delay and 41% cost overrun. To address the two major issues of schedule delay and cost overrun, a case study research design was employed. The research used both quantitative and qualitative data were collected and analyzed. Both of them primary and secondary data were used to answer the research questions. Desk studies of twelve finished construction projects were assessed, and from the analysis it was found that 100% of the construction projects suffered by both time delays and cost overruns. The rate of time overrun ranges from a minimum of 7% to the maximum of 143% of the contract time and cost overrun ranges from a minimum of 2% to the maximum of 41% of the contract amount. A total of 133 questionnaires were distributed and 110 questionnaires were returned & collected which is overall response rate was 83% from BamaCon Engineering Plc office engineers, project managers and site engineers including client and consultant officers. A structured questionnaire in Likert scale was used in data collection system. The data obtained through questionnaire has been analyzed quantitatively using SPSS version 24. In further, the data obtained using interview has been analyzed qualitatively. The design is mixed approach. Thirty (30) project delay attributes were identified through detailed literature review. This research categorized the causes of delay under eight main groups of contractor related factors, client related factors, consultant related factor, other external related factor, project related factors, design related factor, material related factor, and labor & equipment related factors and then the data obtained were analyzed using the relative importance index(RII). Based on RII result, the findings of research are that the major causes of schedule delay causes include improper planning poor site management and supervision, incomplete drawing and detail design, poor contract management, unforeseen circumstances, mistakes, inconsistencies and ambiguities in specifications and drawings, shortage of construction materials required and low capability of the contractors' specialized staff doled out to the project while the major causes of cost overrun are price escalation, quantity underestimation, design change, acceleration (speeding up), lack of quality, delayed caused by the owner and his/her specialist, poor cost management, additional work & rework, incomplete requirements and design.*

*Finally, some recommendations have been delivered under this study on what actions should be taken to tackle the two major problems of schedule delay and cost overrun.*

**Key Words:** schedule delay, cost overrun, cause, impact, resolution

# CHAPTER ONE- INTRODUCTION

## 1.1 Background of the Study

PMI characterize a Project as “a brief undertaking embraced to make a one of a kind item, administration, or result” (PMBOK® Guide, PMI, 2013,P.5). A project is a sequence of unique, complex, and associated activities that have one objective or reason and that must be finished by a particular time, inside financial plan, and as indicated by determination.

The objective of each project is to achieving and ideal result (execution objective) at specific end date (time objective) utilizing a particular measure of spending (cost objective). Execution is the thing that the task deliverables, expectations, or conclusive outcome must do. Time is the planned period over which the work is to be finished. Cost is the predefined or planned expense for the project. In any case, because of various reasons a project may not meet its objective. Thus, viable task the project needs to adjust the three iron triangle (performance, time and cost). The motivation behind undertaking the executives is to anticipate or foresee however many threats and issues as could seasonably be expected; and to design, arrange and control exercises with the goal that the project is finished effectively as conceivable regardless of the considerable number of dangers. Task achievement is typically characterized as meeting the undertaking objectives and goals as endorsed in the project plan.

A successful project is that the project has achieved its specialized presentation kept up its timetable and stayed inside budgetary costs (Frimponga, Oluwoyeb, and Crawford, 2003). The achievement of a project is characterized as far as the finishing of the task in the foreordained time, cost and execution prerequisites a few researchers like edge (2002) contend this isn't essential the correct meaning of a successful project. As indicated by him anticipate achievement is resolved dependent on the customer fulfillment it conveys, not exclusively on the conveyance of the activities with regards to three limitations.

Perquisites set by the undertaking partner are met. As per Roberts & Wallace (2004), the factors time, cost and quality are interrelated and an adjustment in any single variable much of the time significantly affects the others. This implies in attempting to meet calendar and quality necessities, costs increment. On the other hand attempting to contain costs, nature of the work done disintegrates and calendars slip. In the event that we attempt to convey the undertaking

under the base time when we need to bear extra cost and might be tradeoff the nature of the expectations. This demonstrates a task can't be finished by the first arranged financial plan and time table without making any tradeoffs. Deferral and cost overwhelm are innate piece of most ventures regardless of the much procured information in venture and their relief procedure, order to build the view of task achievement (Buys, 2015).

Construction industry is a significant industry that assumes an essential job in the financial development of a nation. Financially, it contributes in huge improvement in the general GDP of a nation. It additionally improves the personal satisfaction by giving the important framework, for example, streets, clinics, schools and other fundamental and upgraded offices. Consequently, it is in a general sense vital to make development ventures finished effectively inside time, financial plan and anticipated quality. In any case; being a perplexing, divided and plan driven industry, it continually acing incessant issues, for example, how quality and efficiency, cost overwhelm, time invade, development waste and others. Of these, cost and time invade is an extreme issues (Cantalli 2009, Olawale and Sun, 2010) on the grounds that it influences the general improvement of any nation. Cost overrun is a worldwide marvel in the development business where seldom extends are done inside the planned expense.

## **1.2 Background of the Organization**

Amongst the quickest development firms predominantly working together in the capital city, Addis Ababa involving a colossal number of labor is BamaCon Engineering PLC. It was built up in 2001, in Addis Ababa, Ethiopia with the name of the proprietor and general manger as "Girma Gelaw Building Contractor". In 2003, the firm enlisted with the service of framework and changed its name to BamaCon Engineering PLC. BamaCon is headquartered in Addis Ababa where the entirety of its tasks are done. The company has an average annual turnover of 565,347,457 (Ethiopia Birr) and a total of 1700 employees in 2020. The firm has effectively completed significant construction projects, for example, places of business, plant building, multipurpose structure and high rises in the course of the most recent 12 years. BamaCon has a likely arrangement of extending its development work to different urban communities in the nation. The organization is ISO affirmed 9001:2015 on July 11, 2019 and carries out its projects according to designs and specifications requirements and ensures that the work will be completed on time, in high quality and in cost effective manner. Over the last years, the company

has developed a wide client base and some of its major clients includes; Adika Tour and Travel, Ambassador, Omedad, Enat Real Estate and Geretta Consult plc. The company is striving to be a leading construction firm in the country and aims at improving its operations and performance to overcome the competitive pressure in the construction industry. Some of the competitors of BamaCon are; Dugda Construction Plc, Afro Tsion Construction Plc and Rama Construction Plc and so on.

### **1.3 Statement of the Problem**

The triple constraints to be considered during construction are time, cost and quality of projects and sometimes specification. This needs legitimate arranging of time and budget with their satisfactorily application. But time and cost overruns is created due to different factors by stakeholders, which affects delivery of construction projects to the client on the allocated budget and estimated time. The client and other partner within the in the industry of development proceeds to criticize intensely concerning the industry falling flat to execute ventures fair inside the set time frame, acceptable quality, and budgeted cost, there remain an incessant challenge of delay which impends the capabilities of all the parties involved. A significant factor which contributes to this problem is lack of application of project management approaches to tackle these delays. This has resulted in poor quality of works, loss of productivity, delayed projects' completion, and increase of total cost of project, unemployment, and liquidation of construction firms, disputes and litigation.

A construction project is commonly acknowledge as successful, when it is completed on schedule and within the agreed budget, with the highest quality and in the safest manner, in accordance with the specifications and to stakeholders' satisfaction. Delays happen in each development extend and the importance of these delays changes impressively from project to project. Construction delays are disruptive and expensive. The six significant factors founds to be contributing to delays in building & civil engineering works are unforeseen ground conditions, poor site supervisions, low speed of decision making involving all extend teams, client started variations, necessary verities of work, and insufficient contractor. (Takim,R., & Akintoye, A.(2012), Mansfield,N.R. and Doran,T(2004)).

Construction delay characterized as “time overwhelm either past completion date indicated in a contract or past the date that parties concur upon for conveyance of project.” It is slipping over



its arranged plan and is considered as common issue in development of projects. Delay in development project completion may be a worldwide wonder that happens within the development industry and considered as one of the foremost common issues causing a huge number of negative impacts on the venture and its taking an interest parties particularly where the government projects are concerned within the development industry of Ethiopia is no exception (Tilahun Sh.2016).

Among the construction projects undertaken most are delayed well beyond the expected time for completion and also required additional budget more than contracted during the commencement of the respective projects. This problem in turn is causing difficulties in financing of upcoming projects, timely utilization of the facility by the private, public and relationship among stakeholders (Employer, Contractor, Financier, etc.) involved in the construction process. This needs appropriate arranging of time and cost with their adequate application. The problem statement is completion and hand over of construction projects with in the contract amount and time, or improving time and cost management in BamaCon Engineering Plc. The main causes of cost overrun and schedule delay of BamaCon Engineering Plc will be assessed in this research.

## **1.4 Research Question**

The major questions that should be raised are:

- What are the causes of schedule delay and cost overruns at BamaCon Engineering Plc?
- What are the impacts or effects for schedule delay and cost overrun of projects completion in BamaCon Engineering Plc worried with time and cost?
- What is the trend of project completion in BamaCon engineering plc with respect to schedule delay and cost overrun?
- How could the schedule delays and cost overruns can be avoided or minimized (mitigation method)?

## **1.5 Research Objective**

### **1.5.1 General Research Objective**

The main objective of this study is to assess the causes of schedule delay and cost overruns in BamaCon Engineering Plc construction which has an experience of delays of projects.

### **1.5.2 Specific Research Objective**

- To identify and assess the schedule delay and cost overruns in construction projects with respect to the projects original duration and contract amount of BamaCon Engineering Plc.
- To identify & assess the main causes (reasons) and impacts for schedule delay and cost overruns in BamaCon Engineering Plc.
- To identify resolution methods or mitigation measure for schedule delay and cost overrun.

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

The extent or scope of this study is to direct the applied and pragmatic audit of schedule delay and cost overrun which is experienced by BamaCon Engineering Plc projects that is found only in Addis Ababa. This research focuses on identifying major causes of schedule delay and cost overrun of the company. This research further distinguishing and analyzing the primary driver causes of mixed use building project schedule delay and cost overrun and lastly recommendation of mitigation measure that limit those issues will be called to.

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

The limitation of this study is that, it is directed uniquely only on construction projects that are completed by BamaCon Engineerig Plc in Addis Ababa. Due to covid-19 global epidemic virus the researcher was not able to get available project plan and other schedule delay and cost overrun related archives and furthermore there is a restriction of available reports from the head office.

### **1.8 Significance of the Study**

This research aims to meaning the factors that cause schedule delay and cost overrun in the mixed use building undertaken by BamaCon Engineering Plc. The significance of this study is to analyze the procedures, methods and to recommend practical implementable solution, that can be used to minimize or avoid time and cost overruns of construction projects; and to handover or deliver construction projects to the client inside the given time and cost entitled on the agreement document. This thesis studies the causes and presents the issues of schedule delay and cost overwhelms. It likewise make a judgment how to limit or keep away from extra time extension

or schedule delay & cost overrun and to deliver projects by meeting business necessities, conveyed and kept up on a time, within budget and maintained the expected business value and return speculations effectively in the construction projects of BamaCon Engineering Plc.

### **1.9 Organization of the Study**

The investigation is sorted out under five sections. Chapter one incorporates the introduction, background and objective of the study. Chapter two spotlights on auditing the available literature on the subject area. Chapter three arrangement with the methodology and analysis. It incorporates the research design, source of data, sample and sampling technique, data collection techniques, and data analysis. Chapter four shows us the result and conversation of the investigation. Chapter five gives summary of major findings, conclusions of the study and suggestions of an assessment.

## **CHAPTER TWO- REVIEW OF RELATED LITERATURE**

This part distinguishes past writing (theoretical approaches) regarding the matter of schedule delay and cost overrun and gives a brief discussion of past discoveries.

### **2.1 Overview**

The Ethiopian construction industry is characterized by countless small scale business visionaries, most of whom work in the nation's casual economy. There are such a significant number of researchers who called attention to about project schedule delay and budget (cost) overrun. To clarify and to maintain a strategic distance from equivocality a few written works unmistakably appears as follows. Successful project management can exist by completing the undertaking expectations and goals inside the predetermined time and budget (Abdu, 2015; Surabattuni. M and Sanjeet.K, 2019). A cost overwhelm otherwise called a cost increment or budget overrun, includes unforeseen caused cost. It includes sudden abundance cost happened because of underestimation of the normal financial plan of the foundation projects (Nabil A., Zaydoun. A, 2017).

Cost overruns don't simply happen normally, there are various components during the construction procedure that when not oversaw appropriately can prompt cost overruns (Al-Najjar, 2002). Schedule delay or time overrun in building construction project is the late in progress or real finishing of work, contrasted with the gauge construction timetable or agreement plan (Luvara G.M.V., and Phoy, S., Jaffari S. Jongo, 2019). As per Chan and Kumaraswamy (1997), the loss of control on schedule and cost prompts disappointment of tasks and the deficiency of control might be caused because of absence of information and mindfulness. Finishing projects inside the time is an indicator of an effective construction industry.

### **2.2 Schedule Delay and Cost Overrun**

Time overrun and cost overruns are the critical issues of any construction projects.

#### **2.2.1 Schedule Delay**

Projects or construction works that are not delivered on time to the client are referenced to as projects that have undergone schedule delays. Hence, Mohammed (2010) defines schedule delays or overruns as an act or event that extends the time to complete or perform an act under

the contract. Also, Assaf and Al-Hejji (2006) explained schedule delays as the time overrun, or beyond the date that the parties agreed upon for delivery of a project. It is essentially a project slipping over its planned schedule and is considered as regular issue in construction projects around the world. They also pointed out that, the client, schedule delay means loss of revenue through the lack of production facilities and rentable space or a dependence on prevent facilities. Sometimes; for the contractor, schedule delay means higher material costs through inflation, and due to labour cost increases. According to Alkhathami (2004) clarifies that schedule delays can be characterize as additional time required to complete a given construction project beyond its original planned duration if compensated for or not.

Researches in creating nations particularly Africa have gained ground progress in deciding the causes behind project delays and cost overruns. As cited by Kaliba, Muya, and Mumba (2009) clarify in their examination that, the significant reasons for delay in road construction projects in Zambia were delayed payments, money related insufficiencies with respect to client or contract modification, contract alteration, monetary issues, material acquirement changes in structure drawings, staffing issues, hardware inaccessibility, helpless oversight, development botches, helpless coordination on location, changes in determinations, work questions and strikes. In Uganda, Agaba (2009) properties delays in construction projects to poor plans and details. In their study, El-Razak, Bassioni, Mobarak, (2008) found that delayed payments, coordination trouble, and poor correspondence were significant reasons for delay in Egypt. Studies outside the African mainland appear to have indistinguishable practically comparable causes. Sambasivan and Soon (2007), and Alinaitwe (2008) set up that lack of common sense, poor site management, insufficient to administrative abilities of the contractor, delayed payments, material deficiency, work gracefully, hardware accessibility and failure, poor communication and rework were the most significant reasons for delays in the Malaysian construction industry. Kouskili and Kartan (2004) distinguished the fundamental elements influencing cost and time overrun as lacking/wasteful gear, instruments and plant, problematic wellsprings of materials on the nearby market, and site mishaps. Subsequently, the rundown of causes affirm above concur with the findings of AbaMajid and McCaffer (1998) who presumed that on the off chance that such causes are viably managed, at that point schedule delay can successfully be alleviated or managed.

Generally, we can understand that if any alteration or adjustment is made to any of the two variables then it in turn will affect the other one. Thus one can say a project with a delayed schedule will require additional money and resources to deliver the project.

### **2.2.2 Cost Overrun**

In project management, the point of undertaking control is to guarantee the activities to complete on schedule, inside financial plan and accomplishing other task targets.

Various studies have explored the causes for project cost overrun on construction project. Kaming, Olomolaiye, Holt, and Harris (1997), who contemplated 31 construction projects in Indonesia, found that from a contractor's perspective, cost overruns were mainly brought about by error of material take-off, increment in material expenses and cost increment because of environmental restriction or limitation. Le-Hoai et al. (2008) ranked the three top causes for cost overruns in Vietnam as a material cost increment because of inflation, inaccurate quantity takeoff and work cost increment because of natural limitation. Kaliba, et al. (2009) conclude that cost heightening (escalation) of construction projects in Zambia are brought about by components, for example, increase climate, scope changes, environmental security and mitigation costs, schedule delay, strikes, technical challenges and inflation. Bubshait and Al-Jawait (2002) recorded the following as variables that cause cost overrun on construction projects in Saudi Arabia; impacts of climate, number of activities going on simultaneously, social and social effects, project area, absence of efficiency measures in Saudi Arabia, level of contenders, provider control, monetary security, lacking creation of raw materials by the nation, nonappearance of construction information. In other investigation on construction projects in Nigeria, directed by Okpala and Aniekwa (1998), it was discovered that draftsmen, specialists and customers concur that lack of materials, fund and installment of finished works and helpless agreement the executives were the most significant reasons for cost overruns.

It merits referencing that Kaming et al. (1997) and Mansfield et al, 1994 likewise design change, inadequate, flighty climate condition, and variance in construction materials as variables affecting cost overrun. Nine (9) basic causes time and cost overrun were distinguished: fragmented structure at the delicate; extra work at proprietor's solicitation; changes in proprietor brief; absence of cost arranging/checking during pre-and post-contract stages; site soil conditions; modification of prime expense and temporary aggregates; re-estimation of temporary

works; coordination's because of site area ; absence of cost reports during construction stage, they additionally gave a rundown of other nine (9) other basic causes which are normally overlooked. They incorporate; delays in giving data to the temporary worker during construction delays, specialized exclusions at configuration stage legally binding cases, for example, expansion of time with cost claims, upgrades to standard drawings during development stage, wrong choice by the directing group in managing the contractual worker's questions in delays, delay in costing varieties and extra works, oversights and mistakes in the bills of amounts, disregarding things with unusual rates during delicate assessment, particularly things with temporary amounts, some offering moves by contract based workers, for example, front-stacking of rates.

According to Kenzer (2009), the common causes of cost overruns are; poor estimating techniques and/or standards, resulting in unrealistic budgets, out-of-sequence starting and completion of activities and events, poor work definition at the lower levels of the organization, inadequate work breakdown structure, unforeseen technical issues/problems, material escalation factors that are unrealistic, poor comparison planned and actual cost and no management policy on reporting and control practices.

## **2.3 Classification of Schedule Delay**

According to Trauner (2009) schedule delays can be seen in these four major categories as

1. Critical and non-critical delays
2. Non-executable (contractor caused) and executable delays
3. Compensable (owner based) and non-compensable delays
4. Concurrent and non-concurrent delays

### **2.3.1 Critical and Non-Critical Delays**

Delays that influence the project finishing or in some cases a milestone date are considered as critical delays and delays that do not influence the project completion or a milestone date are considered as noncritical delays. If these activities are delayed, the project finishing time will be holdup. The determining which activities truly control the project completion date depends on the project itself, the contractor's plan and schedule (particularly the critical path), the

requirements of the contract for sequence and phrasing and the physical constraint of the program or the project, i.e how to build the job from a practical perspective. (Dinakar 2014)

### **2.3.2 Non-Executable (Contractor Caused) and Executable Delays**

Non-executable delays are events that are within the contractor's control or that are foreseeable. These are some example of non-executable delays; late performance of subcontractors, ultimately performance by suppliers, faulty workmanship by the contractor and subcontractors, and a project specific labor strike caused by either the contractor's unintended to meet with labor proxy or by unfair labor practices. (Ahmed 2017)

According to Serdic and Selih (2015) excusable delays are occurrences over which neither the owner nor the contractor have any control, e.g. extreme weather conditions, acts as God and other unforeseen events.

### **2.3.3 Compensable (Owner Based) and Non-Compensable**

A compensable delay is one where a contractor is entitled to monetary or financial recuperation in the form of direct and indirect time related expense arising from an employer risk event. (Caletka & Keane 2008)

### **2.3.4 Concurrent (parallel) and Non-Concurrent Delay**

Concurrent or parallel delays and happen when there are at least two or more independent delays during the same time period. Concurrent delays are significant when one is an employer hazard occasion and the other a contractor risk event, the impacts of which are felt simultaneously. When two or more delay events arise at different times, this is more correctly termed 'concurrent effect' of sequential delay events where as non-concurrent delays mean that although an excusable delay may have happened, the contractor is not entitled for any additional compensation resulting from the excusable delay. (Keane et al 2008)

## **2.4 Main Causes (reasons) of Schedule Delay and Cost Overrun**

Construction delay are bound to occur in practically all projects because of the miscommunication between Contractors, subcontractors, and owners or some other reasons.

As indicated by Abdella and Hussien (2002) causes of schedule delay and cost overrun can be categorized into the following eight main groups.



## **2.4.1 Contractors Related Delay**

### ***2.4.1.1 Inadequate Contractor Experience***

Abd Majid and McCaffer (1998) contemplated the variables of lacking contractual worker experience as supporter of reasons for delays. Long et al. (2004) referenced the elements of insufficient contractor worker experience that add to reasons for delays in construction project. In construction industry, a portion of the delay project are confronting an issue during construction period. And yet contractual worker couldn't tackled the issue quickly in view of no understanding. During the contractor finding method discovering technique to take care of the issue, a portion of the works thoroughly stop due to that issue. After the issue was comprehended, those work keeping proceed yet run out from the timetable. At long last, the entire project will impact delay.

### ***2.4.1.2 Inaccurate Time Estimate***

According to Long, et al. (2004) distinguished the variables of inaccurate time evaluating that add to reasons for delays in construction project. Time gauges are significant as contributions to other method used to oversee and structure for all project. A wrong time estimation strategy may cause a project delay. The contractor don't permitted time for some regular issue consistently occur during the construction stage, for example, breakdown of equipment miss conveyances by provisions, mishaps and crises, etc. On account of this issue the genuine time will run out from the evaluated along these lines, the entire project could be confronting delay.

### ***2.4.1.3 Inaccurate of Cost Estimate***

As per Long et al. (2004) likewise referenced that, the elements of off base expense evaluating that add to causes for delays in construction project. Construction assessing mistakes can be over the top expensive and humiliating. Off base of Cost gauge contribute a ton of cause, for example, wrong estimations from contract drawing, utilizing mistaken units of measure, material inappropriately valued and the most well-known mix-ups in number juggling. At some point contractor in view of incorrect of cost estimation again for that specific work. Finally, because of re-estimation time a portion of the work will impact delay and it will likewise influence entire task to delay.

#### ***2.4.1.4 Poor Site Management and Supervision***

Battaineh (2002) contemplated that the factors of poor site management and supervision as supporters of reasons for delays. Chan and Kumaraswamy (1996) distinguished the elements of poor project members/staff and oversight that add to reasons for delays. In construction industry, a portion of the project team an absence of management and supervision due colleague with no experience and ability, for example, enlist individual who are fresh graduate. When they confronting issue however don't have the foggiest idea how to illuminate it. Other than that, a portion of the supervisor didn't participation with their colleague because of absence of conveyed. Finally, in light of can't tackle the issue quickly the entire task impact delay.

### **2.4.2 Client Related Delay**

#### ***2.4.2.1 Lack of Experience of Client in Construction***

As per Koushki et al. (2005) recognized elements of absence of encounters of customer in construction project have high impact to the causes for delays. A portion of the project delay cause by the client because of insufficient experience particularly fresh developer. More often than not, customer confronting an issue and don't have a clue how to understand it promptly due to no understanding. During client finding the best approach to take care of the issue, a portion of the work couldn't advance. Finally, the entire project delay in light of some specific work delay.

#### ***2.4.2.2 Change Order***

According to Odeh and Battaineh (2002) stated the variables of progress arranges that add to causes for delays. Customer consistently change the plan during the construction time frame, during a similar time that will influence entire project delay. It is on the grounds that contractor can't complete this work until the most recent drawing issued by engineer. Thusly contractor is impossible within the agreement time frame

#### ***2.4.2.3 Client Interference***

As indicated by Long et al. (2004) examined the elements client impedance that adds to causes for delays in construction project. A portion of the customer educate contractual worker to complete extra work, a portion of the work couldn't advance and it will be delay right away.

### **2.4.3 Consultant Related Delays**

#### ***2.4.3.1 Inadequate Consultant Experience***

As indicated by Long et al. (2004) studied the factors of insufficient consultant experience as supporters of causes for delays. In construction industry, there are many specialists carry out their work without experience. Other than that, there are numerous causes of an expert without experience which incorporate diverse site conditions, mismanagement and maladministration site access limitations defective plan and specification.

#### ***2.4.3.2 Poor Design and Delay in Design***

As indicated by Ogunlana, et al. (1996) referenced the elements of poor design and delay in structure that add to reasons for delays in construction project. It is on the grounds that in a project if confronting poor design that will confronting destroy and remade once more.

#### ***2.4.3.3 Incomplete Drawing and Detail Design***

Long et al. (2004) distinguished the variables of fragmented drawing and detail plan as supporters of causes for delays. Ogunlana, et al. (1996) contemplated the components of deficient drawing and detail plan that add to reasons for delays in construction project. During construction, the contractor is doing the work but since of drawing is muddled and none very detail appeared in the drawing. He could not to proceed with the work with issue, so the works need to stop quickly until get more detail of that specific drawing from specialist reacts. Due to without detail drawing the work couldn't be progress, so it will influence that specific work delay and it will defer and it will likewise impact whole project delay.

### **2.4.4 Other External Factors Related Delays**

The factors that are related to external are

- Weather state of the project
- Delay in getting grants from region
- Lack of labor, equipment, materials and costs in the market
- High transportation cost
- Poor financial conditions (swelling, money and so on)

#### **2.4.5 Project Related Delay**

Original contract duration is too short. Legal disputes b/n different parts, deficient meaning of considerable completion, ineffective delay penalties, type of construction contract (Turnkey, construction only) and sort of project offering and award (negotiation, lowest bidder).

#### **2.4.6 Design Related Delay**

Mistakes and inconsistencies in plan documents, unclear and deficient details in drawings, complexity of project plan, insufficient data collection and study prior to design, misunderstanding of clients necessities by configuration engineer, mistakes, inconsistency and ambiguities in specification and un-use of advanced engineering design software.

#### **2.4.7 Material Related Delay Causes**

Absence of construction materials in market, changes in material (sorts) types and specifications during construction, delay in material conveyance, harm of arranged material while they are required critically. Delay in assembling special building materials, late in selection of completing materials because of accessibility of numerous in market.

#### **2.4.8 Labor Related Delay Causes**

Shortage of labors, unqualified workforce, Nationality of labors, Low productivity level of labors and Personal conflicts among labors.

### **2.5 Impact or Effect of Schedule Delay and Cost Overruns**

#### **2.5.1 Schedule Delay**

Schedule delay in construction project negatively affects clients, contractors, and consultants as far as construction in ill-disposed connections. Impacts of schedule overruns are the outcomes that will happen when the reasons for these schedule overruns are not recognized and chipped away at viably. The investigation of Pourrostan and Ismail (2011) recognizes and positions the impacts of construction delays as follows; Cost overrun, dispute, mis- intervention, litigation, arbitration and Cash-stream issues and all out deserting of tasks.

These disclosure are all things considered simultaneousness with various investigations as did by Aibinu and Jagboro (2002) and Montaleb and Kishk (2010). In any case, the investigation of Beki (1999) acquires the part of cases as one of the impacts of the effects of delays in

construction project. In the investigation of Manavazhia and Adhikarib (2002), delays in the conveyance of materials and equipment to construction sites are often a contributory reason to cost overruns in construction projects in developing countries.

### **2.5.2 Cost Overrun**

Impacts are the outcomes that will be empowered when cost overrun happen on a construction project. Nega (2008) states that cost overrun have clear impacts for the key partners specifically, and on the construction business as a rule. To the client, cost overrun infers included expenses far beyond those at first settled upon at the beginning, bringing about less degrees of profitability. To the end client, the additional expenses are passed on as higher rental or rent expenses or costs. To the experts, cost overrun infers powerlessness to convey an incentive for cash and could well stain their notorieties and result in loss of certainty rested in them by customers. To the contractor, it suggests loss of benefit for non-fruit, and maligning that could risk their odds of winning further occupations, if to blame. To the business all in all, cost overrun could realize project surrender and a drop in building activities, bad reputation, and failure to making sure about it at greater costs due to added dangers. To the business as a whole, cost overwhelms could achieve project relinquishment and a drop in building activities, awful standing, and failure to making sure about it at greater expenses due to added risks.

The investigation of Nega.T (2008) further recognized the accompanying as the significant impacts of cost overruns as: delays during construction, supplementary agreement, discourage investment; the investment on project construction by public clients will be less, hence the number of projects will decrease in the future, additional cost/expense, Budget shortfall adversarial relationship between participants of the project, Loss of reputation to the consultant, Loss of profit for non-completion to the contractor; the consultant will be viewed as incompetent by project owners, Significant experience of oversight and agreement with organization for consultants, Delayed installments to contractors, The contractor will suffer from budget shortfall of the client; Loss of users benefit that will be obtained if it has been completed on time . The contractor will suffer from budget shortfall of the client and poor quality workmanship.

In any case, Eshofonie (2008) recognizes four impacts of cost overruns as follows: organization or firm obligation to bankruptcy and risk of the organizations or firms to bad debit, under-usage of labor assets, plants and equipment, expanded undertaking cost because of augmentation of

time: Longer project duration implies that more assets should be assigned to the project, which then increase the project costs and project deserting.

## **2.6 Resolution (Mitigation) Method for Minimizing Schedule Delay and Cost Overrun**

There are a few measures which are found from the researchers' study to control the construction costs or to conquer the issues of cost overrun. The researchers have their own supposition on the best way to take care of the issues, Proper Project Costing and financing: Kaliba et.al (2009), expressed that delays of schedule may happen because of delayed in payments because of complex financial cycles in client organizations. Delay in payment would make financial challenges to contractors and hence delay the schedule to complete the activities nearby. Ashworth (1994), referenced that one of the client's prerequisites in regard of construction project is assessment of its expected cost. Proper cost control is significant as it is the overall trend towards more cost effectiveness and guarantees construction costs not solely in the context of initial costs, yet as far as life cycle costs or total cost appraisal. Kaliba et.al. (2009), stated that contractors, consultants and clients ought to guarantee that they have the correct personnel with appropriate qualifications to manage their projects productively. It is better if construction manager have insight and capabilities in project or construction management, initial cost estimates ought to be as accurate as possible. Accuracy of cost estimate licenses clients to check and choose the necessary funds for executing the project and made accessible when required.

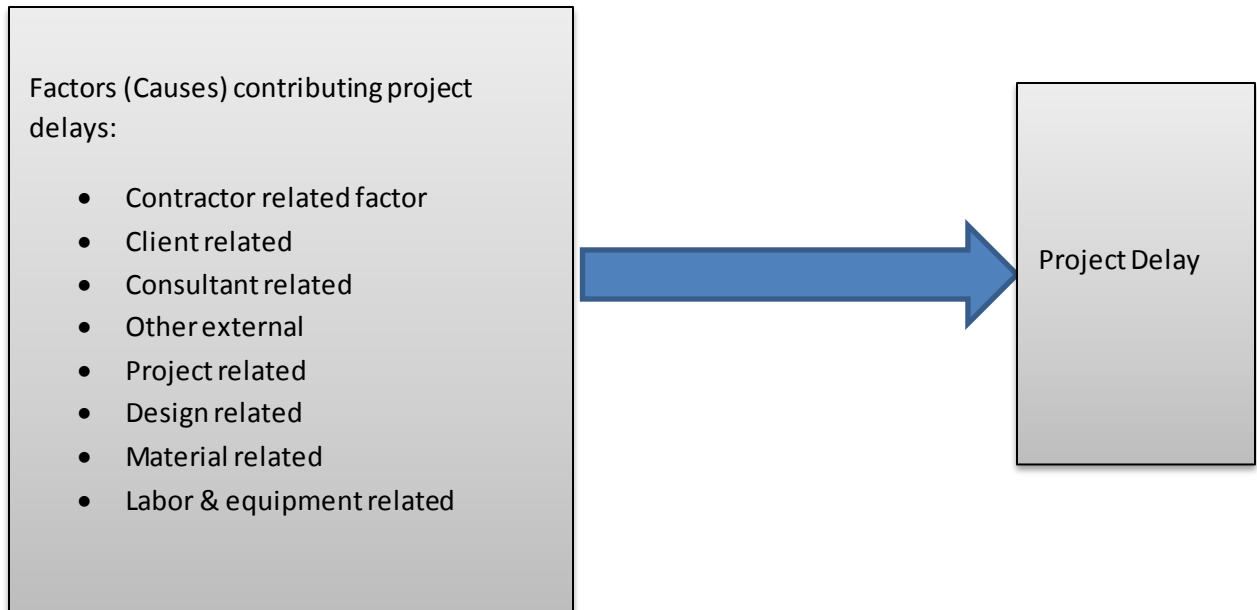
According to Nega (2008), concurred that only concern on the works required finishing the project effectively. Guard against fragmented identification of scope is important to maintain a strategic distance from successive changes. Also, do not join the works out of scope to evade unnecessary works. Peeters and Madauss (2008), discovered some way to deal with keep away cost overrun. In any improvement project, there must be sure measure of risks. Hence, a risk management function should have been performed by project manager to determine and decrease the risks of particular project. The point of risk management is to limit any risk that might result failure to meet the project necessities and they also stated that upheld that once the target of cost has been assessed, it is trailed by picking a suitable contract model where there are procedures to make a connection between the initial estimate and last price.

Rehman et al. (2012) suggested twelve mitigation measures to advance construction cost performance and schedule delay includes: proper project planning & scheduling, frequent progress meeting, effective strategic planning, effective site management and supervision, frequent coordination between the stakeholders, clear information and communication channels, comprehensive contract administration or management, use of appropriate construction methods, proper emphasis on past experience, improving contract award procedure by giving weight to prices and more weight to the capabilities & past experience of contractors and use up to date technology utilization.

Gould (2002), expressed that proficient management is important to deliver a productive and cost efficient site. Scope may be changes because of inadequate planning and feasibility studies. So as to control the project effectively, the project manager must subsequent the schedule to avoid extra costs and ensure the project can be involved on time as planned. Ismael Ibrahim (1996), the sufficiency of control relies upon the accuracy of the original estimate done during planning stage. Cost control requires a detailed analysis of the project cost by parting the project cost into direct cost, aberrant cost and overhead cost and further into labor, material and equipment cost. So that it requires proper coding system and extensive data collection.

Managing construction cost is one the significant tasks in accomplishing successful project completion. Unfortunately it is only occasionally accomplishing effective cost management and often experiencing huge amount of cost overrun.

## 2.7 Conceptual Framework



**Figure 2.1 Conceptual framework**



## **CHAPTER THREE- RESEARCH METHODOLOGY**

### **3.1 Introduction**

In this chapter, it will discuss and describes the study how the study was carried out. It would answer why a particular method of a research approach and method, sources of the data, population of the study, sampling techniques & approaches and sample size determination formula, methods of data collection, validity and reliability of the instrument, method of data analysis. Lastly on this chapter it would be explain the research ethics which is expected from the researcher.

In short this chapter mainly explained about the research design that integrates methods and procedures for the collection, measurement and analysis of the collected data.

### **3.2 Research Design**

According to Nafkote (2015) research which deals with investigation of the practical problem of time and cost overrun is undertaken on the basis of observation of construction projects. The research questions are intended to assess the causes of project delays and cost overrun. The research can be categorized as exploratory, descriptive and correlational type. The research is exploratory so that it is initiated from feasible (practical) problems and investigates whether the causes of time and cost overrun exist. It is also descriptive because it tries to describe the causes of time and cost overrun exist and the variables of time and cost overrun and tries to draw relationship between contract document and rate of time and cost overruns in BamaCon Engineering Plc in the mixed use building construction projects in Addis Ababa. In this research design the descriptive method of research is adopted which is based on the respondents that is going to be forwarded to professionals because it makes practical to assess the magnitude and scope of the problems and facilitate for suggestion of solutions.

### **3.3 Data Collection Methods**

To successfully achieve and meet the research objectives and answer of the research questions, some was prepared by using the following methodologies; data sources includes study population (BamaCon Engineering Plc permanent employees) and other stakeholders such as client and consultant representatives. Survey study which is included by collecting information or data as reported by individual's questionnaires and case studies. Literature review of different

master's thesis, web sites of similar cases and sample project reports (desk study). From the desk study a variety of completed building construction projects which is constructed by BEP were surveyed. During the desk study all the documents of each project such as correspondence letters, project report, certification of payment, the contracted amount with the client, project review documents, contract time during signing of an agreement, actual cost and actual completion time at completion of the project were thoroughly assessed.

### **3.4 Sources of Data**

Different types of construction projects, executed by BamaCon Engineering Plc. Both of them primary and secondary data were used to answer the research questions. To understand how the actual completion time and cost will be influenced, detail questionnaire will be prepared and send to selected group of people who are actors for the project reliability and validity. There are two approaches for sources of the data which includes;

#### **3.4.1 Primary Data**

When the data is collected by the researcher, real time data and for the first time and thus happens to be original in character though survey and experiment, it is categorized in the primary data. This data will be collected through observation, schedules, personal interview, by mailing of questionnaire, telephone interview and other methods.

#### **3.4.2 Secondary Data**

To convince my arguments, I have used (refers) text books, journal articles and articles of books, reviews and company manuals.

### **3.5 Areas of Study**

The project study area was conducted in a mixed use building project which is found in Addis Ababa, Ethiopia. The choice of this area of the study is based on the fact that some projects of the company is affected by significant amount of schedule delay and cost overrun because of different factors and therefore, the project is very basic for the company sustainability.

### **3.6 Population of the Study**

A research population is a well-defined collection of individuals or objects known to have similar characteristics interest to the researcher to evaluate and analyze the main causes of delay

and cost overrun in mixed use building of BamaCon Engineering Plc. The study population for this research was determined on the research analysis.

### 3.7 Sampling Techniques and Sample Size

For this study, respondents were selected based on their experience in mixed use building working experience, knowledge and involvement. Purposive (non-probability, deliberate) sampling was used for selecting samples within the group of owners, consultants and contractors.

Sample size formula helps in calculating or deciding the minimum sample size which is needed so as to know the sufficient or right proportion of the population alongside the confidence level and the margin of error.

Sample size is applied the simplified formula provided by Yemane, (1967) to determine the required sample size at 95% confidence level, degree of variability=0.05. The total population of the study is the employers specifically involved directly in BamaCon Engineering Plc at Addis Ababa projects and some other major stakeholders who involved with the projects like clients and project consultants.

For the contractor, the total population who involved directly in 10 projects is 150, for client side 30 employees and 20 for the consultant side. The total population for this study becomes 200.

$$n = \frac{N}{1+N(e^2)}$$

Where:

n = Desired sample size

N =Total population size (200 in this case)

e = Accepted error limit (0.05) on the premise of the 95 % degrees of confidences put into decimal structure.

$$n = \frac{N}{1+N(e^2)}$$

$$n = \frac{200}{1+200(0.05^2)}=133$$

### 3.8 Research Instruments

Primary data was being collected by the researcher through the use of questionnaire, personal interview, observation and other primary methods. Questionnaires were designed and distributed to selected staff members of BamaCon Engineering Plc office and project site visit distribution as well as through e-mail with the covering letter telling the purpose of the research and as well as for the remaining stakeholders. The personal interview surveys also were conducted by which the researcher administers the questionnaire in face to face manner.

### 3.9 Reliability and Validity of the Study

Reliability is the consistency of a measurement, stability or the degree to which an instrument measures the same way each time it is used under the same condition with the same subject. So, it is the repeatability of an estimation (measurement). Validity is the strength of our inferences, propositions or conclusions. It simply implies that a test or instrument is precisely estimating what it should be. (<http://www.socialresearchmethods.net/tutorial/colosi/lcolosi2.htm>)

To check the questionnaire's validity selected experts invited to comment on the questionnaire as a pre-assessment means. To check the questionnaire item's internal consistency, its reliability was checked by the Cronbach's alpha test coefficient using SPSS version 24.0 software and the gained result was .893 which is beyond .70 result considered as "acceptable" in social science researches.

**Table 3.1 Reliability Test results**



Reliability Statistics	
Cronbach's Alpha	N of Items
.893	73

### 3.10 Data Analysis Techniques

Data analysis is in short a method of putting facts and figures to solve the research problem, research objective and research questions and interpretation of the data.

Analysis of data consists of calculating the RII.

$$RII = \frac{1n_1 + 2n_2 + 3n_3 + 4n_4 + 5n_5}{A \times N} \dots \text{Equation 3.1}$$

Where,

RII= Relative Importance Index,

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

1, 2, 3, 4, 5= weight is given for each of the factors (ranging from 1 to 5)

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

N=total number of respondents

The importance indices were calculated for all delay causes were ranked accordingly.

### **3.11 Ethical Consideration**

Ethical consideration must be considered while doing a research. The first thing that we have to do is participants need to be aware of the purpose of the research and fully informed about the evaluation being conducted and researcher do not forcefully influence the decision of the respondents. In addition to this, the collected data from participants should not be identifying the name and other information and the documents must apply for studying purpose. Lastly but not list is truth telling whereby the researcher is required to provide comprehensive and accurate information in a manner that enhances understanding.

## CHAPTER FOUR- DATA PRESENTATION, ANALYSIS & INTERPRETATION

### 4.1 Introduction

The results and discussion below is devised in three parts corresponding to the research questions and also the sections of the questionnaire. These divisions can help tackle one question at a time. The first part of the results and discussion contains the findings of the questions directed towards identifying the importance of delay causes and ranking in the level of their severity. A total of 30 potential schedule delay causes were selected from previous studies and grouped in eight categories: contractor related factors, client related factors, consultant related factors, other external related factors, project related factors, design related factors, material related factors and labor & equipment related factors.

The questionnaires was developed using Linkert Scale; where 1 represents Strongly Disagree, 2 Disagree, 3 Neutral, 4 Agree and 5 Strongly Agree. Thus, respondents were asked to rank delay causes factors in a five-point scale range from 1 to 5 based on frequency of occurrence from rarely to greatly often.

The data collected from close-ended questions of the questionnaire are analyzed using descriptive data analysis. Appropriate statistical results are presented in a tabular format followed by discussions and analyzed using the Relative Importance Index (RII) to rank causes.

### 4.2 Questionnaire Response Rate

Questionnaires with closed ended questions were designed and distributed for the research purpose. Then the questionnaire is distributed to the major stakeholders according to their proportion.

$$\text{For the contractor side} = \frac{150}{200} * 133 = 100$$

$$\text{For the client side} = \frac{30}{200} * 133 = 20$$

$$\text{For the consultant side} = \frac{20}{200} * 133 = 13$$

Out of totally distributed 133 questionnaires, 110 were filled and returned. Table 4.1 below shows the respondent's response rate through displaying the number of questionnaires distributed to the respondents and returned.

Questionnaires Distributed	Questionnaires Returned	Questionnaires Unreturned	Response Rate (%)
133	110	23	83

Source: Own Survey, 2020

As clearly showed in the above table among the totally distributed 133 questionnaires, those respondents who fill and returned were 110 which makes the overall questionnaire response rate 83 percent.

### 4.3 Characteristics of the Respondents and General Information

Respondents characteristics include their organization they are part of it, gender, their age, level of education, overall work experience and current job title (designation).

The responses of the respondents and the implications are illustrated on table as follows.

#### Respondents' organization

##### Frequency Table

		Organization			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	contractor	90	79.6	81.8	81.8
	consultant	12	10.6	10.9	92.7
	client	8	7.1	7.3	100.0
	Total	110	97.3	100.0	
Missing	System	3	2.7		
Total		113	100.0		

Source: Own Survey, 2020

As shown on the above table among the 110 respondents which is part of the mixed use building project 90 (79.6%) from Contractor, 12 (10.6%) from Client and 8 (7.1%) from Consultant. This shows that the project is mostly involved by the contractor's employees.

## Respondents' gender

		gender			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	82	72.6	74.5	74.5
	female	28	24.8	25.5	100.0
	Total	110	97.3	100.0	
Missing	System	3	2.7		
Total		113	100.0		

Source: Own Survey, 2020

Regarding the respondent's gender which is shown on the, data shows that majority of the respondents (72.6%) were male whereas only 24.8 % of the respondents were female. This figure shows us that the company has more male employees rather than female employees.

## Respondents' age

		age			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<25	25	22.1	22.7	22.7
	25-35	29	25.7	26.4	49.1
	36-45	33	29.2	30.0	79.1
	>45	23	20.4	20.9	100.0
	Total	110	97.3	100.0	
Missing	System	3	2.7		
Total		113	100.0		

Source: Own Survey, 2020

As can be inferred from the survey data, majority of the respondents were in the age range of 36-45. 23 of the respondents were above the age of 45 years and 29 of them were in the range of 25-35 and also 25 of them are below 25.



## Respondents' Educational Background

		<b>education</b>			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	degree	59	52.2	53.6	53.6
	2nd degree	17	15.0	15.5	69.1
	masters	34	30.1	30.9	100.0
	Total	110	97.3	100.0	
Missing	System	3	2.7		
Total		113	100.0		

Source: Own Survey, 2020

When we look at their educational qualification 52.2% have their first degree, 15.0 % have second degree and 30.1 % have Master's Degree.

## Respondents' Working Experience

		<b>expiriance</b>			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-5	12	10.6	10.9	10.9
	6-10	36	31.9	32.7	43.6
	11-15	46	40.7	41.8	85.5
	>15	16	14.2	14.5	100.0
	Total	110	97.3	100.0	
Missing	System	3	2.7		
Total		113	100.0		

Source: Own Survey, 2020

When we look at in terms of working experience, 10.6% of the team members have an experience of 0-5 years, 31.9% have an experience of 6-10 years, and 40.7% have an experience of 11-15 years and lastly only 16 people, 14.2% have experience for over 15 years.

## Respondents' Designation (Current job title)

		designition			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	project manager	44	38.9	40.0	40.0
	office engineer	45	39.8	40.9	80.9
	sit enginner	21	18.6	19.1	100.0
	Total	110	97.3	100.0	
Missing	System	3	2.7		
Total		113	100.0		

Source: Own Survey, 2020

Based on their position, majority of the respondents have office engineer designations. 44 of the respondents were project managers and 21 of the respondents' were site engineers.

### 4.4 Results of the Desk Study

Before analysis and discussion of the causes of schedule delay and cost overruns of BEP, the third major question of the statement of the problem, i.e 'what is the trend of projects completion and handover in BamaCon Engineering plc concerning with schedule and cost?' has to be answered. During desk study twelve construction projects were selected and evaluated their contract & actual completion time and also contract completion and actual completion cost. The data was collected via reviewing project documents and payments. The rate of time overrun ranges from a minimum of 7% to the maximum of 143% of the contract time; and cost overrun ranges from a minimum of 2% to the maximum of 41% of the contract amount.

In the information found in desk study; name of the selected projects, contract and actual completion time and cost, rate of time overrun and cost overrun are depicted as shown as the table beneath.

<i>No.</i>	Name of BamaCon's projects	Contract completion time (days)	Actual completion Time (days)	Contract compl. cost in million (ETB)	Actual compl. Cost in million (ETB)	Rate of time overrun (%)	Rate of cost overrun overrun (%)
1	Al-Sam Plc	665	820	327	398	23	22
2	Sakuur Plc	480	730	137	157	52	15
3	KK plc	300	730	61	69	143	13
4	Nehco Trading	715	1095	234.9	311	53	32
5	Rwanda Embassy	365	390	21.345	30	7	41
6	Rang Plc	545	640	48	51.5	17	7
7	Omedad Plc	1095	1460	95	115	33	21
8	Tsegaye & Families trading Plc	730	1320	2.289	3	81	31
9	Dagi Plc	810	1435	91	103	77	13
10	Meklit real estate	1312	1610	50.2	51	23	2
11	WFP	90	130	32.6	38	44	17
12	Tenkir Trading Plc	1450	1795	61.9	69	24	11

**Table 4.1 summary of construction projects data from the desk study**

## 4.5 Respondent's on Causes (Reasons) of Schedule Delay in BamaCon Construction Projects

**Table 4.2 Respondents reaction on causes of contractor related factor**

Delay causes	SD	D	N	A	SA
<b>Contractor Related Delay</b>					
Inadequate contractor experience	40(36.4%)	34(30.9%)	19(17.3%)	12(10.9%)	5 (4.5%)
Improper planning	2(1.8%)	5(4.5%)	8(7.3%)	25(22.7%)	70(63.6%)
Mistake during construction	26(23.8%)	17(15.4%)	8(7.2%)	23(20.9)	36(32.7%)
Poor site management and supervision	4(3.6%)	14(12.7%)	6(5.4%)	35(31.8%)	51(46.3%)
Shortage of materials in site	18(16.3%)	23(20.9%)	4(3.6%)	20(18.2%)	45(41%)
Poor project management	13(11.8%)	16(14.5%)	7(6.4%)	22(20%)	52(47.3%)
The method of competition in procurement	24(21.8%)	12(10.9%)	5(4.5%)	50(45.5%)	19(17.3%)

Source: Own Survey, 2020

### **Contractor Related Causes of delay**

Among the respondents that were filled and respond for the causes 'inadequate contractor experience' 40(36.4%) are strongly disagree, 34(30.9%) are disagree, 19(17.3%) are neutral, 12(10.9%) are agree and 5(4.5%) are strongly agree. The next causes of delay for contractor related causes is 'improper planning' 2(1.8%) are strongly disagree, 5(4.5%) are disagree, 8(7.3%) are neutral, 25(22.7%) are agree and 70(63.6%) are strongly agree.

Out of which 26(23.8%) are strongly disagree, 17(15.4%) are disagree, 8(7.2%) are neutral, 23(20.9%) are agree and 36(32.7%) are strongly agree for the causes of 'mistake during construction'. For the next survey data of the contractor related causes is 'poor site management and supervision' and the respondents respond as follows: 4(3.6%) are strongly disagree, 14(12.7%) are disagree, 6(5.4%) are neutral, 35(31.8%) are agree and 51(46.3%) are strongly agree. Out of which 18(16.3%) are strongly disagree, 23(20.9%) are disagree, 4(3.6%) are neutral, 20(18.2%) are agree and 45(41%) are strongly agree for 'Shortage of materials in site'.

Out of which 13(11.8%) are strongly disagree, 16(14.5%) are disagree, 7(6.4%) are neutral, 22(20%) are agree and 52(47.3%) are strongly agree for the causes of 'Poor project management'.

The last questionnaire filled by the respondents is ‘the method of competition in procurement’ 24(21.8%) are strongly disagree, 12 (10.9%) are disagree, 5(4.5%) are neutral, 50(45.5%) are agree and 19(17.3%) are strongly agree.

**Table 4.3 Respondents reaction on causes of client related factor**

Delay causes	SD	D	N	A	SA
<b>Client Related Delay</b>					
Lack of experience of client in construction	11(10.1%)	30(27.2%)	5(4.5%)	22(20%)	42(38.2%)
Change order by the owner	8(7.4%)	16(14.5%)	23(20.9%)	26(23.6%)	37(33.6%)
Client interference	31(28.3%)	6(5.4%)	10(9.1%)	41(37.2%)	22(20%)
Delayed disbursing of payments	12(10.9%)	18(16.4%)	10(9.1%)	26(23.6%)	44(40%)
Additional works	9(8.2%)	19(17.3%)	1(0.9%)	30(27.3%)	51(46.4%)
Poor contract management	14(12.7%)	10(9.1)	6(5.5%)	22(20%)	58(52.7%)
Lack/poor/of communication & coordination with contractors	21(19.1%)	15(13.6%)	3(2.7%)	37(33.6%)	34(30.9%)
Finance and payment arrangements	11(10%)	9(8.2%)	5(4.5%)	41(37.3%)	44(40%)

Source: Own Survey, 2020

### **Client Related Causes of delay**

Among the respondents that were filled and respond for the causes ‘Lack of experience of client in construction’ 11(10.1%) are strongly disagree, 30(27.2%) are disagree, 5(4.5%) are neutral, 22(20%) are agree and 42(38.2%) are strongly agree. The next causes of delay for client related causes is ‘Change order by the owner’ 8(7.4%) are strongly disagree, 16(14.5%) are disagree, 23(20.9%) are neutral, 26(23.6%) are agree and 37(33.6%) are strongly agree.

Out of which 31(28.3%) are strongly disagree, 6(5.4%) are disagree, 10(9.1%) are neutral, 41(37.2%) are agree and 22(20%) are strongly agree for the causes of ‘Client interference’. For the next survey data of the client related causes is ‘Delayed disbursing of payments’ and the respondents respond as follows: 12(10.9%) are strongly disagree, 18(16.4%) are disagree, 10(9.1%) are neutral, 26(23.6%) are agree and 44(40%) are strongly agree. Out of which 9(8.2%) are strongly disagree, 19(17.3%) are disagree, 1(0.9%) are neutral, 30(27.3%) are agree and 51(46.4%) are strongly agree for ‘Additional work’.

Out of which 14(12.7%) are strongly disagree, 10(9.1%) are disagree, 6(5.5%) are neutral, 22(20%) are agree and 58(52.7%) are strongly agree for the causes of ‘Poor contract management’.

The other major causes of client related are ‘Lack/poor/of communication & coordination with contractors’. The respondents’ response rates are 21(19.1%) are strongly disagree, 15(13.6%) are disagree, 3(2.7%) are neutral, 37(33.6%) are agree and 34(30.9%) are strongly agree

The last questionnaire filled by the respondents is ‘Finance and payment arrangements’ 11(10%) are strongly disagree, 9 (8.2%) are disagree, 5(4.5%) are neutral, 41(37.3%) are agree and 44(40%) are strongly agree.

**Table 4.4 Respondents reaction on causes of consultant related factor**

Delay causes	SD	D	N	A	SA
<b>Consultant Related Delay</b>					
Inadequate consulting experience	30(27.4%)	25(22.7%)	12(10.9%)	19(17.2%)	24(21.8%)
Poor Design and Delay in Design	33(30%)	26(23.6%)	16(14.5%)	25(22.7%)	10(9.2%)
Incomplete Drawing and Detail Design	6(5.5%)	15(13.6%)	9(8.2%)	20(18.2%)	60(54.5%)

Source: Own Survey, 2020

#### **Consultant Related Causes of delay**

Among the respondents that were filled and respond for the causes ‘inadequate consulting experience’ 30(27.4%) are strongly disagree, 25(22.7%) are disagree, 12(10.9%) are neutral, 19(17.2%) are agree and 24(21.8%) are strongly agree. The next causes of delay for consultant related causes is ‘Poor Design and Delay in Design’ 33(30%) are strongly disagree, 26(23.6%) are disagree, 16(14.5%) are neutral, 25(22.7%) are agree and 10(9.2%) are strongly agree. Out of which 3(2.7 % %) are strongly disagree, 2(1.8%) are disagree, 15(13.6%) are neutral, 20(18.2%) are agree and 70(63.6%) are strongly agree for the causes of ‘Long waiting time for approval of tests and inspections’.

For the next survey data of the consultant related causes is ‘Incomplete Drawing and Detail Design’ and the respondents respond as follows: 6(5.5%) are strongly disagree, 15(13.6%) are disagree, 9(8.2%) are neutral, 20(18.2%) are agree and 60(54.5%) are strongly agree.

**Table 4.5 Respondents reaction on causes of other external related factor**

Delay causes	SD	D	N	A	SA
<b>Other External Factors Related Delays</b>					
Weather state of the project	52(47.3%)	35(31.8%)	0(0%)	13(11.8%)	10(9.1%)
Lack of labor, materials, equipment, and costs in the market	31(28.2%)	29(26.4%)	26(23.6%)	15(13.6%)	9(8.2%)
High transportation Cost	37(33.6%)	35(31.8%)	0(0%)	23(20.9%)	15(13.6%)
Poor financial conditions (swelling, money and so on)	40(36.4%)	33(30%)	15(13.6%)	12(10.9%)	10(9.1%)
Unforeseen circumstances	11(10%)	9(8.2%)	5(4.5%)	39(35.5%)	46(41.8%)
Changes government laws and regulation	16(14.5%)	19(17.3%)	20(18.2%)	23(20.9%)	32(29.1%)

Source: Own Survey, 2020

**Other External Factors Related Delays**

Among the respondents that were filled and respond for the causes ‘Weather state of the project’ 52(47.3%) are strongly disagree, 35(31.8%) are disagree, 0(0%) are neutral, 13(11.8%) are agree and 10(9.1%) are strongly agree. Out of which 31(28.3%) are strongly disagree, 29(26.4%) are disagree, 26(23.6%) are neutral, 15(13.6%) are agree and 9(8.2%) are strongly agree for the causes of ‘Lack of labor, materials, equipment, and costs in the market’. For the next survey data of an Other External Factors related causes is ‘high transportation Cost’ and the respondents respond as follows: 37(33.6%) are strongly disagree, 35(31.8%) are disagree, 0(0%) are neutral, 23(20.9%) are agree and 15(13.6%) are strongly agree. Out of which 40(36.4%) are strongly disagree, 33(30%) are disagree, 15(13.6%) are neutral, 12(10.9%) are agree and 10(9.1%) are strongly agree for ‘Poor financial conditions (swelling, money and so on)’.

Out of which 11(10%) are strongly disagree, 9(8.2%) are disagree, 5(4.5%) are neutral, 39(35.5%) are agree and 46(41.8%) are strongly agree for the causes of ‘Unforeseen circumstances’.

The other major causes of external factor related causes are ‘Changes government laws and regulation’. The respondents’ response rates are 16(14.5%) are strongly disagree, 19(17.3%) are disagree, 20(18.2%) are neutral, 23(20.9%) are agree and 32(29.1%) are strongly agree

The last questionnaire filled by the respondents is ‘Finance and payment arrangements’ 11(10%) are strongly disagree, 9 (8.2%) are disagree, 5(4.5%) are neutral, 41(37.3%) are agree and 44(40%) are strongly agree.

### Respondent’s reaction on causes of project related factor

Delay causes					
<b>Project related causes of delay</b>	SD	D	N	A	SA
Original contract duration is too short	5(4.5%)	12(10.9%)	3(2.7%)	39(35.5%)	51(46.4%)
Corruption	6(5.5%)	5(4.5%)	0(0%)	26(23.6%)	73(66.4%)
Ineffective penalties for delay	13(11.8%)	19(17.3%)	7(6.4%)	29(26.4%)	42(38.2%)
Unavailability of bonus for early completion	35(31.8%)	26(23.6%)	18(16.4%)	12(10.9%)	19(17.3%)
Type of construction contract	45(40.9%)	35(31.8%)	3(2.7%)	17(15.5%)	10(9.1%)
Type of project bidding and award	30(27.3%)	25(22.7%)	29(26.4%)	17(15.5%)	9(8.2%)

Source: Own Survey, 2020

### Project Related Causes of delay

Among the respondents that were filled and respond for the causes ‘Original contract duration is too short’ 5(4.5%) are strongly disagree, 12(10.9%) are disagree, 3(2.7%) are neutral, 39(35.5%) are agree and 51(46.4%) are strongly agree. The next causes of delay for project related causes is ‘Corruption’ 6(5.5%) are strongly disagree, 5(4.5%) are disagree, 0(0%) are neutral, 26(23.6%) are agree and 73(66.4%) are strongly agree.

Out of which 13(11.8%) are strongly disagree, 19(17.3%) are disagree, 7(6.4%) are neutral, 29(26.4%) are agree and 42(38.2%) are strongly agree for the causes of ‘Ineffective penalties for delay’. For the next survey data of the project related causes is ‘Unavailability of bonus for early completion’ and the respondents respond as follows: 35(31.8%) are strongly disagree, 26(23.6%) are disagree, 18(16.4%) are neutral, 12(10.9%) are agree and 19(17.3%) are strongly agree. Out of which 45(40.9%) are strongly disagree, 35(31.8%) are disagree, 3(2.7%) are neutral, 17(15.5%) are agree and 10(9.1%) are strongly agree for ‘Type of construction contract’. Out of



which 30(27.3%) are strongly disagree, 25(22.7%) are disagree, 29(26.4%) are neutral, 17(15.5%) are agree and 9(8.2%) are strongly agree for the causes of ‘Type of project bidding and award’.

**Table 4.6 Respondents reaction on causes of design related factor**

Delay causes	SD	D	N	A	SA
<b>Design related delay causes</b>					
Mistakes, inconsistencies and ambiguities in specifications and drawings	10(9.1%)	15(13.6%)	2(1.8%)	36(32.7%)	47(42.7%)
Inadequate and unclear details in drawing	11(10%)	19(17.3%)	13(11.8%)	31(28.2%)	36(32.7%)
Project design complexities	53(48.2%)	23(20.9%)	12(10.9%)	4(3.6%)	18(16.4%)
Inadequate investigations by the designer during the design phase	36(32.7%)	22(20%)	16(14.5%)	26(23.6%)	10(9.1%)

Source: Own Survey, 2020

### **Design Related Causes of delay**

Among the respondents that were filled and respond for the causes ‘Mistakes, inconsistencies and ambiguities in specifications and drawings’ 10(9.1%) are strongly disagree, 15(13.6%) are disagree, 2(1.8%) are neutral, 36(32.7%) are agree and 47(42.7%) are strongly agree. The next causes of delay for design related causes is ‘Inadequate and unclear details in drawing’ 11(10%) are strongly disagree, 19(17.3%) are disagree, 13(11.8%) are neutral, 31(28.2%) are agree and 36(32.7%) are strongly agree.

Out of which 53(48.2%) are strongly disagree, 23(20.9%) are disagree, 12(10.9%) are neutral, 4(3.6%) are agree and 18(16.4%) are strongly agree for the causes of ‘Project design complexities’.

The last questionnaire filled by the respondents is ‘Inadequate investigations by the designer during the design phase’ 36(32.7%) are strongly disagree, 22 (20%) are disagree, 16(14.5%) are neutral, 26(23.6%) are agree and 10(9.1%) are strongly agree.

### Respondents' reaction on causes of material related factor

Delay causes					
<b>Material related delay causes</b>	SD	D	N	A	SA
Change in material prices	55(50%)	23(20.9%)	5(4.5%)	7(6.4%)	20(18.2%)
Shortage of construction materials required	11(10%)	8(7.3%)	3(2.7%)	51(46.4%)	37(33.6%)
Changes in specifications and material types during construction	9(8.2%)	13(11.8%)	9(8.2%)	49(44.5%)	30(27.3%)
Delay in delivery and late ordering material	34(30.9%)	26(23.6%)	11(10%)	18(16.4%)	21(19.1%)
Late procurement of materials by the contractor	41(37.3%)	19(17.3%)	17(15.5%)	21(19.1%)	12(10.9%)

Source: Own Survey, 2020

#### Material Related Causes of delay

Among the respondents that were filled and respond for the causes 'change in material prices' 55(50%) are strongly disagree, 23(20.9%) are disagree, 5(4.5%) are neutral, 7(6.4%) are agree and 20(18.2%) are strongly agree. The next causes of delay for contractor related causes is 'Shortage of construction materials required' 11(10%) are strongly disagree, 8(7.3%) are disagree, 3(2.7%) are neutral, 51(46.4%) are agree and 37(33.6%) are strongly agree.

Out of which 9(8.2%) are strongly disagree, 13(11.8%) are disagree, 9(8.2%) are neutral, 49(44.5%) are agree and 30(27.3%) are strongly agree for the causes of 'Changes in specifications and material types during construction'. For the next survey data of the material related causes of delay is 'Delay in delivery and late ordering material' and the respondents respond as follows: 34(30.9%) are strongly disagree, 26(23.6%) are disagree, 11(10%) are neutral, 18(16.4%) are agree and 21(19.1%) are strongly agree. The last questionnaire filled by the respondents is 41(37.3%) are strongly disagree, 19(17.3%) are disagree, 17(15.5%) are neutral, 21(19.1%) are agree and 12(10.9%) are strongly agree for 'Late procurement of materials by the contractor'.

**Table 4.7 Respondents reaction on causes of labor and equipment related factor**

Delay causes	SD	D	N	A	SA
<b>Labor and equipment related delay causes</b>					
Manpower shortage (skilled and unskilled labor)	57(51.8%)	37(33.6%)	1(0.9%)	5(4.5%)	10(9.1%)
Insufficient skill of labor and manpower	38(34.5%)	15(13.6%)	36(32.7%)	15(13.6%)	6(5.5%)
Low capability of the contractors' specialized staff doled out to the project	4(3.6%)	26(23.6%)	12(10.9%)	32(29.1%)	36(32.7%)
Labor strikes by the contractor workforce	80(72.7%)	17(15.5%)	0(0)	3(2.7%)	10(9.1%)
Low productivity level of labour	39(35.5%)	27(24.5%)	25(22.7%)	16(14.5%)	3(2.7%)

Source: Own Survey, 2020

**Labor and equipment Related causes of delay**

Among the respondents that were filled and respond for the causes ‘manpower shortage (skilled and unskilled labor) 57(51.8%) are strongly disagree, 37(33.6%) are disagree, 1(0.9%) are neutral, 5(4.5%) are agree and 10(9.1%) are strongly agree. The next causes of delay for labor related causes is ‘Insufficient skill of labor and manpower’ 38 (34.5%) are strongly disagree, 15(13.6%) are disagree 36 (32.7%) are neutral, 15(13.6%) are agree and 6(5.5%) are strongly agree.

Out of which 4(3.6%) are strongly disagree, 26(23.6%) are disagree, 12(10.9%) are neutral, 32(29.1%) are agree and 36(32.7%) are strongly agree for the causes of ‘Low capability of the contractors’ specialized staff doled out to the project’. For the next survey data of the labor related causes is ‘Labor strikes by the contractor workforce’ and the respondents respond as follows: 80(72.7%) are strongly disagree, 17(15.5%) are disagree, 0(0%) are neutral, 3(2.7%) are agree and 10(9.1%) are strongly agree. The last questionnaire filled by the respondents is ‘Low productivity level of labour’ which is 39(35.5%) are strongly disagree, 27(24.5%) are disagree, 25(22.7%) are neutral, 16(14.5%) are agree and 3(2.7%) are strongly agree.

## 4.6 Respondent's Response on Causes of Cost Overrun in BamaCon Construction Projects

Causes of cost overrun	SD	D	N	A	SA
Design change	4(3.6%)	7(6.4%)	3(2.7%)	38(34.5%)	58(52.7%)
Delays caused by the owner and his/her agent	21(19.1%)	25(22.7%)	9(8.2%)	26(23.6%)	29(26.4%)
Acceleration	13(11.8%)	7(6.4%)	22(20%)	32(29.1%)	36(32.7%)
Quantity underestimation	0(0%)	3(2.7%)	5(4.5%)	23(20.9%)	79(71.8%)
Price escalation	1(0.9%)	3(2.7%)	0	21(19.1%)	85(77.3%)
Lack of quality	23(20.9%)	3(2.7%)	10(9.1%)	44(40%)	30(27.3%)
Corruption	46(41.8%)	14(12.7%)	2(1.8%)	29(26.4%)	19(17.3%)
Change in legislation	23(20.9%)	17(15.5%)	22(20%)	35(11.8%)	13(11.8%)

Source: Own Survey, 2020

Among the respondents that were filled and respond for the causes 'Design change 4(3.6%) are strongly disagree, 7(6.4%) are disagree, 3(2.7%) are neutral, 38(34.5%) are agree and 58(52.7%) are strongly agree. The next causes for cost overrun is 'delays caused by the owner and his/her agent' 21(19.1%) are strongly disagree, 25(22.7%) are disagree, 9(8.2%) are neutral, 26(23.6%) are agree and 29(26.4%) are strongly agree.

Out of which 13(11.8%) are strongly disagree, 7(6.4%) are disagree, 22(20%) are neutral, 32(29.1%) are agree and 36(32.7%) are strongly agree for the causes of 'acceleration'. For the next survey data of the causes of cost overrun is 'quantity underestimation' and the respondents respond as follows: 0(0%) are strongly disagree, 3(2.7%) are disagree, 5(4.5%) are neutral, 23(20.9%) are agree and 79(71.8%) are strongly agree. The fifth survey data for the causes of cost overrun is 'Price escalation' which respondents response as 1(0.9%) strongly disagree, 3(2.7%) are disagree, 0(0%) is neutral, 21(19.1%) are agree, and 85(77.3%) are strongly agree. In addition to the above causes of cost overrun 'lack of quality' 23(20.9%) strongly disagree, 3(2.7%) disagree, 10(9.1%) neutral, 44(40%) agree and 30(27.3%) strongly agree. The last questionnaire filled by the respondents is 23(20.9%) are strongly disagree, 17(15.5%) are disagree, 22(20%) are neutral, 35(11.8%) are agree and 13(11.8%) are strongly agree for 'change in legislation'.

## 4.7 Respondent's Reaction on the Impacts of Delay in BamaCon Construction Projects

**Table 4.8 Respondent's reaction on the impacts of schedule delay**

Impacts	SD	D	N	A	SA
Cost Overrun	0(0%)	4(3.6%)	12(10.9%)	61(55.5%)	33(30%)
Dispute	7(6.4%)	11(10%)	17(15.5%)	47(42.7%)	28(25.5%)
Arbitration	20(18.2%)	22(20%)	3(2.7%)	30(27.3%)	35(31.8%)
Litigation	13(11.8%)	17(15.5%)	13(11.8%)	36(32.7%)	31(28.2%)
Abandonment	16(14.5%)	21(19.1%)	40(36.4%)	20(18.2%)	13(11.8%)

Source: Own Survey, 2020

On the above table shows us the respondent's reaction on the impacts of delay in BamaCon Engineering Plc

Among the respondents that were filled and respond for the impacts 'cost overrun 0(0%) are strongly disagree, 0(0%) are disagree, 19(17.3%) are neutral, 52(47.3%) are agree and 39(35.5%) are strongly agree. The next impacts of delay is 'Cost Overrun' 0(0%) are strongly disagree, 4(3.6%) are disagree, 12(10.9%) are neutral, 61(55.5%) are agree and 33(30%) are strongly agree.

Out of which 7(6.4%) are strongly disagree, 11(10%) are disagree, 17(15.5%) are neutral, 47(42.7%) are agree and 28(25.5%) are strongly agree for the effects of 'Dispute'. For the next survey data of the effects of delay is 'Arbitration' and the respondents respond as follows: 20(18.2%) are strongly disagree, 22(20%) are disagree, 3(2.7%) are neutral, 30(27.3%) are agree and 35(31.8%) are strongly agree. The effects of the delay for 'Litigation' respondents respond 13(11.8%) are strongly disagree, 17(15.5%) are disagree, 13(11.8%) are neutral, 36(32.7%) are agree and 31(28.2%) are strongly agree.

The last questionnaire filled by the respondents is 16(14.5%) are strongly disagree, 21(19.1%) are disagree, 40(36.4%) are neutral, 20(18.2%) are agree and 13(11.8%) are strongly agree for 'Abandonment'.

## 4.8 Resolution Methods for Schedule Delay and Cost Overrun

**Table 4.9 Resolution methods respondents responded**

Resolution method	SD	D	N	A	SA
Compare the budget prepared at weekly or monthly intervals with the actual performance achieved	12(10.9%)	8(7.3%)	5(4.5%)	47(42.7%)	38(34.5%)
Give information/preparing/to untalented specialists dependent on their extent of work	25(22.7%)	8(7.3%)	19(17.3%)	21(19.1%)	37(33.6%)
Direct site gatherings and meetings all the more every day and again	28(25.5%)	19(17.3%)	11(10.0%)	31(28.2%)	21(19.1%)
Improving agreement grant methodology	8(7.3%)	27(24.5%)	4(3.6%)	23(20.9%)	48(43.6%)
Prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage	-	-	6(5.5%)	38(34.5%)	66(60.0%)
Realistic and reasonable cost assessment and estimation	-	-	-	45(40.9%)	65(59.1%)
Recruit skilled workers to achieve great progresses	35(31.8%)	14(12.7%)	12(10.9%)	21(19.1%)	28(25.5%)
Training and improvement of all members to help conveyance measure	2(1.8%)	9(8.2%)	11(10.0%)	34(30.9%)	54(49.1%)
Send clear and complete message to workers to guarantee viable correspondence	-	-	4(3.6%)	45(40.9%)	61(55.5%)
Timely advancement control, schedule control cost control, resource control by contracting and finishing date & cost	-	-	-	23(20.9%)	87(79.1%)
Increase the construction productivity	3(2.7%)	8(7.3%)	2(1.8%)	39(35.5%)	58(52.7%)

Source: Own Survey, 2020

#### 4.9 The Relative Importance Index for the Causes of Schedule Delay

The construction delay is generally apparent reality and is included as a typical issue in construction projects. Delays in construction projects occurs because of various factors and causes or reasons. A total of 30 delay causing factors were identified and classified in to eight factor groups: contractor related factors, client related factors, consultant related factors, other external factors, project related factors, and design related factors, material related factor, and labor and equipment factor.

<b>Delay causes</b>	<b>RII</b>	<b>Rank</b>
Inadequate contractor experience	0.4327	7
Improper planning	0.8836	1
Mistake during construction	0.6473	6
Poor site management and supervision	0.8091	2
Shortage of materials in site	0.6927	4
Poor project management	0.7527	3
The method of competition in procurement	0.6509	5

Source: Own Survey, 2020

As shown on the above table, the most influential and highly ranked contractor related delay causes in the BamaCon Engineering Plc projects, are delay caused by improper planning (RII=0.8836), poor site management and supervision (RII=0.8091), poor project management (RII=0.7527), shortage of materials in site (RII=0.6927), the method of competition in procurement (RII=0.6509,) mistake during construction (RII=0.6473) and inadequate contractor experience (RII=0.4327).

This finding can be agreed with what was found by Adem (2018) a study on delay caused by subcontractor is the first causes of delay for contractor related factors. But improper planning and poor site management are the second and third delay causing factors.

**Table 4.10 RII and ranking of Client related delay causes**

<b>Delay causes</b>	<b>RII</b>	<b>Rank</b>
Lack of experience of client in construction	0.6982	6
Change order by the owner	0.7236	5
Client interference	0.6309	8
Delayed disbursing of payments	0.7309	4
Additional works	0.7727	3
Poor contract management	0.7818	1
Lack/poor/of communication & coordination with contractors	0.6873	7
Finance and payment arrangements	0.7782	2

Source: Own Survey, 2020

As shown on the above table 4.10, from Clients perspective; most important factors which are the main causes of delay are: poor contract management (RII=0.7818), finance and payment arrangements (RII=0.7782), Additional works (RII=0.7727), delayed disbursing of payments (RII=0.7309), change order by the owner (RII=0.7236) and lack of experience of client in construction (RII=0.6982), Lack/poor/of communication & coordination with contractors (RII=0.6873), and Client interference (RII=0.6309).

Tsegay and H. Luo (2017) identified improper project feasibility study the first, late in site delivery for construction work and design the second, lack of on time finance and payments the third, interference on execution of work the fourth, slowness in decision making the fifth, and Poor communication and coordination the sixth most important client related factors.

**Table 4.11 RII and ranking of Consultant related delay causes**

<b>Delay causes</b>	<b>RII</b>	<b>Rank</b>
Inadequate consulting experience	0.5673	2
Poor Design and Delay in Design	0.5145	3
Incomplete Drawing and Detail Design	0.8054	1

Source: Own Survey, 2020

As shown on the table 4.11 above, the most influential and highly ranked consultant related delay causes in the BamaCon Engineering Plc projects are incomplete drawing and detail design



(RII=0.8054), inadequate consulting experience (RII=0.5673), poor design and delay in design (RII=0.5145).

Tsegay and H. Luo (2017) identified top four consultant related causes. These are late in approving and receiving of complete work, poor communication and coordination, poor supervision and late testing & inspection and Inadequate experience of consultant.

Similarly Eyasu Tolera (2018), identified the top five consultant related factors. These are weak in follow up the planned work schedule by the contractor, inadequate planning and scheduling of work by contractor, Shortage of contractors materials on site, Poor site management and supervision by contractors and Poor project manager abilities.

**Table 4.12 RII and ranking of Other External Factors Related Delays causes**

<b>Delay causes</b>	<b>RII</b>	<b>Rank</b>
Weather state of the project	0.4073	7
Delay in getting permits /grants from different government offices	0.4454	6
Lack of labor, materials, equipment, and costs in the market	0.4945	4
High transportation Cost	0.4982	3
Poor financial conditions (swelling, money and so on)	0.4527	5
Unforeseen circumstances	0.7818	1
Changes government laws and regulation	0.6654	2

Source: Own Survey, 2020

As shown on the above table 4.12, the RII and highly ranked other external factors related delay causes in the BamaCon Engineering Plc projects, are unforeseen circumstances (RII=0.7818), changes government laws and regulation (RII=0.6654), high transportation Cost (RII=0.4982), lack of labor, materials, equipment, and costs in the market (RII=0.4945), poor financial conditions (swelling, money and so on) (RII=0.4527), delay in getting permits /grants from different government offices (RII=0.4454)and weather state of the project (RII= 0.4073).

In the study Tsegay and H. Luo (2017) corruption is the first and unavailability of utilities at site is the second, policy and commitment of government are highly influential external delay factors. Similarly, Abdella. M and Hussin .T (2002) weather condition is the first, unforeseen

ground conditions the second, problems with neighbors is the third and regulatory change and building code is the fourth external delay factors.

**Table 4.13 RII and ranking of Project related causes of delay**

<b>Delay causes</b>	<b>RII</b>	<b>Rank</b>
Original contract duration is too short	0.8163	2
Corruption	0.8818	1
Ineffective penalties for delay	0.7236	3
Unavailability of bonus for early completion	0.5163	4
Type of construction contract	0.44	6
Type of project bidding and award	0.509	5

Source: Own Survey, 2020

As shown on the table 4.13, the most influential and highly ranked project related delay causes in the BamaCon Engineering Plc projects are Corruption (RII=0.8818), original contract duration is too short (RII=0.8163), ineffective penalties for delay (RII=0.7236), unavailability of bonus for early completion (RII=0.5163), type of project bidding and award (RII=0.509) and type of construction contract (RII=0.44).

**Table 4.14 RII and ranking of Design related delay causes**

<b>Design related delay causes</b>	<b>RII</b>	<b>Rank</b>
Mistakes, inconsistencies and ambiguities in specifications and drawings	0.7727	1
Inadequate and unclear details in drawing	0.7127	2
Project design complexities	0.4382	5
Inadequate communication between owner and designer during the design phase	0.5782	3
Inadequate investigations by the designer during the design phase	0.5127	4

Source: Own Survey, 2020

As shown on the above table 4.14, the most influential and highly ranked design related delay causes in the BamaCon Engineering Plc projects, are delay caused by mistakes, inconsistencies and ambiguities in specifications and drawings (RII=0.7727), inadequate and unclear details in drawing (RII=0.7127), inadequate communication between owner and designer during the design phase (RII=0.5782), inadequate investigations by the designer during the design phase (RII=0.5127) and project design complexities (RII=0.4382).

<b>Delay causes</b>	<b>RII</b>	<b>Rank</b>
Change in material prices	0.4436	5
Shortage of construction materials required	0.7727	1
Changes in specifications and material types during construction	0.7418	2
Delay in delivery and late ordering material	0.5382	3
Late procurement of materials by the contractor	0.4982	4

Source: Own Survey, 2020

As shown on the above table, the most influential and highly ranked material related delay causes in the BamaCon Engineering Plc projects, are shortage of construction materials required (RII=0.7727), changes in specifications and material types during construction (RII=0.7418), delay in delivery and late ordering material (RII=0.5382), late procurement of materials by the contractor (RII=0.4982) and change in material prices (RII=0.4436).

In the study Tsegay and H. Luo (2017) the most important construction material delay factors are Inflation/price increases in materials, Lack of quality materials and slow delivery of material.

**Table 4.15 RII and ranking of Labor and equipment related delay Causes**

<b>Delay causes</b>	<b>RII</b>	<b>Rank</b>
Manpower shortage (skilled and unskilled labor)	0.3909	4
Insufficient skill of labor and manpower	0.4836	2
Low capability of the contractors' specialized staff doled out to the project	0.7273	1
Labor strikes by the contractor workforce	0.32	5
Low productivity level of labour	0.4491	3

Source: Own Survey, 2020

As shown on the above table, the relative importance index and highly ranked labor and equipment related delay causes in the BamaCon Engineering Plc projects, are low capability of the contractors' specialized staff doled out to the project (RII=0.7273), insufficient skill of labor and manpower (RII=0.4836), low productivity level of labour (0.4491), manpower shortage (skilled and unskilled labor) (RII=0.3909) and labor strikes by the contractor workforce (RII=0.32).

Similarly in the study Abdella. M and Hussin .T (2002) the most important labor and equipment related delay factors are labor productivity, labor supply and equipment availability.

#### 4.10 Top schedule Delay Causes

Top Causes of schedule delay	RII	Rank
Shortage of construction materials required	0.7727	6
Improper planning	0.8836	1
Poor site management and supervision	0.8091	2
Poor contract management	0.7818	4
Incomplete Drawing and Detail Design	0.8054	3
Unforeseen circumstances	0.7818	4
Mistakes, inconsistencies and ambiguities in specifications and drawings	0.7727	6
Low capability of the contractors' specialized staff doled out to the project	0.7273	8

Source: Own Survey, 2020

On the above table, as ranked by the respondent, nine (9) most important factors causing delay in BamaCon Engineering Plc construction project are summarized and presented. Improper planning with RII=0.8836 is suggested as the most important factor causing delay on mixed use building construction projects. This is closely followed by poor site management and supervision involved in the project with RII=0.8091, incomplete drawing and detail design with RII=0.8054 comes third and then poor contract management with RII=0.7818 and then after mistakes, inconsistencies and ambiguities in specifications and drawings with RII=0.7727 and lastly low capability of the contractors' specialized staff doled out to the project with RII=0.7273 are the major causes of schedule delay for the projects.

Adiam (2016) identified seven top delay-causing factors and proved that, poor site management, supervision by the contractor, ineffective planning, Shortage of contractors materials on site and scheduling of work by the contractor are the top five delay factors related to contractors. Similarly, Adem (2018) ranked owner interference, frequent change orders , long waiting time for approval of tests and inspection , shortage of construction material , mistakes in design documents, inappropriate organizational structure linking all parties involved in the project, mistakes and discrepancies in design documents , discrepancies in contract document, delays caused by subcontractors and lack of communication between these parties as the most significant delay factors in the Ethiopian construction project.

#### 4.11 The Relative Importance Index for the Causes of Cost Overrun

**Table 4.16 RII and Ranking of causes of cost Overrun**

<b>Causes of cost overrun</b>	<b>RII</b>	<b>Rank</b>
Design change	0.8527	3
Delays caused by the owner and his/her agent	0.6309	6
Acceleration	0.7290	4
Quantity underestimation	0.9236	2
Price escalation	0.9381	1
Lack of quality	0.70	5
Corruption	0.5290	8
Change in legislation	0.5963	7

Source: Own Survey, 2020

As shown on the above table 4.16, the relative importance index and highly ranked price escalation cause for cost overrun in the BamaCon Engineering Plc projects, (RII=0.9381), quantity underestimation to the project (RII=0.9236), design change (RII=0.8527), acceleration (0.7290), lack of quality (RII=0.7), delays caused by the owner and his/her agent (RII=0.6309), change in legislation(RII=0.5963) and corruption (RII=0.5290).

#### 4.12 Top Three Delay Causes

**Table 4.17 top three causes of cost overrun**

<b>Delay causes</b>	<b>RII</b>	<b>Rank</b>
Inadequate living condition for labour	0.9182	3
Quantity underestimation	0.9236	2
Price escalation	0.9381	1

Source: Own Survey, 2020

In Table 4.17, as ranked by the respondent, three (3) most important factors causing of cost overrun in BamaCon Engineering Plc construction project are summarized and presented. Price escalation with RII=0.9381 is suggested as the most important factor causing cost overrun on mixed use building construction projects. This is closely followed by quantity underestimation involved in the project with RII=0.9236, delay caused by inadequate living condition for labour with RII=0.9182 comes third.

Adiam (2016) identified seven top delay-causing factors and proved that, poor site management, supervision by the contractor, ineffective planning, Shortage of contractors materials on site and scheduling of work by the contractor are the top five delay factors related to contractors. Similarly, Adem (2018) ranked owner interference, frequent change orders , long waiting time for approval of tests and inspection , shortage of construction material , mistakes in design documents, inappropriate organizational structure linking all parties involved in the project, mistakes and discrepancies in design documents , discrepancies in contract document, delays caused by subcontractors and lack of communication between these parties as the most significant delay factors in the Ethiopian construction project.

#### **4.13 The RII and Ranking of Impacts of Delay**

The desire to finish a project on time, under the planned budget, and with the highest quality is common goals for all contracting parties, including the contractor, the client and the consultant. Delay ordinarily brings about misfortune or losses of one form or another for everybody. The causes lead the impacts of schedule delay on construction projects.

The six impacts of project delay identified were:

- ✚ Schedule Delay
- ✚ Cost Overrun
- ✚ Dispute
- ✚ Litigation
- ✚ Arbitration
- ✚ Abandonment of the project

One of the objectives of this study is evaluate the existing problems associated with construction projects completion time and cost; and hence this part consists of discussion & results of impacts of schedule delay & cost overrun.

After calculating the RII of each impact, it was found as indicated in the table 4.22 and rank of the main or top impacts or effects of schedule delay & cost overrun in BEP projects.

**Table 4.18 RII and ranking of impacts of project delay**

<b>Impacts</b>	<b>RII</b>	<b>Rank</b>
Cost Overrun	0.8236	2
Schedule Delay	0.8364	1
Dispute	0.7418	3
Arbitration	0.6691	5
Litigation	0.7	4
Abandonment of the project	0.5873	6

Source: Own Survey, 2020

Table 4.18 shows that schedule delay ranked the highest with RII of 0.8364, cost overrun ranked the next highest with RII of 0.8236 while dispute ranked third with RII of 0.7418. Time overrun and cost overrun affect the two components of project namely schedule and budget. Litigation and arbitration were ranked fourth and fifth RII values of 0.7 and 0.6691 respectively. Abandonment of the project was ranked sixth with RII value of 0.5873.

In similar studies (Adem H. (2018), Aibinu and Jagboro (2002), Samarah & Bekr(2016) and Haseeb, Xinhai-Lu, Bibi,Dyian & Rabbani (2011)) identified time overrun, cost overrun and despites, arbitration, litigation and abandonment of the project as a major impacts of delay.

The third major question of the statement of the problem is, ‘how could the schedule delays and cost overruns can be avoided or minimized?’ and so that this part consists of discussion and results of resolution of schedule delays & cost overruns. After calculating the RII of each resolution methods, the result is found out as indicated table below. Accordingly, table 4.19 below indicates the RII & rank of the 11 resolution methods of schedule & cost overrun in BEP construction projects.

**Table 4.19 RII and Ranking of Resolution Methods (Mitigation Measure)**

<b>Resolution method</b>	<b>RII</b>	<b>Rank</b>
Compare the budget prepared at weekly or monthly intervals with the actual performance achieved	0.7654	7
Give information/preparing/to untalented specialists dependent	0.6673	9
Direct site gatherings and meetings all the more every day and again	0.5934	10
Improving agreement grant methodology	0.7382	8
Prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage	0.9091	3
Realistic and reasonable cost assessment and estimation	0.9182	2
Recruit skilled workers to achieve great progresses	0.5873	11
Training and improvement of all members to help conveyance measure	0.8345	6
Send clear and complete message to workers to guarantee viable correspondence	0.9036	4
Timely advancement control, schedule control, cost control, resource control by contracting and finishing date & cost.	0.9582	1
Increase the construction productivity	0.8564	5

Source: Own Survey, 2020

As shown on the above table 4.19, the relative importance index (RII) and highly ranked timely advancement control, schedule control, cost control, resource control by contracting and finishing date & cost is the one of the best resolution method which is responded by the respondent (RII=0.9582), realistic and reasonable cost assessment and estimation (RII=0.9182), Prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage (RII=0.9091), realistic and reasonable cost assessment and estimation (RII=0.9036), increase the construction productivity (RII=0.8564), training and improvement of all members to help conveyance measure (RII=0.8345), compare the budget prepared at weekly or monthly intervals with the actual performance achieved (RII=0.7654), improving agreement grant methodology (RII=0.7382) and give information/preparing/to untalented specialists dependent (RII=0.6673) are some of the resolution methods for the schedule delay and cost overrun in BamaCon Engineering Plc. The top eleven resolution methods or mitigation measures RII result showed that all of them are



above average 0.7 this implies that, RII results are on the higher level the resolution methods able to control the schedule delay and cost overrun (Jacob et al, 2015).

Besides, respondents proposed other mitigation measure, which incorporates; design competition rather quality cost based acquirement; searching of the contractors as per the recent work done i.e. due diligence; selecting consultants and contractors via design competition; and understanding clients budget; participatory (which may incorporate; donor, users, caretaker/estate office, consultants, contractors) during design and project implementation. Other possible mitigation measures in managing with delay and cost overrun in building project, as proposed by the respondents incorporate:-continuous progress management meetings; consistent supervision, site and technical meetings; frequent coordination between the concerned bodies involved; use of advanced technology and construction methods; clear data and communication channel among project team members; and late in decision making. Clients are the project proprietor, when they do not settle on choices on time with respect to extended matters; they delayed down on site project activities.

According to Doran,T and Ugwu,O.O (1994) stated that slow decision making could be caused by an organization's internal bureaucracy, or wrong channel of communication in building projects. It was also suggested by previous researches suggest that strong management team, through investigation of site conditions, developing communication systems linking all project teams, offering incentives for early completion will help in mitigating delays.

## **CHAPTER FIVE- SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION**

This final chapter highlights the summary of findings, conclusion drawn and recommendation have been given as per the findings of the assessment to improve the schedule delay and cost performance in the BamaCon Engineering Plc projects.

### **5.1 Summary of Findings**

The major purpose of the study was to identify the causes of schedule delay and cost overrun in BamaCon Engineering Plc projects. Furthermore, the research aimed to assess the schedule delay and cost overrun in construction projects with respect to the project original duration and contract amount of BamaCon engineering and also to identified the major causes (reasons) and impacts for schedule delay and cost overrun of the projects and made resolution methods or mitigation measures for schedule delay and cost overrun. In this study the analysis done on general issues of project schedule management revealed that majority of the respondents are in agreement with that the proper planning and activity identification were not done.

Regarding the cause of schedule delay, eight significant causes were identified. Namely, contractor related factors, client related factors, consultant related factors, other external related factors, project related factors, design related factors, material related factors and labor & equipment related factors. Based on the rank of relative importance index; the major causes of schedule delays are improper planning, poor site management and supervision, incomplete drawing and detail design, poor contract management, unforeseen circumstances, mistakes, inconsistencies and ambiguities in specifications and drawings, shortage of construction materials required and low capability of the contractors' specialized staff doled out to the project whereas the major cause of cost overrun are price escalation, quantity underestimation, design change, poor cost management, additional work & rework, incomplete requirements and design, acceleration (speeding up), lack of quality, delayed caused by the owner and his/her specialist.

Analysis was also carried out on the impact of delay on the project work. Schedule delay, cost overrun, dispute, litigation, arbitration and abandonment of the project are the impacts/effects of delay encountered so far among parties involved were ranked highest. Time is factor that is very essential in all activities that has to be carried out, in a contract document. A specific time frame

is given for delivery of project and if the time is being exceeded more money is often spent which could lead to increase in final budget of project highest to cost overrun and finally to dispute.

## **5.2 Conclusion**

Based on the findings and data analysis of the research, the following conclusions were drawn on the schedule and cost management and reasons behind schedule delay and cost overrun.

Based on the results of the analysis of the desk study, some projects of BEP were investigated in the research suffered with time and cost overruns in their implementation and completion. For these construction projects, the actual time overruns ranges from 7% to 143% of the contract completion time and cost overrun ranges from 2 to 41% of the contract completion cost of the project which is poor performance.

Based on the rank of relative importance index, the project in general faced improper planning, poor site management & supervision, incomplete drawing & detail design, poor contract management, unforeseen circumstances, mistakes, inconsistencies and ambiguities in specifications and drawings are the major causes of schedule delay whereas price escalation, quantity underestimation, design change, poor cost management, additional work & rework, incomplete requirements and design, acceleration (speeding up of the work), lack of quality, delayed caused by the owner and his/her specialists are the major causes of the cost overrun at BamaCon Engineering Plc. As indicated in the previous section both the way the determined is poor and the way the schedule is managed and cost is administered is ineffective at the company.

The fourth major question of the problem of the statement was to forward the resolution or mitigation methods to minimize or avoid schedule delay and cost overruns in BEP construction projects. For that matter, the study has identified the mitigation measures that should be taken during analysis and RII results indicated that schedule control, cost control, resource control, by contracting and finishing date & cost (RII=0.9582), realistic and reasonable cost assessment and estimation (RII=0.9182), prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage (RII=0.9582), and send clear & complete message to workers to guarantee viable correspondence (RII=0.9582) has been ranked in the first, second, third and fourth mitigation methods of schedule delay and cost overruns.

Finally, it can be concluded that all the above mentioned problems are integral byproducts of poor project management as both time and cost are essential elements in project management.

### **5.3 Recommendations**

The problems of time and cost overrun are influencing the building construction of BamaCon Engineering Plc. All stakeholders (clients, contractors and consultants) should cooperate to accomplish successful projects within the specified time frame and budget, surpass the anticipated quality standard. Particularly competent project team and construction managers' should give close consideration to planning and preventive activity to keep the construction project on budget and schedule, and play an important role in keeping projects from delay or additional expense. For that reason, executing quality administration framework through talented, able and reliable project managers is imperative, since project managers are the individuals who are occupied with the overall planning, coordination, monitor of risks and control of a project from starting to finish. So as to minimize the occurrences of delay and cost overrun of the BEP mixed use construction building, the company should:

- ✓ Contractor should prepare proper plan and achieve schedule using the appropriate scheduling techniques and revise as appropriate;
- ✓ Contractor must also allocate adequate construction equipment's and ensure to avoid the shortage of construction material;
- ✓ The contractor should mobilize resources without delay;
- ✓ Consultants shall ensure that the documents or design & specifications issued by consultants to contractors are free from mistakes or discrepancies and any design error must be rectified immediately to avoid delay in the progress of project works;
- ✓ Clients and consultants should also promptly respond to contracts enquires in revising and approving documents (design, drawings, submittals, sample material tests etc..) without delay;
- ✓ The clients must ensure that sufficient contingency is available on the client's side to spend on speeding up or accelerating costs in case of any delay;
- ✓ The clients must ensure that the contractor handover the site to contractors immediately after contract agreement has signed;

- ✓ Include all the partners and stakeholders in settling project related decisions with respect to time and cost. The project team members, the end users, top management, any individual who influences or who is influenced by the project ought to be included;
- ✓ Set performance necessities for choosing project participants i.e. skillful consultants (advisors) and well performing and experienced contractors;
- ✓ Implement different tasks through appropriate coordination and control of planning, design, estimating, contracting and construction in the whole cycle;
- ✓ Create effective systems and communication channels so that delay in choice can be limited and furthermore for powerful time and cost control for settling clashes that can't be dodge;
- ✓ Giving training to the project group will likewise diminish or minimize mistaken assumptions and confusions which will support them with settling on choices rapidly and deliver the project on schedule and within budget (cost).

Further studies are recommended to be embraced in other areas of BamaCon Engineering Plc projects to come up with a nationwide mechanism for limiting delays and cost overruns in general construction industry.

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## APPENDIX

### Appendix A: Research Budget

No.	Items	Amount		Remark
		Birr	Cent	
1	Stationary cost for questionnaires and thesis	3,000	00	
2	Secretarial cost	800	00	
3	Transportation and refreshment cost	2,500	00	
4	Internet cost and refreshment cost	1300	00	
5	Training cost	2,000	00	
	Sub total	9,600	00	
	Contingency 10%	960	00	
	Grand total	10,560	00	

### Appendix B: Research timetable

No.	List of activities to be performed	Time	Remark
1	Preparing thesis I (What part of the proposal i.e Introduction, Literature Review and Research Methodology)	Up to June22-29,2020	
2	Data Collection	July 22-Sep 07, 2020	
3	Writing analysis and interpretation of results, conclusion & recommendation	Sep 08-Oct13,2020	
4	Submitting 1 <sup>st</sup> draft to advisors and improving it based on feed back	Oct 14-Nov 03,2020	
5	Writing the final version of the research report	Nov 04-Dec 19,2020	
6	Submitting final research paper signed by the advisor to the respective school/institute	Dec 20-30,2020	
7	Thesis defense period	Jan 09-22,2021	
8	Submitting revised final version of the paper to the respective school/institute	Within ten days after the defense period	

**St. Mary's University**  
**School of Graduate Studies**  
**MA in Project Management**

**Note of Permission**

Dear Sir/Madam I kindly request you that you will help answer this questionnaire. Your response is highly valuable and contributory to the outcome of the research titled “**An assessment of the causes of schedule delay and cost overrun on a mixed use building: the case of BamaCon Engineering Plc projects.**” All information provided shall at utmost be kept confidentially and utilized for academic purpose only.

With kind regards,

**General Instruction**

- No need to write your name
- Please read the questions properly & provide an appropriate response and make (√) your responses and fill the blanks provided when it requires.

Contact of this researcher

Fisseha Gebre

e-mail:fishgebre55@gmail.com

Phone Number: +25191 355 1310

**Part I: General Background Information**

1. Type of organization      A. Contractor      B. Consultant      C. Client
2. Gender      A. Male      B. Female
3. Age      A. <25      B. 25-35      C. 36-35      D. >45
4. Level of education  
A. 1<sup>st</sup> degree    B. 2<sup>nd</sup> degree    C. Masters    D. PhD    if others please specify\_\_\_\_\_
5. Relevant working experience  
A. 0-5 years    B. 6-10 years    C. 11-15 years    D. >15 years
6. Designation  
A. Project manager    B. Office engineer    C. Site engineer    D. if others please specify\_\_\_\_\_

**Part II Causes of Schedule Delay and Cost Overruns of construction projects in BamaCon Engineering Plc**

Please use a tick (√) mark to answer the following statements as SA (Strongly agree), A (Agree), N (Neutral), D (Disagree) and SD (Strongly Disagree)

No	2.1 Causes for schedule delay	SD	D	N	A	SA
	<b>2.1.1 Contractor related delay</b>					
	Inadequate Contractor Experience					
	Improper planning					
	Mistake during construction					
	Poor site management and supervision					
	Shortage of materials in site					
	Poor project management					
	The method of competition in procurement					
	<b>2.1.2 Client related delay</b>					
	Lack of experience of client in construction					
	Change order by the owner					
	Client interference					
	Delayed disbursing of payments					
	Additional works					
	Poor contract management					
	Lack/poor/of communication & coordination with contractors					
	Finance and payment arrangements					
	<b>2.1.3 Consultant related delay</b>					
	Inadequate Consulting experience					
	Poor Design and Delay in Design					
	Incomplete Drawing and Detail Design					
	<b>2.1.4 Other External Factors related delays</b>					
	Weather state of the project					

	Lack of labor, materials, equipment, and costs in the market					
	High transportation Cost					
	Poor financial conditions (swelling, money and so on)					
	Unforeseen circumstances					
	Changes government laws and regulation					
	<b>2.1.5 Project related delay</b>					
	Original contract duration is too short					
	Corruption					
	Ineffective penalties for delay					
	Unavailability of bonus for early completion					
	Type of construction contract					
	Type of project bidding and award					
	<b>2.1.6 Design related delay causes</b>					
	Mistakes, inconsistencies and ambiguities in specifications and drawings					
	Inadequate and unclear details in drawing					
	Project design complexities					
	Inadequate investigations by the designer during the design phase					
	<b>2.1.7 Material related delay causes</b>					
	Change in material prices					
	Shortage of construction materials required					
	Changes in specifications and material types during construction					
	Delay in delivery and late ordering material					
	Late procurement of materials by the contractor					
	<b>2.1.8 Labor and equipment related delay causes</b>					
	Manpower shortage (skilled and unskilled labor)					
	Insufficient skill of labor					
	Shortages of contractor's administrative staff					

Low skill of manpower					
Lack of technical professionals in the contractor's organization					
Low capability of the contractors' specialized staff doled out to the project					
Labor strikes by the contractor workforce					
Low productivity level of labour					
Additional factors, if any					
<b>2.2 Causes Cost Overrun</b>					
Delays caused by the owner and his/her agent					
Design change					
Acceleration					
Quantity underestimation					
Price escalation					
wastage					
Corruption					
Lack of quality					
Change in legislation					
Additional Factors, if any					

**Part III Impacts or effects of schedule delay and cost overrun**

3.1) please rank impacts or effects of delay below in what you consider to be the most influential effect of delay.

The five-point scale ranged from 1 to 5, so that please fill the table as Strongly Disagree =1, Disagree =2, Neutral=3, Agree=4, and Strongly Agree=5.

	<b>Impacts or effects of Schedule delay</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
	Cost Overrun					
	Schedule Delay					
	Dispute					
	Arbitration					
	Litigation					
	Abandonment					

3.2) please rank impacts or effects of cost overrun below in what you consider to be the most influential effect of cost overrun.

	<b>Impacts or effects of cost overrun</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
	Additional cost/expense on the user rental/lease/costs					
	Budget shortfall adversarial relationship between participants of the project					
	Delayed payments to contractors					
	Budget shortfall adversarial r/ship b/n participants of the project					
	Loss of profit for non-completion to the contractor					
	High cost of supervision & contract administration for consultants					
	The contractor will suffer from budget shortfall of the client					

**Part IV Resolution Methods of Schedule Delay and Cost Overrun**

4.1) please rank the resolution methods for schedule delay and cost overrun

	<b>Resolutions</b>	<b>SD</b>	<b>D</b>	<b>N</b>	<b>A</b>	<b>SA</b>
	Compare the budget prepared at weekly or monthly intervals with the actual performance scored or succeed					
	Give information/preparing/to untalented specialists dependent on their extent of work					
	Direct site gatherings and meetings all the more every day and again					
	Improving agreement grant methodology					
	Prepare a cash flow diagram and monitoring & evaluation of the progress during the contract period and implementation or execution stage					
	Realistic and reasonable cost assessment and estimation					
	Recruit skilled workers to achieve great progresses					
	Training and improvement of all members to help conveyance measure					
	Send clear and complete message to workers to guarantee viable correspondence					
	Timely advancement control, schedule control cost control, resource control by contracting and finishing date & cost.					
	Increase the construction productivity					

If you have any other recommendation/solution to control the schedule delay and cost overrun

Please put your resolution method to minimize /controlling mechanism for schedule delay and cost overrun that has been facing on BamaCon Engineering Plc projects.

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Thank you so much!!