

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES



ADDIS ABABA INSTITUTE OF TECHNOLOGY
SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING

**A Study on Causes of Non-Excusable Delays and Excusable but Non-Compensable
Delays of Road Construction Projects (Case Study in Selected ERA Projects)**

A Thesis

By

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A thesis submitted to school of graduate studies in partial fulfillment of the requirements
for the degree of Master of Science in Construction Technology and Management

December, 2017

DECLARATION

I declare that this thesis entitled “**A Study on Causes of Non-Excusable Delays and Excusable but Non-Compensable Delays of Road Construction Projects (Case Study in Selected ERA Projects)**” is my original work. This thesis has not been presented for any other university and is not concurrently submitted in candidature of any other degree, and that all sources of material used for the thesis have been duly acknowledged.

Candidate:

Name: _____

Signature: _____

DEDICATED TO

To My Superman and Beloved Granddad

ABATE ARAGAW ADEM

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ABSTRACT

Construction delays are occurring in every phase of a construction project and are common problems in construction projects in Ethiopia. Moreover, hence determining the contractual responsibility of delay is the major causes of project failure and the most likely source of dispute in construction projects. If the delay is not identified and the corrective project management decision is not taken in time a project may incur extra cost and extension of project time, which gives rise to dissatisfaction to all the parties involved and nowadays it's becoming a major obstruction for their development for developing countries like Ethiopia.

Therefore, this research was carried out to dig-out information on the factors that causes non-excusable and excusable but non compensable delays of construction companies contracted to Ethiopian Road Authority in order to improve time performance of the project by managing better these causes. The scope of the research is selected ERA's projects which are completed or being executed by these contracted companies.

Having this, the research assess and observes the problems in relation to such projects with respect to their project performance, delay justification, data recording and documentations, suitability of conditions of contract and approaches of determination and assessment in different head of claim. So that; it identifies and understand gaps (problems and challenges) in considering and managing these causes of non-excusable and excusable but non compensable delays in road construction projects.

The methodology adopted in undertaking this research was the mixed approach involving a detailed review of the relevant literature followed by questionnaire survey and interviews to investigate the variables identified in more depth. Questionnaire surveys together with desk study were used to collect data on different delay factors and causes of the delay occurred.

As a result, this research first identified 10 key delay factors causing delay in Ethiopian road construction projects, and then 86 the most common and critical causes of construction delay were evaluated by using the methodology adopted in the field. The findings therefore show that 13.33% of the causes of delays from the case study is considered as non-excusable delays are inadequate planning and scheduling by contractor and poor site management and supervision by

contractor; The other 20% of the case analysis are found as excusable-non-compensable delays which are caused by external factor those includes suspensions due to adverse weather conditions, delay due to currency adjustment factor and suspension of works due to discovery of landmines. The remaining 66.67% of the causes are identified as excusable-compensable delays.

In addition, contractor related factor, equipment related factor and material related factor are the most critical factors; whereas external factor is moderately critical factor as perceived by the respondents that need to be considered as causes of non-excusable delays and excusable but non-compensable delays in road construction based on this study.

Although, from such major delay category it is found that, seven causes perceived by client as most critical are: (1) sub-contractor, (2) contract management, (3) labor productivity, (4) site management, (5) equipment availability and failure, (6) inadequate contractor experience, and (7) late delivery of materials. Six causes as perceived by contractor as most critical are: (1) unusually severe weather, (2) sub-contractor, (3) shortage in material, (4) finance and payments of completed work, (5) late approval of payment, and (6) site management. The other five causes are perceived by consultant as most critical are includes: (1) poor coordination on site, (2) improper planning and scheduling, (3) construction methods, (4) quality in material, and (5) delay to provide the right of way.

This paper finally came up with a conclusion report incorporating the different aspects of the project and provoked to give a solutions related to the findings that are disseminated to concerned parties towards reducing the impact of delays on road construction projects in ERA's practice. Lack of willingness of professionals to complete and return the questionnaire, and difficulties to access documents related to delay claims was the limitation of this study. To this end, therefore it was decided to make this research as a stepping stone for further similar researches. It is due to these qualifications, I found this study adds something relevant to the area of development studies.

Redeat Abate Aragaw
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Keywords: *Non - Excusable Delay; Excusable but Non - Compensable Delay; Road Construction Project; Project Management; Performing Organization*

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ABBREVIATIONS/ACRONYMS

EFDR	Ethiopian Federal Democratic Republic
ERA	Ethiopian Roads Authority
CPM	Construction Project Management
IHA	Imperial Highway Authority
ETCA	Ethiopian Transport Construction Authority
SDBM	Sole Dispute Board Member
EoT	Extension of Time
PMI	Project Management Institute
PMBok	Project Management Body of Knowledge
PMIBok	Project Management Institute Body of Knowledge
MGT	Management
PMM	Project Management Methodology
ETB	Ethiopian Birr
USD	United States Dollar
UK	United Kingdom
FIDIC	Fédération International Des Ingénieurs - Conseils (International Federation of Consulting Engineers)

CHAPTER ONE

1. INTRODUCTION

1.1. General

Historic chronicles of the 17th and 18th centuries show that there were a number of small roads trail and foot paths, in addition to the traditional shoulder portage, animals like mules, donkeys and horses and camels were used as a means of transportation in Ethiopia.

In the 18th century, especially during the reign of Emperor Tewodros, although the technology was primitive it was believed that planned road construction efforts were made.

It is also believed that Emperor Yohannes IV, who succeeded Tewodros, was engaged in road building. However due to the danger of invasion by Egyptians, Derbush and Turkish the Emperor was not able to achieve his desires.

It was prior to the second Italian occupation i.e. between the years 1896 and 1936 that a great success was made in road construction. Emperor Menilik was said to be a successful road builder participating himself in the construction. In 1903 the road from Eritrea to Addis Ababa and the road from Addis to Addis Alem were built. In addition it was during this time that the first Asphalt roads appeared in Addis.

During the Italian occupation roads were built by them and they were established to meet the requirements of the Military control rather than to promote the overall development of the country's economy. In addition, the roads lacked most of the modern location, design and construction features desirable for present day high speed traffic.

The roads and trails built and improved during the 5 years Italian occupation were about 6000km. Approximately 2500 km of them were given a single asphalt surface treatment, drainage structures were usually of stone masonry and at least three tunnels were built. However, when Ethiopia regained its independence, the Italians in their fleeing attempt almost undid what they created by blasting bridges and dynamiting roads.

From the time the Italian packed off to home to the eventual creation of the Imperial Highway Authority (1941 to 1951) road construction or maintenance activity was almost subsided for a stagnation period of one decade because of lack of funds, equipment and expertise.

Following the eviction of the Italian occupiers, the Imperial Ethiopian Government was convinced that a Road Agency solely responsible for rehabilitating/restoring and expanding the road network throughout the country had to be established. Accordingly, the Imperial Highway Authority (IHA) was established under proclamation No. 115/1951 as a semi-autonomous agency with specific duties to plan, design, construct, and maintain roads. Responsibilities for construction and maintenance of roads remained under a single autonomous authority (IHA) for 26 years (1951-1977).

The Ministry of Transport and Communication turned out to be the supervising authority of ERA. The Ethiopian Roads Authority has been reestablished under proclamation 133/1978 incorporating, among others, the Rural Roads Department in addition to the Highway Department. In 1980, the Military Government that took power in 1974 reformed the agency into the Ethiopian Transport Construction Authority (ETCA) by proclamation No. 189/1980 and became answerable to the newly formed Ministry of Construction. The proclamation enlarged responsibility of the Authority by expanding its task to incorporate the construction of Airports, Seaports, Railways, and Municipal Roads.

Following the shift from a command-based economy to a market oriented one in 1991, ERA was reestablished by proclamation No.63/1993 with a view to providing a strong administration under the leadership of a Board.

As part of its reform, the government assigned administration of rural roads to the regional self-governments and main roads to ERA as part of the Federal Government's responsibility. ERA's role regarding rural roads was then limited to rendering support such as overall network planning, training and technical assistance as required by Regional Governments.

To cope up with existing situations, ERA was again re-established by proclamation No. 80/1997 with the objective to develop and administer highways, and to ensure the standard of road construction.

With the establishment of the new cabinet of Ministers in October 2001, a Ministry of Infrastructure and later on Ministry of Works and Urban Development has been formed with the responsibility of developing the infrastructure of the nation.

ERA, which was one of the organizations under the Ministry of Works and Urban Development and accountable to the Board, is responsible for planning and formulating long and short term plans and programs for road construction, design, maintenance of trunk and major link roads, as well as for administration of contracts.

Currently, the main responsibilities of ERA are network planning; management of contract projects and force account operations. The long-term objective is to focus on policy, planning and contract administration and to pull out gradually from direct operational works. Roads are constructed with the aim of connecting two places of interest traversing various land forms.

According to the proclamation, ERA is legally autonomous agency responsible for the management of the country's roads. The proclamation further stipulates that trunk and major link, which make up the federal road network system, are administered by the Ethiopian Roads Authority.

Ethiopian Roads Authority's primary function is to maintain the existing road network through the districts as its corporate responsibility. The maintenance of the entire main road network is carried out by ten maintenance districts which are conveniently located at various regions throughout the country.

The proclamation also authorized ERA to administer weigh bridges and through them to control overloaded vehicles which are one of the major causes for fast deterioration of roads. ERA is administered by a Board and the Board of Directors will provide General Policy direction and have primary oversight responsibility for project performance monitoring.

1.2. Research Background

Construction is one of the largest and challenging industries. Due to its long-lasting, exposed to different changes and executed in the site (which depends on different site conditions), construction industry is unique in nature unlike other industries. Because of this, it needs a continuous attention and follow-up in order to prevent it from conflicts and disputes. Among which delay is a situation in which a project due to some causes related to the contractor, client, client's consultant or other causes has not been finished in contractual or agreed period.

Delay is quite common in construction projects. Delay to completion of a project could bring significant losses on society as well as the project cost resulting in time overrun, cost overrun, disputes, litigation, and complete abandonment of projects. The damage caused by a project delay is compensated by the Contractor in principle in the form of 'liquidated damage'. However, the Contractor shall claim the extension of time or the recovery of financial burden if the Employer is liable for the cause of delay [1].

In fact, a variety of factors contribute to the delay of project completion in complex interdependencies of a number of tasks hence determining the contractual responsibility of delay is the most likely source of dispute in construction projects.

As some of the causes of the construction delays can be controlled during the life cycle of the project, a significant resource saving can be achieved by identifying and managing better these causes [2]. Following this fact, time performance is one of the key measures of the project success along with quality and cost of a project.

As it is prevailed above, success and failure of any project including road constructions will be measured by these three requirements. Therefore, the focus of this research will be on the success of road projects in selected ERA projects in terms of completion period (time requirement) that delineates the causes of non-excusable and excusable-non-compensable delays.

Consequently, this research is somehow dealt to study a very common problem which is affecting almost all road construction projects in the country that is the failure to meet the stated/planned completion period (which said to be delay).

From this point of view, Excusable delays are those not attributable to the contractor's actions or inactions, and typically includes delays caused by employer and/or by unforeseen or neutral events. These events are beyond the contractor's control and are without fault or negligence on his/her part. Excusable delays can be further classified into excusable with compensation and excusable without compensation. On the other hand, non-excusable delays are ones that are not accepted by the client and may result some contractual liquidated damage for the performing organization.

According to this brief introduction the research objective can be defined as identification of key causes of non-excusable and excusable but non compensable delays in road construction projects. Research scope covers federal road projects which have been completed or being executed by executive companies, performing organizations affiliated to the Ethiopian road authority. In this regard this identification will be done from performing organization point of view.

1.3. Statement of the Problem

This section of the research states about the driving force to study the selected area. The initiation for the study of this research is largely due to personal observation and low performance of asphalt road construction projects in the country in terms of different delay factors.

Hamidreza et al. assumed that there has been universal criticism of the failure of the construction industry to deliver projects in a timely way. Accordingly, timely completion of a road construction project is frequently seen as a major criterion of project success by clients, contractors and consultants alike [2].

Besides, the project-team comes together to create that unique development on a particular site under circumstances that will never be repeated. They may be complex, demanding high level of co-ordination of permissions, people, goods, plant and materials and construction can begin despite many uncertainties, and as a consequence, delays are common.

Furthermore, the involvement of advanced technologies and owner-desired-changes makes it even more difficult to keep a project on the scheduled track. Coupled with this state are innate uncertainties and sophistication in the physical, financial, and economic environment in which most projects are performed.

However, delays generally regarded as the most common problem, complex, risky and frequently encountered in Ethiopian Road Construction Project. The importance of time with respect to managing better such causes of delay is very important for both parties, namely the owner or client (in terms of performance) and contractors (in terms of money) and often disputed and loss can lead to legal action, resulting in cost compensations and time extensions of the road projects in Ethiopia.

According to Tadele [57], the mostly stated and commonly known factor that is challenging the road sector development in Ethiopia is lack of finance both for the network expansion as well as maintenance and rehabilitation of the infrastructure. Thus, Robel clarified this [58] that when large projects deviate from their objectives (either in cost, completion time, performance, safety or environmental effects), the damage caused obviously transcends out of the contracting parties and affects the project stakeholders and the public at large. Emphasizing the completion time deviation factors as they are very common in our country's construction industry, lack of justified methodologies in quantifying and analyzing delays happens to be the greater challenge. Also the task of justifying and quantifying the effects of each delay event required for the proof of causation and quantum is well recognized as an extremely difficult undertaking.

Even if road infrastructure development has significantly grown, the country has been ranked on the bottom with the countries of the world with the lowest road network [57]. According to Solomon, improving the performance of the industry through effective and efficient systems and processes is important, not least because the industry has a bottom line effect on the country's economy and the society as a whole but also it is of importance for the industry's (sector firms') survival in the wake of the fierce international competition it is facing [59].

In the lights of these problems this research therefore, tries to determine delay causes and effects of the ERA's selected road construction projects and also to adopt an appropriate frame work for improving delay analysis and administration methods specifically by studying the major and the

one that occurred commonly on road constructions which are affiliated to Ethiopian Road Authority; which is causes of non-excusable and excusable but non compensable construction delays in order to give recommendations with respect to compensation and minimizing contractors' loss. To this effect, the research problem statement is derived to enhance such conditions to be benefited by improving time performance of the project by managing better these causes.

1.4. Research Objectives

The main objectives of this research are:

- To clarify causes of non-excusable and excusable but non compensable construction delays.
- To suggest ways to improve time performances of the road project by managing better these causes.
- To discuss the benefits of road construction executive companies by minimizing their losses.
- To assess the conditions of contract related to the challenges faced in the execution of the projects.
- To come up with conclusions and offer recommendations for the development of Ethiopian construction industry especially on road construction projects.

1.5. The Research Questions

Within the view of accomplishing the above objectives, the research has posed the following three questions, which are to be investigated by the selected research instruments:

1. What are the possible causes of non – excusable and excusable but non – compensable construction delays in the Ethiopian road construction practices?
2. What are the shortcomings, drawbacks and limitations of contractor's practices in associated with conditions of contract?
3. What are the significant factors of the causes in time performance of the project and how wide are the impacts of the project delay?

1.6. Scope of the Study

The scope of the study has been limited to the cases of a few locally selected road construction projects overseen by Ethiopian Road Authority. The study was conducted on five ERA's Regional projects based on geographical and climatic differences and contractual experiences between local and foreign executive companies.

It is nevertheless hoped that it will be sufficient to give an overview of the major causes of delays that are common in the Ethiopian construction industry from the perspectives of owner, contractors and consultants that was approached by literature review, questioner survey and case study analysis to identify the most common and frequently happening factors of delay in the road sector.

The focus of the research is therefore explained to the causes of non-excusable and excusable but non compensable construction delays especially on selected ERA projects, with a brief focus on some clauses of this particular form of contract and its relevance to the local conditions existing in the Ethiopian Construction Industry. Some of the projects reviewed, however are incomplete at the time of writing; hence the total cases of delays considered may not reflect the final status.

1.7. Limitation of the Study

The major limitation of the study was the lack of willingness of professionals to complete and return the questionnaire which took too long time than expected. A series of briefings on the questionnaire was conducted to motivate respondents for completing the questionnaire as its findings are for academic purpose. In addition, it is found difficult to access documents related to delay claims submitted by the contractor and determination made by the engineer and employer. This has created a great deal of shortage of information for the researcher to build up the study in depth. To this end, it was decided to make this research as a stepping stone for further similar researches.

CHAPTER TWO

2. LITERATURE REVIEW

2.1. General

This chapter deals about different literatures' which was conducted on the area of both project management and road project management. Most of the literatures' discussed hereunder are conducted on different countries and situations to ascertain the fact that delay factors could be different in different countries and situations. The purpose of this chapter is to refer it and integrate with the finding of this study for a better understanding of the research objective.

However, before discussing the concepts related to types of delays and delay factors, points related to construction project and its management and general causes of delays are stated as introduction to the main parts of the literature, which is focused on non-excusable and excusable-non-compensable types of delay in the road construction sector.

2.2. A Project Basics

2.2.1. Project Definition

Organizations perform work. Work generally involves either operations or projects, although the two may overlap. Operations and projects share many characteristics; for example, they are: Performed by people; Constrained by limited resources; Planned, executed, and controlled [3]. Operations and projects differ primarily in that operations are ongoing and repetitive while projects are temporary and unique [3].

Many people and organizations have defined what a project is, or should be, but probably the most authoritative definition is that given in BS 6079-1 'Guide to Project Management' [4]. This states that a project is:

‘A unique set of co-ordinated activities, with definite starting and finishing points, undertaken by an individual or organization to meet specific objectives within defined schedule, cost and performance parameters.’

On the other hand, according to PMI (Project Management Institute) Standards Committee, a project can also be defined in terms of its distinctive characteristics that “a project is a temporary endeavor undertaken to create a unique product, service, or result”. The temporary nature of projects indicates that a project has a definite beginning and end. Every project creates a unique product, service, or result which means that it is different in some distinguishing way from all similar products or services [3].

Wubishet describes that most organizations often inclined to use projects as their main handling mechanism of their businesses, i.e. *Management by Projects*. Projects are understood to be parts of the main business of organizations with the following identifying characteristics [6]:

- ✚ **Unique**, involving innovative/advanced characteristics;
- ✚ **Temporary**, for it has a definite ending – constrained by time, finance & other borrowed resources;
- ✚ **A component of a certain business**, requiring predetermined goals and courses of actions; and
- ✚ **Complex (if applicable)**, associated with size, variety, handling difficulty, importance, urgency, changes or a combination of two or more of them. It is also related to inter related and numerous activities involved, the context in which their management processes were built in and their decision making procedures.

Projects may be undertaken to generate revenue, such as introducing methods for improving cash flow, or be capital projects which require additional expenditure and resources to introduce a change to the capital base of the organization [4]. Projects are undertaken at all levels of the organization. They may involve a single person or many thousands. They may require less than 100 hours to complete or over a years. Projects may involve a single unit of one organization or may cross organizational boundaries as in joint ventures and partnering. Projects are often critical components of the performing organization’s business strategy [3].

As stated in the definition, a project has a definite starting and finishing point and must meet certain specified objectives. Broadly these objectives, which are usually defined as part of the business case and set out in the project brief, must meet three fundamental criteria [4]:

- i. The project must be completed on time;
- ii. The project must be accomplished within the budgeted cost;
- iii. The project must meet the prescribed quality requirements.

These criteria can be graphically represented by the well-known project triangle. Some organizations like to substitute the word ‘quality’ with ‘performance’, but the principle is the same – the operational requirements of the project must be met, and met safely [4].

In certain industries like airlines, railways and mining, etc. the fourth criterion, safety, is considered to be equally important, if not more so. In these organizations, the triangle can be replaced by a diamond now showing the four important criteria. The order of priority given to any of these criteria is not only dependent on the industry, but also on the individual project [4].



Fig.1: Project Triangle (Source: Project Management, Planning and Control)

The planning, monitoring and control of all aspects of a project and the motivation of all those involved in it, in order to achieve the project objectives within agreed criteria of time, cost and performance. To achieve this, a number of methods, procedures and techniques have been developed, which together with the general management and people skills enable the project manager to meet the set criteria of time, cost and performance/quality in the most effective way.

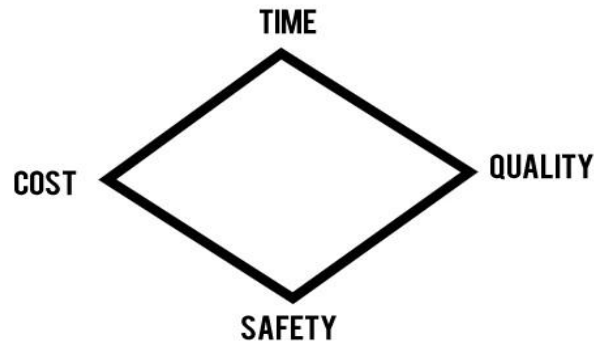


Fig.2: Project Diamond (Source: Project Management, Planning and Control)

2.2.2. The Construction Projects

There is a very wide range of possible project types. A project is defined, whether it is in construction or not, by the following characteristics: A defined goal or objective; Specific tasks to be performed; Defined beginning and end; Resources being consumed. The goal of construction project is to build something. What differentiate the construction industry from other industries is that its projects are large, built on-site, and generally unique. Time, money, labor, equipment, and, materials are all examples of the kinds of resources that are consumed by the project.

Therefore, a construction project is basically a temporary endeavor with specified time & cost, initiated to create a unique product, service or result, tend to be limited edition.

As examples, the following sections are some common types of acceptable construction projects that the Company has undertaken:

- Building Structures
- Engineering Structures
- Geotechnical Investigations
- Civil Engineering Earthworks
- Project Management and Contract Administration
- Master Plans and Feasibility Studies
- Environmental Engineering
- Hydraulics, water resources and irrigation engineering

- Water supply and sanitary engineering
- Transportation engineering
- Drawing and architecture
- Estimation and specification
- Management techniques
- Surveying
- Valuation
- Building materials
- Computer application.

Among the above construction projects, road construction projects have specific needs and objectives. The projects are categorized into the following sections:

- **Paving:** All highway, freeway, expressway, turnpike, toll road, road and street construction or reconstruction regardless of ownership.
- **Bridge:** All bridges and bridge abutments for vehicles, railroads and pedestrians, including connecting bridges between buildings.
- **Runway/Taxiway:** Specialty paving for aircraft, rockets and missiles.
- **Sidewalk/Parking Lot:** All paving for driveways, parking areas and sidewalk construction.
- **Highway Signs/Guardrails:** All structures to contain and separate highway traffic or structural signs that span the roadway.
- **Vehicle Tunnel:** All tunnels designed for vehicles, subways or trains.
- **Pedestrian Tunnel:** All tunnels designed for pedestrian use.
- **Railroad:** All construction involving railroad, rapid transit or subway tracks or sidings.

2.2.3. Construction Project Management

Management is defined as the art of arranging and/or organizing various activities, operating equipment and group of people in a suitable manner to create systematic operation with continuity to achieve a common goal. As construction is also one of the industries which need

the proper systematic coordination of activities, materials, labor and operating equipment, therefore managing such industry is necessary [6].

Management can also be defined as the use of people and other resources to accomplish objectives. That is, management by necessity involves the creation of an environment in which people can use resources to reach stated goal. It also involves the implementation of the function of management: planning, organizing, implementing and controlling. These functions are the very essence of management.

The management towards coordinating different workmen, availing the required machinery and material at the right time, executing the project economically and successfully, and controlling over the quality, time and sequence of flow of construction in a well-planned and organized manner is called *Construction Project Management* [6].

Construction management is different from a steady state Organization management in that it has a distinct beginning and a distinct end while a steady state Organization runs continuously. However, construction management as part of project management it can also be incorporated in a steady state Organization.

In our world construction resources are scarce, hard to obtain easily and becoming expensive every day in spite of the fact that their demand is high. It is this reality which obliged us to utilize them efficiently and effectively. In other words, that is the basic reason why construction industry need to be managed and professionalism in construction management assumes special significance.

Construction Management is necessary to insure [6]:

- proper planning and organization of the works,
- the effective use of resources,
- the completion of works within estimated budget and specified time,
- in time delivery and utilization of materials,
- the necessary quality of the work,
- proper usage of equipment and latest methods of construction and technology,
- evolving a reputation for high quality of workmanship,

- controlling over the contract agreed upon and specification,
- motivating people to work to their best and creating an organization that works as a team,
- in taking sound decisions at the lowest practical management level through delegation of authorities,
- proper communication and reporting of the works executed,
- the provisions of safe and satisfactory working conditions for all workers,
- monitoring of the works to be executed against planning,
- proper sequence of flow of construction, and
- proper coordination of the resources to create an organization that works as wholesome to fulfill the objectives.

Therefore, the role of project management is to exercise overall control of the project from its inception through to the completion of commissioning. Thus, the ultimate responsibility for project management lies squarely with the client. His primary function is to define the parameters of the project and to provide decisions, approvals and guidance. The responsibility of project manager normally spans design, construction and commissioning. His function is to control the sequence of events and decisions leading to completion of the project [5].

Accordingly, Construction Project Management is therefore to coordinate and administer all components including the technology and safety and health requirements in order to successfully accomplish based on the five criteria of performance: Relevance, Efficiency, Effectiveness, Utility and Sustainability and Impact [6].

These performance criteria can briefly be described as:

1. **Relevance:** Response to needs and priorities
2. **Efficiency:** Delivery in terms of cost, time and quality as per specification
3. **Effectiveness:** Achievement of the common goal
4. **Sustainability:** Continuation of its relevance
5. **Impact:** Various effects of the project

For a construction industry or project to be successful, the contribution of CPM is undeniable [6].

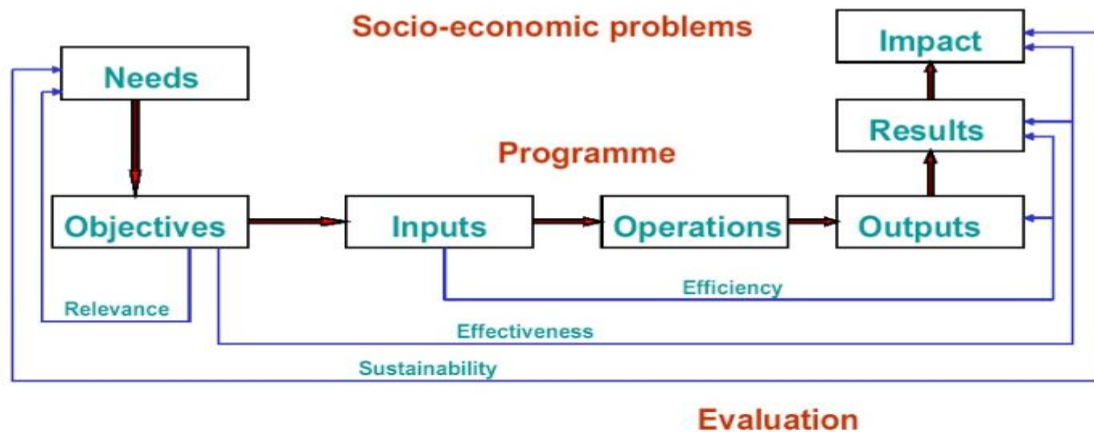


Fig.3: Performance Criteria (Source: Principles of Construction Management, April, 2006)

This can be exhibited by researchers Critical Success and failure Factors and their close relationship with the principles and functions of Management Theories [6]. Construction Project Managers are those professionals who could oversee the overall processes of construction projects from their inception to their use and disposal stages. That is; the observance, assessment and fulfillment of the overall relevance, efficiency, effectiveness, utility, sustainability and impact of a construction project to the society at large and to the client and users in particular is the role of Construction Project Management Professionals.

All other professionals are experts in the field whose contribution are very vital but are particulars in the process of the Construction Project development. Besides, the development of the construction industry technologically and in management perspectives such as policy, regulation, and etc. development issues is one of the major roles of Construction Project Management Professionals. These roles have clearly demonstrated the importance of Construction Management to project managers.

2.2.4. Processes in Construction Project Management

Projects are composed of processes [3]. A *process* is “a series of actions bringing about a result” [12]. Project processes are performed by people and generally fall into one of two major categories [3]:

- *Project management processes* are concerned with describing and organizing the work of the project.
- *Product-oriented processes* are concerned with specifying and creating the project product. Product-oriented processes are typically defined by the project life cycle and vary by application area.

Perkins indicates that project management processes is characterized by five groups of processes which enable project managers to execute the objectives of the projects in an organization [8]. A project management institute standards committee also proclaims these five groups of project management processes (or Process Groups).

Accordingly, the PMBOK Guide describes the nature of project management processes in terms of the integration between the processes, their interactions, and the purposes they serve as follows [3]:

- **Initiating Process Group**
- **Planning Process Group**
- **Executing Process Group**
- **Monitoring and Controlling Process Group**
- **Closing Process Group**

The integrative nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups [3], as shown in Figure 4. Monitoring and Controlling processes occur at the same time as processes contained within other Process Groups. Thus, the Monitoring and Controlling Process is pictured as a “background” Process Group for the other four Process Groups shown in Figure 4 below.

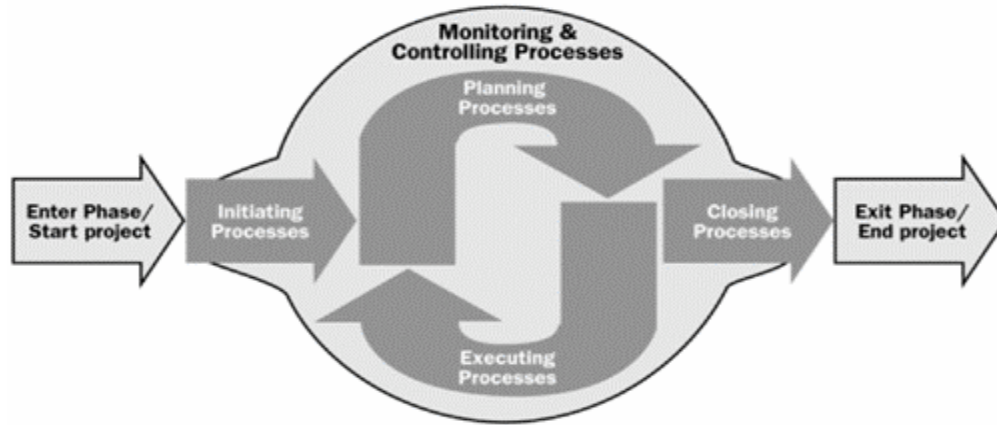


Fig.4: Project Management Process Groups (Source: PMBOK Guide 5th Edition)

2.2.5. Construction Project Life Cycle

The contribution of proficient knowledge can be very beneficial, mainly when it comes to large and complicated projects, since experts in various specialties can offer valuable services. On the other hand, it is very important and advantageous to understand how the different parts of the process match together. It is chiefly the requirement of the owner to assure that such flaws do not happen between them. And it owes all participants involved in the project to regard the interests of owners, as at the end, it is the owners who provide the resources and make the decisions.

By examining the project life cycle from an owner's perspective we can focus on the proper roles of various activities and participants in all stages regardless of the contractual arrangements for different types of work [7].

Because projects are unique undertakings, they involve a degree of uncertainty. Organizations performing projects will usually divide each project into several project phases to provide better management control and appropriate links to the ongoing operations of the performing organization. Collectively, the project phases are known as the project life cycle.

The project life cycle serves to define the beginning and the end of a project. The project life cycle definition will also determine which transitional actions at the end of the project are

included and which are not. In this manner, the project life cycle definition can be used to link the project to the ongoing operations of the performing organization [3].

The project life cycle is usually performed in phases. Each phase accomplishes specific work toward reaching the project goal and produces one or more deliverables; and the end of a phase is defined by completing its deliverable [8].

According to Perkins project management life cycle comprises five phases which are discussed below [8]. However, according to PMBOK Guide [3] the Process Groups are not project life cycle phases. In fact, it is possible that all Process Groups could be conducted within a phase. As projects are separated into distinct phase or subcomponents, such as concept development feasibility study, design, prototype, build, or test, etc., all of the Process Groups would normally be repeated for each phase or subcomponent.

- (i) Project Initiation,
- (ii) Project Planning,
- (iii) Project Execution,
- (iv) Project Monitoring & Controlling, and
- (v) Project Closure.

(i) Project Initiation

The PMBOK Guide (2013) describes project initiation that consists of those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase. Within the Initiating processes, the initial scope is defined and initial financial resources are committed.

In this phase the institution initiate a project by defining its purpose and scope, the justification for initiating it and the solution to be implemented. During this phase suitably skilled project team members are recruited and a project office is set to perform the activities [14].

Specifications of the project are defined, project objectives are established, teams are formed, and major responsibilities are assigned [10]. The phase also defines communication channels, authority, and the chain of command through the upper management with the PM [15].

A suitable response to the need is documented in a business case with recommended solution options. A feasibility study is conducted to examine whether each option clearly identifies the project objective and a final recommended solution is determined.

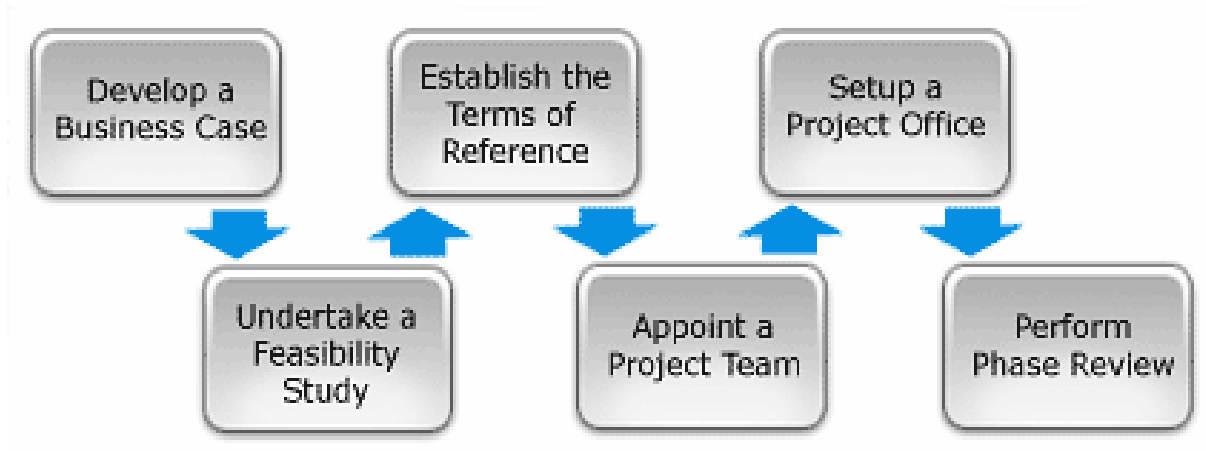


Fig.5: Project Initiation (Source: Overview of Project Management)

When a solution is approved, a project is initiated to implement the approved solution. For this, a project manager is appointed. At this stage, the major deliverables and the participating work groups are identified. This is the time when the project team begins to take shape. Approval is then required by the project manager to move onto the detailed planning phase.

(ii) Project Planning

The planning phase involves further development of the project in detail to meet the project's objective. Planning includes estimating time, cost, and resources required to perform the work, and produces plans to serve as a baseline and direct the work. The team identifies all of the work to be done. The project's tasks and resource requirements are identified, along with the strategy for producing them.

In a broader sense identification of each activity as well as their resource allocation is also carried out. A project plan outlining the activities, tasks, dependencies, and timeframes is created. Planning also includes risk identification and risk reduction efforts and the results of the Planning Phase become the Project Plan [8].

According to Perkins *et al.* the planning phase uses the project rules as a foundation and defines the path to achieve the project goals. It is performed by the project manager and the core project team, interfacing with appropriate elements of the organization, and identifies the actual work to be done”.

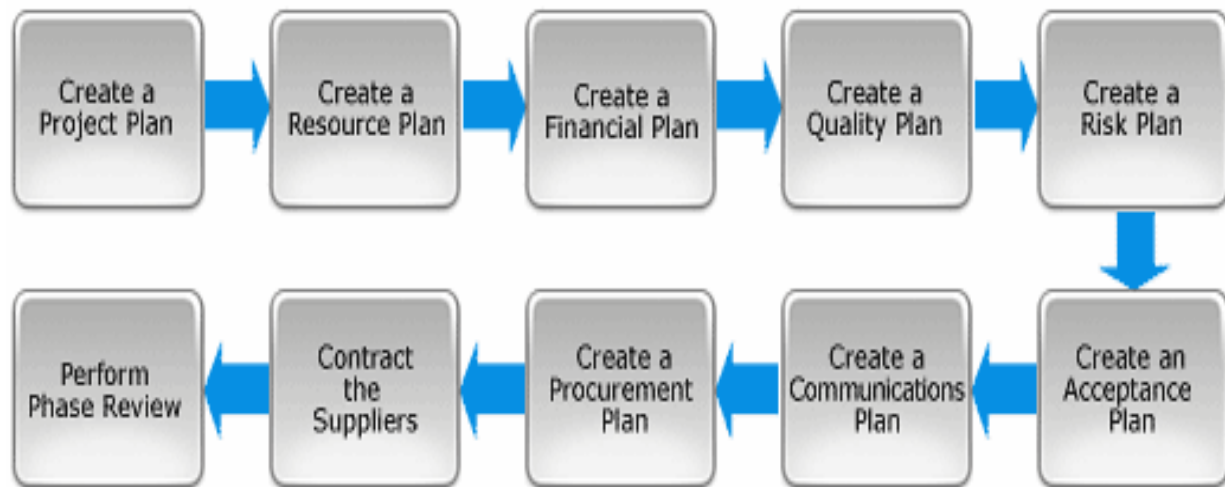


Fig.6: Project Planning (Source: Overview of Project Management)

In this phase the plans are developed to determine logistical requirements of the project [10]. This phase is guided by policy documents to help guide the team throughout the project delivery. The Planning Phase involves completing the ten key steps identified in figure 6 [14] [8].

Finally, we require a document to show the quality plan, providing quality targets, assurance, and control measures, along with an acceptance plan, listing the criteria to be met to gain customer acceptance. At this point, the project would have been planned in detail and is ready to be executed.

(iii) Project Execution

This is the implementation phase, where the project plan is put into motion and the work of the project is performed practically on site. It is essential to maintain control and communicate as needed during each implementation stages.

Execution involves building the deliverables and controlling the project delivery, scope, costs, quality, risks and issues: as illustrated in figure 7 below [8]. In this phase the project team adheres to the management *processes* to monitor and control the deliverables being output by the project.

Throughout the project implementation, people carry out the tasks, and progress information is being reported through regular project team meetings. The project manager uses this information to preserve control over the direction of the project by comparing the progress reports with the project plan to measure the performance of the project activities. If any deviation is found from the already defined plan corrective measures are made.

Projects are managed by means of time, cost, quality of deliverables and specification measures are used for control. This phase is complete when all goals are reached through monitoring and controlling, and then the project is said to be ready for closure.

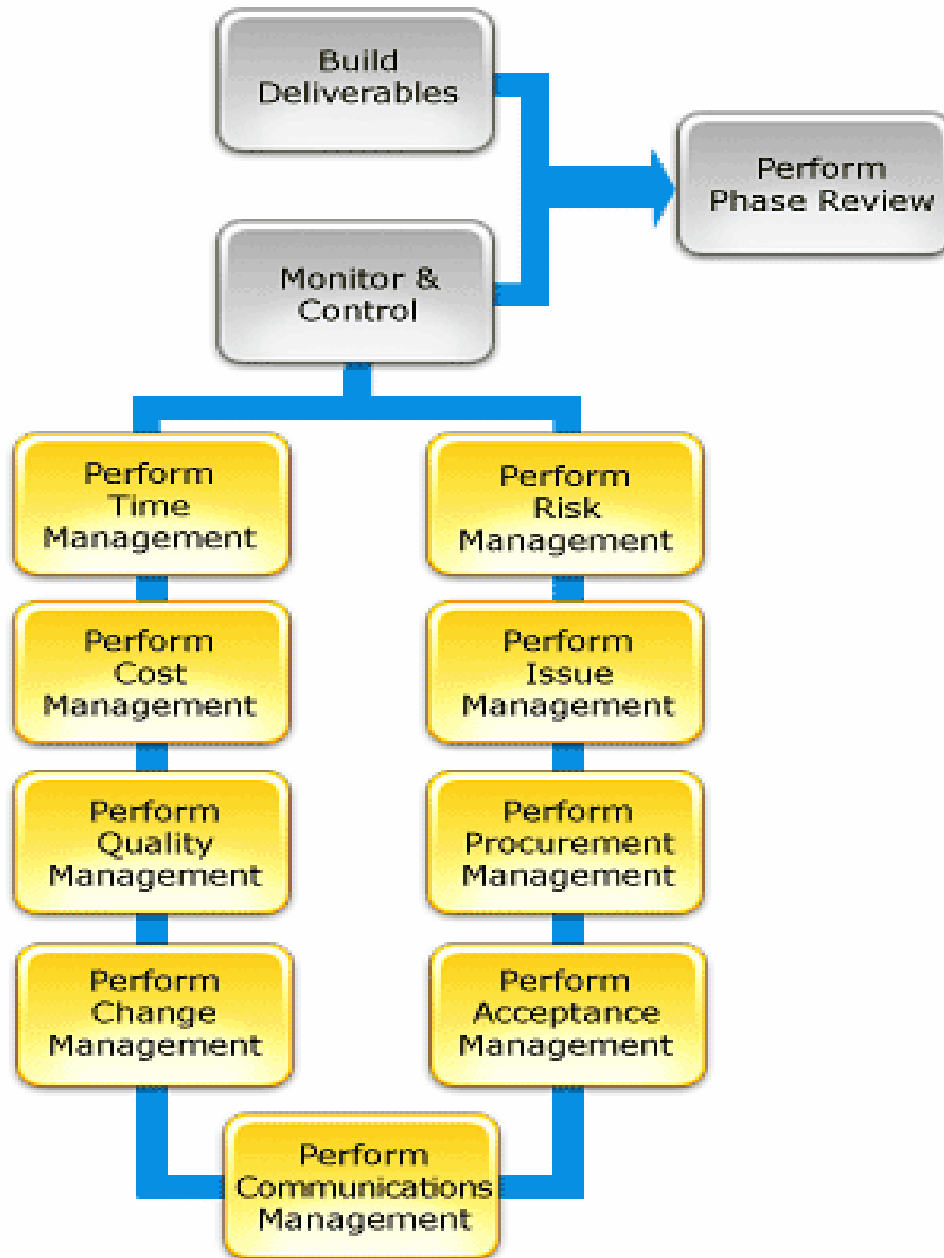


Fig.7: Project Execution (Source: Overview of Project Management)

(iv) Project Monitoring & Controlling

PMBOK Guide (2013) describes that the monitoring and controlling process consists of those processes required to track, review, and orchestrate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes.

The key benefit of this process cycle is that project performance is measured and analyzed at regular intervals, appropriate events, or exception conditions to identify variances from the project management plan [3].

According to PMBOK Guide (2013), the monitoring and controlling process also involves:

- Controlling changes and recommending corrective or preventive action in anticipation of possible problems,
- Monitoring the ongoing project activities against the project management plan and the project performance measurement baseline, and
- Influencing the factors that could circumvent integrated change control or configuration management so only approved changes are implemented.

This continuous monitoring provides the project team insight into the health of the project and identifies any areas requiring additional attention. In multiphase projects, the monitoring and controlling process coordinates project phases in order to implement corrective or preventive actions to bring the project into compliance with the project management plan [3]. This review can result in recommended and approved updates to the project management plan. In order to reduce or control overhead, management-by-exception procedures and other techniques can be appropriately considered.

(v) Project Closure

Project Closure is the final phase and involves releasing the final deliverables to the customer. The team may also hand over project documentation to the business, terminating supplier contracts, releasing project resources and communicating project closure to all stakeholders [14].

The contract is signed off as fulfilled and all other paperwork is completed. It consists primarily of tying up loose ends. Any unresolved issues from the contract or Statement of Work are resolved in this phase [8] to ensure compliance and to avoid failure in the project and completing a post implementation review. Completing a project requires procedures to closeout project contractual and administrative activities [11].

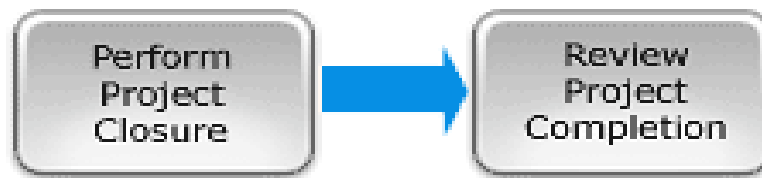


Fig.8: Project Closure (*Source: Overview of Project Management*)

Perkins et al explained that a very important activity of this phase is assembling the project history. Project history includes the success stories, the challenges involved and lessons taught [8]. Last and final is to conduct lessons-learned studies to examine what went well and what didn't.

In other words the project lifecycle can be used to assess the various stages a project goes through and also determining the budget of each stage. This type of analysis would make the knowledge of experience to be transferred back to the project organization, which will help future project teams.

2.3. Project Management Application

According to Moleli, the main purpose of project management application is to enable project managers to track the progress of a project that they are working on [15]. Any developer that has worked on a very large project will know that he/she has to give periodic updates on the progress of the work that is being done on a particular project. By using a project management application, the process is made somewhat easier, in the sense that a project manager can just log on and check on the progress made [16].

PMBOK Guide describes that project management applications as *project management knowledge areas* that are further grouped into ten separate Knowledge Areas to execute the respective projects. The section below discusses a brief outline of the project management applications [3].

i) Project Integration Management

Project Integration Management explains all the steps involved that make sure that all the different areas of the project are properly coordinated [13]. PMBOK Guide states that Project Integration Management includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups [3]. As already mentioned on PMBOK Guide , Project Integration Management processes includes: develop project charter; develop project management plan; direct and manage project work; monitor and control project work; perform integrated change control; and close project or phase.

ii) Project Scope Management

According to the Management Institute, Project Scope Management explains all the steps that need to be taken to ensure that only the necessary work required to ensure the successful completion of the project is what used is [13]. It is primarily concerned with defining and controlling what is or is not included in the project. It comprises the following processes: plan scope management, collect requirements, define scope, create WBS (work breakdown structure), validate scope, and control scope [3].

PMBOK Guide said also that the processes, tools, and techniques used to manage product scope vary by application area and are usually defined as part of the project life cycle.

iii) Project Time Management

Moleli explains that Project Time Management clarifies all the steps that need to be taken so that every task is completed on time, so that the project is not delayed but completed on time [15]. Project Time Management includes the processes required to manage the timely completion of the project which are as follows: plan schedule management; define activities; sequence activities; estimate activity resources; estimate activity durations; develop schedule; and control schedule [3].

iv) *Project Cost Management*

Project Cost Management includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget [3]. According to PMBOK Guide, it comprises plan cost management; estimate costs; determine budget; and control costs.

However, project cost management is primarily concerned with the cost of the resources needed to complete project activities. It should also consider the effect of project decisions on the cost of using the project product.

v) *Project Quality Management*

Project Quality Management includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken [3]. It includes “all activities of the overall management function that determine the quality policy, objectives, and responsibilities and implements them by means such as quality planning, quality control, quality assurance, and quality improvement, within the quality system” [13].

Plan quality management, perform quality assurance, and control quality are said to be the Project Quality Management processes provided by PMBOK [3].

vi) *Project Human Resource Management*

Project Human Resource Management explains all the steps that need to be taken to ensure effective utilization of all the people involved in the project [13]. Project Human Resource Management includes the processes that organize, manage, and lead the project team. It comprises plan human resource management, acquire project team, develop project team and manage project team [3].

vii) *Project Communication Management*

According to PMBOK Guide, Project Communications Management includes the processes that are required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information [3]. It provides the critical links among people, ideas, and information that are necessary for success through the following major processes: Plan communications Management, Manage communications, and control communications [3].

viii) *Project Risk Management*

Project Risk Management explains the various methods involved in identifying, analyzing and avoiding a potential threat to the project [13]. It includes maximizing the results of positive events and minimizing the consequences of adverse events. The objectives of project risk management are to increase the likelihood and impact of positive events, and decrease the likelihood and impact of negative events in the project [3]. It comprises of the following major processes: Plan risk Management, Identify risks, Perform Qualitative risk Analysis, Perform Quantitative risk Analysis, Plan risk responses and control risks [3].

ix) *Project Procurement Management*

PMBOK Guide describes that Project Procurement Management includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team. The organization can be either the buyer or seller of the products, services, or results of a project. It explains the necessary steps to be followed when out-sourcing services. Plan procurement management, conduct procurements, control procurements, and close procurements are the major processes of Project Procurement Management according to the management institute [3].

x) *Project Stakeholder Management*

Lester says that almost any person or organization with an interest in a project can be termed a *stakeholder* [4]. According to Wubishet, stakeholders can be defined as either individuals or

units or the organization itself for which they claim a stake in the project such that they get benefit from or affected by the whole processes of the project and its deliverables [6].

Stakeholders can be divided into two main groups: *direct (or primary)* stakeholders, and *indirect (or secondary)* stakeholders. Each of these groups can contain *positive* stakeholders who support the aims and objectives of the project, whereas *negative* stakeholders who do not support the project and do not wish it to proceed [4].

Project Stakeholder Management includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution. Stakeholder satisfaction should be managed as a key project objective through the following processes Identify stakeholders, plan stakeholder management, manage stakeholder engagement, and control stakeholder engagement [3].

2.4. The Construction Extension to the Project Management Knowledge Areas

The PMBOK Guide describes the generally accepted knowledge and practices applicable to most projects most of the time, upon which there is widespread consensus about their value and usefulness. The Construction Extension to the PMBOK Guide also includes construction industry unique knowledge areas that are not apply to most projects most of the time. These construction industry unique knowledge areas are described below [52]:

xi) Project Safety Management

Safety Management includes the processes required to assure that the construction project is executed with appropriate care to prevent accidents that cause or have the potential to cause personal injury or property damage. Safety management is basically a subset of risk management but because it is functionally so specialized (traditionally unique) and important on every construction project. Good safety practice on a construction project can reduce or eliminate accidents and injury to personnel, improve effectiveness of performance and reduce total project

cost. Safety planning, safety plan execution and administration and reporting are the major processes that provided for good safety management [52].

xii) Project Environmental Management

Project Environmental Management includes the processes required to ensure that the impact of the project execution to the surrounding environment will remain within the limits stated in legal permits. The major processes required for environmental management are environmental planning, environmental assurance, and environmental control. It is related with identifying the environmental characteristics surrounding the construction site and the potential impacts the construction may bring to the environment; planning the approach towards avoiding environmental impacts and achieving environmental conservation (and improvement if possible); auditing the plan and controlling the results; and inspecting environmental conditions [52].

xiii) Project Financial Management

Financial Management includes the processes to acquire and manage the financial resources for the project and is more concerned with revenue source and analyzing/updating net cash flows for the construction project than is cost management. Thus, financial management is distinctly different from cost management which relates more to managing the day-to-day costs of the project for labor and materials. The financial management is limited to financing the cost of construction of the project itself, although long-term financing may include both construction and operation. The major processes involved are financial planning, financial control, and administration and records [52].

xiv) Project Claim Management

Claim Management describes the processes required to eliminate or prevent construction claims from arising and for the expeditious handling of claims when they do occur. Claim Management is an important process in construction to stimulate a careful approach to contract preparation and expeditious handling of claims should they arise. Claim Management is, in some respects, similar to risk management and consists of the following four processes: claim identification, claim quantification, claim prevention, and claim resolution [52].

2.5. Project Management Consulting

Various types of project management consulting exist, depending on the industry, the skill set required and the project to be completed [17]. Project consultants may be those who advise on the type of project to be constructed, the volume of the project and other issues related to project management. In project management consulting, the consultant is responsible for the successful completion of the project within a specific time frame and on a specific budget [15].

In project management consulting, the institution defines the deliverable items, benchmarks and timelines [17]. The consultants have a combination of expertise in the specific industry and the ability to manage people. Like all careers they also need to have excellent communication, negotiation and administrative skills which are necessary to successfully coordinate a group of people to achieve any goal.

According to Wisegeek, Project management consultants are usually hired for complex, large-scale projects and must have above average skills in these areas. Every individual involved in the process of planning, designing, financing, constructing and operating physical facilities related to the project under consideration, gain different viewpoints on project management for construction. The poor coordination and communication between the specialists can result in waste, excessive cost, and delays.

2.6. Constraints To Project Management

Before a project manager and his team work on a project, there are certain constraints that have to be dealt with in project management. The three constraints of project management are cost, time and scope [15]. These three constraints take a triangular form, with each corner reflecting each constraint. Every one of these constraints should be properly used or else the whole project will result in complete failure. A project manager cannot use one part of the triangle without using the other two sides [18].

The first constraint, the *time* constraint deals with the specific duration it should take to finish the project. To successfully finish the project on time, a time schedule should be drawn up and then broken down into different time frames according to how long certain parts of a project will take

to complete. The three constraints of a project will always compete with each other, e.g. if a project team enlarges the scope of the project then as a result both the time and budget of the project will also increase [19].

The *cost* involved with successfully completing a project is dependent on a number of different elements, and some of these are material costs, the costs of labor, risk, and machines. The profit must also be analyzed when one is considering the cost constraint [19].

The third constraint, the *scope*, “can be defined as the tools and resources that are needed to achieve the end objective of the team” [19]. The scope can also be described as the overall goal of the project. It is very important for the project manager and his team to use these constraints accordingly in order to avoid failure from the project [15].

Furthermore, lack of attention to communication and consultation processes can generate project rejection by community members. This can ultimately be a cause of substantial delays, increased costs, and unsatisfactory compromise solutions, which could have been avoided through earlier consultation according to Moleli [15].

But the understanding of the entire process of project management will make them respond more effectively to the owner’s desires. Hence, they can contribute their proficiency through opinions in improving the productivity and quality of their work. Enhancement of project management boosts the construction industry which in turn facilitates the development of national and world economy. To have significant improvements, know the construction industry, its working environment and the institutional constraints affecting its activities and the nature of project management.

2.7. Delay of Construction Projects

Delay may be defined as a period during which a contractor cannot employ his resources at normal intended output, having regard to the nature and amount of work which is available under the agreed program of working or under any rearrangement of that program.

According to Hamidreza et al, Delay is a situation in which a project due to some causes related to the contractor, client, client's consultant or other causes has not been finished in contractual or agreed period. The mentioned researchers said that delays are insidious often resulting in time overrun, cost overrun, disputes, litigation, and complete abandonment of projects [2].

A construction delay is anything that impedes the ability of a contractor to maintain a schedule. In construction projects, as well in other projects where a schedule is being used to plan work, delays happen all the time. It's what is being delayed that determines if a project, or some other deadline such as a milestone, will be completed late. Furthermore, delays in construction projects are frequently expensive, since there is usually a construction loan involved which charges interest, management staff dedicated to the project whose costs are time dependent, and ongoing inflation in wage and material prices.

However, in more complex projects, problems will arise that are not foreseen in the original contract, and so other legal construction forms are subsequently used, such as change orders. It is very rare, in the modern construction world, for a single contractor to complete every phase of a construction project. The task of completing many small jobs falls on the shoulders of sub-contractors or independent contractors who are willing to work temporarily for the general contractor. These smaller units create a schedule according to the time frame they are given to complete a job.

Any construction delay that causes the smaller sub-contractor to wait, prior to beginning a job, also gives the sub-contractor less time to complete his task. A project's duration might be just a week or it might go for on years, but every project has an end date. Through this period it comprises a process. The project time objective specifies the project completion time. Virtually all road construction projects were not completed as planned. There may be many reasons both foreseeable and unforeseeable, for non-completion of road project timely.

According to FIDIC Guide to the use of conditions of contract for works of civil engineering Construction (1997), in order to complete a project within the required time and budget, it is essential that each phase of its preparation and execution, starting with the assessment of feasibility and terminating with the handing over of the completed project by the Contractor to the Owner, be formulated with precision in order to limit delays, disputes and unforeseen additional costs [20].

2.7.1. Causes of Construction Delay

It is known that one of the most important problems in the construction industry is delay. Delay occurs in every construction project and magnitude of these delays varies considerably from project to project. As a project manager requires that you complete your projects on time, finish with in budget, and make sure your customers are happy with what you deliver [21].

However, Ismael describes that a project can be classified in to three phases: project conception, project design, and project construction [22]. Thus, we generally categorize events that cause delays in to two:

- a) Pre-construction events causing delays during construction stage (this includes events that occur during project conception, project design and project contracting), and
- b) Construction stage events causing delays.

a) Causes of Delay Due to Events during Pre-construction Stage

Pre-construction stage is defined as all activities required to take a project from nomination through to advertisement for construction contract letting [23]. The pre-construction process includes all the activities required to develop a project into the detailed plan specifications and estimates that are used by contractors as their construction plan.

The project manager and implementing agencies must allow sufficient time to complete all the essential pre-construction activities in the overall project schedule in order to minimize the possible delays and cost overruns encountered during implementation stage [24].

According to Girma et al, the major events that may result in delay arising from pre-construction stage are [24]:

- i. Contract document preparation
- ii. Design preparation
- iii. Tender document preparation
- iv. Process of tendering
- v. Contract negotiation process

Also, Wubishet noted that the causes of delay and cost overruns arising from pre-construction stage that lead to claims and disputes are resulted due to the existence of high uncertainty during the early phase of a project, which possess the most probable influencing power on the project [25]. Accordingly, Sami et al explained as decisions made early in the life of the project have the most profound effect on the project's objectives of delivering a safe, quality project within the time and budget allocated [26].

b) Causes of Delay Due to Events during Construction Stage

When a construction project begins, the original schedule often changes due to several types of delays. Many types of delays are preventable by planning properly and thoroughly for the job. Other types are often inevitable due to circumstances beyond the contractor's control. Maintaining the original construction schedule is imperative for staying on budget and completing the project on time.

Besides, Girma et al explain that factors which cause delay during implementation stage may result in additional cost to both the client and the contractor. The loss of revenue or benefit that could have been gained if the project was completed on time, consultant fees which are paid throughout the project, cost associated with head office support of the project are among the costs to be cited as the major ones incurred by the employer [24].

Similarly, Abebe in his paper work studied that the additional cost to be incurred by the contractors include: additional overhead costs, costs of extension of various bonds such as performance bond and bank guarantee, operational and maintenance cost of facilities [27].

Therefore, the main objective of this research is to set out the various causes of delay on road projects at implementation stage, and their effects on the project's goal which will be discussed in chapter four.

2.7.2. Identification of Causes of Delay

Many researches and articles have been carried out on identification of causes of delay in construction projects. According to Syed et al, there are two kinds of causes of delays in construction projects: *external* and *internal* cause [31]. Internal causes of delays include the causes, which come from four parties involved in the project - Owner, Designer, Contractors, and Consultant. Other delays, which do not come from these four parties, are based on external causes for instance from the government, material supplier, weather.

In accordance with Girma et al pointed out causes of delays that the construction industry is facing now a days during implementation stage are:

- Possessive decision-making mechanism
- Highly bureaucratic organization
- Improper inspection approach
- Different attitude between the consultant and contractor
- Financial difficulties
- Inexperienced personnel
- Insufficient number of staff
- Deficiency in project coordination
- Inadequate and old equipment
- Lack of high technology equipment
- Harvest time

According to FIDIC 87 also that, delays in construction work mainly occurring during implementation stage are due to [37]:

- Delay in site hand over.
- Late approval of payment certificates.

- Changing the scope of the work.
- Low contractor's financial and technical capacity.
- Delay of drawings or instruction.
- Unforeseeable physical condition.
- Suspension of work up on the engineer's instruction.

From a causation perspective of different researches made by scholars in the area, delays may be categorized as [24] [34] [36]:

1. Delays caused by the Contractor;
2. Delays caused by the Client or by the Employer;
3. Delays caused by the Consultant;
4. Delays caused by neutral events or Delays caused by outside the control of either party to the contract.

Delays caused by the Contractor

According to the literatures reviewed in related to the study, some of the following causes of delay can be attributed under contractor's risk [36] [39] [40] [41] [42]:

- Planning failure
- Organization failure
- Scarcity of resources
- Controlling failure
- Coordination failure
- Lack of qualified engineers
- Failure to hold cash flow for cast

Delays Caused by the Client

The client delays completion of the work in various ways. Among these, the following are the main ones as a report published by the construction industry council of UK [43]:

- Rigid budgets

- Changes of mind during construction
- Ordering extra which delay the work
- Delay to provide the right of way
- Differing site conditions
- Suspension

Delays Caused by the Consultant

Ismael in his study and also Fisk in his text includes the following causes of delays as a major causes of delays that are caused by the consultant side [44] [45]:

- Late approval of laboratory tests
- Design changes
- Late approval of payment
- Poor briefing of document (i.e. specification, bill of quantity.)
- Postponement of work
- Late approval of shop drawings

Delays caused by Neutral Events

Neutral events are those for which neither the employer nor the contractor is responsible, e.g. exceptionally adverse weather conditions. Most contracts allow the contractor more time to complete but with no corresponding entitlement to recover any loss and/or expense caused, said Ndekugri [34].

According to Frics [36], events which considered as outside the control of either party to the contract, are:

- Force majeure
- Exceptional adverse weather condition
- Civil commotions or strikes use of fuel or labor
- Material market instability
- Government legislation change

- Government statutes that restricts use of fuel or labor

Before analyzing construction delays, a clear understanding of the general types of delays to better identification the cause and effect relationship among the different causes of delays is necessary.

2.7.3. Types of Construction Delays

Construction projects involve expensive equipment, tremendous overhead, significant manpower and large payrolls for owners and contractors alike. All parties involved in the construction process (i.e., owners, consultants, contractors, subcontractors and suppliers) have a vested interest in on-time performance and on-time payment. Delays in completing a construction project (or a portion thereof) can have significant financial impact on the owner and the contractor.

However, it is important to understand the types or categories which a delay falls into before analyzing construction delays. To initiate the further mitigation efforts and to convert it into a merit, a clear understanding of types of delays is necessary. The delays are classified or categorized into five basic ways [49] [54]:

- (i) **Critical or Non-Critical**
- (ii) **Excusable or Non-Excusable**
- (iii) **Concurrent or Non-Concurrent**
- (iv) **Compensable or Non-Compensable**
- (v) **Independent or Serial**

Before determining the impact of a delay on the project, one must determine whether the delay is critical or non-critical. Additionally, all delays are either excusable or non-excusable. Both excusable and non-excusable delays can be defined as either concurrent or non-concurrent. Delays can be further broken down into compensable or non-compensable delays. Delays can also be described as independent or serial.

From the above classification point of view, this research paper is focused on the type of delay that is the most concerning to both the contractor and the client in many cases; this is the *non-*

excusable and *excusable but non - compensable* construction delay. This type of delays defines, in many instances, which pays the added costs attributed to the delay in progress, especially on road constructions.

Accordingly, the scope of the research is the federal road projects which have been completed or being executed by executive companies and performing organizations affiliated to the Ethiopian Road Authority /ERA/.

(i) Critical or Non-Critical

Critical Delay: Critical delay is event which causes the delay to the completion of the work project within stipulated period. In order for delay to warrant an extension of contract time, the delay must affect the completion of the project. This provides the basis for the high importance attached to the use of critical path method (CPM) of scheduling for proving or disproving time related claims such as extension of time and prolongation cost [53].

Few results are mentioned below:

- Extending project duration
- Extended field overhead
- Unabsorbed home office overhead
- Liquidated damage
- Idle labor & equipment cost
- Labor & material cost escalation and many more.

Non-Critical Delays: When the delay does not influence the project being completed in a timely manner, it is not a critical delay, and consequently it is not a delay cost that results in the contractor getting reimbursed.

Non-critical delays affect the work progress but do not cause delay to overall the completion of the project. It is a delay that is not the cause of extended project duration; however, it will have an effect in terms of activities getting completed late than scheduled completion. These activities will also affect project cost estimates as reiterated below;

- Idle labor & equipment cost
- Labor & material cost escalation and many more.

(ii) Excusable or Non-Excusable

Excusable Delays: Excusable delays usually include delays for which the owner is responsible as well as delays specifically excused by the contract. Excusable delay is not the fault of the contractor and is the type of delay that will entitle the contractor to additional time, additional compensation, or both. In the construction world, excusable delays consist of any delays that are unforeseeable, and fall beyond the contractor's control and without the fault or negligence of the Contractor [21] [31] [24].

Examples of these causes are:

- (1) Acts of God or of the public enemy,
- (2) Acts of the Government in either its sovereign or contractual capacity (Force Measure Clause),
- (3) Natural Calamities (Fires, Floods, etc.),
- (4) Political/Social Unrest
- (5) Epidemics,
- (6) Quarantine restrictions,
- (7) Strikes (Terrorist Attacks),
- (8) Freight embargoes,
- (9) Unusually severe weather,
- (10) Delay from Client (Approvals, Decisions, Design changes, etc.),
- (11) Errors and Omissions in the contract drawing,
- (12) Labor union strikes, and so forth.

In each instance, the failure to perform must be beyond the control and without the fault or negligence of the Contractor. In this case, contractor does not have any control on the activity getting delayed. These are the causes of a delay where the contractor is entitled for extension of time or compensation or both, under the terms & conditions of contract.

Non-Excusable Delays: On the other hand, if a delay is found to be non-excusable, it is something that was foreseeable and within the control of the contractor. Non-excusable delays can be anything that the contractor could have prevented. It is a delay where the contractor is fully responsible for the activities getting delayed and resulted in extending project duration (responsible for critical delays). This is the delay solely caused by them and may trigger the owner's assessment of liquidated damages. Therefore, a contractor that is responsible for the delay will not be entitled to an extension of time or delay damages for the delay that it has caused.

In the instance of non-excusable delay, the owner may demand that the contractor accelerate its performance to meet the schedule, recover actual or liquidated damages from the contractor and, in extreme cases, terminate the contract based on the contractor's default [21] [31] [24].

Causes associated with a non-excusable delay include:

- delayed mobilization,
- delayed procurement,
- improper project planning and scheduling,
- failing to submit shop drawings in a timely manner,
- failing to commence work as required by the contract,
- proving poor workmanship or improperly allocating labor and materials,
- lacking the proper equipment needed to perform the work,
- failing to make progress with the project,
- failing to coordinate work,
- failing to perform work on time resulting in the contractor's inability,
- lack of needed materials,
- failing to schedule workers properly,
- poor contract management,
- unreliable subcontractors or suppliers,
- underestimates of productivity,
- poor site management and supervision,
- wrong construction methods,

- critical events that were not highlighted to client on right time,
- delayed submission of important documents, etc.

A comprehensive classification of causes of construction delays has also been recommended by Majid et al [28]. They classified the main causes of non-excusable delays according to the source of occurrence, and then identified the factor contributing to those causes. They classified the factor of causes of non-excusable delays into twelve groups:

- (1) Material-Related Delays;
- (2) Labor-Related Delays;
- (3) Equipment-Related Delays;
- (4) Financial-Related Delays;
- (5) Improper Planning;
- (6) Lack Of Control;
- (7) Subcontractor-Related Delays;
- (8) Poor Coordination;
- (9) Inadequate Supervision;
- (10) Improper Construction Methods;
- (11) Technical Personnel Shortages; And
- (12) Poor Communication.

In this case, the contractor has to bear the risk of cost consequences including the liability to pay damages for itself but possibly for the other parties as well. He/she is expected to have control over the non-excusable delays and, presumably, do more to prevent them. Therefore, it is contractor's responsibilities to continue their work with no entitlement to claim for extension of time or delay damages until they completed the project. Research findings from literatures are shown in Table 1 as ranked top causes of non-excusable delays. .

Table 1: Ranked Top 20 Causes of Non - Excusable Construction Delays (Source: [2])

No.	Non-Excusable Causes of Construction Delay
1	Not selecting competent subcontractors
2	Poor management of the project changes
3	Lack of mechanism for recording, analyzing, and transferring project lessons learned
4	Delay in forwarding material and equipment to the site
5	Delay in awarding subcontractors' contracts
6	Lack of effective managing and controlling subcontractors
7	Delay in detail design by project engineer subcontractor
8	Delay in supplying shortage of the equipment
9	Poor management of project site
10	Poor management of project site
11	Issues on recruiting, attaining, and promoting expert and experienced project team
12	Lack of effective communication and coordination with project stakeholders specially with the client/client's consultant
13	Delay in obtaining technical information from subcontractors
14	Conflicts among performing organization, client and client's consultant
15	Slow decision making by project manager
16	Detail design errors by project engineer subcontractor
17	Delay in basic design by performing organization
18	Lack of applying contractual tools (liquidated damage or acceleration of work) against subcontractor
19	Delay in basic design by project engineer subcontractor
20	Conflicts in work schedules of the subcontractors

(iii) Concurrent or Non-Concurrent

A situation where more than one delay event occurs at the same time affecting multiple activities simultaneously/independently affecting the completion is *concurrent delay*. However, not all those events enable the contractor to be entitled for extension of time & cost claim. Importantly, it is the causes of delay rather the delay themselves, that must overlap. It is also defined as “the occurrence of two or more delays events at the same time, one an employer risk event, the other a contractor risk event and the effects of which are felt at the same time” [33] [24].

Alternatively, events might be said to be concurrent only in the sense that for some part of their duration they overlapped in time. Yet again, events might to be said concurrent if they possessed a common starting point or common end point. It might also be possible to describe events as concurrent that they possessed a causative influence upon some subsequent event, even though they did not overlap in time.”

Concurrent delay is a problem that happening on most of the construction industry project. This issue arises when two or more delaying event at the same time in a project cannot complete on time. In this situation, both owner and contractor are responsible for the delay. Commonly concurrent delays which involve any two or more excusable delays result in extension of time. When excusable with compensation and non-excusable delays are concurrent, an extension of time can be issued or the delay can be distribution between the owner and the contractor. Concurrent delay can be categories in three types of delays:

- If excusable and non-excusable delays occur concurrently, the contractor only to allow claim for extension of time:
- If excusable with compensation and excusable without compensation delays occur concurrently, the contractor is entitle to claim extension of time but no delay damages:
- If two excusable with compensation delays occur concurrently, the contractor is entitled to claim extension of time and delay damages.

It can be said that the issues and problems involved in concurrent delays is complicated and difficult one. Generally, claims in concurrent delay are contended as both a sword and a shield in order to claim damages or extension of time or, both. But the viability and success of claims or defense availed always depend on the facts, evidences and terms of the contract of each and every case. Inference can be drawn from the judicial pronouncements which are helpful in ascertaining and guiding in the decision of claims.

(iv) Compensable or Non-Compensable

Compensable Delay: Compensable delay is entitling the contractor to additional time to substantially complete the project and, based upon the contract, additional compensation in the form of extended general conditions. This type of delay could be the result of owner-directed changes, differing site conditions, design revisions, suspension of performance, *i.e.*, actions that are outside of the contractor's control but within the owner and its agents' control [29] [30] [32] [24].

Non-Compensable Delay: Non-Compensable delay, on the other hand, is typically your force majeure delay including unusually severe weather conditions, fire, or labor strikes; these are the types of delay that are beyond any parties' control in the construction process, which is why the contractor would be entitled to additional time, but not additional money [29] [30] [32] [24].

When it comes to compensable delays, in most cases they will be defined in the contract. Compensable delays are typically known as "No damages for delay" clauses, and with this the contractor has the ability to be compensated for a particular delay cost, depending on the circumstances.

All compensable delays fall under excusable delays. However, non-compensable may fall under critical, non-critical, excusable or non-excusable; depending upon the situation it has created and conditions of contract.

Excusable, but Non-compensable Delay: Excusable, but Non-Compensable Delays are entitle a contractor to an extension of time only. Typically, this type of delay is caused by something beyond the control of either the contractor or the owner. For example, acts of God, unusual

weather and labor disputes will entitle a contractor to additional time to complete the work, and is usually the contractor's only remedy [29] [30] [32].

Excusable, but Compensable Delay: When an excusable delay is compensable, a party can claim time extension as well as compensation for delay caused, and where the excusable delay is non compensable, in such case the party can only claim for time extension but not compensation [30] [31] [32] [24]. However, the depth studies as to what extent these factors and variables can affect the construction project.

(v) **Independent or Serial**

According to Braimah (2008), the terms of “independent delays”, “serial delays” and “concurrent delays” are used to describe delays based on the interrelation of the above delay types with respect to their duration and time of occurrence. ***Independent delays*** are delays that occur in isolation or without other consecutive or simultaneous delays while ***Serial delays*** occur in sequence consecutively and not overlapping with each other on a particular network path [54].

2.7.4. Occurrence of Construction Delay

Most construction contracts require the contractor to carry out and complete the project by a specified date or within a specified period from a commencement date [34].

The proneness of projects to delay has attracted the attention of researchers all over the world, for example by Jonathan et al (2001) studied that an activity's completion may be delayed due to a start or extended activity duration. While an activity's start may be delayed due to certain reasons; while its duration may be extended due to some other reasons.

An activity's delayed completion may cause delays in the succeeding activities, which in turn can cause a delay in the project completion [24].

Delays can occur in any and all activities, and these delays can concurrently or simultaneously cause delays in the project completion. In other words, a project delay is the accumulated effect of the delays in individual activities [24] [35].

2.7.5. Effects of Construction Delays

A construction project is basically a temporary endeavor with specified time & cost, initiated to create a unique product, service or result, tend to be limited edition. The project-team comes together to create that unique development on a particular site under circumstances that will never be repeated. They may be complex, demanding high level of co-ordination of permissions, people, goods, plant and materials and construction can begin despite many uncertainties, and as a consequence, delays are common [49].

Furthermore, the involvement of advanced technologies and owner-desired-changes makes it even more difficult to keep a project on the scheduled track [55]. Coupled with this state are innate uncertainties and sophistication in the physical, financial, and economic environment in which most projects are performed. Such conditions have made completing projects on schedule and on budget a difficult task to accomplish, often leading to claims on cost compensations and time extensions.

It is obvious that construction delays are considered as time lag in completion of activities from its specified time as per contract or can be defined as late completion or late start of activities to the baseline schedule, directly affecting specified cost. As a result, there will be extensions of time required which will further result in fine, increased cost due to inflation, termination of contract, court cases etc. or combinations of all stated factors, resulting in delay damages [49].

Thus, construction delays are often result of a mismanaged event/s and can be seen as a risk for the projects, which if identified, analyzed and managed in a systematic process at inception, could be managed, minimized, shared, mitigated or accepted to give some good results and minimize chances of further delay.

In addition to this, according to the study made by Samuel, delay in construction project has a negative effect on clients, contractors, and consultants in terms of growth in adversarial relationships, mistrust, cash-flow problems, arbitration, and litigation. A construction project may be regarded as a successful endeavor until it satisfies the cost, time, and quality limitations applied to it. However, it is not uncommon to see a construction project failing to achieve its goal within the specified cost, time, and quality [56].

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1. Introduction

A research design is a means of providing a plan of frame work for data collecting and analysis. It is a plan that ‘guides the investigator in the process of collecting, analyzing and interpreting observations. The nature of the research topic, its aims and objectives and the resource available largely determine its design.

Research involves critical investigation of the various aspects of the problem under consideration; understanding and formulating guidelines that govern the research procedure; and developing and / or testing theories for the enhancement of the existing situation, state or process [51]. These criteria determine the methodology adopted in carrying out this research. As a result of the diversity in the types and sources of data required for answering these questions, the study used data which are qualitative and quantitative in nature. From the two main categories of design; observational and experimental, the study was found to be observational for the minimum intervention of the researcher.

Several literatures related to the aims and objectives of the research were reviewed to provide sufficient explanation about delay and delay related issues by considering past and present events in relation to the case of road construction of the selected ERA projects. This further classified the research design into descriptive explanatory case study. In this light thus, a research concerns with both what the research explores (the issues, the facts and conclusions) and how the facts are acquired and the conclusions are reached [59]. Therefore, previous chapter discuss about the problems, cause and effects of delay in road construction projects. This chapter on the other hand will explain all the method used for data collection in this study.

3.2. The Research Design and Methods Adopted

Research design refers to the plan or organization of scientific investigation, designing of a research study involves the development of a plan or strategy that will guide the collection and analyses of data. Therefore, a plan of action must be developed that shows how the problem will

be investigated, what information will be collected using which methods, and how this information will be analyzed in order to arrive at conclusions and develop recommendations. The main factors in considering methodology used are based on the objectives of the research. The methodology used was developed at initial point of the research. The methodology describes the practical way in which the whole research project has been organized. This research is a practical problem developed from the observation of asphalt road construction projects and the research questions are oriented to investigate the cause of non-excusable and excusable but non-compensable delays in selected road construction projects of ERA.

This research can be categorized as applied and descriptive type. It is applied because the research is initiated from practical problems and finds whether there exists such delay causes or not. It is also descriptive because it tried to describe the actual delay factors and the causes of delay for the ERA projects.

3.3. Method of Data Collection Adopted

The study has utilized a mix of primary and secondary data through semi-structured interviews and different online and published secondary data sources. Thus, the key task in research is to design research process so that the information obtained permits the assessment of their impact. This design was chosen since it enables to assess the magnitude and scope problems and facilitate for the suggestion of solutions.

The reason behind to discuss about the source and nature of the data is the success of the study is highly depends on availability of appropriate data. The study will rely on primary data and the major source of the data will be different domestic organizations and construction companies which are involved in executing ERA projects. These include Ethiopian Ministry of Transport, Ethiopian Road Authority /ERA/, regional road authorities, road project consulting offices, road project executive companies.

Depending on the availability of required data from a given sources, the data will be collected using different methods that includes: Reviewing of different relevant domestic and foreign literatures, ongoing researches, books, conference proceedings, the websites, construction

management and engineering journals and relevant practices related to road construction delays.

Analyzing of case studies that will apply on Ethiopian Road Authority, construction companies and consulting engineers to determine the causes of construction delays and methods used to avoid and mitigate delays for selected ERA projects.

Apart from observation, questionnaire was used as a primary information collecting tool. Data surveying that will be conducted by questionnaire and interviewing the parties involved in selected road projects. The questionnaire was designed based on factors that were identified as the causes of delay, effects of delay and methods to minimize the effects. A questionnaire survey was developed to assess the perception of client, contractor, and consultant of the relative importance of causes, effects and methods to minimize construction delay. The questionnaire was developed from literature review that was done through books, magazines and journals, the internet and other sources.

3.4. Population and Sampling of the Study

The populations used in this research were selected ERA projects and participants such as, client, contractors and consultants of the projects. Thus, the objective of sampling is to provide a practical means of enabling the data collection and processing components of research to be carried out while ensuring that the sample provides a good representation of population [51].

Accordingly, the target groups in this study were 5 selected ERA projects based on their geographical locations, climatic differences and contractual requirements in terms of local and foreign companies and their affiliated organizations which mainly of client, contractors and consultants.

On the other hand, the questioners are distributed for those randomly selected contractors and consultants that are involved in such road projects at their offices and project sites, and to the client (ERA) at the offices. From this point, the total distributed questioner is 45, and the parties take the portion that of 20 (45%) for client and its staff, 15 (33%) for contractors and the remaining 10 (22%) for consulting offices.

3.5. Methods of Data Analysis

Based on literature review and organizational experience in executing construction projects, an initial list of causes of non-excusable construction delays and excusable but non-compensable construction delays will analyze and develop through case study in the selected area of projects. The study examines the causes of non-excusable and excusable but non-compensable delays on selected road construction projects to achieve the objectives of this study. A critical review of relevant literature will done coupled with questionnaire survey to collect information on potential causes of delay factors for such selected road projects.

The results will be presented in tabular and graphical forms and the analysis and discussions will also be made on the research findings both qualitatively and quantitatively. Consequently, analysis of the data obtained from questionnaires and interviews have process which involves simple statistical approach, examining, tabulating and categorizing based on the chosen measurement scale. After the collected data will be analyzed, the findings and results will discuss.

The procedure used in analyzing of data was aimed at establishing the relative importance of various factors that contribute to causes, effects and methods of minimizing road construction projects in the perspective of the Employer. Finally, the researcher will give his conclusion and recommendation, based on the analysis and discussion.

The analysis part combined (is based on) all groups of respondents (contractors, consultants and owners) in order to obtain significant results. The data is analyzed by calculating the relative important index model to rank the hypothesized factors based on their importance and frequency which is derived from the views of the respondents of the three groups.

Calculation of Relative Importance Index (RII):

Kometa et al. [13], Aibinu et al. [14] and Faridah [15] used the relative importance index (RII) method in their research. The same method was adopted in this study for analysis of causes of delays within various groups (client, consultants and contractors). The five point scale ranged from 1 (Not Critical at all) to 5 (Most Critical) was transformed to relative importance index (RII) for each factor as follows:

$$RII = \frac{\sum w}{A \times N}$$

Where, W is weighting given to each factor by the respondents (ranging from 1 to 5), A is the highest weight (in this case is 5) and N is the total number of respondents.

The RII value is range from 0 to 1 which the higher the value of RII, the more important was the cause of delays. The RII was used to rank the different causes. The RII is then being classified based on the RII classification table as shows in table 3. The discussion will be made when the RII was classified as most critical causes of delay only.

Table 2: Classification of RII

Scale	Level of Preference	RII
1	Not critical at all	$0.0 \leq RII \leq 0.2$
2	Slightly critical	$0.2 < RII \leq 0.4$
3	Moderately critical	$0.4 < RII \leq 0.6$
4	Critical	$0.6 < RII \leq 0.8$
5	Most critical	$0.8 < RII \leq 1.0$

CHAPTER FOUR

4. RESULT ANALYSIS AND DISCUSSION

4.1. Analysis of Case Studies for Selected ERA Projects

Based on the geographical location and equivalent road network volume five regional offices are established; these are:

1. Northern ERA Regional Office - Gondar
2. Southern ERA Regional Office - Shashemene
3. Eastern ERA Regional Office - Diredawa
4. Western ERA Regional Office - Jimma
5. Central ERA Regional Office – Alemgena

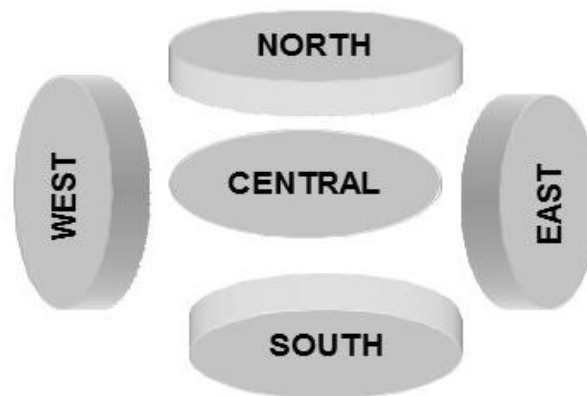


Fig.9: ERA Regional Offices

In accordance with this classification, an initial list of causes of non-excusable and excusable but non - compensable construction delays will analyze and develop through the following case studies areas in terms of geographical locations, climatic differences and contractual requirements with respect to local and foreign construction companies.

Case Study 1: Mekelle – Abi Adi – Adwa Road Upgrading Project (Northern ERA Regional)

Lot III: Werei Ridge – Adwa

Case Study 2: Sawla – Maji Road Upgrading Project (Southern ERA Regional)

Contract I: Sawla - Laska

Case Study 3: Harar By-Pass Road Project (Eastern ERA Regional)

Case Study 4: Gedo-Nekempte Road Rehabilitation Project (Western ERA Regional)

Gedo – Bako Road Project

Case Study 5: Welkite – Hossena Road Upgrading Project (Central ERA Regional)

Contract I: Welkite - Arkit

Thus, the study is focus on the main causes of non-excusable delays and excusable but non compensable delays according to the source of occurrence, and then identified the factor contributing to those causes as shown in the tables below.

Table 3: Category of Delay from a Source of Occurrence

No.	Category of Delay from a Causation Perspective	Some Major Causes of Delays
1	Delays caused by the Contractor	<ul style="list-style-type: none"> • Planning failure • Organization failure • Scarcity of resources • Controlling failure • Coordination failure • Lack of qualified engineers • Failure to hold cash flow for cast
2	Delays caused by the Client	<ul style="list-style-type: none"> • Rigid budgets • Changes of mind during construction • Ordering extra which delay the work • Delay to provide the right of way • Differing site conditions • Suspension
3	Delays caused by the Consultant	<ul style="list-style-type: none"> • Late approval of laboratory tests • Design changes • Late approval of payment • Poor briefing of document (i.e. specification, bill of quantity.) • Postponement of work • Late approval of shop drawings
4	Delays caused by neutral events	<ul style="list-style-type: none"> • Force majeure • Exceptional adverse weather condition • Civil commotions or strikes use of fuel or labor • Material market instability • Government legislation change • Government statutes that restricts use of fuel or labor

Table 4: The Factor of Causes of Non-Excusable Delays

No.	Factor of Causes of Non-Excusable Construction Delays
1	Material-Related Delays
2	Labor-Related Delays
3	Equipment-Related Delays
4	Financial-Related Delays
5	Improper Planning
6	Lack of Control
7	Subcontractor-Related Delays
8	Poor Coordination
9	Inadequate Supervision
10	Improper Construction Methods
11	Technical Personnel Shortages
12	Poor Communication

Table 5: The Factor of Causes of Excusable but Non-Compensable Delays

It is noted that some of the factors listed here below can't influence as causes of delay in ERA's (Ethiopia) situation, but it was important to mention such all factors (almost neutral events or external factors) for respondent's decisions in the study.

No.	Factor of Causes of Excusable but Non-Compensable Construction Delays
1	Acts of God or of the public enemy
2	Acts of the Government in either its sovereign or contractual capacity (Force Measure Clause)
3	Natural Calamities (Fires, Floods, etc.)
4	Political/Social Unrest
5	Epidemics
6	Quarantine restrictions
7	Strikes (Terrorist Attacks)
8	Freight embargoes
9	Unusually severe weather
10	Delay from Client (Approvals, Decisions, Design changes, etc.)
11	Errors and Omissions in the contract drawing
12	Labor union strikes

4.1.1. Mekelle – Abi Adi – Adwa Road Upgrading Project;

Lot III: Werei Ridge – Adwa

Project Information

As the works for the captioned project got underway, certain modifications, amendments and a further involvement of additional works (VO No. 1-5) became apparent due to different reasons mainly the local administration request. *(Please refer the major additional works and issuance date on table 8)*

In accordance with the relevant provisions of the contract, the Contractor is entitled to be granted for an additional time for completion of the works (*i.e. EOT No. 1 – 5, 816 Calendar Days*) for changes in the amount or nature of extra or additional work.

Table 6: Basic Contract Data of the project

Contract Data	
Contract Name	Construction of Werei Ridge – Adwa Road Upgrading Project
Funding/Financer	Government of Ethiopia (FDRE)
Length (km)	67.5
Condition of Contract	FIDIC-IV
Type of Contract	Ad-measurements
Construction Type	Construction of DS4 standard
Consultant	TOWERS Consulting PLC
Contractor	Alemayehu Ketema General Contractor
Contract Signing Date	August 12, 2011
Commencement Date	September 6, 2011
Original Completion Date	September 6, 2014
Original Contract Period	1189 Calendar Days
EOT Approved	816 Calendar Days
Revised completion date	November 30, 2016

History of Events

According to the original scope of the works Contract, the Contractor is expected to complete the whole of the works with 1095 calendar days thereby establishing the completion date on September 6, 2014.

However, during the implementation of the Contract issuance of additional works and the late issuance of drawings through VO became apparent due to different reasons mainly as a result of the local administration request.

Table 7: The major changes for the contract works are listed herein below:

VO No.	Description	Issuing Date	VO Amount (ETB, inc. VAT)
1	Realignment works of Adwa Town <i>(changing the original design of Adwa Town from 500m with 21m to 5km with 27.5m)</i>	19- Sep- 2012	47,863,076.00
2	Extension of Adwa Town to Alemeda Textile Factory	18-Nov-2014	90,797,696.00
3	Addition of Cover Ditch for Maykenetal Town	02-Apr-2013	6,404,671.00
4	Widening of Adwa Town section	17-Sep-2015	54,639,431.00
5	Extension of 500m from Maykenetal Town to Adwa town	24-Feb-2016	11,005,519.19
Total VO Amount (ETB)			210,710,393.19

Accordingly, the Engineer has assessed the Contractor's claim submission in line with the pertinent clauses of the Contract and determined the extension of time that is fairly the entitlements of the Contractor and recommended for granting same to the Contractor, so that due date for completion of the project is revised accordingly.

Table 8: EOTs Granted to Contractor

EoT No.	Claim Head	Contractor's Claim (Cal. Days)	Engineer's Determination (Cal. Days)	Approval Date	Revised Completion Date
1	Increase in Qty. (VO No. 1 & 2)	669	132	13-Jun-2014	15-Jan-2015
2	Reconsideration of EoT 1	669	135	30-Jan-2015	30-May-2015
3	Delay in granting possession of site	530	247	20-Jul-2015	02-Feb-2016
4	Increase in Qty. due to instructed VOs	316	148	10-Mar-2016	29-Jun-2016
5	Increased volume of the project works following the issuance of VOs and automatic quantity increase of the rural section	379	154	29-Aug-2016	30-Nov-2016

Findings of the Case

In view of the Contractor's claim, Engineer's recommendation and Employer's opinion for ease of reference that the Contractor has granted for EOT and compensation. However, design changes, increased in quantity, additional work order, and delay to furnish and deliver the site to the contractor are an event that caused by Owner and Consultant since the contractor shall be entitled for both extension of time and additional compensation because of the cause for such delay is excusable-compensable delay.

To justify the concurrency of the delay and the approved EoT to the contractor, the Contractor's claim submittal documents shows that the contractor used "As Planned – Impacted" method of

analysis to calculate the required EoT as there has not been any major re-sequencing of activities during the project period. Accordingly, the increased quantities and corresponding revised duration of the major critical activities has been calculated. The calculation of the revised duration is based on the production rate of the consented Clause 14 programme, adjusted to reflect changed conditions which specified in their contract.

Due to this, the Engineer has stated that, though the overall Contractor's approach for EoT analysis is acceptable in principle, the following discrepancies have been observed in the Contractor's baseline schedule.

- Extensive and impractical durations have been allocated for the grouped activities such as Embankment (Cut, borrow to fill and capping) and Excavation to Spoil (Soft, Hard, Unsuitable and Structural excavation).
- With regard to Embankment, the Contractor used productivity rate of 319 m³ per day while the baseline schedule used 434.78 m³ per day. Reverting the same from the original quantities' the duration reduced from 1189 working days to 942 working days,
- Concerning excavation, the schedule shows an extended duration due to earthwork and structural excavation summed up implying that the activities will be conducted with finish to start assumptions in the critical activity diagram. However, practically the activities could be done concurrently (with Start to Start activity link) separate duration is computed for the assessment.
- The Engineer further stated that, the Contractor impacted schedule has different sequence that of the original programme; accordingly, rearrangements are made to match the pattern on the baseline schedule and the actual site operation and condition.
- The lag/lead time between some activities has been adjusted whenever same is found in the baseline work programme to be impractical.

In view of the above, the Engineer has considered Cut-to-Spoil, common excavation as a critical activity because it requires the longest duration. Consequently, the time required to execute critical activity calculated using the daily productivity rates and corresponding duration have been inserted into the baseline schedule and impacted schedule generated the same is attached with the Engineer's report.

Table 9: Summary of Case Analysis of Werei Ridge – Adwa Road Upgrading Project

No.	Subject for Claims	Identified Causes of Delay	Responsible Parties	Delay Categories	Remarks
1	Due to VO no.1 changing the original design of Adwa Town from 500m with 21m to 5km with 27.5m	Design changes (Realignment works) and Increased in Qty	Delays caused by Owner/ Consultant	Excusable but Compensable	Granted for EoT and delay damage
2	Due to VO no.2 Extension from Adwa town to Alemeda Textile Factory	Increased in Qty	Delays caused by Owner/ Consultant	Excusable but Compensable	Granted for EoT and delay damage
3	Delays in handing over of Adwa town section due to additional woks instructed under VO1 & VO2	Delay to furnish and deliver the site to the contractor	Delays caused by Owner/ Consultant	Excusable but Compensable	Granted for EoT and delay damage
4	Due to VO no.3 addition of Cover Ditch for Maykenetal Town	Additional work	Delays caused by Owner/ Consultant	Excusable but Compensable	Granted for EoT and delay damage
5	Due to VO no.4 modification of the width of Adwa town road	Design changes and Increased volume of the project works	Delays caused by Owner/ Consultant	Excusable but Compensable	Granted for EoT and delay damage
6	Due to VO no.5 Extension of Maykenetal Town and Adwa with 500m	Design changes and Increased volume of the project works	Delays caused by the Client	Excusable but Compensable	Granted for EoT and delay damage

4.1.2. Sawla – Maji Road Upgrading Project;

Contract 1: Sawla - Laska

Project Information

The Contract for the works was awarded by the Ethiopian Roads Authority (ERA) to the Contractor, SATCON Construction PLC, by Letter of Award, on August 08, 2011. The previous Engineer appointed for this project was Beza Consulting Engineers PLC and the STADIA Engineering Works Consultant PLC is the current Engineer and Supervision Consultant. The salient features relating to the Contract are shown in the table below.

Table 10: Basic Contract Data of the Project

Contract Data	
Contract Name	Construction Works of Sawla - Maji Road Project; Contract 1: Sawla - Laska
Funding/Financer	Government of Ethiopia
Contracting Authority	Ethiopian Roads Authority
Length(Km)	52.318
Type of Contract	Item rate
Construction Type	Upgrading the Existing Gravel Road to DBST
Consultant	STADIA Engineering Works Consultant PLC
Contractor	SATCON Construction PLC
Conditions of Contract	FIDIC IV (1987)
Notification of Award	August 08, 2011
Contract Signing Date	August 12, 2011
Commencement Date	September 11,2011
Original Completion Date	September 12, 2014
Original Contract Period	1095 Calendar Days
Defects Notification/DL Period	365 Calendar Days
EOT Approved	935 Calendar Days
Revised Completion Date	April 3, 2017

History of Events

The project road has faced many challenges to date that have entitled the Contractor for extensions of time. The Contractor has submitted his claim for additional extensions of time for the events he alleges that have occurred outside the control of the Contractor which derailed the performance of the works and its timely completion.

The Engineer has assessed the Contractor's claim submission in line with the pertinent clause of the Contract and determined the extensions of time that is deemed fair entitlement and recommended granting of same to the Contractor, so that the due date for completion of the project will be revised accordingly.

Table 11: EOTs Granted to Contractor

Item No.	Claimed Issues	Contractor's Request (Cal. Days)	Engineer's Determination (Cal. Days)	Employer's Assessment (Cal. Days)
1	Delay due to increase in volume of works following variation orders (VO. No.4, 7, 8, 9 and 10)	1425	740	787
2	Delay due to unexpected and exceptionally adverse climatic conditions	42	30	28
3	Delay due to in removal of Right Of Way obstruction	127	120	120

In this regard, the Contractor submitted his extensions of time claim due to exceptionally adverse climatic conditions, increased quantity of rock excavation, delay in removal of Right Of Way obstruction, additional workload emanated from variation orders No. 04, 07, 08, 09 and 10. Accordingly, the Engineer has assessed the Contractor's EoT claim and forwarded recommendation to the Employer for review and subsequent action.

Considering all activities are to be executed concurrently, the maximum numbers of days required to execute all activities depend on base production. Hence, the employer has made no separate assessment from the Engineer's determination and found out that the Contractor is entitled to an extension of time.

Findings of the Case

Hence, in review of the Contractor's contractual entitlement, Engineer's assessment and determination and the Employer's stance as to the time extension that the Contractor is entitled as a result of those causes of delay event.

Table 12: Summary of Case Analysis of Sawla - Laska Road Upgrading Project

No.	Subject for Claims	Identified Causes of Delay	Responsible Parties	Delay Categories	Remarks
1	Delay due to increase in volume of works following variation orders (VO. No.4, 7, 8, 9 and 10)	Excess in quantity and addition of work	Delays caused by Owner/ Consultant	Excusable but Non-Compensable	Granted for EoT and delay damage
2	Delay due to unexpected and exceptionally adverse climatic conditions	Suspensions due to adverse weather conditions	Delays caused by Neutral Events	Excusable but Non-Compensable	Granted for EoT
3	Delay due to in removal of Right Of Way obstruction	Right Of Way obstruction	Delays caused by Owner/ Consultant	Excusable but Non-Compensable	Granted for EoT, and but the contractor is not entitled for delay damage by the employer

However, the Employer acknowledges the Contractor's claim in delayed removal of ROW for the execution of critical activities such as 68,012.12m³ of common excavation and 45,218.46m³ of borrow to fill. Thus, the effect of which is still continuing to date and determination of the

effect is not possible until the removal of obstruction within the right of way is finalized. Hence, it would be better to analyze this particular case after removal of ROW.

Since, delay due to increase in volume of works following variation order and delay to removal of Right Of Way obstruction to the contractor are an event that caused by Owner/ Consultant that the contractor shall be entitled for both extension of time and additional compensation because of the cause for such delay is excusable-compensable delay. But, delay due to unexpected and exceptionally adverse climatic conditions is the case that subjected for excusable but non-compensable cause of delay which is granted for EoT to contractor.

4.1.3. Harar By-Pass Road Project

Project Information

The Contract for the Works was awarded by the Ethiopian Roads Authority to the Contractor by Letter of Award, on 21st January 2013. The salient features relating to the Contract are:

Table 13: Basic Contract Data of the Project

Contract Data	
Contract Name	Harar By-Pass Road Project
Funding/Financer	Federal Democratic Republic of Ethiopia
Contracting Authority	Ethiopian Roads Authority
Length (Km)	20.175 Km
Type of Contract	Re-measurement
Construction Type	DS3 Asphalt Concrete
Consultant	CORE Consulting Engineers PLC
Contractor	Gemeshu Beyene Construction PLC
Notification of Award	January 21 2013
Contract Signing Date	January 23 2013
Commencement Date	September 26, 2013

Original Completion Date	May 26, 2015
Original Contract Period	608 cal. days
Defects Notification/DL Period	365 days
Extension of Time granted	376 calendar days
Revised Completion Date	11 th August 2016

History of Events

The Contractor has submitted his claim for additional extensions of time for the events he alleges that have occurred outside the control of the Contractor which derailed the performance of the works and its timely completion. However, the engineer determined and the employer has assessed the contractor's request for EoT as shown in the table below.

Table 14: EOTs Granted to Contractor

No.	Claimed Issue	Contractor's Request (Cal. Days)	Engineer's Determination (Cal. Days)	Employer's Assessment (Cal. Days)
1	Due to Right of Way Obstruction	391	62	62
2	Increase in Quantity of work	357	288	288
3	Delay Due to Interruption by the Local Community	81	26	26
4	Delay due to rainy season	60	Nil	Nil
5	Delay due to Sundays	40	Nil	Nil
6	Delay due to Public Holidays	7	Nil	Nil

Therefore, the Engineer/Employer has given approval to grant the Contractor a time extension of 376 calendar days that pushed the previous revised completion date to 11th August 2016 without any cost implication to the contract since the project has experienced a concurrent delay and revise the due date of the time for completion.

Findings of the Case

However, in review of the Contractor’s contractual entitlement, Engineer’s assessment and determination and the Employer’s stance that the Engineer/Employer has assessed the Contractor’s claim submission in line with the pertinent clause of the Contract and determined the extensions of time that is deemed fair entitlement and recommended granting of same to the Contractor, so that the due date for completion of the project will be revised accordingly.

But, for the Engineer/Employer to give such extension of time; the Contractor is required to provide detailed particulars and site records to support his claim and but he has failed to present and justify his claim as per the General Conditions of the Contract document clearly indicating how such delay due to the rainy days, Sundays and Public Holidays affect the progress of the work.

On the other hand, the Engineer has asserted that there are concurrent delays attributable to the Contractor’s fault, such as delay in rock excavation work, machinery breakdown and frequent turnover of Project Managers. Thus, such events are the problem of the contractor’s inadequate planning and scheduling since it is non-excusable delays, but it was rejected from both an extension of time and delay damages in this case by the engineer and employer.

Table 15: Summary of Case Analysis of Harar By-Pass Road Project

No.	Subject for Claims	Identified Causes of Delay	Responsible Parties	Delay Categories	Remarks
1	Due to Right of Way Obstruction	Delay to furnish and deliver the site to the contractor	Delays caused by Owner/ Consultant	Excusable but Compensable	Granted for EoT, and but the contractor is not entitled for delay damage by the employer
2	Increase in Quantity of work	Excess in quantity	Delays caused by Owner/ Consultant	Excusable but Non-Compensable	Granted for EoT

3	Delay Due to Interruption by the Local Community	Poor communication and coordination between parties	Delays caused by Owner/ Consultant	Excusable but Compensable	Granted for EoT, and but the contractor is not entitled for delay damage by the employer
4	Delay due to rainy season	Poor site management and supervision by contractor	Delays caused by Contractor	Non-Excusable	not entitled to both EoT & delay damage
5	Delay due to Sundays	Inadequate Planning & Scheduling since the contract is calendar days	Delays caused by Contractor	Non-Excusable	not entitled to both EoT & delay damage
6	Delay due to Public Holidays	Inadequate Planning & Scheduling since the contract is calendar days	Delays caused by Contractor	Non-Excusable	not entitled to both EoT & delay damage

Since, the Contractor alleged that the late RoW obstruction (Tele tower) results inability of proceeding rock excavation and subsequent activities in section from Km 1+760 to Km 3+020 with estimated quantity of 45,913m³ so he give notice to claim to the Engineer's office for relocation of Tele tower.

The Engineer, while assessing the Contractor's submission noted that the contractor's failure to commence the work is due to his own problems. Thus, the Engineer advised the contractor to continue the rock excavation around Tele tower, stating that design modification of road has been done by shifting centerline of road 40m away from nearest leg of tower and also the Engineer approved the masonry fence to protect the lower part of structure. However, the contractor has declined to construct masonry fence around the leg of the Tower and in addition the contractor stooped road works between Km 1+760 and Km3+020.

Nevertheless, the Engineer has stated that according to the above arguments the affected zone of rock excavation is between Km 2+460 and Km 2+700 with an estimated quantity of 13,913m³ which lead to delay in the Time for Completion of the project.

Unlike, the Contractor's basis of EOT on the estimated quantity of rock excavation, the Engineer has concluded that the Contractor's entitlement for additional time, if any, should be computed based on the actual estimated affected zone of rock excavation. In view of the above assumption, the Engineer has computed the corresponding duration of critical activities actually affected by ROW problems due to relocation of Tele Tower.

However, Delay to furnish and deliver the site to the contractor by removal of Right Of Way obstruction and Poor communication and coordination between parties due to interruption by the local community are an event that caused by Owner/Consultant since the contractor shall be entitled for both extension of time and additional compensation because of the cause for such delay is excusable-compensable delay.

4.1.4. Gedo - Nekempte Road Rehabilitation Project

Gedo – Bako Road Project

Project Information

The project road, Gedo to Bako, is located in the Western Shoa Zone of the Oromiya National Regional State. The project road is a portion of the country's road network connecting the capital Addis Ababa with western part of the country. It is the first section of the Gedo-Nekempte Road Rehabilitation Project. The main works of the Project comprise of the construction of earthworks and an asphalt concrete pavement.

Table 16: Basic Contract Data of the Project

Project Name	Gedo-Nekempte Road Rehabilitation Project, Contract 1: Gedo-Bako Road Project
Funding Agency	International Development Association (IDA), World Bank, in collaboration with the Federal Democratic Republic of Ethiopia
Employer's name	Ethiopian Roads Authority
Contractor's name	China Highway Group Limited
Engineer's name	DHV Consultants
Date of Contract Signature	29 July 2009

Commencement Date	22 January 2010
Original Contract Period	913 Cal. days
Original Completion Date	12 April 2012
Extension of Time granted	314 calendar days
Revised completion Date	24 April 2013
Defects Notification Period	365 Calendar Days
Type of Contract	Re-measurable quantities with price adjustment of rates
Original Contract Amount	ETB 354,350,909.62
Estimated Final Contract Price	ETB 632,306,431.39
Contract Length: Original	66.132 km
Conditions of Contract	FIDIC March 2006

History of Events

The Contractor gave notice of his intention to claim for extensions of time and costs for several claims and measurement issues encountered throughout the course of the Contract. However, the engineer determined along with the contract and the employer has also assessed the contractor's request that determined by the engineer for EoT as shown in the table below.

Table 17: The major changes for the contract works are listed herein below:

No.	Occurrence	Extension of Time Awarded	Revised Completion Date	Remarks
1.	Shifting of commencement date	101 days	22 July 2012	Original completion date was 12 April 2012
2.	Suspension of works due to discovery of landmines	6 days	28 July 2012	
3.	Adverse weather conditions	16 days	16 October 2012	Days given outside rainy season time
4.	Quantity changes in major and minor drainage structures	70 days	25 Dec. 2012	
5.	Delayed payment of VAT amounts deducted initially	121 days	24 April 2013	

Regarding the commencement date of the works, in addition to the earlier correspondences, Contractor latest letter no. GNRRI-CHGL-DHC-482, dated: 8 October 2010, expressed his dissatisfaction with the specified commencement date of the project, which was set originally by the Engineer on 12 October 2009. Contractor alleged that the ‘necessary requirements prior to issuance of such notice to commence the works’ were not met. Contractor formally submitted on the 22 of May 2010 his Statement of Claim EOT/001 on delayed Commencement Date. The Engineer reviewed and re-assessed the commencement date and issued his determination in June 2011 to all parties and the commencement date was set to be 22 January 2010 as Contractor was given possession of the first 5km of site on 21 January 2010.

Findings of the Case

In review of the Contractor’s contractual entitlement, Engineer’s assessment and determination and the Employer’s stance that the Engineer/Employer has assessed the Contractor’s claim submission in line with the pertinent clause of the Contract and determined the extensions of time that is deemed fair entitlement and recommended granting of same to the Contractor, so that the due date for completion of the project will be revised accordingly.

However, the events caused by Owner/Consultant that of excusable-compensable delays for which the contractor shall be entitled for both extension of time and additional compensation in this case, the contractor did not eligible by the employer except for granting extension of time.

Table 18: Summary of Case Analysis of Gedo – Bako Road Project

No.	Subject for Claims	Identified Causes of Delay	Responsible Parties	Delay Categories	Remarks
1	Shifting of commencement date	Delay to furnish and deliver the site to the contractor	Delays caused by Owner/Consultant	Excusable but Compensable	Granted for EoT, but he is not entitled to delay damage
2	Suspension of works due to discovery of landmines	Suspensions due to unforeseen events laid just under the surface of the road	Delays caused by Neutral Events	Excusable but Non-Compensable	Granted for EoT

3	Adverse weather conditions	Suspensions due to adverse weather conditions	Delays caused by Neutral Events	Excusable but Non-Compensable	Granted for EoT
4	Quantity changes in major and minor drainage structures	Contract modifications (replace and add new works to the project; change in specifications)	Delays caused by Owner/ Consultant	Excusable but Compensable	Granted for EoT, but he is not entitled to delay damage
5	Delayed payment of VAT amounts deducted initially	Delay in approving payments	Delays caused by Owner/ Consultant	Excusable but Compensable	Granted for EoT, but he is not entitled to delay damage

However, through Contractor's letter dated 5 April 2013, CHG submitted Extension of Time claim EOT/006 to the Engineer (letter Ref. N^o.: GNRRPI-CHGL-DHC-2098). Basis of the claim was the delayed payment of the advance payment and deduction of a VAT amount on said advance payment which was never supposed to happen. It is noted that the Advance Payment, requested by the Contractor on 19 July 2010 was paid by the Employer on 28 October 2010 (80 days later), and that 13.0435% of the advance amount was deducted as VAT.

The Contractor sought an Extension of Time totalling 714 days based on his assessment, the Engineer's instruction of the Contract Commencement Date was not valid. The Engineer rejected Contractor's extension of time claim on 28 May 2013 (letter ref: IF- AF3013000130) on the basis that the claim was time barred; and that the Contractor was seeking relieve for his poor performance through this time claim.

On 24 October 2013, Contractor submitted the matter to the SDBM as a dispute in terms of Sub-Clause 20.4 of the Contract. This dispute was filed as Dispute Referral No.2. Both, Employer and Contractor CHG were allowed to plead their case, after which SDBM reviewed the matter and provided his decisions around mid-January 2014 as follows:

- Time is NOT at large on the Contract;
- The Contractor is entitled to an extension of time of 3.98 months, with associated costs. The Completion Date is now 24 April 2013. Delay Damages are to be adjusted accordingly;

- Contractor and Employer are to decide on the consequential time related costs by negotiation; up to date, Contractor has not claimed and/or negotiated any consequential time related costs on account of this claim head;
- The Contractor may, at his option, accept the Interest on Late Payment determined by the Engineer (and paid in IPC 32, but to be revised due to contractual developments of revised interest rates as determined by the SDBM) in lieu of the consequential time related costs which would come with the awarded EOT of 3.98 months extension of time.
- If Contractor CHG does claim consequential time cost on account of this claim header then the Interest payments made on account of “Late payment due to deducted VAT amounts” will have to be reversed.

4.1.5. Welkite – Hossaena Road Upgrading Project

Contract II: Arekit – Hossaena

Project Information

Welkite - Hosaina Road Upgrading Project, which is designated as Contract I: Welkite - Arkit and Contract II: Arekit - Hosaina are the first and second section of Welkite - Hosaina Road project respectively. It is located in the Southern Nations and Nationalities & Peoples Regional State. For this study, the analysis dealt with the second section of the project from Arekit – Hosaina. It provides a DS3/DS4 standard road link between the nodal towns Arekit, Kebul, Mugo, Lera, Shurmo and Hossaina.

Table 19: Basic Contract Data of the Project

Project Name	Welkite - Hossaena Road Upgrading Project, Contract II: Arekit - Hosaina
Contract Funded by:	International Development Association (IDA), and The World Bank [Credit No.4561-ET]
Employer:	The Ethiopian Roads Authority
Consultant:	COMPTRAN Engineering & Planning Associates in Joint Venture with BEZA Consulting Engineers (Ethiopia) and in association with Beza Consulting Engineers (Sub-

	Consultant, Kenya)
Contractor:	HAWK International Finance & Construction Co. Ltd. (Yemeni Contractor)
Project Period:	912 Calendar Days
Notification of Award:	13 th May, 2011
Letter of Acceptance :	19 th May 2011
Date of Contract Signature:	27 th June 2011
Contract Commencement Date:	7 th October 2011
Mobilization Period:	7 th Jan, 2012)
Original Completion Date:	6 th April 2014
Granted Extension of Time:	408 days
Revised Completion Date:	18 th May 2015
Type of Contract:	Measurement (BoQ)
Condition of Contract:	FIDIC MDB 2005
Specification:	ERA 2002
Original Contract Amount:	ETB 618,998,415.32
Revised Total Contract Amount	ETB 676,071,337.23
Maintenance Period:	365 days
Contract Length:	65.5 km.

History of Events

There were several claims raised by the Contractor, HAWK International Finance & Construction Co. Ltd., during course of the construction. Thus, there have been numerous correspondences between the Contractor, and the supervisor's representative's on various matters/claims that has been raised during the construction time. The Contractor has submitted various claims under different claim heads which includes Extension of Time (due to Variation Orders and Adverse Weather Condition), and cost claim (cost due to change in legislation, cost due to prolongation and cost claim due to price adjustment).

The details of all claims including the basis of the claim, the Engineer’s determination (the Contractor’s entitlements) for either extension time for completion or additional cost has been presented during the monthly/annual progress report in which each claim has been determined. The summary of the Contractor’s claim for EoT and/or additional costs together with the Engineer’s/Employer’s determination is presented hereunder.

Table 20: The major changes for the contract works are listed herein below:

Claim No.	Subject of Claim	Date of Notice	Extension of Time/Cost Claim by Contractor	Consultant's Recommendation to Client
1	Intent to Claim for Work Delay	18 th Nov. 2011	Not Indicated	Rejected
2	EOT of Obstruction	23 rd Jan. 2012	Not Indicated	Rejected
3	Notice Rains	18 th Apr. 2012	Not Indicated	Rejected
4	Delayed Instruction Regarding Bus Bay	7 th May 2012	Not Indicated	Rejected
5	Hindrance by Locals people	22 nd Nov. 2012	Not Indicated	Rejected
6	Hindrance by Police and local	17 th Dec. 2012	Not Indicated Cost of ETB 72,500	Rejected
7	Notice for EoT due to Additional work	11 Jan. 2013	EoT Details has been submitted	Determined
8	Unseasonal Rain Fall	7 th Feb. 13	ETB 1,375,165 ETB	Rejected
9	Change in Legislation (Pension Claim)	12 th Feb. 13 and 19 th Aug. 2015	ETB:1,674,355.63 and ETB:1,464,582.36	ETB: 1,063,013.93 and ETB 1,006,887.13 has been approved
10	Additional work	22 Feb. 2013	208 calendar days	77 cal. days has been granted
11	Revised work Program	5 th Jun. 2013	EoT of 116 days for rain and others	94 cal. days has been granted

**A Study on Causes of Non-Excusable Delays and Excusable but Non-Compensable Delays of Road Construction Projects
(Case Study in Selected ERA Projects)**

Claim No.	Subject of Claim	Date of Notice	Extension of Time/Cost Claim by Contractor	Consultant's Recommendation to Client
12	Excessive Rainfall	Mar 13, Apr 13, May 13, Jun 13, Jul 13 & Aug 13	126 days EoT & ETB 778,874.54	17 cal. days has been granted & no additional cost
13	Disruption by Local	21 st Oct. 2013	No Reliefs	Rejected
14	Disruption Lera Town	21 st Feb. 2014	Reliefs, Idle Equipm	Rejected
15	EoT Clarification	28 th May 14	Extension to May 2015	Determined and extension issued up to Feb 23, 2015
16	Claim no. 4	26 th January 2015	Extension of time	Determined and extension issued up to May 18, 2015
17	Notice of stoppage by local people around crusher plant area and complete blockage of the road	24 th Feb.2015	Extension of time and reimbursement of costs	Rejected
18	Notice in response to rejection letter RE/SD/851/15dated March 04 2015	9 th Mar.2015	Extension of time and reimbursement of costs	Rejected
19	Notice in response to RE/SD/891/15dated April 18 2015	25 th Apr.2015	Extension of time	Rejected
20	Claim no. 5	15 th May.2015	Extension of time	Rejected
21	Prolongation Cost Claim	4 th Mar. 2016	ETB 37,715, 839.40	ETB 9,247,100 has been decided to the Contractor by SDBM
22	Dispute on Price Adjustment	14 th July 2016	ETB: 0.00	ETB (-13,262,787.68) and USD 2,113,079.21 has been decided to ERA by SDBM

As discussed here above in the table, the Contractor has submitted various claims under different claim heads which includes Extension of Time (due to Variation Orders and Adverse Weather Condition), cost claim (cost due to change in legislation, cost due to prolongation and cost claim due to price adjustment). Finally, all submitted claims were assessed by COMPTRAN Engineering & Planning Associates in Joint Venture with BEZA Consulting Engineers Plc., granted to the Contractor as required up on getting the necessary approval from Employer.

Regarding the prolongation cost, the Contractor had been granted 408 calendar days of time extension by Employer’s Representative owing to various reasons at different time. Due to this fact, the Contractor has claimed the prolongation cost for the extension of time granted to him due to the adverse weather condition and additional works granted to him at different times which amounts ETB: 37,715, 839.40. The case has been referred to the Sole Dispute Board Member (SDBM) for his determination.

Accordingly, having reviewed the Contractor’s disputes and subsequent response/clarification from the Employer and the Contractor, the SDBM has decided on behalf of the Contractor for the claimed prolongation cost amounting ETB 9,247,100.

Findings of the Case

Accordingly, having reviewed the Contractor’s disputes and subsequent response/clarification from the Engineer and the Employer, all submitted claims were assessed by COMPTRAN Engineering & Planning Associates in Joint Venture with BEZA Consulting Engineers Plc., granted to the Contractor as required up on getting the necessary approval from Employer. The claim issues that have been raised during the project and the findings for the same is summarized hereunder:

Table 21: Summary of Case Analysis of Arekit – Hossaena Road Project

No.	Subject for Claims	Identified Causes of Delay	Responsible Parties	Delay Categories	Remarks
1	Notice for EoT due to Additional work	Increased in quantity	Delays caused by Owner/ Consultant	Excusable but Non-Compensable	Granted for EoT

2	Change in Legislation (Pension Claim)	Contract modifications	Delays caused by Owner/ Consultant	Excusable-Compensable	Entitled to EoT and delay damages
3	Excessive Rainfall	Suspensions due to adverse weather conditions	Delays caused by Neutral Events	Excusable but Non-Compensable	Granted for EoT
4	Revised work Program	Late in reviewing and approving work schedules	Delays caused by Owner/ Consultant	Excusable-Compensable	Granted for EoT
5	Prolongation Cost Claim	Delay due to contract extension	Delays caused by Owner/ Consultant	Excusable-Compensable	Entitled to EoT and delay damage
6	Dispute on Price Adjustment	Due to currency adjustment factor	Delays caused by Neutral Events	Excusable but Non-Compensable	Not entitled to delay damage

4.2. Summary of the Findings from the Case Analysis of Selected ERA Projects

From the above case studies, this research paper is focused on the type of delay that is the most concerning to both the contractor and the client in many cases; this is the *non-excusable* and *excusable* but *non - compensable* construction delay. This type of delays defines, in many instances, which pays the added costs attributed to the delay in progress, especially on road constructions.

Accordingly, it is known as the scope of the research is selected ERA projects as it is analyzed here above which have been completed or being executed by executive companies and performing organizations affiliated to the Ethiopian Road Authority.

Therefore, the following table shows that the summary of the identified causes of non-excusable and excusable but non - compensable construction delays for the above selected case analysis of ERA Projects.

Table 22: Summary of the Identified Causes of Delays from the above Selected Case Analysis of ERA Projects

No.	Non-Excusable Causes of Delays	Excusable - Non-Compensable Causes of Delays	Excusable -Compensable Causes of Delays
1	Inadequate planning and scheduling by contractor	Suspensions due to adverse weather conditions	Delay to furnish and deliver the site to the contractor
2	Poor site management and supervision by contractor	Due to currency adjustment factor	Increased in quantity due to variation orders
3		Suspension of works due to discovery of landmines	Design changes due to variation orders
4			Additional work due to variation orders
5			Right Of Way obstruction
6			Poor communication and coordination between parties
7			Contract modifications
8			Delay in approving payments
9			Late in reviewing and approving work schedules
10			Delay due to contract extension

From the table above we understand that, the identified causes of non-excusable delays are a delay caused by contractor due to Sundays and public holidays. The engineer and employer reject the claim submittals of the contractor since the case found as the contract was calendar days, not working days. Even if the contract is working days, such delay was occurred due to inadequate planning and scheduling by contractor. This should be entitled to delay damage to employer. However, the engineer's evaluation and the employer's assessment didn't considered as the case for delay damage entitlements. This is was one of the gap found in the conditions of contract and the contract management by consultancy.

Poor site management and supervision by contractor is the other identified causes of non-excusable delays in the case analysis due to rainy season. For the same case, the engineer's evaluation and the employer's assessment didn't considered as the case for delay damage

entitlements to the employer due to the claim submittals by contractor was insufficient documents to support the claim in good enough.

The other findings of the analysis are suspensions due to adverse weather conditions, which is frequently occurred on road construction projects; suspension of works due to discovery of landmines, and due to currency adjustment factor are delays caused by external factors or by neutral events which are conducted as excusable but non compensable delays. These all were entitled to extension of time in the analysis. The most findings of the causes are known to as excusable-compensable delays, however the research discussion point is limited to the one that of non-excusable and excusable but non-compensable delays.

In summary of the findings of the case analysis, 13.33% of the causes of delays were considered as non-excusable delays due to the contractor's inadequate performance. The other 20% of the case analysis were found as excusable but non – compensable delays which were caused by external factor. The remaining 66.67% were identified as causes of excusable but compensable delays caused by owner and consultants which pays the added costs attributed to the delay in progress since such delay types are not the scope of this study.

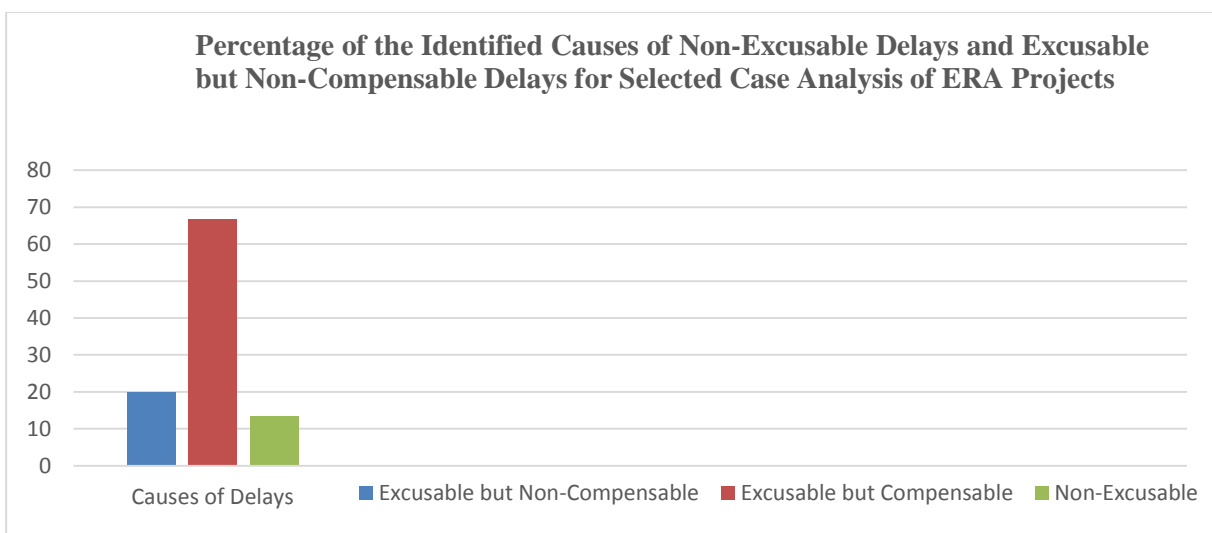


Fig.10: Percentage of the Identified Causes of Delays from the case studies

4.3. Analysis of Questionnaire Survey

This topic deals with analysis of information obtained from questionnaire survey and includes identification of the critical causes, effects, and methods for minimizing the effects of delay. The collected data were analyzed using the method discussed earlier in chapter three.

The questioners are distributed to randomly selected contractors and consultants that are involved in road sector and to the client (ERA). From the total distributed questioner, the parties take the following portion.

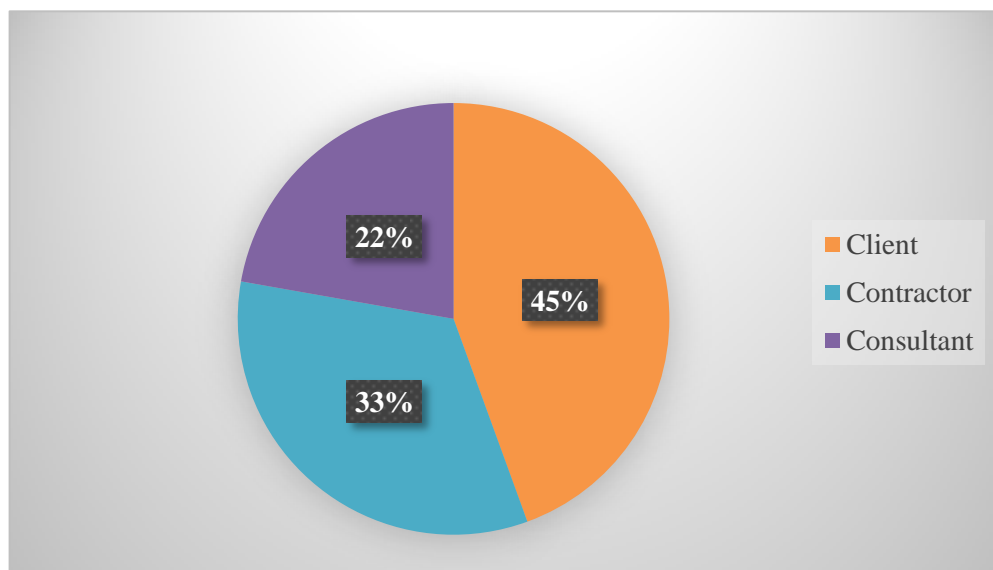


Fig. 11: Respondent's Organization

Professionals directly involved in contract administration, construction supervision, design division, technical and project management activities were considered for questionnaire survey.

From which, 29% (10) of professionals have less than 5 years of experience, while 42% (15) are from 5-10 years of experience in the sector, and 29% (10) of them are having 10-15 years of experience as shown the table below.

Table 23: Experience of Respondents (Years)

Experience	Respondents				
	Client	Contractor	Consultant	Sum	%age
< 5 years	4	4	2	10	29%
5 - 10 years	8	5	2	15	42%
10 - 15 years	5	2	3	10	29%
Total	17	11	7	35	100%

In this study, 48.57% (17) owners, 31.43% (11) contractors, and 20% (7) consultants participated in the questionnaire. The general response rate for owners, contractors and consultants was 77.78% and the total number of respondents for the three parties was 35 out of 45 respondents. The response rate of the owner 85% (17 out of 20 respondents), for contractors was 73.33% (11 out of 15 respondents), and 70% (7 out of 10 respondents) for consultants.

Table 24: Questionnaires Distribution and Response Rate

Respondents	Questionnaire Distributed (No.)	Questionnaire Returned (No.)	Response Rate (%)
Client (ERA)	20	17	85
Contractor	15	11	73.33
Consultant	10	7	70
Total	45	35	77.78

Consequently, 57% of professionals are from organizations of more than 15 years of establishment, while 14% from 10 - 15 years of experience in the sector, 23% of them are from organizations of more than 5 - 10 years of experience and only 6% are having less than 5 years of experience.

In addition, 17% of the respondents are from foreign companies currently involved in the road construction projects; of them 33% have an experience of 10 - 15years, 50% have 5 - 10years and 17% are involved in the sector that of less than 5 years. The rest 83% of the respondents are domestic companies as summarized as the quality of respondents in the tables below.

Table 25: Experience of Companies in Road Construction Projects

Duration	Client	Consultant	Contractor	Sum	%age
<5 Years	0	0	2	2	6%
5-10 years	0	3	5	8	23%
10-15 years	0	3	2	5	14%
>15years	17	1	2	20	57%
Total	17	7	11	35	100%

Table 26: Type or Origin of the Respondents' Organization

Organization	Respondent	Domestic Origin	Foreign Origin	%age of Domestic	%age of Foreign
Client (ERA)	17	17	0	100%	0%
Consultant	7	5	2	71%	29%
Contractor	11	7	4	64%	36%
Total	35	29	6	83%	17%

Table 27: Experience of Foreign Companies in Road Construction sector in Ethiopia

Experience	Respondents			
	Consultant	Contractor	Sum	%age
< 5 years	0	1	1	17%
5-10 years	1	2	3	50%
10-15 years	1	1	2	33%
Total	2	4	6	100%

Regarding educational status of the respondents, about 34% of them are M.Sc. degree holders and the rest of the respondents are at about 66% have B.Sc. degree as summarized here below.

Table 28: Educational Status of Respondents

Respondents	Educational Status				
	B.Sc.	M.Sc.	Total	%age of B.Sc.	%age of M.Sc.
Client	11	6	17	65%	35%
Consultant	5	2	7	71%	29%
Contractor	7	4	11	64%	36%
Total	23	12	35	66%	34%

The other considerations of the questionnaire survey is the managerial position of respondents in their company in accordance with their decision role in contract administration, construction supervision and those participating in relation to others contractual matters. From this point of view, about 36% of the respondents are participating in the top management position; 43% of them are working in middle management level and the rest 21% are others who have parts on contractual cases.

Table 29: Managerial Position of Respondents in their Company

Respondent Position	Client	Consultant	Contractor	Client %age	Constl. %age	Contr. %age	Average
Top Mgt	5	3	4	29%	43%	36%	36%
Middle Mgt	7	3	5	42%	43%	45%	43%
Other	5	1	2	29%	14%	19%	21%
Total	17	7	11	100%	100%	100%	100%

4.4. Analysis on Identified Causes of Delay from Questionnaire Survey

In this section, a total of eighty six (86) major causes that contribute to delay of road construction projects are identified from literature review and forwarded for questionnaire survey. These are further divided into three groups and categorized into ten factors of delay.

The factors are analyzed in each groups based on their relative importance index from viewpoints of employers, contractors, and consultants. Their index are ranked to choose the top contributing factors and are placed in their respective category to point out the top contributing factors agreed by the three parties.

Causes of Delay

The primary data collected from the second part of the questionnaire was analyzed from the perspective of client, consultants and contractors. Each individual cause's RII perceived by all respondents was computed for overall analysis. The RII was computed for each cause to identify the most significant causes. The causes then discussed based on the RII classification class. From the RII value, 0.8 to 1.0 is the most critical level of preference and being the most important causes as the results.

From 3 groups of delay classification and 10 factors of delay categories, that based on the level of criticality in class 5 which classified as most critical factor as perceived by client, there are seven causes can be found which is sub-contractor (RII=0.918), contract management (RII=0.894), labor productivity (RII=0.894), site management (RII=0.882), equipment availability and failure (RII=0.871), inadequate contractor experience (RII=0.859), and late delivery of materials (RII=0.826).

The causes as perceived by contractor that can be found is six causes including: unusually severe weather (RII=0.867), sub-contractor (RII=0.836), shortage in material (RII=0.827), finance and payments of completed work (RII=0.804), late approval of payment (RII=0.803), and site management (RII=0.800); whereas five causes are perceived by consultant which includes: poor coordination on site (RII=0.851), improper planning and scheduling (RII=0.843), construction methods (RII=0.843), quality in material (RII=0.802), and delay to provide the right of way (RII=0.801).

Table 30: Ranking of causes of delay from a causation perspective of respondent's organization

No.	Causes of Delay	Client		Contractor		Consultant	
		RII	Rank	RII	Rank	RII	Rank
Client Related Factor							
1	Finance and payments of completed work	0.699	8	0.804	1	0.543	2
2	Owner interference	0.798	1	0.436	10	0.429	6
3	Slow decision making	0.518	11	0.491	7	0.457	5
4	Unrealistic contract duration and requirements imposed	0.788	5	0.418	11	0.343	9
5	Obtaining permits from municipality	0.565	10	0.545	5	0.314	10
6	Rigid budgets	0.576	9	0.473	8	0.286	11
7	Changes of mind during construction	0.776	6	0.527	6	0.371	8
8	Ordering extra which delay the work	0.729	7	0.582	3	0.514	3
9	Delay to provide the right of way	0.793	2	0.455	9	0.801	1
10	Differing site conditions	0.791	3	0.600	2	0.400	7
11	Suspension	0.790	4	0.618	1	0.486	4
Consultant Related Factor							
12	Contract management	0.894	1	0.745	1	0.714	1
13	Preparation and approval of drawings	0.647	7	0.655	3	0.514	5
14	Quality assurance	0.753	3	0.564	6	0.571	3
15	Waiting time for approval of drawings	0.494	9	0.527	8	0.543	4
16	Late approval of laboratory tests	0.682	5	0.545	7	0.429	9
17	Design changes	0.447	10	0.509	9	0.486	6
18	Late approval of payment	0.706	4	0.673	2	0.629	2
19	Poor briefing of document (i.e. specification, bill of quantity.)	0.635	8	0.636	4	0.457	8
20	Postponement of work	0.659	6	0.491	10	0.400	10
21	Late approval of shop drawings	0.765	2	0.582	5	0.486	6
Contractor Related Factor							
22	Sub-contractor	0.918	1	0.836	1	0.771	2
23	Site management	0.882	2	0.800	2	0.743	3

24	Construction methods	0.741	5	0.691	5	0.843	1
25	Preparation and approval of shop drawings	0.671	8	0.673	6	0.457	8
26	Mistakes during construction stage	0.747	4	0.709	4	0.571	5
27	Inadequate contractor experience	0.859	3	0.764	3	0.514	6
28	Mistakes in preliminary stage (soil investigation)	0.541	15	0.655	7	0.343	12
29	Financing by contractor during construction	0.682	7	0.564	10	0.486	7
30	Planning failure	0.729	6	0.545	11	0.429	9
31	Organization failure	0.600	12	0.436	15	0.314	14
32	Scarcity of resources	0.612	11	0.473	14	0.371	11
33	Coordination failure	0.624	10	0.509	12	0.343	12
34	Controlling failure	0.647	9	0.582	9	0.400	10
35	Lack of qualified engineers	0.553	14	0.491	13	0.629	4
36	Failure to hold cash flow for cast	0.565	13	0.636	8	0.257	15

Table 31: Ranking of Identified Causes of Non-Excusable Delays from respondent’s perspective

No.	Causes of Delay	Client		Contractor		Consultant	
		RII	Rank	RII	Rank	RII	Rank
Material - Related Factor							
37	Quality in material	0.694	4	0.655	2	0.802	1
38	Shortage in material	0.766	2	0.827	1	0.686	2
39	Procurement of materials	0.753	3	0.636	3	0.571	3
40	Importing of materials	0.494	5	0.618	4	0.514	4
41	Late delivery of materials	0.826	1	0.545	5	0.457	6
42	Unreliable suppliers	0.447	6	0.491	6	0.486	5
Labor - Related Factor							
43	Labor supply	0.659	5	0.543	29	0.543	3
44	Labor productivity	0.894	1	0.657	5	0.657	1
45	Motivation/Moral/Commitment	0.694	3	0.457	70	0.429	6
46	Absenteeism	0.624	7	0.514	51	0.514	4
47	Shortage of skilled labor	0.647	6	0.457	70	0.457	5
48	Mobilization of labor	0.671	4	0.571	8	0.571	2
49	Issues and conflicts among workers	0.706	2	0.457	70	0.400	7

Equipment - Related Factor							
50	Equipment availability and failure	0.871	1	0.782	1	0.600	1
51	Equipment allocation problem	0.635	2	0.618	4	0.543	2
52	Improper equipment	0.553	4	0.636	3	0.457	4
53	Shortage of equipment & its parts	0.612	3	0.655	2	0.486	3
Financial - Related Factor							
54	Financial indiscipline/dishonesty	0.741	1	0.582	4	0.400	3
55	Arranging financing facilities for the project	0.482	4	0.600	3	0.343	4
56	Delay payment to suppliers/sub-contractors by contractor	0.541	3	0.618	2	0.429	2
57	Inadequate fund allocation	0.682	2	0.655	1	0.571	1
Subcontractor - Related Factor							
58	Conflicts in sub-contractors schedule in execution of project	0.471	4	0.473	3	0.543	2
59	Frequent change of sub-contractors because of their inefficient work	0.518	3	0.673	1	0.457	4
60	Delays in sub-contractors work	0.541	2	0.582	2	0.514	3
61	Poor sub-contractors performance	0.553	1	0.455	4	0.571	1
Contract and Site - Related Factor							
62	Improper planning and scheduling	0.694	2	0.673	1	0.843	2
63	Lack of control on site	0.647	5	0.600	5	0.400	7
64	Poor coordination on site	0.753	1	0.636	3	0.851	1
65	Inadequate supervision and site management	0.494	9	0.655	2	0.486	4
66	Improper construction methods	0.682	3	0.509	8	0.429	6
67	Rework due to errors during construction	0.447	10	0.545	6	0.457	5
68	Poor communication between parties	0.518	8	0.436	11	0.514	3
69	Technical Personnel Shortages	0.424	11	0.455	10	0.314	10
70	Poor qualification of the technical staff	0.576	6	0.491	9	0.371	8
71	Inappropriate overall organization structure linking to the project	0.529	7	0.527	7	0.343	9
72	Major disputes and negotiations	0.659	4	0.618	4	0.286	11

Table 32: Ranking of Identified Causes of Excusable but Non-Compensable Delays from respondent's perspective

No.	Causes of Delay	Client		Contractor		Consultant	
		RII	Rank	RII	Rank	RII	Rank
External Factor							
73	Acts of God or of the public enemy	0.376	11	0.473	9	0.257	12
74	Acts of the Government in either its sovereign or contractual capacity (Force Measure Clause)	0.435	7	0.509	7	0.371	8
75	Natural Calamities (Fires, Floods, etc.)	0.471	5	0.491	8	0.486	5
76	Political/Social unrest	0.412	9	0.618	4	0.343	9
77	Epidemics	0.294	14	0.400	13	0.200	14
78	Quarantine restrictions	0.318	13	0.418	12	0.314	10
79	Strikes (Terrorist Attacks)	0.353	12	0.600	5	0.229	13
80	Labor union strikes	0.494	3	0.436	11	0.286	11
81	Freight embargoes	0.400	10	0.382	14	0.514	4
82	Unusually severe weather	0.694	1	0.867	1	0.757	1
83	Problem with neighbours	0.482	4	0.636	3	0.457	6
84	Accidents during construction	0.447	6	0.545	6	0.543	3
85	Material market instability	0.518	2	0.655	2	0.571	2
86	Unforeseen site condition	0.424	8	0.455	10	0.400	7

This is interesting to compare the causes as perceived by client, consultants and contractors. Most often, one party were blaming the other. Two of the top causes perceived common between client and contractors are: sub-contractor and site management, which are considered as non-excusable causes of delays. The consultants blaming contractor's improper planning, contractor's construction methods, contractor's poor coordination on site contractor's quality in materials, which also are considered as non-excusable causes of delays; and the other cause that considered as excusable but non compensable cause of delays include client's delay to provide the right of way as the important causes of delay. But, in some cases, this may be considered as excusable-compensable cause of delay.

Table 33: Ranking of Causes of Delay based on Overall's view of the study

No.	Causes of Delay	Percentage of Respondent					Overall	
		1	2	3	4	5	RII	Rank
Client Related Factor								
1	Finance and payments of completed work	11.43	14.29	20.00	14.29	40.00	0.663	10
2	Owner interference	20.00	14.29	17.14	20.00	28.57	0.579	29
3	Slow decision making	22.86	28.57	34.29	5.71	8.57	0.489	61
4	Unrealistic contract duration and requirements imposed	14.29	31.43	22.86	11.43	20.00	0.516	55
5	Obtaining permits from municipality	22.86	28.57	28.57	11.43	8.57	0.475	69
6	Rigid budgets	37.14	17.14	22.86	11.43	11.43	0.445	75
7	Changes of mind during construction	11.43	31.43	17.14	17.14	22.86	0.558	36
8	Ordering extra which delay the work	11.43	20.00	25.71	22.86	20.00	0.609	23
9	Delay to provide the right of way	5.71	22.86	28.57	14.29	28.57	0.628	19
10	Differing site conditions	8.57	20.00	28.57	11.43	31.43	0.612	21
11	Suspension	8.57	17.14	22.86	22.86	28.57	0.642	14
Consultant Related Factor								
12	Contract management	0.00	0.00	20.00	54.29	25.71	0.785	3
13	Preparation and approval of drawings	2.86	28.57	37.14	17.14	14.29	0.605	24
14	Quality assurance	2.86	22.86	34.29	22.86	17.14	0.629	18
15	Waiting time for approval of drawings	11.43	31.43	45.71	11.43	0.00	0.521	52
16	Late approval of laboratory tests	11.43	25.71	34.29	14.29	14.29	0.552	38
17	Design changes	20.00	31.43	40.00	8.57	0.00	0.481	66
18	Late approval of payment	0.00	20.00	37.14	25.71	17.14	0.669	9
19	Poor briefing of document (i.e. specification, bill of quantity.)	14.29	22.86	28.57	17.14	17.14	0.576	31
20	Postponement of work	11.43	34.29	31.43	11.43	11.43	0.517	54
21	Late approval of shop drawings	14.29	31.43	14.29	22.86	17.14	0.611	22

Contractor Related Factor								
22	Sub-contractor	0.00	2.86	14.29	31.43	51.43	0.842	1
23	Site management	0.00	5.71	11.43	45.71	37.14	0.808	2
24	Construction methods	2.86	31.43	20.00	11.43	34.29	0.658	11
25	Preparation and approval of shop drawings	0.00	28.57	37.14	25.71	8.57	0.600	25
26	Mistakes during construction stage	0.00	2.86	40.00	37.14	20.00	0.709	8
27	Inadequate contractor experience	2.86	5.71	25.71	40.00	25.71	0.712	7
28	Mistakes in preliminary stage (soil investigation)	11.43	28.57	45.71	8.57	5.71	0.513	56
29	Financing by contractor during construction	8.57	31.43	28.57	11.43	20.00	0.577	30
30	Planning failure	8.57	28.57	31.43	11.43	20.00	0.568	33
31	Organization failure	22.86	34.29	20.00	20.00	2.86	0.450	73
32	Scarcity of resources	14.29	37.14	28.57	14.29	5.71	0.485	63
33	Coordination failure	14.29	34.29	31.43	11.43	8.57	0.492	59
34	Controlling failure	11.43	25.71	40.00	8.57	14.29	0.543	44
35	Lack of qualified engineers	14.29	34.29	22.86	20.00	8.57	0.557	37
36	Failure to hold cash flow for cast	28.57	25.71	14.29	17.14	14.29	0.486	62
Material - Related Factor								
37	Quality in material	0.00	20.00	42.86	28.57	8.57	0.631	17
38	Shortage in material	0.00	14.29	37.14	37.14	11.43	0.773	4
39	Procurement of materials	2.86	20.00	31.43	25.71	20.00	0.654	12
40	Importing of materials	11.43	25.71	48.57	11.43	2.86	0.542	45
41	Late delivery of materials	11.43	25.71	31.43	17.14	14.29	0.562	35
42	Unreliable suppliers	20.00	37.14	31.43	11.43	0.00	0.475	70
Labor - Related Factor								
43	Labour supply	2.86	25.71	40.00	14.29	17.14	0.619	20
44	Labour productivity	0.00	0.00	34.29	40.00	25.71	0.747	5

**A Study on Causes of Non-Excusable Delays and Excusable but Non-Compensable Delays of Road Construction Projects
(Case Study in Selected ERA Projects)**

45	Motivation/Moral/Commitment	14.29	25.71	34.29	8.57	17.14	0.538	47
46	Absenteeism	14.29	25.71	37.14	14.29	8.57	0.537	48
47	Shortage of skilled labour	11.43	25.71	37.14	14.29	11.43	0.550	39
48	Mobilization of labour	11.43	25.71	28.57	20.00	14.29	0.584	26
49	Issues and conflicts among workers	11.43	25.71	22.86	20.00	20.00	0.581	28
Equipment - Related Factor								
50	Equipment availability and failure	0.00	0.00	37.14	31.43	31.43	0.563	34
51	Equipment allocation problem	5.71	25.71	37.14	20.00	11.43	0.449	74
52	Improper equipment	8.57	28.57	42.86	14.29	5.71	0.412	80
53	Shortage of equipment & its parts	2.86	28.57	45.71	11.43	11.43	0.438	77
Financial - Related Factor								
54	Financial indiscipline/dishonesty	8.57	34.29	17.14	17.14	22.86	0.574	32
55	Arranging financing facilities for the project	28.57	28.57	20.00	14.29	8.57	0.475	68
56	Delay payment to suppliers/sub-contractors by contractor	11.43	34.29	31.43	17.14	5.71	0.529	49
57	Inadequate fund allocation	0.00	17.14	48.57	25.71	8.57	0.636	16
Subcontractor - Related Factor								
58	Conflicts in sub-contractors schedule in execution of project	28.57	22.86	31.43	11.43	5.71	0.495	58
59	Frequent change of sub-contractors because of their inefficient work	22.86	25.71	17.14	20.00	14.29	0.549	40
60	Delays in sub-contractors work	22.86	20.00	25.71	22.86	8.57	0.546	42
61	Poor sub-contractors performance	14.29	37.14	28.57	11.43	8.57	0.526	50
Contract and Site - Related Factor								
62	Improper planning and scheduling	0.00	20.00	40.00	31.43	8.57	0.637	15
63	Lack of control on site	5.71	34.29	34.29	14.29	11.43	0.549	41
64	Poor coordination on site	2.86	20.00	31.43	25.71	20.00	0.653	13

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65	Inadequate supervision and site management	11.43	28.57	42.86	11.43	5.71	0.545	43
66	Improper construction methods	8.57	31.43	34.29	14.29	11.43	0.540	46
67	Rework due to errors during construction	20.00	34.29	34.29	8.57	2.86	0.483	64
68	Poor communication between parties	28.57	25.71	22.86	17.14	5.71	0.489	60
69	Technical Personnel Shortages	31.43	34.29	31.43	2.86	0.00	0.397	82
70	Poor qualification of the technical staff	20.00	34.29	25.71	11.43	8.57	0.480	67
71	Inappropriate overall organization structure linking to the project	25.71	25.71	31.43	11.43	5.71	0.467	71
72	Major disputes and negotiations	11.43	28.57	28.57	25.71	5.71	0.521	53
External Factor								
73	Acts of God or of the public enemy	37.14	45.71	8.57	5.71	2.86	0.369	84
74	Acts of the Government in either its sovereign or contractual capacity (Force Measure Clause)	31.43	22.86	37.14	8.57	0.00	0.439	76
75	Natural Calamities (Fires, Floods, etc.)	25.71	28.57	31.43	8.57	5.71	0.482	65
76	Political/Social unrest	28.57	34.29	20.00	11.43	5.71	0.458	72
77	Epidemics	62.86	22.86	11.43	2.86	0.00	0.298	86
78	Quarantine restrictions	40.00	48.57	8.57	2.86	0.00	0.350	85
79	Strikes (Terrorist Attacks)	40.00	34.29	14.29	5.71	5.71	0.394	83
80	Labor union strikes	34.29	34.29	14.29	14.29	2.86	0.405	81
81	Freight embargoes	31.43	34.29	28.57	5.71	0.00	0.432	78
82	Unusually severe weather	2.86	11.43	37.14	20.00	28.57	0.741	6
83	Problem with neighbours	14.29	28.57	37.14	20.00	0.00	0.525	51
84	Accidents during construction	20.00	28.57	37.14	11.43	2.86	0.512	57
85	Material market instability	11.43	22.86	37.14	25.71	2.86	0.581	27
86	Unforeseen site condition	31.43	31.43	31.43	2.86	2.86	0.426	79

However, the major groups/ categories of delay were identified. Accordingly, the main factors from three contracting parties were also considered and from which eighty six causes of Non-Excusable and Excusable but Non-Compensable delays are categorized under such delay factors.

Table 34 will summarize the factor according to the category that perceived by client, consultants and contractors.

Table 34: Ranked Categories of Causes of Non-Excusable and Excusable but Non-Compensable Delays from respondent's perspective

No.	Causes of Delay Categories	Client		Contractor		Consultant		Overall	
		RII	Rank	RII	Rank	RII	Rank	RII	Rank
Ranking of causes of delay from a causation perspective of respondent's organization									
1	Client Related Factor	0.748	4	0.819	5	0.429	8	0.665	6
2	Consultant Related Factor	0.668	6	0.893	3	0.823	3	0.795	4
3	Contractor Related Factor	0.922	1	0.872	4	0.930	2	0.908	1
Ranking of Identified Causes of Non-Excusable Delays from respondent's perspective									
4	Material - Related Factor	0.763	3	0.812	6	0.943	1	0.839	3
5	Labor - Related Factor	0.699	5	0.971	1	0.510	6	0.727	5
6	Equipment - Related Factor	0.898	2	0.895	2	0.814	4	0.869	2
7	Financial - Related Factor	0.612	7	0.614	9	0.436	7	0.554	9
8	Subcontractor - Related Factor	0.521	9	0.645	8	0.521	5	0.562	8
9	Contract & Site - Related Factor	0.584	8	0.759	7	0.429	9	0.590	7
Ranking of Identified Causes of Excusable-Non-Compensable Delays from respondent's perspective									
10	External Factor	0.437	10	0.521	10	0.416	10	0.458	10

From the above ten factors that contribute to road construction delays of the study, contractor related factor (RII=0. 908), equipment related factor (RII=0.869) and material related factor (RII=0. 839) are the most critical causes, whereas external factor (RII=0.458) is moderately

critical causes as perceived by the respondents that need to be considered as causes of non-excusable delays and excusable but non-compensable delays in road construction based on this study.

4.5. Summary of Result Analysis and Discussion

From the result and discussion point of view as analyzed in the previous sub topics, five ERA projects were selected as on geographical and contractual basis. Results from the selected case analysis indicated that 15 causes of delays were identified. From which, two are considered as non-excusable causes of delays that includes inadequate planning and scheduling by contractor, and poor site management and supervision by contractor. Three of the results were found as excusable but non-compensable which includes suspensions due to adverse weather conditions, delay due to currency adjustment factor, and suspension of works due to discovery of landmines. The other ten causes were identified as excusable but compensable delays.

The desk study was also used to identify three major groups of delay category. The result showed that ten main factors were identified from contracting parties. Among which, three are perceived as the most critical causes, including contractor related factor, equipment related factor and material related factor. Whereas the one that is external factor is moderately critical causes as perceived by the respondents. The other point is, out of eighty six causes of delays that derived from literature reviews and forward as questionnaire survey, the top 18 most critical causes that contribute for delays were identified and the top seven from employer, six from contractor and the rest five from client's agent (consultant) side were identified.

In summary of the results obtained at this thesis, and compare it with the results and analysis of previous literatures, it's found that there are a real similarity of the important factors that influencing the construction of road projects. But, contractor related factor is a major problem in Ethiopian Roads Authority as found in this study.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1. Conclusion

Within the view of accomplishing the research objectives, this study has posed to react on the research questions, which are to be investigated by the selected research instruments.

Through this study, the construction industry in the road projects is still facing the delay in project and this research come out with the study on causes of non-excusable and excusable but non-compensable delays. From this point of view that a case analysis and questionnaire are designed and distributed among the client, contractors and consultants firm in selected ERA projects.

From the analysis of case studies, this research paper is focused on the type of delay that is the most concerning to both contractor and client in many cases which have been completed or being executed by executive companies and performing organizations affiliated to the Ethiopian road authority. Accordingly, it is known as the scope of the research is in selected ERA projects studying on causes of non-excusable and excusable but non - compensable delays.

Based on the objectives of the study, at first, it is clarified that of 13.33% of the causes of delays from the case study is considered as non-excusable delays are inadequate planning and scheduling by contractor and poor site management and supervision by contractor; The other 20% of the case analysis are found as excusable-non-compensable delays which are caused by external factor those includes suspensions due to adverse weather conditions, delay due to currency adjustment factor and suspension of works due to discovery of landmines. The remaining 66.67% of the causes are identified as excusable-compensable delays which pays the added costs attributed to the delay in progress. Hence, excusable but compensable delays are not the scope of this study.

This study classified that three major groups of delays are: (1) Causes of delay from a causation perspective of respondent's organization, (2) causes of non-excusable delays from respondent's

perspective, and (3) causes of excusable but non-compensable delays from respondent's perspective.

These major groups of delays has also sub classified into ten factors of delay categories which are: (1) Client Related Factor, (2) Consultant Related Factor, (3) Contractor Related Factor, (4) Material - Related Factor, (5) Labor - Related Factor, (6) Equipment - Related Factor, (7) Financial - Related Factor, (8) Subcontractor - Related Factor, (9) Contract & Site - Related Factor, and (10) External Factor. From the above ten factors that contribute to construction delays, contractor related factor (RII=0.908), equipment related factor (RII=0.869) and material related factor (RII=0.839) are the most critical causes, whereas external factor (RII=0.458) is moderately critical causes as perceived by the respondents that need to be considered as causes of non-excusable delays and excusable but non-compensable delays in road construction based on this study.

In accordance with this, the study identified 86 causes of delays and among which, 18 causes of delays based on the level of preference in class 5 which classified as most critical causes of delay as perceived by overall views of respondents.

From which, the seven causes that can be found by client are: (1) sub-contractor (RII=0.918), (2) contract management (RII=0.894), (3) labor productivity (RII=0.894), (4) site management (RII=0.882), (5) equipment availability and failure (RII=0.871), (6) inadequate contractor experience (RII=0.859), and (7) late delivery of materials (RII=0.826). Six causes as perceived by contractor are: (1) unusually severe weather (RII=0.867), (2) sub-contractor (RII=0.836), (3) shortage in material (RII=0.827), (4) finance and payments of completed work (RII=0.804), (5) late approval of payment (RII=0.803), and (6) site management (RII=0.800). The other five causes are perceived by consultant includes: (1) poor coordination on site (RII=0.851), (2) improper planning and scheduling (RII=0.843), (3) construction methods (RII=0.843), (4) quality in material (RII=0.802), and (5) delay to provide the right of way (RII=0.801).

Secondly, the research objectives achieved that the identified causes of delays of the study are found as time lag in completion of activities from its specified time as per contract or can be defined as late completion or late start of activities to the baseline schedule, directly affecting specified cost.

Thirdly as a result of the study with respect to the research objectives, there has been a negative effect on clients, contractors, and consultants in terms of growth in adversarial relationships, mistrust, litigation, arbitration, cash-flow problems, increased cost due to inflation, termination of contract, court cases, etc. or combinations of above stated factors, resulting in extensions of time and delay damages are discussed through the methodology followed to effect the benefits by managing better such causes. .

At fourth, the study that proclaims on the conditions of contract related to the challenges faced in the execution of the projects has shown the gap to stating shortcomings, drawbacks and limitations of such cases associated with contractor's practices. Finally, based on the findings of the research, the following recommendations are forwarded which is expected from key stakeholders of asphalt road construction projects for the development of Ethiopian construction industry.

5.2. Recommendations

In this paper the key causes of non-excusable and excusable but non-compensable delays of road construction projects in selected ERA projects have been identified through a case study and questionnaire survey. Based on the analysis and the findings of the study, the following recommendations are forwarded to clients, consultants and contractors.

General Recommendations:

- Government must create a climate of economic stability that is sufficient to inspire investors, especially in the production of construction materials to be produced from local materials with enough quantity and quality in the local market, this will help to reduce excessive price fluctuations associated with imported construction materials.
- Creating awareness using peer discussion, forum and experience sharing among professionals, major stakeholders, public authorities, professional organizations, and academic institutions should be held on road construction projects.
- Also, conducting on job training to individual firms/projects; especially; to professionals and local contractors, all about capacity building issue on the on the road construction sector so as to develop their performance in the industry.

- It is important to avoid the use of vague and unenforceable subjectivity terms in the preparation of specifications as they may cause problems towards achieving the required specifications.
- In addition, government has to pledge specialists to do researches regarding different causes of delays and their effect on the road construction projects.

Recommendation for client:

- We know that clients usually select the contractors which give lowest bid. But to prevent any problem that might happen in future, clients should select contractors that have sufficient experience, enough technical and financial capability and have sufficient manpower to make sure the project run smoothly.
- Secondly, Client should provide the right of way and has to furnish and deliver the site to the contractor on time. Before the construction starts the client has to fulfill all the necessary requirements for delivering the site. Failure to deliver the site will cause time and cost overrun.
- Thirdly, client should not frequently interfere during the project for example keep making changes about the requirement. This can interrupt contractor's productivity of work.
- Fourthly, Change orders by owner during construction which can affect time, cost, or scope of the project required special attention and should be managed by applying an integrated change control system or other similar system which pay attention of cost & time evaluation of the changes.
- Finally, client should have enough money to pay the contractors just in time. Client should work carefully so that bank or any finance institution will released the payment on schedule.

Recommendation for consultants:

- Consultant should work on drawing carefully and on timely approval to eliminate design discrepancies and errors.
- Consultants also should monitor the work done by the contractor closely and making inspection time to time.
- Consultants also should include the duration and the solution to settle disputes during the making of the contract between the clients and contractors in early stage.

- Consultants are advised to continuous coordination and direct communication with contractors and clients, to manage well for change orders or variations and to maintain contract managements indeed.
- Consultants should adopt efficient information distribution systems to guard against coordination gaps; respond as quickly as possible to contractor and client questions and requests for clarification to avoid associated delays and confusions which consequentially will lead to time and cost overrun.

Recommendation for contractors:

- The most important thing is contractor should take the project that they have expertise on it only.
- Secondly, contractors should have enough money based on the cash flow to start the project in order to run the project smoothly.
- Third, contractors should provide proper planning, scheduling and good site management system to the clients in the different activities of the project so as to avoid any mistakes that may lead to rework of activities, and for such delay factors. By an effective management and control of these causes, the time of the project delay can be decreased.
- Last, the contractor also have to make sure in selecting competent and appropriate subcontractors, materials, labor and equipment with sufficient and good enough to start the project.

Recommendation for Future Study:

Further research work on other types of delay and related factors are suggested and arranging forums of discussion among parties in the sector is crucially important to managing better the projects and upgrading professional commitments of those involved in the road construction project.

The management of compensable delays and identified causes in road construction projects has to be studied in depth. In addition, the concurrency of different types of delays, the engineer's recommendation, and the employer's assessment for the same case has also to be researched out.

**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

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SCHOOL OF CIVIL AND ENVIRONMENTAL ENGINEERING**

**A Study on Causes of Non-Excusable Delays and Excusable but Non-Compensable
Delays of Road Construction Projects (Case Study in Selected ERA Projects)**

A Thesis

By

Redeat Abate Aragaw

Advisor: Dr.Eng. Wubishet Jekale /Ass. Professor/

A thesis submitted to school of graduate studies in partial fulfillment of the requirements
for the degree of Master of Science in Construction Technology and Management

December, 2017

**A Study on Causes of Non-Excusable Delays and Excusable but Non-Compensable Delays of Road Construction Projects
(Case Study in Selected ERA Projects)**

DECLARATION

I declare that this thesis entitled “**A Study on Causes of Non-Excusable Delays and Excusable but Non-Compensable Delays of Road Construction Projects (Case Study in Selected ERA Projects)**” is my original work. This thesis has not been presented for any other university and is not concurrently submitted in candidature of any other degree, and that all sources of material used for the thesis have been duly acknowledged.

Candidate:

Name: _____

Signature: _____

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(Case Study in Selected ERA Projects)

DEDICATED TO

To My Superman and Beloved Granddad

ABATE ARAGAW ADEM

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A Study on Causes of Non-Excusable Delays and Excusable but Non-Compensable
Delays of Road Construction Projects (Case Study in Selected ERA Projects)

By

Redeat Abate Aragaw

APPROVED BY BOARD OF EXAMINERS:

Advisor

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Internal Examiner

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ABSTRACT

Construction delays are occurring in every phase of a construction project and are common problems in construction projects in Ethiopia. Moreover, hence determining the contractual responsibility of delay is the major causes of project failure and the most likely source of dispute in construction projects. If the delay is not identified and the corrective project management decision is not taken in time a project may incur extra cost and extension of project time, which gives rise to dissatisfaction to all the parties involved and nowadays it's becoming a major obstruction for their development for developing countries like Ethiopia. Therefore, this research was carried out to dig-out information on the factors that causes nonexcusable

and excusable but non compensable delays of construction companies contracted to Ethiopian Road Authority in order to improve time performance of the project by managing better these causes. The scope of the research is selected ERA's projects which are completed or being executed by these contracted companies.

Having this, the research assess and observes the problems in relation to such projects with respect to their project performance, delay justification, data recording and documentations, suitability of conditions of contract and approaches of determination and assessment in different head of claim. So that; it identifies and understand gaps (problems and challenges) in considering and managing these causes of non-excusable and excusable but non compensable delays in road construction projects.

The methodology adopted in undertaking this research was the mixed approach involving a detailed review of the relevant literature followed by questionnaire survey and interviews to investigate the variables identified in more depth. Questionnaire surveys together with desk study were used to collect data on different delay factors and causes of the delay occurred. As a result, this research first identified 10 key delay factors causing delay in Ethiopian road construction projects, and then 86 the most common and critical causes of construction delay were evaluated by using the methodology adopted in the field. The findings therefore show that 13.33% of the causes of delays from the case study is considered as non-excusable delays are inadequate planning and scheduling by contractor and poor site management and supervision by

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contractor; The other 20% of the case analysis are found as excusable-non-compensable delays which are caused by external factor those includes suspensions due to adverse weather conditions, delay due to currency adjustment factor and suspension of works due to discovery of landmines. The remaining 66.67% of the causes are identified as excusable-compensable delays. In addition, contractor related factor, equipment related factor and material related factor are the most critical factors; whereas external factor is moderately critical factor as perceived by the respondents that need to be considered as causes of non-excusable delays and excusable but noncompensable delays in road construction based

on this study.

Although, from such major delay category it is found that, seven causes perceived by client as most critical are: (1) sub-contractor, (2) contract management, (3) labor productivity, (4) site management, (5) equipment availability and failure, (6) inadequate contractor experience, and (7)

late delivery of materials. Six causes as perceived by contractor as most critical are: (1) unusually severe weather, (2) sub-contractor, (3) shortage in material, (4) finance and payments of completed work, (5) late approval of payment, and (6) site management. The other five causes are perceived by consultant as most critical are includes: (1) poor coordination on site, (2) improper planning and scheduling, (3) construction methods, (4) quality in material, and (5) delay to provide the right of way.

This paper finally came up with a conclusion report incorporating the different aspects of the project and provoked to give a solutions related to the findings that are disseminated to concerned parties towards reducing the impact of delays on road construction projects in ERA’s practice. Lack of willingness of professionals to complete and return the questionnaire, and difficulties to access documents related to delay claims was the limitation of this study. To this end, therefore it was decided to make this research as a stepping stone for further similar researches. It is due to these qualifications, I found this study adds something relevant to the area of development studies.

Redeat Abate Aragaw
December, 2017

Keywords: *Non - Excusable Delay; Excusable but Non - Compensable Delay; Road Construction Project; Project Management; Performing Organization*

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ABBREVIATIONS/ACRONYMS

EFDR Ethiopian Federal Democratic Republic
ERA Ethiopian Roads Authority
CPM Construction Project Management
IHA Imperial Highway Authority
ETCA Ethiopian Transport Construction Authority
SDBM Sole Dispute Board Member
EoT Extension of Time
PMI Project Management Institute
PMBok Project Management Body of Knowledge
PMIBok Project Management Institute Body of Knowledge
MGT Management
PMM Project Management Methodology
ETB Ethiopian Birr
USD United States Dollar
UK United Kingdom
FIDIC Fédération Internationale Des Ingénieurs - Conseils
(International Federation of Consulting Engineers)

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APPENDIX

Addis Ababa University

School Of Graduate Studies

Addis Ababa Institute of Technology

School of Civil and Environmental Engineering

Master of Science in Construction Technology and Management

A Study on Causes of Non-Excusable Delays and Excusable but Non-Compensable Delays of Road Construction Projects (Case Study in Selected ERA Projects)

QUESTIONNAIRE FOR RESEARCH THESIS

Introduction:

This questionnaire is prepared to obtain information from key informants with semi-structured questions. The information is required for the academic research entitled “A Study on Causes of Non-Excusable Delays and Excusable but Non-Compensable Delays of Road Construction Projects (Case Study in Selected ERA Projects)”, which is being conducted as partial fulfillment of MSc in construction technology and management.

The main objective of the research is to identify the major factors of delays that categorized as non-excusable and excusable-non-compensable causes, and make recommendations based on the findings.

The questionnaire consists of two sections. Section A: General Organizational and Personal Information. Section B: Identification of Causes of Non-Excusable Delays and Excusable but Non-Compensable Delays of Road Construction Projects (Case Study in Selected ERA Projects). At the end there is a space that left for general comments regarding the research topic.

Your response, in this regard, is highly valuable and contributory to the outcome of the research. All feedback will be kept strictly confidential, and utilized for this academic research only.

Finally, I would like to thank you in advance for your willingness to answer the questionnaires.

Thank you,

Redeat Abate

Post graduate student, Construction Technology and Management

A.A University, Technology Faculty, Civil Engineering Department

Tel: 0913 41 61 77

Addis Ababa

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Section A: General Organizational and Personal Information

- 1. Name of Organization/Company: -----
- 2. Type of Organization/Company:
 - Client Contractor Consultant
- 3. Managerial Position of Respondents in their Company: -----
- 4. Address (optional): Mob. ----- E-mail: -----
- 5. Professional/Educational Status of Respondents:
 - MSc. BSc. Others
- 6. Experience of Respondents:
 - < 5 years 5 - 10 years 10 - 15 years
- 7. Experience of Companies in Road Construction Projects:
 - <5 Years 5-10 years 10-15 years >15years
- 8. Type or Origin of the Respondents' Organization
 - Domestic Foreign
- 9. Experience of Foreign Companies in Road Construction sector in Ethiopia
 - < 5 years 5-10 years 10-15 years
- 10. Other organizational and personal information: -----

Section B: Identification of Causes of Non-Excusable Delays and Excusable but NonCompensable

Delays of Road Construction Projects (Case Study in Selected ERA Projects).

Please indicate the significance of each factor by ticking the appropriate boxes with given scales. Add any remarks relating to each factor on the last column; e.g. as to the reasons, the critical factors or the solutions.

- (1) Not critical at all (2) Slightly critical (3) Moderately critical
- (4) Critical (5) Most critical

Table A: Ranking of causes of delay from a causation perspective of respondent's organization

No. Causes of Delay Scale of Respondent Remark

1 2 3 4 5

Client Related Factor

1 Finance and payments of completed work

2 Owner interference

- 3 Slow decision making
- 4 Unrealistic contract duration and requirements imposed
- 5 Obtaining permits from municipality
- 6 Rigid budgets
- 7 Changes of mind during construction
- 8 Ordering extra which delay the work
- 9 Delay to provide the right of way
- 10 Differing site conditions
- 11 Suspension

Consultant Related Factor

- 12 Contract management
- 13 Preparation and approval of drawings
- 14 Quality assurance
- 15 Waiting time for approval of drawings
- 16 Late approval of laboratory tests
- 17 Design changes
- 18 Late approval of payment
- 19 Poor briefing of document (i.e. specification, bill of quantity.)
- 20 Postponement of work
- 21 Late approval of shop drawings

Contractor Related Factor

- 22 Sub-contractor
- 23 Site management
- 24 Construction methods
- 25 Preparation and approval of drawings
- 26 Mistakes during construction stage
- 27 Inadequate contractor experience
- 28 Mistakes in preliminary stage (soil investigation)
- 29 Financing by contractor during construction

- 30 Planning failure
- 31 Organization failure
- 32 Scarcity of resources
- 33 Coordination failure
- 34 Controlling failure
- 35 Lack of qualified engineers
- 36 Failure to hold cash flow for cast

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Table B: Ranking of Identified Causes of Non-Excusable Delays from respondent's perspective

No. Causes of Delay Scale of Respondent Remark

1 2 3 4 5

Material - Related Factor

- 37 Quality in material
- 38 Shortage in material
- 39 Procurement of materials
- 40 Importing of materials
- 41 Late delivery of materials
- 42 Unreliable suppliers

Labor - Related Factor

- 43 Labour supply
- 44 Labour productivity
- 45 Motivation/Moral/Commitment
- 46 Absenteeism
- 47 Shortage of skilled labour
- 48 Mobilization of labour
- 49 Issues and conflicts among workers

Equipment - Related Factor

- 50 Equipment availability and failure
- 51 Equipment allocation problem
- 52 Improper equipment
- 53 Shortage of equipment & its parts

Financial - Related Factor

- 54 Financial indiscipline/dishonesty
- 55 Arranging financing facilities for the project
- 56 Delay payment to suppliers/sub-contractors by contractor

- 57 Inadequate fund allocation
Subcontractor - Related Factor
 58
 Conflicts in sub-contractors schedule in execution of project
- 59
 Frequent change of sub-contractors because of their inefficient work
- 60 Delays in sub-contractors work
 61 Poor sub-contractors performance
Contract and Site - Related Factor
 62 Improper planning and scheduling
 63 Lack of control on site
 64 Poor coordination on site
 65 Inadequate supervision and site management
 66 Improper construction methods
 67 Rework due to errors during construction
 68 Poor communication between parties
 69 Technical Personnel Shortages
 70 Poor qualification of the technical staff
 71
 Inappropriate overall organization structure linking to the project
- 72 Major disputes and negotiations

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A Study on Causes of Non-Excusable Delays and Excusable but Non-Compensable Delays of Road Construction Projects (Case Study in Selected ERA Projects)

Table C: Ranking of Identified Causes of Excusable-Non-Compensable Delays from respondent's perspective

No. Causes of Delay Scale of Respondent Remark

1 2 3 4 5

External Factor

73

Acts of God or of the public enemy

74

Acts of the Government in either its sovereign or contractual capacity (Force Measure Clause)

75

Natural Calamities (Fires, Floods, etc.)

76

Political/Social unrest

77

Epidemics

78

Quarantine restrictions

79

Strikes (Terrorist Attacks)
80
Labor union strikes
81
Freight embargoes
82
Unusually severe weather
83
Problem with neighbours
84
Accidents during construction
85
Material market instability
86
Unforeseen site condition

General Comments:

