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**ST. MARY'S UNIVERSITY**

**SCHOOL OF GRADUATE STUDIES**

**MASTER OF BUSINESS ADMINISTRATION IN PROJECT MANAGEMENT**

**ANALYZING THE CAUSE OF PROJECT IMPLIMENTATION DELAYS IN ADDIS ABABA ROAD CONSTRUCTION AUTHORITY**

BY: BEZAWIT KEFELEGN ID: SGS/0614/2010B

**September 9, 2020**

**ADDIS ABABA, ETHIOPIA**

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A RESEARCH PAPER SUBMITTED TO ST. MARY'S UNIVERSITY, SCHOOL OF GRADUATE STUDIESMASTER OF BUSINESS ADMINISTRATION IN PROJECT MANAGEMENT

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## ***ENDORSEMENT***

This thesis has been submitted to St. Mary's University College, School of

Graduate Studies for examination with my approval as a university advisor.

Advisor Signature

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

**September, 2020**

# **Letter of Certification**

*This is to certify that Bezawit Kefelegn has conducted this project work entitled Analyzing the cause of project implementation delays in Addis Ababa Road Construction Authority under my supervision. This project work is original and suitable for the submission in partial fulfillment of the requirement for the award of Master of Arts Degree in Project Management.*

Temesgen Belayneh (PHD) Signature

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# ***Acknowledgment***

*This research paper is synergistic product of many minds. First, I want to thank the almighty God. I am grateful to the inspiration and guidance of many people who have helped me through this thesis. I feel a deep sense of gratitude to: My advisor, Temesgen Belayneh (PhD) for his intellectual advice, support, constructive comments and thorough guidance. To all who has helped me through developing the thesis and for their unreserved effort to guide and support me with high level of integrity, without their support it is almost impossible to complete this study. I would also like to express my appreciation to all individuals who contributed to this thesis through providing valuable information and by scarifying their precious time in filling the questionnaires.*

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# ***LIST OF ACRONYMS***

**RSDP:** Road Sector Development program

**APM:** Association of project manager

**IPMA:** International project management

**PMBOK:** Project Management Body of knowledge

**ERA**: Ethiopian Road Authority

**RII:** Relative Importance Index

# ***Abstract***

*Addis Ababa road construction Authority is established to construct road in the city by promoting development agendas by mobilizing fund from domestic and foreign sources while ensuring its sustainability. However while implementing the project the company has faced delays which is caused by different factors. To have successfully operating projects that can meet the predetermined goals, projects should be accomplished on time, if delayed, the causes must be known first. The aim of the study, therefore, is to assess the major factors for project implementation delay. This study investigates the causes of delay in project implementation in Addis Ababa road construction Authority. The study adopts quantitative methods with the help of primary and secondary data. Primary data was collected using self-administered questionnaires on 150 selected respondents from 174, total population. Secondary data was collected through reviewing of related materials such as road construction project contract documents and project completion reports. This research categorized the causes of delay under six main groups of client related, consultant related, contractor related, external related, material related and labor related. Then assessed their impacts on delay using relative importance index (RII) as a basis for analysis.*

## **CHAPTER ONE**

**INTRODUCTION**

### **1.1 Background of the study**

A project can be acknowledged as success when it is completed on schedule and within budget, highest quality and in the softest manner. If a project’s time of completion is extending, while taking all necessary measures to bring back the project into track, the project manager should update and convince the customer. However, failure of satisfying project requirements has been repeatedly occurred, especially when projects are completed beyond contract period. Such case is called delay which is defined as the time exceeded the project duration stated on the contract. Twort (2011) defined real delay as a period during which a contractor cannot employ his men or machines or staff at their normal intended output, having regard to the nature and amount of work which is available under the agreed program of working or under practicable rearrangement of the program.

The time interval of contract performance has a direct effect on the profitability of construction projects from the perspective of all stakeholders (Akintoye, 1991). For project owners, lost profits or benefits stem from being unable to make use of the project at the agreed date whilst to the contractor, extra cost will be incurred due to prolonged stay on site. Most standard forms of contract thus have provisions that anticipate delay brought about by the actions and/or inactions of the contractor, the owner or are outside the control of both parties. The contractor is often excused from the consequences and/or allowed compensation for any costs due to delays resulting from events or circumstances that are beyond its control. Project delay are now a major source of conflict in the construction industry and also one of the most difficult to resolve (SCL, 2002).

There are many reasons contributing to project delay and vary from country to country. They can be caused by project parties, manpower, machineries and some of them are uncontrollable such as weather effects. Despite of the efforts made by professionals to achieve the project in a timely manner, the responsibility for delay is mainly associated with them in many cases. (IJARDE,2018). Therefore, when the cost of project exceeds the targeted budget, in many cases, the developer has to face the brunt and in rare cases only, the customer may be convinced to release additional funds.

In most countries, construction activity constitutes 6-9% of the gross domestic product (GDP) and constitutes more than half of the fixed capital formation as infrastructure and public utilities capital works required for economic development (Chitkara 2003). The construction industry in many countries accounts for 9 % of the Gross Domestic Product (GDP). However, it is becoming more complex because of the sophistications of the construction process itself and the large number of parties involved in the construction process.

Road construction is one of the major activities in construction industry which has become the main infrastructures that contribute to the economic growth of a country. Most economic activities are dependent on how many roads are available and how fast those trades can be reachable to the users. Therefore, in order to make economic activities much easier, effective road construction is needed.

The Government of Ethiopia has well recognized that limited road network coverage and poor condition of the existing road network has been an impediment to economic recovery and economic growth. Therefore, to address the problems in the road sector; the Government has launched the Road Sector Development Program (RSDP) in 1997. Since then, four phases of RSDP were implemented over the period of 1997 - 2015 and the fifth phase; RSDP V has been implemented since July 2015 (ERA, 2016).

### **1.2 Road construction in Addis Ababa**

Addis Ababa, which means *new flower*, is currently Ethiopia's largest metropolis, an official diplomatic capital of Africa, and the fourth largest diplomatic center in the world. The city rises from 1 800 to 3 200 meters above sea level. As the national economic center, Addis Ababa receives approximately 54% of Ethiopian investment. Emperor Menilik was said to be a successful road builder participating himself in the construction.

The first two roads in Addis Ababa was constructed in 1902. For about 20 years the government has been constructing roads in the capital city. And 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. (ERA website). Addis Ababa Road Authority constructed in 1997 G.C. The authority has spent around 31 billion birr while repairing and constructing new roads till the year 2017. (A.A.R.A, 2017). The Government of Ethiopia has well recognized that limited road network coverage and poor condition of the existing road network has been an impediment to economic recovery and economic growth.

However, the construction process has faced different challenges and delayed so many times. Construction delay is a global phenomenon faced by many construction industries for this reason the magnitude of risk and unpredictability is very high in the building industries compared to other industries (Gardezi *et al,* 2014). Addis Ababa Road construction has been doing different infrastructural activities in order to give proper service so there won’t be any problems in the traffic flow. Due to different activities in different government sector the road construction delayed and reconstructed many times. (A.A.R.A, 2017).

Therefore, to address the problems in the road sector; the Government has launched the Road Sector Development Program (RSDP) in 1997. Since then, four phases of RSDP were implemented over the period of 1997 - 2015 and the fifth phase; RSDP V has been implemented since July 2015 (ERA, 2016). In 2005 Addis Ababa Road Authority has developed a system which will manage the road construction process. However, it has been demolished due to different problems faced by the team. The company receives different financial support from different development partners including:

* The World Bank (WB)
* European Union (EU)
* African Development Bank (ADB)
* Nordic Development Fund (NDF)
* Bank of Arab for Economic Development in Africa (BADEA)
* OPEC Fund for International Development (OFID)

In this connection, making improvement in the road sector of the country will have a significant impact on economic and social sectors as well. With this objective in mind, this research will assess the critical factors of project delay as well as other undesirable causes that delay road construction projects. Hence, the primary output of this investigation is to develop a suitable resolution way to mitigate the occurrence of delay on road projects and minimize the risks of project failures. Delay is the time overrun either beyond the completion date specified in the contract or beyond the time that the parties agreed upon for delivery of the project. A delay in a construction project may cause losses, or negatively affect some or all of the project parties.

**1.3 Statement of the Problem**

The importance of developing a project plan has long been recognized by different sectors performing projects regardless of the area/context of the project. Many construction projects have been facing different types of problems which leads the project to be delayed and this is one of the main problems. However, numerous construction projects are still plagued by delays and cost overruns, which can frequently be traced to ineffective identification and treatment of limitations due to the improper project planning. First, when a project plan is not properly prepared during the project initiation phase before starting to implement the project, subsequent conflicts in the field are inevitable. Usually, there is additional cost if a project is delayed, they are either extended or accelerated. The common practices normally allow a percentage of the project cost as a profit or an allowance in the contract price and this profit is usually based on judgment.

Today’s projects are becoming more and more technically complex and logistically challenging, which exposes construction operations to even more complex constraints. The effects of construction delays are not confined to the construction industry only, but influence the overall economy of country [Abubeker, 2015]. It is one of the common problems that upset the construction companies in terms of competitiveness and long term sustainable in the global market (Sweis, 2008).

Aziz *(*2013) identified high-impact value of delay causes in Egypt as: Funding problems, different strategies patterns for bribes, Shortage of equipment, Ineffective project planning and scheduling, Poor site management and investigation, Poor monetary control on site, Rework, Selecting non-skilled contractors, Sudden Accidents, poor planning, low-skilled working team, Inadequate contractor experience, Frequent equipment breakdowns, Global financial crisis, Complexity of the work (project type, project scale, etc.), Project Legal arguments between project stakeholders, disagreement between joint-ownership variation, poor construction method, non-skilled labor, and Conflicts.

According to Siraw Y.(2014), the cause of schedule delay includes slow site clearance, supply of materials, Inflation, and exchange rate fluctuation, progress payments delay by owner, unforeseen site condition, slow equipment movement and quality of materials, contractor‘s financial problems and inaccurate cost estimation. Different studies has been conducted which focus on the cause of delays in Ethiopia. For example, Abdissa (2003) has shown that projects were delayed from 20.66% to 500% of original contract duration. Even though a number of studies has been carried out previously on the subject under current study focuses, it had mainly focuses on the project practice of Ethiopia road construction the whole. However this study tried to identify the most important and frequent causes of schedule delay in road construction projects in the case of Addis Ababa Road Construction Authority.

## **1.4 Research questions**

* What are the major causes of Road Construction project delays?
* How much of each different causes of delays contribute in delaying the project?

### **1.5 Objective of Study**

This research was aimed to identifying the major causes of delays and effects of delay in Addis Ababa Road Authority. To achieve this aim, the following specific objectives have been identified:

* To identify the major factors that contributes to the delay in Addis Ababa Road Construction Authority.
* To assess how much different factors of delay impacts the implementation process.
* To identify the effect of delays in Addis Ababa Road construction Authority projects.

### **1.6 Significance of Study**

Basically, this study is expected to identify the answer or result for some of the irregular issues that exist in construction industry such as issues that related delay in Road construction project. Normally, the purpose why these issues arise in the event of delay is due the parties who are unclear and not alert to the causes of delay. Thus, by identifying the causes of delay in road construction project, this study of result will be the guideline to the certainly parties involve, so that it will avoid any source that will happen in their project and carrying out the works within the time, budget and quality as in the contract. And it can be as a basic guidance for those who are involved in construction industry for instance, developers, architects, engineers, quantity surveyors and others in relation to the issue of delay.

**1.7 Scope and limitation of the study**

The research was designed to examine the current challenges and causes in delay of road construction projects in Addis Ababa Road Authority. The study is expected to assess the current major factors which leads to project delay. Furthermore, based on a survey of the current situation, the research should facilitate forwarding important procedural and functional suggestions and advice for improvements to the implementation of the project. The research was limited to Addis Ababa road construction. And it was processed during the world pandemic flu called corona virus (COVID 19). Therefore, it was very hard to collect the available data’s since most of the activities were banned.

### **1.8 Organization of the paper**

This research was organized in to five chapters. The first chapter deals with the basic components and sub components of the research, which includes introduction, background of the study and organization background, statement of the problem, significance of the study, objective of the research and research question, scope of the study, limitation of the study, research methodologies and organization of chapters. The second chapter is dealing with review of related literature. The third chapter deals with methods of the study, how the data was collected and methods of data collection. The fourth chapter deals with Data analysis and interpretation in sub components of the research and summaries of findings. The last chapter presents conclusions based on the analysis and provides possible recommendations.

**CHAPTER TWO**

## **REVIEW OF RELATED LITERATURES**

### **2. Introduction**

The construction industry occupies a very significant position in the resources of many nations as it is one of the major industries contributing to the GDP of any nation. The construction industries in Palestine contribute 33% of the Palestinian GDP which is at the increase when compared to every other sectors like, the production, education, communication, vocation, and entertainment sector (Mahammad 2011, Orozco et al. 2011).

This chapter is focused on the importance of the causes of Road construction delay and the factors contributing to Road construction delay. Furthermore, it describes the State of the art technology used globally to address the issue of delay and the theoretical framework used to address the issue regarding delay in the Addis Ababa Road Authority.

The involvement of financers is not limited to, financing matters, but they also involve in introducing best practices that enhance the capacity of the domestic construction industry as a way forward to ensuring sustainability of the projects they finance. The Road, Sector Development Plan is an ideal means of handling integrated plan in the road sector involving financing plans (ERA, 2014). Road sector construction projects in Ethiopia have an influence on the development strategies of the country. The development strategies of a country achieved through successful road projects intended to improve accessibility of the rural area; lower costs associated with transport maintenance and open more areas for development activities. Road projects, involving large amount of capital, also contribute to the total economy through job creation and in a ripple effect to other business activities. (Ashenafi, 2006.)

**2.2 Project Delay**

According to the Project Management Body of Knowledge (PMBOK), 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. The end is reached when the project‘s objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. Projects can also have social, economic, and environmental impacts that far outlive the projects themselves (PMBOK 5th edition). International Project Management Association (IPMA) defines a project as a time and cost constrained operation to realize a set of defined deliverables up to quality standards and requirements. On the other hand, the Association of Project Managers (APM) defines a project as a unique, transient endeavor undertaken to achieve a desired outcome.

The definable time period of projects indicates a definite beginning and end. The end is reached when the projects objectives have been achieved or when the project is terminated because its objective will not or cannot be met, or when the need for the project is no longer exists. Project management is the planning, scheduling, and controlling of project activities to meet project objectives. The major objectives that must be met include performance, cost, and time goals, while at the same time you control or maintain the scope of the project at the correct level. [James P. Lewis 1995]. The planning process compromises issues like project scope, work brake-down structure, and estimation method for time & cost as main topics.

The execution of a project is said to be successful when it is completed within the scheduled time, without exceeding the allotted budget, and according to the specified quality and standards. Therefore, a proper practices of project managerial functions; proper planning of every element of a project.

#### **2.3 Types of delay**

Delays in construction projects have been put in various classifications by several authors but most of these classifications have a lot in common in terms of their fundamentals. Theodore (2009) mentioned that there are four basic ways to categorize type of delays:

2.4.1 Excusable or non-excusable

2.4.2 Compensable or non-compensable

2.4.3 Concurrent delay

2.4.4 Critical or noncritical

##### ***2.3.1 Excusable and non-excusable***

**Excusable Delay** Excusable delays are caused by conditions that are reasonably unforeseeable and not within the contractor‘s control.

**Non-excusable Delay:** is where contractor compensate on the basis either on liquidated damages or actual damages. Liquated damages base on the daily rate of estimated costs which is likely to incur in the delay of construction projects the owner by the contractor (Muhammad A. *et al*., (2017). Late performance of subcontractors; late performance by suppliers; faulty workmanship by the contractor or subcontractors; a project specific labor strike caused by either the contractor‘s unwillingness to negotiate or by unfair job practices will lead to this type of delay.

###### **2.3.2 Compensable or non-compensable**

**A compensable delay**: is a delay where the contractor is entitled to a time extension and to additional compensation. Relating back to the excusable and non-excusable delays, only excusable delays can be compensable.

**Non-compensable**: delays mean that although an excusable delay may have occurred, the contractor is not entitled to any added compensation resulting from the excusable delay. Thus, the question of whether a delay is compensable must be answered. Additionally, a non-excusable delay warrants neither additional compensation nor a time extension.

###### **2.3.3 Concurrent Delays**

The concept of concurrent delay has become a very common presentation as part of some analysis of construction delays. The concurrency argument is not just from the standpoint of determining the project’s critical delays but from the standpoint of assigning responsibility for damages associated with delays to the critical path. Owners will often cite concurrent delays by the contractor as a reason for issuing a time extension without additional compensation. Contractors will often cite concurrent delays by the owner as a reason why liquidated damages should not be assessed for its delays.

###### **2.3.4 Critical or noncritical**

Delays that affect the project completion, or in some cases a milestone date, are considered as critical delays, and delays that do not affect the project completion, or a milestone date, are noncritical delays. If these activities are delayed, the project completion date or a milestone dater will be delayed.

#### **2.4 Causes of delay**

Delays and cost overruns are the most common problems in construction industry in both developed and developing countries (Enshassi *et al,* 2009). Delays occur in every construction project and the magnitude of these delays varies significantly from project to project and country to country (Weal *et al,* 2007). Cost and time overruns are the key problems of any construction projects. These issues are causing the negative impact on the development of country economic growth and prosperity (Raj K. Shah, 2016).

Al-Tabtabai (2002) conducted a study on causes of delays in construction projects in Kuwait and found out that the major causes of delay were

* Slow financial and payment procedures
* Slow decision-making process
* Limited authority among supervision staff
* Risk allocation mainly on the contractor; and Lack of design drawings coordination.

Memon, Rahman and Aziz (2012) conducted a study on time and cost performance in construction projects in Malaysia and revealed that only 21% of public sector projects and 33% of private sector projects were completed within time. The results of the study showed that the most important delay factors were:

* Design and Documentation Issues
* Financial Resource Management
* Project Management and Contract Administration
* Contractors Site Management and
* Information and Communication Technology.

Kamanga and Steyn [2013] reported that the majority of contractors in Malawi failed to complete their projects in a timely manner including road projects. Therefore, this research has been carried out to identify the problems behind such delays. A questionnaire survey prepared with 72 delay causes categorized into 6 groups has been designed. The respondents were requested to assess the level of importance for each factor based of five point Likert-scale ranging from never occurring to continual occurring. The results indicated that the factor number one causing delay was shortage of fuel.

Owolabi et al. (2014) studied the causes and effects of delay on project construction delivery time in Nigeria. They stated that seven out of ten projects in Nigeria suffered delays in their execution. The results of the study indicated that the following were the five major causes of delay:

* Lack of funds to finance the project to completion
* Changes in drawings
* Lack of effective communication among the parties involved
* Lack of adequate information from consultants and slow decision making.

Sweis, Sweis, Hammad and Shboul (2008) studied delays in construction projects in Jordan and the major causes of delay were: Financial difficulties faced by the contractor; too many change orders from owner; poor planning and scheduling of the project by the contractor; Presence of unskilled labor; and Shortage of technical professionals in the contractor’s organization.

Faridi and El-Sayegh (2006) studied the significant factors causing delay in the construction industry in the United Arab Emirates and revealed that the following were the most important factors causing delay:

* Preparation and approval of drawings
* Inadequate early planning of the project
* Slowness of the owner’s decision-making process
* Shortage of manpower and
* Poor supervision and poor site management.

In Ghana, Frimpong, Oluwoye and Crawford (2003) carried out a research on Causes of delay and cost overruns in construction of groundwater projects in developing countries. The researchers indicated that 75% of the projects in Ghana exceeded the original project schedule. The study revealed that the most important causes of delay were:

* Monthly payment difficulties
* Poor contract management
* Material procurement
* Inflation and Contractor’s financial difficulties.

In India, Ravisankar, Ananda Kumar and Krishnamoorthy (2014) conducted a study on the quantification of delay factors in the construction industry. The researchers indicated that time overrun vary between 50% and 80% for projects completed worldwide. The study revealed that the most important causes of delay were:

* Shortage of unskilled and skilled labor
* Design changes by owner or his agent during construction
* Fluctuation of prices; High waiting time for availability of work teams; and Rework due to errors.

Shanmugapriya and Subramanian (2013) investigated significant factors influencing time and cost overruns in Indian construction projects. The researchers indicated that 60% of projects in India suffered time overruns. The study found out that the following were the most significant factors causing time overruns: Material market rate; Contract modification; Rework of bad quality performance; unclear specification; and Dependence on fresher to bear the whole responsibility.

Ayudhya (2011) evaluated the common delay causes of construction projects in Singapore and found out that the major causes of delay were: Delay in progress payment by owner; Adverse weather conditions; Main contractor financial problems; Evaluation of completed works; and Acts of God.

Mahamid (2013) researched on the causes of time overrun causes in road construction projects in Palestine and found out that the major causes of time overrun were: Segmentation of the West Bank and limited movement between areas; Political situation; Progress payments delay by owner; Lack of efficient equipment; and Difficulties in financing project by contractor. In Malaysia, Abdulla, Rahman and Aziz (2010) studied the causes of delay in Construction Projects and the results showed that the major causes of delay were: Cash flow and financial difficulties faced by Contractors; Contractor's poor site management; Ineffective planning and scheduling by Contractors; Inadequate Contractor experience; and Shortage of site workers.

In a survey of the West Bank in Palestine, Mahamid (2011) indicated that the most severe factors affecting time delay in road construction projects from the owners’ perspective are:

* poor communication between construction parties
* poor resource management
* delays in commencement
* Insufficient inspectors and rework.

In Morocco, Challal and Tkiouat (2012) researched on the causes of deadline slippage in construction projects and found out the five major causes of delay were: Errors in initial budget assessment; Architecture and engineering volatility program (multiple modification requests); Site hazards; Failure of an actor; and Insufficiency or lack of prior study and feasibility.

Similarly, Al-Najjar (2008) concluded that the most important factors causing time overruns in building construction projects in the Gaza Strip as perceived by contractors were: strikes, Israeli attacks and border closures, lack of materials in the markets, shortage of construction materials at site, delays of material deliveries to site, cash shortages during construction, poor site management, poor economic conditions (currency, inflation rate, etc), shortage of equipment and tools on site, and owner delay in freeing the contractors payments for completed work.

Kaliba [2009] et.al examined the problems exposed by road projects in Zambia in terms of time and cost overruns. Several theoretical factors have been determined based on the literature and the files of similar projects completed in the past. The factors that were relevant to the study then have been confirmed by expert panels in the field. Next, a questionnaire survey was designed and distributed to professionals in road construction. The importance of each factor was calculated using weighted average method. It was found that payment delay and effect of weather were the first factors causing delay and cost overrun, respectively.

#### **2.5 Effects of Delay**

Delay in construction can have different kinds of consequences in a project, such as late completion, lost productivity, acceleration, consequential damages, increased cost and contract termination. In the study which was conducted in in Nigeria by Aibinu and Jagboro (2002) six effects of delay, which was Time overrun; Cost overrun; Dispute; Negotiation; Total abandonment; and Litigation.

**2.6 *Methods of Minimization of construction delays***

Whenever delay happens in construction there should always be a method to minimize the problem in order to avoid more risks and losses. Divya. R. and S. Ramya (2015) recommended following points in order to minimize and control delays in construction projects: Frequent progress meeting; Use up-to-date technology utilization; Use proper and modern construction equipment; Use appropriate construction methods; Effective strategic planning; Proper material procurement; Accurate initial cost estimates; Clear information and communication channels; Frequent coordination between the parties involved; and Proper emphasis on past experience. Majid [2006] put numerous delay coping mechanisms like Proper material procurement, Proper emphasis on past, experience Accurate cost initial estimates, proper planning and scheduling of project, and frequent coordination between parties involved.

## **2.7 Conceptual Framework**

There are many reasons contributing to project delay and vary from country to country. They can be caused by project parties, manpower, machineries and some of them are uncontrollable such as weather effects. A number of studies have been conducted in regard to delays in construction projects for decades with scholars advancing various factors and groups of factors that contribute to causing delays.

*Fig 2.7 conceptual frame work*

## **CHAPTER THREE**

**METHODOLOGY**

**3.1 Introduction**

The research methodology briefly outlines research design, study population, sample size and sampling technique, sources of data, methods and procedures of data collection, reliability and validity measures, methods of data analysis and ethical considerations. Based on the purpose of the research, the researcher used quantitative research method.

### **3.2 The research design**

A research design is the arrangement of condition for collection and analysis of data in the manner that combine relevance to the research purpose with economy in procedure Saunders et al, (2009). The study Quantitative data were adopted and therefore survey questionnaire were drawn. The questionnaire was a closed ended question based on Likert scale range from 1 (very low) to 5 (very high).

### **3.3. Data collection and Instrument**

Data is one of the most important and vital aspect of any research studies. Researchers conducted in different fields of study can be different in methodology but every research is based on data which is analyzed and interpreted to get information. Data is the basic unit in statistical studies. Statistical information like survey, population variables, health statistics, and road accidents records are all developed from data.

There are two sources of data collection techniques. Primary and Secondary data collection techniques, Primary data collection uses surveys, experiments or direct observations. Secondary data collection may be conducted by collecting information from a diverse source of documents or electronically stored information, surveys and market studies are examples of a common sources of secondary data.

To conduct this study, the researcher has used both primary and secondary data source, the primary data which was collected from survey questionnaire and the secondary data from different articles, surveys, and research papers were utilized.

**3.4 Sampling design and sampling technique**

According to Kothari (2004), a sample is part of the target population that has been procedurally selected to represent the study. Although there are time and other anticipated limitations to visit all service sectors organization, the researcher visited Addis Ababa Road Construction Authority in order to incorporate the important personnel who can provide pertinent information. The total samples of respondents were 150. Employees were selected by using non-probability (purposive) sampling technique. Explanatory research method approach was used in collecting data from the respondents. The descriptive survey method was preferred because it gives depth knowledge why the delays are occurring.

**3.5. Study Population and Sampling procedure and Sample Size**

#### **3.5.1 Study Population**

The population of the study comprises the main parties of road construction projects namely owners/client staff, Contractor (Project managers, project office engineers, site engineers, surveyor & supervisors) and consultants who are involved in Addis Ababa road construction projects. The population of the study covers employees who has been working in road construction which are the employees of Addis Ababa road construction Authority currently. The employees has different years of experience in road construction projects.

#### **3.5.2 Sampling Procedure**

Purposive (non-probability, deliberate) sampling technique was used to select the respondents under owners, consultants and contractors. This method is used because of the small number of study population. William, (2005) indicates the importance of purposive sampling method in allowing the researcher to get information from a sample of the population that one thinks knows most about the subject matter.

### **3.6 Data Analysis**

The study, after identifying the research area, questionnaire was designed and developed to address research questions in order to collect primary data for further analysis. Then the pilot survey was done to test the reliability and validity of the questions. The data was collected through the questionnaires which were grouped according to themes and then converted to statistical packages for analysis and interpretation. The goals are to integrate themes and concepts into a theory that offers an accurate, detailed and subtle interpretation of the research arena Kothari, (2004)., frequency distribution, chart, description of fact based on some statistical analysis were performed through SPSS to interpret the data. Based on the literature review and some additional suitable questions developed. The questionnaire has 46 road construction project delay causes and these causes were categorized into the following four major groups such as Client related, Consultant related, Contractor related, External factor related, material related and labor related delay causes. The data obtained from the survey used a Likert scale range from 1 (very low) to 5 (very high) and the data analysis is determined to establish the relative importance of various factors that contribute to construction delays. Ranking of the attributes in terms of their criticality as perceived by the respondents was done by use of Relative Importance Index (RII). Relative Importance Index (RII) was computed using RII Equation Abdala and Hussein, (2002)

RII =W/ (A x N), where

W = Weightage given to each factor by the respondents A = Highest weight (i.e., 5 in this case)

N = the total number of respondents

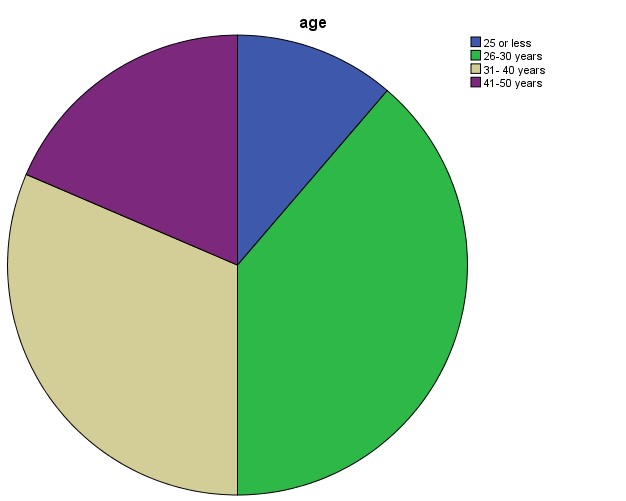
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## **CHAPTER FOUR**

**RESULT AND DISCUSSION**

In this chapter the presentation of the data collected from respondents through questionnaire is presented. The survey was conducted on Addis Ababa Road Construction Authority employees (Project managers, project office engineers, surveyors, supervisors, and contractors). The questionnaire used in this study has 46 set of questions.

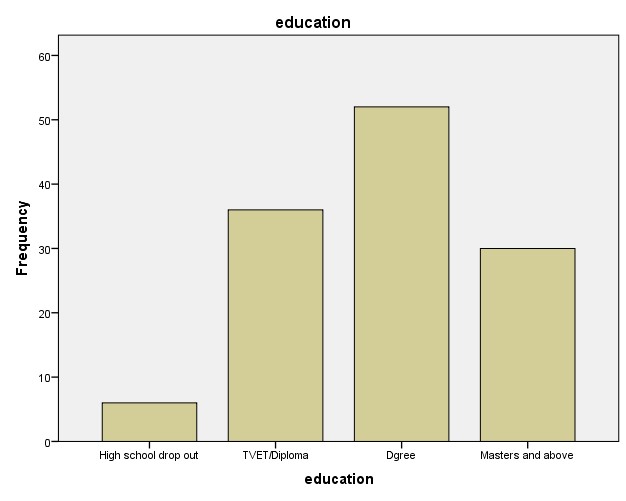
### 4.1 Respondents by Age



*Figure 4.1 respondents by Age*

Figure 4.1 shows that among the total of 124 respondents 11.8 % are between 26– 30 Years ,38% of them are between 31– 40Years, 31.5% of them are between 41– 50 Years, and 18% them are 51 and above years of age. This indicates that more than half of the respondents are in their working age (youth) .which helps them to be more active, flexible and easy to explore (dig more about the subject matter.

### **4.2 Educational background of the respondents**



*Figure 4.2 Educational background of the respondents*

Figure 4.1 shows that 4.8 % of the respondents are high school dropout,29% of them have TVET/Diploma, 41 % of them has degree and 24% of them has Masters and above. This shows that most of the respondents has certified knowledge about road construction and its process. Which means they have a depth knowledge in the field, take responsibilities, has the capability in finalizing as well as making the project to be smooth.

### **4.3 Experience in Road construction projects**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Frequency | Percent | Cumulative  Percent |
| 1-5 years  6-10 years  11-15 years  16 and above  Total | 44 | 35.5% | 35.5  74.2  97.6  100.0 |
| 48 | 38.7% |
| 29 | 23.4% |
| 3 | 2.4% |
| 124 | 100.0 |

*Table 4.3 Experience in Road construction projects*

Table 4.2 shows that from 124 respondents 44 of them has 1-5 years of experience,48 of them has 6-10 years of experience, 29 of them has 11-15 years of experience, and the other 3 respondents has 16 and above 16 years of experience. Which indicates that respondents has knowledge and has practiced (worked) under road construction projects. More experience means one has a undergone in collection of skill about the subject matter, is professional and has the ability to perform without difficulty.

**4.4 causes of Delays**

In this research different causes of delays in Addis Ababa road construction projects has been categorized under six main groups Causes related to clients, delay causes related to consultants, causes related to contractors ,related to external factors, related to material factors and related to labor factors. Each delay causes are assessed from the view point of Addis Ababa road construction employees (project manager, project office engineer, surveyor, supervisor and contractor) clients, consultants and contractors. Each factor is evaluated and ranked based on likelihood of occurrence as perceived by respondents and the calculated mean are taken to rank delay causes using Relative Importance Index (RII).

#### **4.4.1 Client related causes of Delays**

|  |  |  |  |
| --- | --- | --- | --- |
| No | **Causes of Delay** | **Mean** | **RII** |
| 1 | Delay in decision making | ***3.1532*** | 0.512903 |
| 2 | Delay in revising and approving documents design drawing submittals | ***3.2742*** | 0.497521 |
| 3 | Delay of financing and payments By the owner | ***4.1667*** | 0.569355 |
| 4 | Intermittent stoppage of work due to cash flow constraints | ***3.9194*** | 0.416129 |
| 5 | Design change by owner or his agent during construction | ***2.5484*** | 0.365574 |
| 6 | Delay by owner in handing over process of approval of completed work | ***4.1721*** | 0.687805 |
| 7 | Bureaucracy excessively complicated administrative procedure | ***3.5124*** | 0.545161 |
|  |  |  | 0.366667 |
| 8 | Difficulty in accessing bank credit | ***2.4355*** |  |

*Table 4.4.1 Client related causes of Delays*

Table 4.4.1 shows list of client related factors and from the 8 delay causes related to the clients Delay by owner in handing over process of approval of completed work ranked on the first place with the mean value of 4.1721 or the average relative importance index value equals to (RII=0.687805). The second most important client related cause of delay is Delay of financing and payments by the owner with relative importance index value of (RII=0.569355), followed by Delay in revising and approving documents design drawing submittals, Design change by owner or his agent during construction, Difficulty in accessing bank credit, Bureaucracy excessively complicated administrative procedure, and Difficulty in accessing bank credit. This indicates that which plays a big role in client related factor delay is that owner in handing over process of approval of completed work clients take most of their time to process approval of completed documents which has a great impact on Delay.

**4.4.2 Consultant related causes of Delays**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Causes of Delay** | **Mean** | **RII** |
| 1 | Delay in site delivery to the contractor | 3.3145 | 0.537097 |
| 2 | Poor communication and coordination with other parties | 3.0968 | 0.580645 |
| 3 | Lack of experience of consultants | 3.0820 | 0.583607 |
| 4 | Slow response to contractor inquiries | 3.6098 | 0.478049 |
| 5 | Delay in preparing in trim payment certificates | 3.3065 | 0.53871 |
| 6 | Mistakes or discrepancies in documents or design | 3.2581 | 0.548387 |
| 7 | Inadequate site investigation | 3.7419 | 0.480412 |
| 8 | Unclear and inadequate details in drawings | 2.6210 | 0.451613 |
| 9 | Insufficient estimation of original contract duration | 4.1774 | 0.675806 |

*Table 4.4.2 Consultant related causes of Delays*

Table 4.4.2 shows list of Consultant related factors and from the 9 delay causes related to the Consultant Insufficient estimation of original contract duration ranked on the first place with the mean value of 4.1774 or the average relative importance index value equals to (RII=0.675806). The second most important consultant related cause of delay is Delay in preparing in trim payment certificates with relative importance index value of (RII=0.53871), followed by Poor communication and coordination with other parties, Slow response to contractor inquiries, Delay in preparing in trim payment certificates and Inadequate site investigation. This indicates that Delay in preparing in trim payment certificates and Inadequate site investigation. This indicates that the most consultant project delay factor is that incapability of consultants in estimating the project duration properly. They give a short insight in scheduling of project duration of a certain road construction project.

#### **4.4.3 Contractor related causes of Delays**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Causes of Delay** | **Mean** | **RII** |
| 1 | Unsafe practice at site (Poor safety conditions on site) | 3.7769 | 0.36452 |
| 2 | Delay in mobilization | 3.3629 | 0.44463 |
| 3 | Difficulties in financing the project by contractor | 3.5161 | 0.52742 |
| 4 | Poor site management and supervision | 4.1613 | 0.64355 |
| 5 | Deficiency in planning and scheduling of project | 3.7097 | 0.36774 |
| 6 | Rework due to errors during construction | 2.6210 | 0.45806 |
| 7 | Delays related to sub-contractors work | 3.4876 | 0.57886 |
| 8 | Incompetent project team | 3.3629 | 0.50248 |
| 9 | Inadequate contractor experience | 2.9590 | 0.52742 |
| 10 | Under estimation of cost of the road project by contractor | 2.7823 | 0.6082 |
| 11 | Inappropriate construction methods | 3.1694 | 0.49677 |
| 12 | Under estimation of complexity of the road projects | 3.1057 | 0.56613 |
| 13 | Delay in procurement and procedures of long lead items | 4.1694 | 0.67581 |
| 14 | Changes in material types and specifications during construction | 2.6532 | 0.36613 |

Table *4.4.3 Contractor related causes of Delays*

Table 4.4.3 shows list of *Contractor* related factors and from the 14 delay causes of Contractor related factors, Delay in procurement and procedures of long lead items ranked on the first place with the mean value of 4.1694 or the average relative importance index value equals to (RII=0.67581). The second most important contractor related cause of delay is Poor site management and supervision with relative importance index value of (RII=0.64355), followed by Unsafe practice at site (Poor safety conditions on site), Difficulties in financing the project by contractor, Delays related to sub-contractor’s work, Incompetent project team and Under estimation of complexity of the road projects. This indicates that there is error on material specification and letter of credit process delay as well as poor management, insufficient insight in planning and executing the plan.

#### **4.4.4 External factor related causes of Delays**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Causes of Delay** | **Mean** | **RII** |
| 1 | Delay due to telecommunication constructions | 4.1417 | 0.66935 |
| 2 | Global financial crisis | 3.1393 | 0.57213 |
| 3 | Inflation and escalation of material prices | 4.1532 | 0.67097 |
| 4 | Unforeseen weather conditions | 1.9758 | 0.36935 |
| 5 | Geopolitical and reginal stability | 2.6452 | 0.30484 |
| 6 | Restriction at job site, poor site access, traffic congestion | 3.3468 | 0.37167 |
| 7 | Accident during construction | 2.9839 | 0.53065 |

Table *4.4.4 External factor related causes of Delays*

Table 4.4.4 External factor related causes of Delays related factors and from the 7 delay causes of External factor related factors, Inflation and escalation of material prices ranked on the first place with the mean value of 4.1532 or the average relative importance index value equals to (RII=0.67097). The second most important External factor related cause of delay is Delay due to telecommunication constructions with relative importance index value of (RII=0.66935), followed by Global financial crisis, Geopolitical and reginal stability, Restriction at job site, poor site access, traffic congestion, Accident during construction. This indicated that inflation of material price can elongate the duration or/and causes in Road contraction projects, and the second most contributor factor in this category is delay due to construction of telecommunication projects, which is the result of discoordination of government organization.

#### **4.4.5 Material related causes of Delay**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Causes of Delay** | **Mean** | **RII** |
| 1 | Delays due to material delivery | 3.0403 | 0.463934 |
| 2 | Equipment allocation problem | 3.5081 | 0.591935 |
| 3 | Frequent equipment breakdown | 3.1570 | 0.498387 |
| 4 | Shortage of construction materials | 3.6803 | 0.603226 |

*Table 4.4.5 Material related causes of Delays*

Table 4.4.5 shows that material related factors and from the 4 delay causes of material related factors, Shortage of construction materials ranked on the first place with the mean value of 3.6803or the average relative importance index value equals to (RII=0.603226). The second most important Material related cause of delay is Equipment allocation problem with relative importance index value of (RII=3.5081), followed by, Delays due to material delivery and Frequent equipment breakdown. This indicates that not doing the requirement analysis properly, short insight in the scope area, not forecasting the situation and getting ready for the consequence.

#### **4.6 Labor related causes of Delay**

|  |  |  |  |
| --- | --- | --- | --- |
| No | **Causes of Delay** | **Mean** | **RII** |
| 1 | Unqualified workforce | 3.8952 | 0.576774 |
| 2 | Personal conflicts among labor | 3.2661 | 0.420968 |
| 3 | Shortage of labor | 2.9113 | 0.57681 |

*Table 4.4.6 Labor related causes of Delays*

Table 4.4.6 shows that Labor related factors and from the 3 delay causes of Labor related factors, is Unqualified workforce ranked on the first place with relative importance index value of (RII=0.576774), followed by, Personal conflicts among labor and Shortage of labor. This indicates that there is insufficient requirement selection process randomly select unqualified workforce in order to minimize cost.

## **CHAPTER FIVE**

## **CONCLUSION AND RECOMMENDATIONS**

### **5.1 Summary of findings**

From the result it was founded that Delay in procurement and procedures of long lead items and consultant Insufficient estimation of original contract duration was considered the major causes affecting delay in road projects. Generally respondents agreed that out of a total of 45 delay attributes; Delay by owner in handing over process of approval of completed work, Delay in procurement, procedures of long lead items Poor site management and supervision Inflation, escalation of material prices, Delay in decision making, Delay in mobilization, and shortage of equipment are considered as the most prominent delay causes of road projects.

## **5.2 Conclusion**

In a construction project where time truly equals money, the management of time is critical, thus predicting the cause of delay may play a key role towards project success. From total forty-six causes factors causing delays (which were concluded in the questionnaire) has been grouped under in to six parts, client related factor, consultant related, contractor related, external, material, and labor related factors. The researcher has drawn top ten most important factors. These are:

* Delay by owner in handing over process of approval of completed work
* Delay of financing and payments by the owner
* Consultant Insufficient estimation of original contract duration
* Delay in procurement and procedures of long lead items
* Poor site management and supervision
* Shortage of construction materials
* Difficulties in financing the project by contractor,
* Incompetent project team and Under estimation of complexity of the road projects
* Low productivity of labor and
* Inflation and escalation of material prices

**5.2 Recommendation**

Road construction project can be discovered as successful when the construction project activities are done by proper planning and scheduling, within the allocated budget and specified quality, under specified timeframe and by the satisfaction of the stakeholders. Based on the above mentioned results and findings of this study, the following points can be recommended as ways to minimized and control delay in road construction projects.

* Client should ensure that they have well established consistent cash flow net before starting the project.
* Owners should be handing over process of approval of completed work on time
* Clients should ensure that effective planning of project costs to determine adequate budget/ funds are available for the project in order to avoid intermittent stoppage of works as a result of funding constraints.
* Client shall deliver/handover the site to contractors immediately
* Clients should always check they financial capacity, before embarking on any project
* Consultants should avoid the redesign of the project once submitted.
* Consultant should plan sufficient estimation of original contract duration
* Consultant must undertake adequate site investigation and supervision and must assign competent and well experienced representative.
* Contractors should always take inventory of the quantity of materials on site so as to know when it is due for replacement to avoid delay on shortage of material.
* Contractors should ensure that they employ well skilled and experienced labor to avoid defective work.
* Contractors should ensure that they apply good safety principles in project execution to avoid any site accident that might lead to delay.
* Contractors should ensure that workers are motivated to enable them put in their best in meeting the project deadline.
* Proper work as per specification to avoid rework due to error. More research on construction delays should be done in order to develop guidelines, or methods of minimizing construction delays.

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## **Annex Questionnaire**

**St. Mary's University**

**School of Graduate Studies**

**Master of business administration in Project Management**

**Questionnaire on causes of delay contributing to project implementation in Addis Ababa road construction authority projects**

* To identify the major factors that contributes to the delay in Addis Ababa Road Construction Authority.
* To assess how much different factors of delay impacts the implementation process.
* To identify the effect of delays in Addis Ababa Road construction Authority projects.

The information you will provide will be used as primary data for the partial fulfillment for the Award of Master of Arts Degree in Project Management. All your responses are strictly confidential and the findings of this study will be used for academic purpose only.

Please don’t write your name anywhere on this questionnaire. I would like to express my heartfelt gratitude in advance for your kind participation. Please

Tick (√) where appropriate in the box.

**Section: one**

### Demographic Information

1. **Sex:** Male Female
2. **Age:**

25 years or less

Between 26– 30 Years

Between 31– 40Years

Between 41– 50 Years

51 and above years

**3. Education level:**

High school drop out

TVET /diploma

Degree

Masters and above

### 4. Experience in Road construction (in years)

1-5 11-15

6-10 16 and above

### 5. Job Designation

Project manager Supervisor

Project office engineer Resident engineer

Surveyor

## **Section two**

1. **Ranking causes of Delay**

Frequency (How often the attribute is implemented or considered) on rating scale of 1-5 as shown below

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Rating scale | Very low | Low | Moderate | High | Very High |
|  | 1 | 2 | 3 | 4 | 5 |

Frequency: How often is *“Delay in decision making*” considered or does it occurs in construction projects?

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Causes of Delay** | Frequency | | | | | | |  | |
| No | 1 | 2 | | 3 | | 4 | | 5 | |
| 1 | Delay in decision making |  |  | |  | |  | |  | |
| 2 | Delay in revising and approving documents (design, drawings, submittals, sample materials etc. |  |  | |  | |  | |  | |
| 3 | Delay of financing and payments by owner |  |  | |  | |  | |  | |
| 4 | Intermittent stoppage of work due to cash flow constraints |  |  | |  | |  | |  | |
| 5 | Design changes by owner or his agent during construction |  |  | |  | |  | |  | |
| 6 | Delay by owner in handing over process or approval of completed work |  |  | |  | |  | |  | |
| 7 | Bureaucracy (Excessively complicated administrative procedure) |  |  | |  | |  | |  | |
| 8 | Difficulty in accessing Bank (Credit, LC etc) |  |  |  | |  | |  | |
| 9 | Delay in site delivery to contractor |  |  |  | |  | |  | |
| 10 | Poor communication and coordination with other parties |  |  |  | |  | |  | |
| 11 | lack of experience of consultants |  |  |  | |  | |  | |
| 12 | Slow response to contractor inquiries |  |  |  | |  | |  | |
| 13 | Delay in preparing interim payment certificates |  |  |  | |  | |  | |
| 14 | Mistakes or discrepancies in documents or design & specifications issued by consultants |  |  |  | |  | |  | |
| 15 | unclear and inadequate details in drawing |  |  |  | |  | |  | |
| 16 | Inadequate site investigation |  |  |  | |  | |  | |
| 17 | unsafe practice at site(poor safety conditions on site) |  |  |  | |  | |  | |
| 18 | insufficient estimation of original contract duration |  |  |  | |  | |  | |
| 19 | Delay in mobilization |  |  |  | |  | |  | |
| 20 | Difficulties in financing the project by contractor |  |  |  | |  | |  | |
| 21 | Poor site management and supervision |  |  |  | |  | |  | |
| 22 | Deficiency in planning and scheduling of project |  |  |  | |  | |  | |
| 23 | Rework due to errors during construction |  |  |  | |  | |  | |
| 24 | Delays related to sub-contractors work |  |  |  | |  | |  | |
| 25 | Incompetent project team |  |  |  | |  | |  | |
| 26 | Inadequate contractor experience |  |  |  | |  | |  | |
| 27 | Under estimation of cost of the road project by contractor |  |  |  | |  | |  | |
| 28 | Inappropriate construction methods |  |  |  | |  | |  | |
| 29 | Under estimation of complexity of the road projects |  |  |  | |  | |  | |
| 30 | Delay in procurement and procedures of long lead items |  |  |  | |  | |  | |
| 31 | Changes in material types and specifications during construction |  |  |  | |  | |  | |
| 32 | Delay due to telecommunication construction |  |  |  | |  | |  | |
| 33 | Global financial crisis |  |  |  | |  | |  | |
| 34 | inflation and escalation of material prices |  |  |  | |  | |  | |
| 35 | Unforeseen Weather conditions |  |  |  | |  | |  | |
| 36 | Geopolitical and regional stability |  |  |  | |  | |  | |
| 37 | Restriction at job site (Poor site access, traffic congestion) |  |  |  | |  | |  | |
| 38 | Accident during construction |  |  |  | |  | |  | |
| 39 | Delay due to material delivery equipment allocation problem |  |  |  | |  | |  | |
| 42 | frequent equipment break down |  |  |  | |  | |  | |
| 43 | shortage of construction materials |  |  |  | |  | |  | |
| 44 | unqualified work force |  |  |  | |  | |  | |
| 45 | personal conflicts among labor |  |  |  | |  | |  | |
| 46 | shortage of labor during construction |  |  |  | |  | |  | |

**Section 3**

1. **Mitigation Measures**

Please suggest your recommendation to minimize project delay. What you recommend for minimization of delay to road construction projects.

1. List things that should be done minimize project delay in road construction?