ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES

PERCEIVED CAUSES OF PROJECT IMPLEMENTATION DELAY IN ROAD CONSTRUCTION PROJECTS: A CASE OF ADDIS ABABA CITY ROADS AUTHORITY

BY

YARED MIRGA

JUNE, 2019
ADDIS ABABA, ETHIOPIA

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ID. No SGS/0437/2010A

ADVISOR

TIRUNEH LEGESSE (ASST. PROFESSOR)

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APPROVED BY BOARD OF EXAMINERS

Dean, Graduate Studies	**Signature**	**Date**
Advisor	**Signature**	**Date**
External Examiner	**Signature**	**Date**
Internal Examiner	**Signature**	**Date**

DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Tiruneh Legesse (Asst. Professor). All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

_____	_____	_____
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ENDORSEMENT

This thesis has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a University advisor.

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Name	**Signature**	**Date**

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ABSTRACT

The main objectives of this study were to identify the causes of delay in road construction projects, to study the effects of delay in road construction projects, to study the present use of project management tools and techniques in managing delays and to investigate the role of stakeholders in delay of road projects in Addis Ababa city. Descriptive research design utilized to explain perceived causes of road construction project delay. The study employed a survey questioner, to investigate causes of the problem from respondents. The Questionnaires were used as the main source of gathering information from 95 clerical and professional respondents who work at Addis Ababa City Roads Authority. It was found from the study that the five most influential causes of road project completion delay are: " Poor site management and supervision ", " Late procurement of materials " ," Delays in the conversion and transfer of utility services", "Poor contract management by different parties" and " Delays in payments to sub- contractors, machinery renters and contract employees ". The study identified cost overruns, extension of time, negative social impact, idling of resources and reduction of purchasing power of the allocated budget as major effects of road project delays. First and foremost, the study recommends that continuous monitoring and evaluation should be done in order to ensure that all the steps of the project cycle are achieved. Secondly, the study recommends that effective and efficient material procurement systems should be established within projects. The third recommendation is that the organization should work closely with stakeholders to ensure that on time conversion and transfer of utility services. Finally, the study recommends that AACRA should ensure that application of good project planning and scheduling technique in order to avoid cost overruns and delay.

Keywords: – Road Construction Projects, Project delays, Delay causes, Delay effect.

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Contents

List of Tables

List of Figures

List of Acronyms

AACRA	Addis Ababa City Roads Authority
APM	Association for Project Management
CCM	Critical Chain Method
CPM	Critical Path Method
PDM	Precedence Diagram Method
PERT	Program Evaluation Review Technique
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
SPSS	Statistical Package for Social Science
WBS	Work Breakdown Structures

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Time is money; delay in a certain construction project affects time and cost, which is the lifeblood of any economy. Timely completion of construction projects is considered one of the most important factors to project success, as well as quality and safety. All around the world many construction projects face one of the biggest construction problems which is delay, it differ from country to country, from a construction project to another and from construction type to another due to every project circumstances (Sullivan & Harris, 1996). Delay affects construction project in a different way as for the owner or the contractor.

Construction delays can be defined as the late completion of work compared to the planned schedule or contract schedule. Construction delays can be minimized only when their causes are identified (Wei, 2010). Keith (2005) defined the word "delay'' as something happening at a later time than planned, expected, specified in a contract or beyond the date that the parties agreed upon for the delivery of a project. Fung (2006) defined delay as the slowing down of work without stopping construction entirely and that can lead to time overrun either beyond the contract date or beyond the date that the parties have agreed upon for the delivery of the project.

Construction industry is very large, complex, and requires huge capital investments. Delay in the completion of a construction project is one of the biggest problem faced by the construction industry and a major problem for construction project participant leading to costly disputes and adverse relationships amongst project participants. Public construction projects in Ethiopia are part of the country's development initiative. It shares considerable amount of the country's scarce financial resources. In Ethiopia, the construction industry is the highest recipient of government budget in terms of government development program. Consequently, public construction projects consume an average annual rate of nearly 60% of the government's capital budget (Ministry of Works and Urban Development, 2006).

Construction delay is considered to be one of the recurring problem in the construction industry and it has an adverse effect on project success in terms of time, cost and quality. It is revealed from previous studies Abd. Majid and Mccraffer (1998), Alwi and Hampson (2003), Assaf and Al-Hejji (2006), Assaf, Al-khalif and Al-Hajmi (1995), Singh (2010), Sweis, Hammad and Schboul (2008) and Siraw (2014), that the failure of any project is mainly related to the problems and failure in performance (contractor, owner) of project which causes delay or time overrun and cost overrun in project. Delays are always measured as expensive to all parties concerned in projects and very often it will result in clash, claims, total desertion and much difficult for feasibility and also it slows the growth of construction sector (Assaf, et al., 1995).

In the study of Assaf and Al-Hejji (2006), delay is a project slipping over its planned schedule and is considered as common problem in construction projects. Bassioni and El-Razek (2008) identified that delay in construction project is considered as one of the most common problems causing multitude negative effect on project and its participant parties. Therefore, it is essential to identify the actual causes of delay in order to minimize and avoid delays and their corresponding expenses.

The study of causes of delay in road construction projects in Addis Ababa is important because time is one of the three pillars of construction project management: time, cost and quality. A study on project delays is expected to lead to better understanding of the causes of inefficiency in road construction projects. Once the most important causes of significant delay causing factors are identified, the parties to the projects shall then be able to channel their energies and resources to the specific factors thereby reducing delays to the projects. The study on road construction is important in Addis Ababa context because roads contribute to economic growth and poverty reduction in the city.

1.2 Statement of the Problem

Construction sectors particularly road construction is very important for the development and economic growth of any developing countries (Haseeb and Rabbani, 2011). It facilitates mobility of goods and services, and business activities of vicinities areas. Saudi (2006) investigates, completing projects on time is an indicator of efficiency, but construction process is subject to

many variables and unpredictable factors. Construction delay is recognized as the most widely known, expensive and damaging issue experienced in most construction project. Road construction projects are usually exposed to substantial threat to time delay. Delay in the performance of construction projects is a worldwide problem (Haseeb and Rabbani, 2011). Construction projects have a worldwide history of exceeding their time duration and initial budgets when completed (Farid and El_Sayegh, 2006). Assaf and Al-Hejji (2006) define delay as time slip from the initial planned time; and these are a common phenomenon in construction projects. Studies by Assaf and Al-Hejji (2006) on delay indicated that project owners suffer from revenue losses, while contractors are affected by high overhead costs due to increased working durations, high material costs due to inflation and increased labor costs.

Construction industry plays a significant role in any country's economy and it is a backbone for industries (Muya, Kaliba, Sichombo and Shakantu 2013). Construction projects, whether simple or complex, are frequently behind schedule due to various uncertainties. Even today's advanced technology and understanding of project management techniques have not solved the problem of delay (Sweis et al., 2008). Any delay in a project can lead to cost overruns since time and cost are linked (Sambasivan and Soon, 2007). Delay results in either extension or acceleration of projects and therefore, incur extra cost (Ramanathan, Narayanan and Idrus, 2012). Furthermore, delay affects project by losing competitive advantages and market share and increases conflicts, disputes, and claims and results in dissatisfaction of all involved parties (Ramanathan et al., 2012). For the project owner, delay may lead to loss of revenue through lack of production facilities and rentable space or a dependence on present facilities.

Delay is one of the most usual, significant and serious problems which impact the time factor in road construction projects in Ethiopia. Even with technological advances and getting better understanding of project management by project managers, delay is a critical factor. There are different reasons for delay in road construction projects. In some cases delays make the condition even more complex. It require detail study to recognize delay causes and choose accurate and right actions to reduce the adverse impact of delays on the duration of road construction projects.

In different studies cause of delay in road construction project is connected with clients, contractors and consultants. However, in road construction projects the stakeholders are

different. Stakeholders in road construction are different from client up to final beneficiary. Hence conducting study on causes of delay on road projects from limited stakeholders' side will not give complete solution to the problem. That is why even many studies are conducted in delay still the problem is existed. In addition most of the studies in Addis Ababa are conducted before 2012. As time changes construction technologies, stakeholders and requirements will change. Therefore, delay is an important issue in construction industry. Thus, there is a real need to investigate causes of time delays in Addis Ababa road construction projects because of their criticality and limited number of published studies that addressed this problem. The aim of this study is to identify factors that hinder the completion of road projects on planned time in Addis Ababa City.

1.3 Research Questions

In this study, the process of developing the research questions was based on the above problems mentioned in the statement of the problem and. In addition, the questions were improved through discussion with road construction industry specialists, and finally improved in order to meet the purposes of the study. At the end of this study, the researcher attempted to answer the main problem and the following key questions:

1. What are the effects of road construction projects delay in Addis Ababa?
2. What are the roles of stakeholders on delay of road construction projects in Addis Ababa?
3. What is the rank of effects of road construction projects delay in Addis Ababa?
4. To what extent project management tools and techniques utilized in managing delays in road construction projects in Addis Ababa?
5. What are the possible solutions to minimize delays in road construction projects in Addis Ababa?

1.4 Objectives of the Study

General Objective

To study perceived causes of project implementation delay in road construction projects in Addis Ababa City

Specific Objectives

1. To investigate effects of road construction projects delay in Addis Ababa;
2. To explore the role of stakeholders in road construction projects delay in Addis Ababa;
3. To assess the level of effects of road construction projects delay in Addis Ababa by ranking them;
4. To study the use of project management tools and techniques in managing delays in road construction projects in Addis Ababa;
5. To investigate possible solutions in order to minimize delays in road construction projects in Addis Ababa.

1.5 Definition of Terms

Delay: According to Aibinu and Jagboro (2002), delay can be defined as a situation in which a project contractor and project owner jointly or separately fail to meet their end of the bargain in project completion.

Construction Delays: Assaf and Al-Hejji (2006) defined delay as the time overrun compared to completion date as specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. Abd. Majid and McCraft (1998) defined delays as the time overrun beyond the contract date or the date that the critical activities have been delayed.

1.6 Significance of the Study

This study provides insights that reveal the factors influencing road construction project delays in Addis Ababa city. It has an aim of enabling project delivering organizations become more knowledgeable of the factors by looking into ways that can minimize project delay. With this,

project delivering organizations shall maintain productivity and sustainability by identifying, acquiring and adequately implementing measures that prevent delays in projects that lead to improved delivery.

This study is essential to the government in formulation of road construction project policies and procedures to implement the policy. An informed policy provides useful guidelines to the industry which minimizes project delay, cost overrun, failures, reduces risks and severally enables order in the construction industry. This study has benefits to the following stakeholders;

Contractors: The results of this study has great importance to any individual involved in road construction project and implementation since they can get insight on the factors that cause road construction project delays in Addis Ababa.

Clients: The results of this study has great importance to the owners of the project since they can get insight on how effectively projects can be implemented and delivered without experiencing delays caused by the identified factors.

Researchers: The results of this study has great importance to researchers since it shall provide insight on the factors influencing road construction project delays in Addis Ababa, hence enable them to get information on the same.

This study also intends to generate practical and theoretical further research questions that can become useful study basis for future researchers. The findings should be considered as a contribution in the debate about how to improve project time management in construction industry particularly with regard to road construction projects.

1.7 Scope of the Study

Scopes are restricting boundaries that a researcher put in the study (Perry, 2012). Owing to the broad and complex nature of the construction industry, the study has focused on road construction projects in Addis Ababa. This study focused only on asphalt road construction projects constructed by Addis Ababa City Road Authority in Addis Ababa City as a contractor. The study has been designed to investigate causes of road projects construction delays, effects of this delays, the role of stakeholders in delay and the means of minimizing delays. The scopes have an effect on generalizing the study findings (Silverman, 2013).

1.8 Organization of the Research Report

The paper has consisted five chapters. The first chapter deals with introduction, statement of the problem, basic research questions, objectives of the study, definition of terms, significance of the study, scope of the study and organization of the paper. Chapter two presents review of related literatures. Chapter three describes the methodology of the study. The empirical findings of the study are presented and interpreted in chapter four. Chapter five deal with summary, conclusions and recommendations. Finally, references are listed and appendices are attached at the end.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

As mentioned earlier, this study is on topic perceived causes of delay in road construction projects in Addis Ababa, Ethiopia. To answer the research questions it is necessary to find out necessary theoretical and empirical previous studies on the problems. Therefore, it is necessary to provide theoretical information about project delay and related concept first. The purpose of this chapter is to provide the required theories to understand about delay, causes and effects of delay in construction projects. This chapter answers questions:

- What is project delay?
- What are the causes of delay in project?
- What are the consequences of delay?
- What are stakeholders in road construction projects?

Information provided in this chapter will give the reader an understanding of delay and delay causes. In addition, chapter acts as a foundation for the next chapters. In the following, a definition about project delay, causes and effects will be provided. Afterwards, stakeholders, previous studies, and possible measures to minimize the problem will discuss in detail.

2.2 Project Time Management

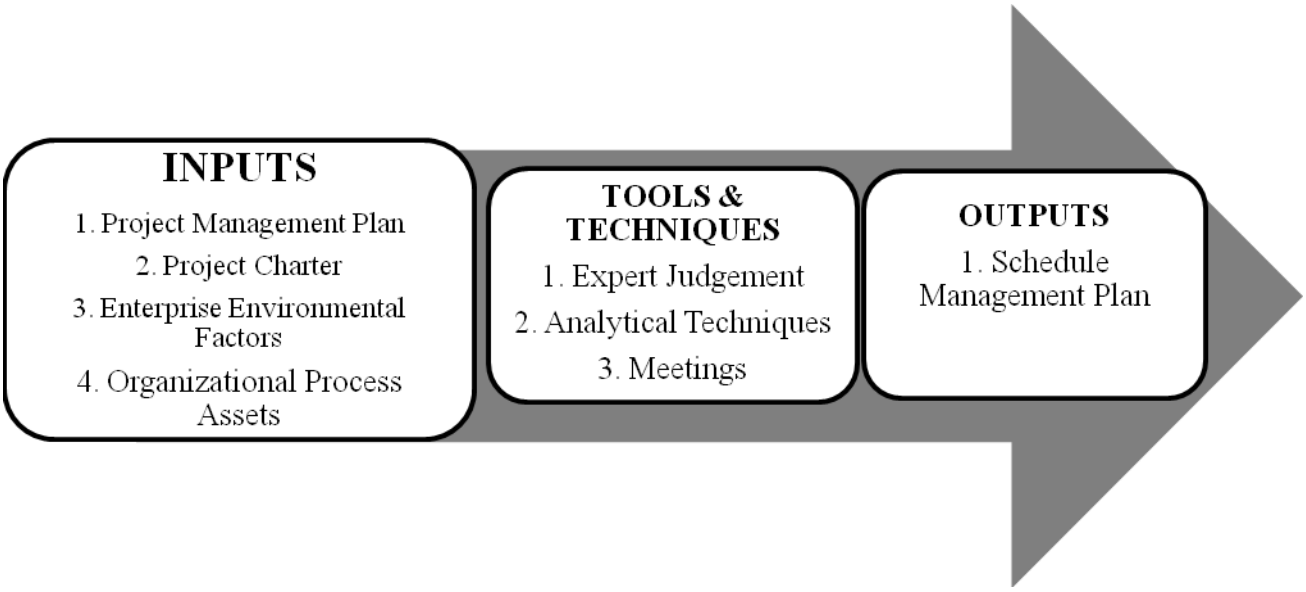
According to project management institution guide to Project Management Body of Knowledge PMBOK (2013) time management in project is discussed in detail below. Project Time Management includes the processes required to manage the timely completion of the project. These processes are listed here below:

2.2.1 Plan Schedule Management

Plan Schedule Management is the process of establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule. The key benefit of this process is that it provides guidance and direction on how the project schedule

will be managed throughout the project. The inputs, tools and techniques, and outputs of this process are depicted in figure one below.

Figure 1: Plan Schedule Management: Inputs, Tools & Techniques and Outputs

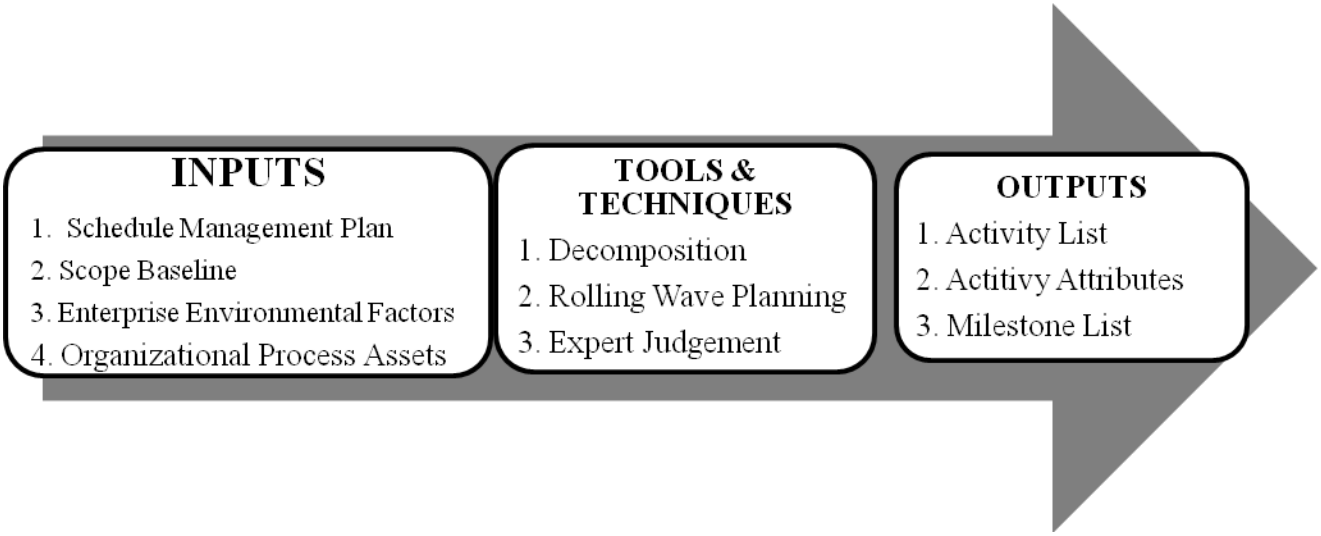


Source: Project Management Institute [PMI] (2013)

2.2.2 Define Activities

Define activities is the process of identifying and documenting the specific actions to be performed to produce the project deliverables. The key benefit of this process is to break down work packages into activities that provide a basis for estimating, scheduling, executing, monitoring, and controlling the project work. The inputs, tools and techniques, and outputs of this process are depicted in the next page through figure 2.

Figure 2: Define Activities: Inputs, Tools & Techniques and Outputs

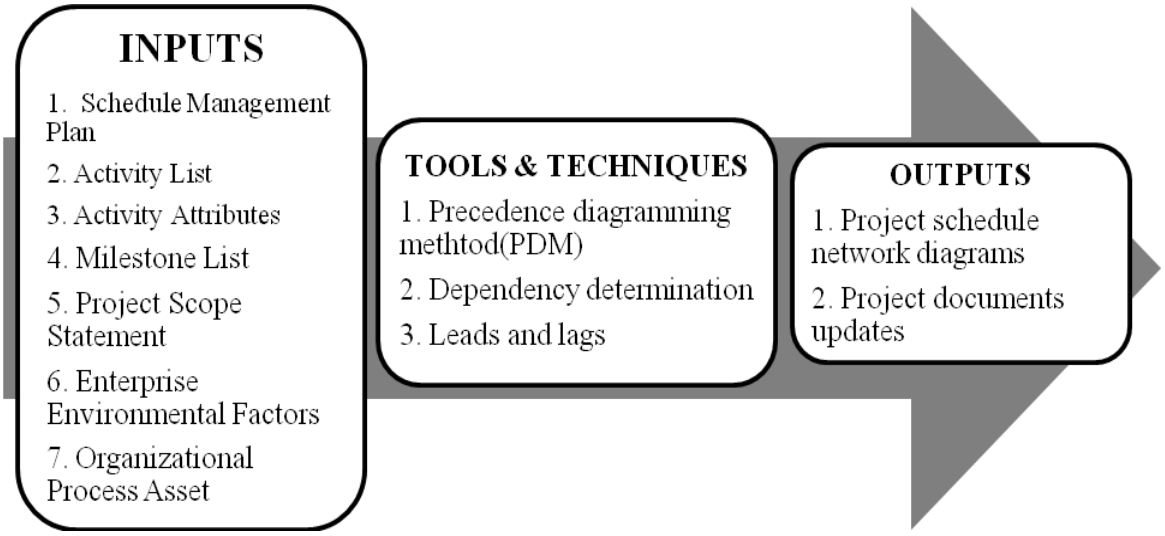


Source: PMI (2013)

2.2.3 Sequence Activities

Sequence activities are the process of identifying and documenting relationships among the project activities. The key benefit of this process is that it defines the logical sequence of work to obtain the greatest efficiency given all project constraints. The inputs, tools and techniques, and outputs of this process are depicted in figure 3 below.

Figure 3: Sequence Activities: Inputs, Tools & Techniques and Outputs

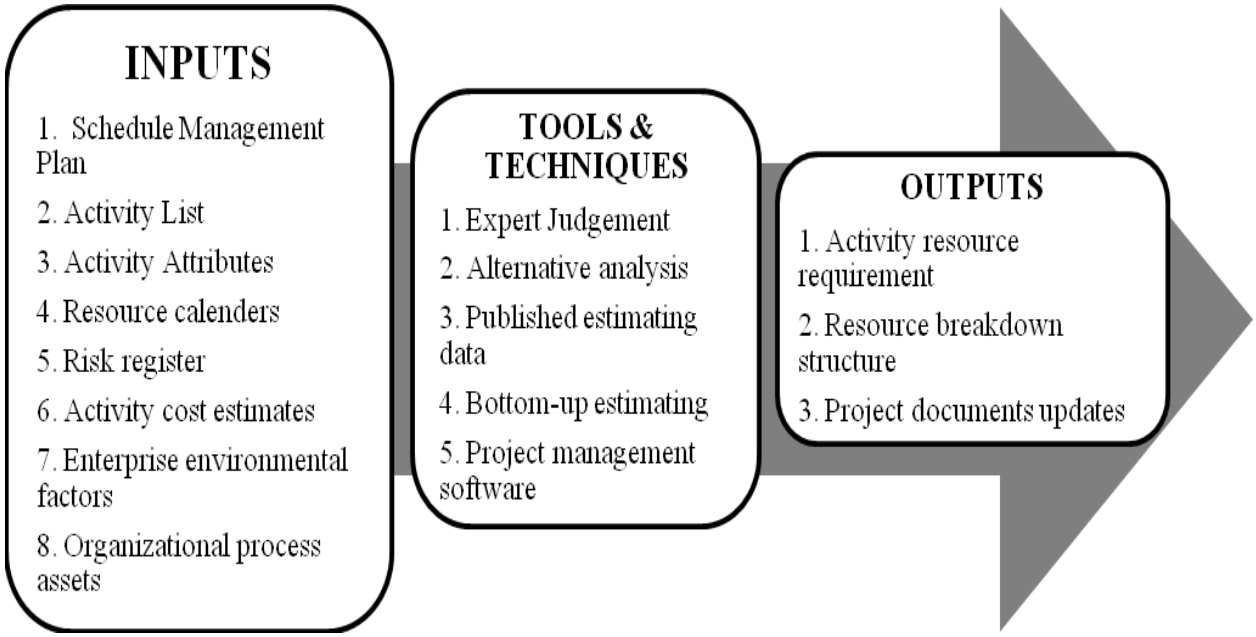


Source: PMI (2013)

2.2.4 Estimate Activity Resources

Estimate activity resources are the process of estimating the type and quantities of material, human resources, equipment, or supplies required to perform each activity. The key benefit of this process is that it identifies the type, quantity, and characteristics of resources required to complete the activity which allows more accurate cost and duration estimates. The inputs, tools and techniques, and outputs of this process are depicted in figure 4 below.

Figure 4: Estimate Activity Resources: Inputs, Tools & Techniques and Outputs

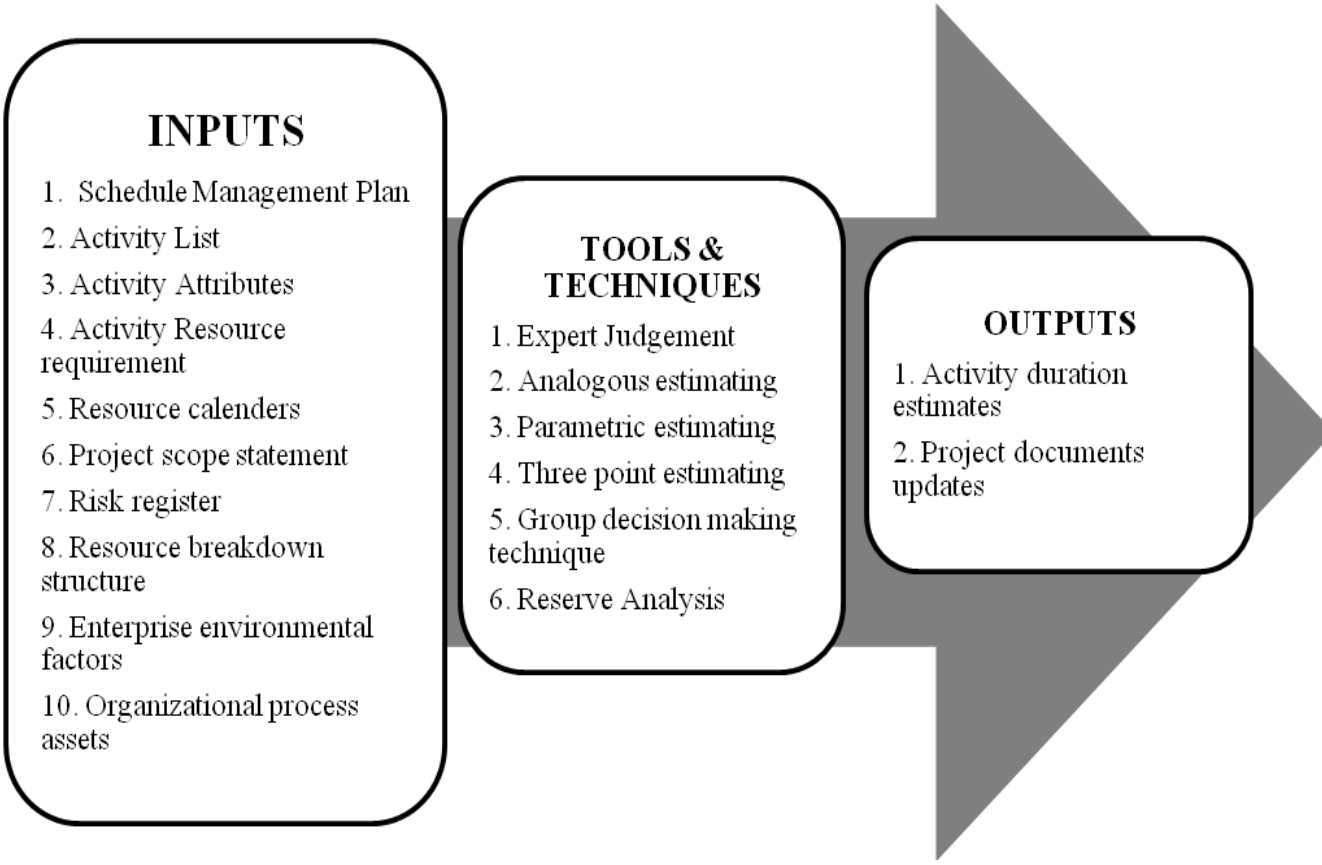


Source: PMI (2013)

2.2.5 Estimate Activity Durations

Estimate activity durations are the process of estimating the number of work periods needed to complete individual activities with estimated resources. The key benefit of this process is that it provides the amount of time each activity will take to complete, which is a major input into the develop schedule process. The inputs, tools and techniques, and outputs of this process are depicted in figure 5 next page.

Figure 5: Estimate Activity Durations: Inputs, Tools & Techniques and Outputs

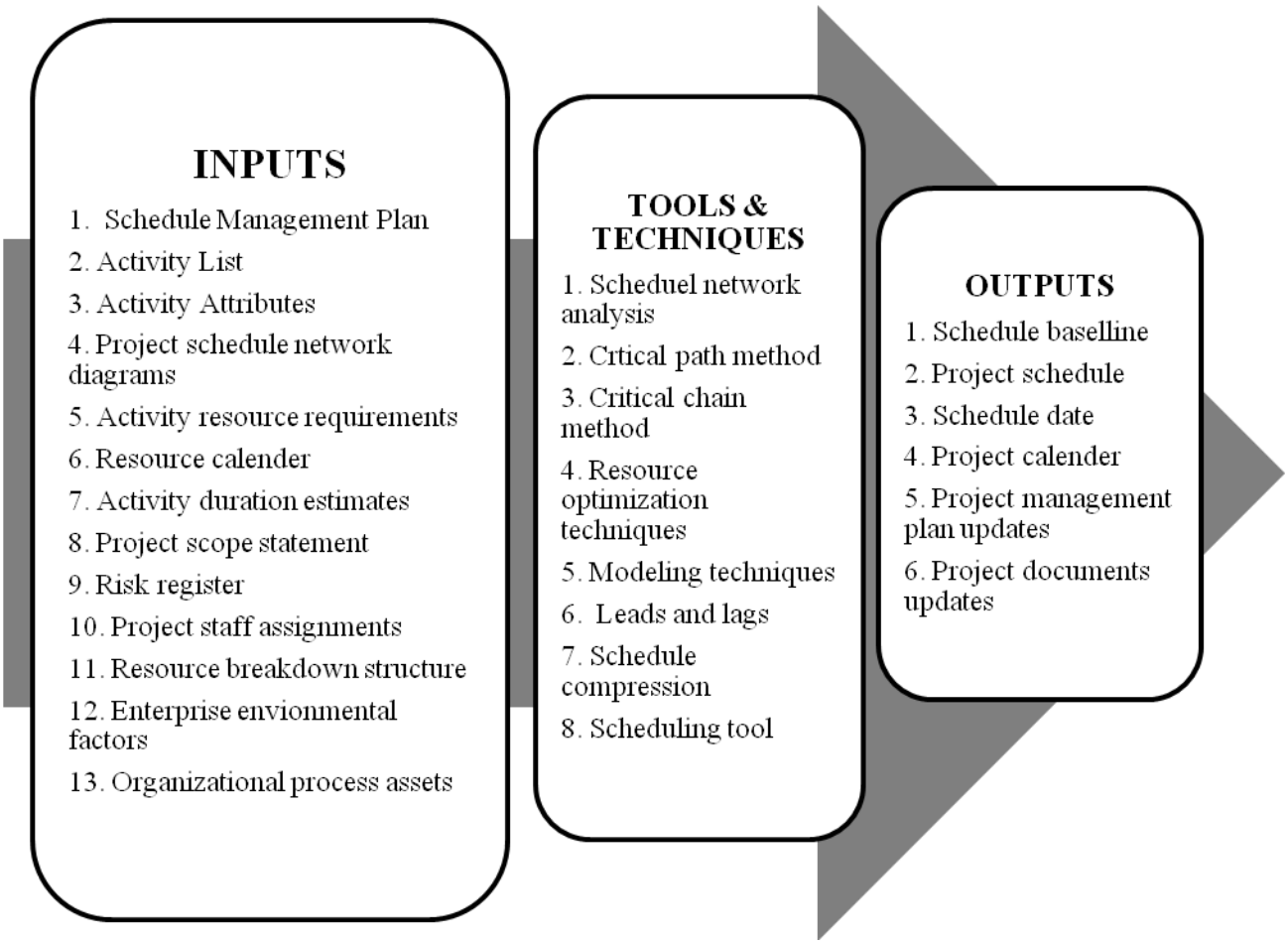


Source: PMI (2013)

2.2.6 Develop Schedule

Develop schedule is the process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model. The key benefit of this process is that by entering schedule activities, durations, resources, resource availabilities, and logical relationships into the scheduling tool, it generates a schedule model with planned dates for completing project activities. The inputs, tools and techniques and outputs of this process are depicted in figure 6 next page.

Figure 6: Develop Schedule: Inputs, Tools & Techniques, and Outputs

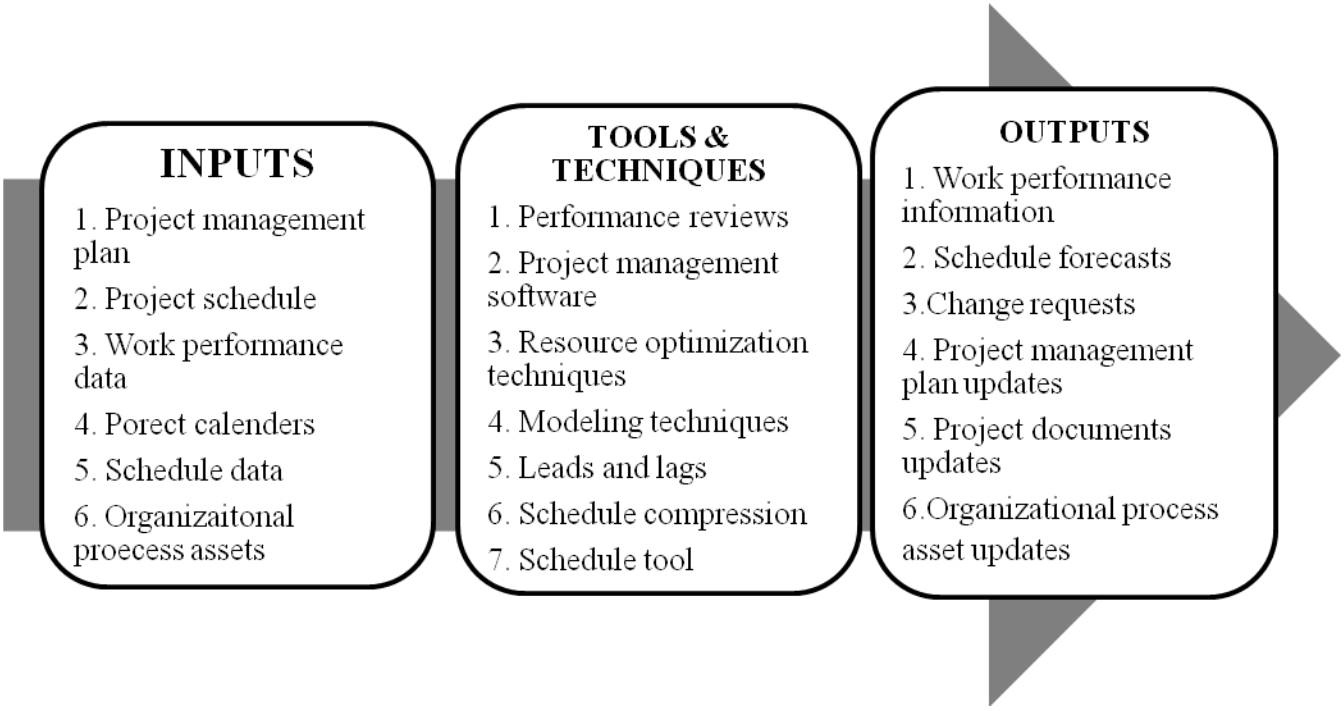


Source: PMI (2013)

2.2.7 Control Schedule

Control Schedule is the process of monitoring the status of project activities to update project progress and manage changes to the schedule baseline to achieve the plan. The key benefit of this process is that it provides the means to recognize deviation from the plan and take corrective and preventive actions and thus minimize risk. The inputs, tools and techniques, and outputs of this process are depicted in figure 7 next page.

Figure 7: Control Schedule: Inputs, Tools & Techniques, and Outputs



Source: PMI (2013)

2.3 Delay in Road Construction Projects

2.3.1 Project Delay

In a construction project, delay is the result of unexpected act or event that extents required time to complete the tasks under contract or beyond the date agreed by parties to deliver the project (Ramanathan et al., 2012). Delay can be either extra days of work for an activity or late start of an activity (Yang, Chu and Huang 2013). Projects comprise of collections of activities and delays can be measured at the activity or project level. On the activity level, delays can affect completion of activities, which may or may not have an impact on succeeding activities. At the project level, analysis typically focuses on delays relative to project completion (Gonzalez, Gonzalez, Molenaar and Orozco, 2014).

Delay in construction is a state in which the actual progress of the phases of a construction project becomes slower than as planned or completing the project late (Chartered Industry of Building [CIOB], 2008). Delay in the setting of construction refers to prolonged period of construction and interruptions of events that distracts the programme of the construction. Cheung, Shu and Arditi (2001) states that delay is acknowledged as the most risky, costly,

common, and complex problem encountered during projects. Delays are synonymous with construction projects. Delay has been established as one of the commonest experience in the construction project globally (Ahmed, Azhar, Kappagntula and Gollapudil, 2003). Multiple studies have identified incident of delay as a major problem facing construction projects in the world (Kaliba, Muya and Mumba, 2009). However, delays are not only experienced in the emerging and developing countries only, delays are a global phenomenon (Memon, Rahman and Azis, 2011).

2.3.2 Types of Delays

Alaghbari, Razali, Salim and Ernawati (2007) states that delay in construction projects is divided in to the following main types. And detail discussion of each delay type is made here below.

- ♣ Concurrent Delay
- ♣ Non – Concurrent Delays (Solo Delay)
- ♣ Excusable Delay
- ♣ Non-excusable Delay
- ♣ Compensable Delay
- ♣ Non Compensable Delay

- **Concurrent Delay**

According to Long (2015), the term concurrent delay is mainly used to identify a situation where by two different causes of delay match on a project during a schedule time. That is if a delay that was caused by the client is on the same activity path with the delay caused by the contractor, such the delay is said to be concurrent. However, if the delay caused by the contractor and that caused by the client affect the similar activity at the same time or a different activity that was supposed to run the same time and result to the addition of the project completion date such delay is said to be concurrent.

- **Non – Concurrent Delays (Solo Delay)**

Delay caused by one party, with other parties not having any responsibility for it. It happened when one of the project's activities need more than planned time to accomplish it in the schedule

time listed in the plan. Critical path method is the tool used to know the duration of the delay, the resulting cost and its impact on other activities. In addition, it assist in the identification and knowledge of party causing the delay and therefore carry the responsibility and the costs of delay (Scott, 1997).

- **Excusable Delay**

Trauner, Manginell, Lowe, Nagata and Furniss (2009) states that excusable delays are delays resulting from an unplanned and unforeseeable event beyond the contractors or the subcontractors' control. These are delays resulting from events such as fire outbreaks, floods, acts of God, client variation, mistakes and errors in specifications, variation in site conditions or buried services, abnormally weather condition, acute illness, death or absence of one of the contractors without notice are known as excusable delays.

- **Non-excusable Delay**

These are delay conditions that are under the contractor's control or circumstances that are foreseeable. Some of the examples of these delays causes are as follows: 1. Sub-contractors inappropriate execution of task, 2. Improper conveyance of materials, 3. Structural flaw from workman, 4. Labor strike caused by the contractor (Dinakar, 2014). Gardezi, Manarvi and Gardezi (2014) states that non-excusable delays are caused by the contractor or its suppliers in this case. The contractor is not entitle to any compensation and is expected to finish the work at the specified time of the contract duration or make compensation to the client.

- **Compensable Delay**

Compensable delays are delay where a substantial amount is given to the contractor as compensation in addition to an extension in the project completion date. However, only delays with valid reason are considered for compensation (Hampton, Baldwin & Holt, 2012). Although, delay can be compensable without extension of the contract time, for a party to be compensated for any delay that party must not contribute to the delay of project. Rather the delay should be the fault of the other party (Bramble and Callahan 2011). However, Gardezi, Mana and

Gardezi (2014) have a view that these delay are caused by the client or action of his agent e.g. late release of architectural drawings or engineering design.

- **Non Compensable Delay**

Of the reasons for the delay according to Scott (1997) study: Force measure, wars, natural disasters such as an earthquake or flood, unforeseen circumstances, exceptional weather conditions, snow or heavy rain, etc. It is a delay occurring as a result of events beyond the control of both the contractor and the owner (Fugar and Agyakwah – Baah, 2010). Examples of this types of delay are unusual weather, wars and environmental phenomena such as earthquakes, fires and acts of government (Soon, 2010). In this case, the contractor is normally entitled to a time extension but no compensation for delay damages (Ibironke, Oladinrin, Adeniyi and Eboreime, 2013).

2.4 Causes of Delay

Ayman (2000) in his study on construction delay, a quantitative analysis conducted to investigate the reasons for delays on construction projects. The outcome of the research shows that major reasons for delay in projects are related to design engineer, change in the use of the proposed building, bad weather condition, logistic, financial conditions and changes in the quantity of materials needed to execute the project. The existence of these delay factors in any project has an effect on its completion date. Doloi, Sawhney, Iyer and Rentala (2012) in their research on analyzing factors affecting delays in Indian construction projects are lack of dedication, incompetency of site manager, poor coordination, lack of understanding of project scope and communication problem are possible factors causing delay.

Le-Hoai, Lee and Lee (2008) in their studies enumerated some of the project-related variable that can cause delay in large construction projects in Vietnam. These are project complexness, environment, size; and scope. Although Lowsley and Linnett (2006) in their research on delay in construction made reference to other variables such as changing climate conditions, unanticipated ground conditions, accessibility of resources and incomplete design details. Fugar and Agyakwah-Baah (2010) in their research on delay in building construction project in Ghana enumerated numerous causes of delay. And found that delay in getting permission from council,

poor estimation of project cost, underrating the complications of projects, bank transaction challenges, inconsistency in price of materials and poor site supervision. Sweis et al. (2008) in their research on the causes of construction delay in Jordan and concluded that financial problem encountered by the contractor and client are the primary causes of project delay.

Assaf and Al-Hejji (2006) studied different projects in Saudi Arabia to determine the most important reasons for delay in construction projects. The study revealed that most of the reasons for delay are delay in progress payments, ineffective planning and scheduling by contractor, poor site management and supervision, shortage of labors and financial shortage. Tumi, Omran and Pakir (2009) studied delays in construction projects in Benghazi city in Libya. One of the most important reasons that emerged from the study regard to delay in construction projects in Libya are lack of effective communication, design error, shortage of material supply, slow decision making, financial issues, cash- flow problems during construction and increase in qualities.

Odeh and Battaineh (2002) studied aiming to identify the most important reasons for delay in construction projects in Jordan from the point of view of both contractors and consultants. The results were that contractors and consultants agreed on the following reasons leading to delay. Payments delay, low labor productivity, slow decision making, unnecessary owner involvement, inexperience of contractors, financial shortage, improper planning and sub-contractors poor performance are main reasons for delay.

Frimpongs, Oluwoye and Crawford (2003) studied on delays in construction projects in Ghana revealed that most of the reasons for project delay are poor management of sub-contractors, material Supply management, poor project management and materials price fluctuation. Wiguna and Scott (2005) studied the nature of the critical risk factors affecting project performance in Indonesian building. The study revealed that the most important risks contributed to projects delay are change in designs, designs error, weather conditions, price increase, delay in cash flows and mistake in the course of implementation.

Al Hindawi and Awad (2007) studied the reasons of delay in construction projects in Iraq. The questionnaire included 78 causes of the delay were presented to random samples that include engineers, owners and contractors. From the data analysis result the most important reasons for

delay are lowest price bid, contractor's financial problem, weakness in time scheduling, materials price fluctuation and delay in laboratory tests result

Sambasivan and Soon (2007) studies delay and their effect on project completion in Malaysia. Earlier studies considered either the cause or the effects of project delays separately. In this study 150 questionnaire are distributed to respondents of clients, consultants and contractors to identify causes of delay. The study revealed that the causes for delay are poor planning, poor site management, lack of contractor experience, inadequate fund allocation by the client, problems with sub-contractors, lack of materials, unavailability of equipment, equipment failure, Weak communication between parties involved and implementation errors.

Different researches in the past conducted to find delay factors or causes in construction projects. And also there are some studies on delay causes in road construction projects. The researcher summarized different studies on delay at different countries and time. Let look some of them in short and summarized way.

Assaf, Al-Khalil and Al-Hazmi (1995) study on causes of delay in large building construction projects. This study has identified 56 main causes of delay in Saudi Arabia large building construction projects and their relative importance. A survey of contractors, owners, and architects/engineers was conducted on the causes of delay factors in large building projects in Saudi Arabia. The survey showed that all three groups generally agree on the ranking of individual delay factors. The factors were categorized into nine major groups and were ranked. The nine groups were material, manpower, equipment, financing, changes, government relations, scheduling and controlling, environment, and contractual relationships. Based on the contractors surveyed, the most important delay factors were preparation and approval of shop drawings, delays in contractor's progress, payment by owners and design changes.

Al-Tabtabai (2002) conducted a study on causes of delays in construction projects in Kuwait and found out that 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 Azis (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. In Morocco, Challal and Tkiouat (2012) researched on the causes of deadline slippage in construction projects and found out 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.

In India, Desai and Bhatt (2013) studied the critical causes of delay in residential construction projects and found out that the most important delay factors were: Original contract duration was too short; Legal disputes between various parties; Ineffective delay penalties; Delay in progress payments by owner; and Delay to furnish and deliver the site to the contractor by the owner. Alinaitwe, Apolot and Tindiwensi (2013) carried out a study on causes of delays and cost overruns in Uganda's public sector construction projects and the results showed the major causes as: Change of work scope and/or changes in material specifications; High inflation, insurance and interest rates; Poor monitoring and control, due to incompetent and/or unreliable supervisors; Delayed payment to contractors, subcontractors and/or suppliers; and Fuel shortages.

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. In India, Ravisankar, Anandakumar and Krishnamoorthy (2014) conducted a study on the quantification of delay factors in the construction industry. 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.

The above studies shows important factors or causes in construction projects delay. The factors will be input for different construction project management. However, causes for delay differ from country to country, from time to time and from project to project. Hence, searching knowledge on causes of project implementation delay is vital. Specially knowing causes of road projects construction delay in Ethiopia particularly in Addis Ababa city is crucial to solve the problem.

2.5 Effects of Delay

Several studies have been carried out addressing how construction project delay has effect on different stakeholders. It is undoubtedly clear from available studies across different countries that delays in construction projects have some form of effects on the outcome of such projects. Let see some of the studies on effects of delay of road construction projects.

Amoatey, Ameyaw, Adaku & Famiyeh (2014) conducted a study in Ghana, analyzing causes and effects of construction delay in Ghanaian state housing construction projects. The findings of the study showed that delays in project execution affect the delivery of construction projects in terms of cost overrun, time overrun, litigation, lack of continuity by client and arbitration. Sambasivan and Soon (2007) study on causes and effects of delays in Malaysian construction industry. The study revealed six main effects of delays in executing construction projects to include; disputes, cost and time overrun, litigation, and project abandonment by the contractor.

In a similar study in Nigeria, Aibinu and Jagboro (2002) undertook an assessment of the main effects of delays on construction projects delivery. The study revealed that time overrun, cost overrun, disagreement, arbitration, total abandonment of the project by the contractor and lawsuit amongst participating parties were the main effects of delays on construction projects in Nigeria. The study further established that delay of construction project often results in time extension. These extensions of time usually lead to extra financial expenditures. Disputes amongst project participants are also identified as another effect of delay, mostly between contractor and client for either extension of time or financial claims for under budget or variation.

Sunjka and Jacob (2013) further revealed in their study that the most critical effects of delays on construction projects in Niger Delta are Cost overruns, time overrun, disputes and claims. Another study by Salunkhe and Patil (2014) addressed the effects of construction delays on project time overrun in India. This study was underscored by the recognition of delays in the construction industry. The study highlighted the types of construction delays, which results in cost and time overrun. In another study, Ahmed, Kappagantula and Gollapudi (2003) summed that the effects of delay in construction projects could lead to; confrontational relationships, disbelief, lawsuit, financial issues, project rejection, and causes unnecessary anxiety amongst project participants.

Alzan, Smit, Pittt and Chan (2011)in a study of the causes and effects of delays on construction projects have identified six (6) effects of delay as per the analysis of the variables. They included cost overrun and extension of time, rescheduling, company reputation loss, loss production, and efficiency as the most common effects of delay in construction projects. According to Li, Love and Drew (2000), when a delay occurs, the project manager is faced with three options. These effects are extra money to complete the construction work, compromising quality by reducing standards as well as specification and rework due to modification of the work. The resultant effects are further manifested in the form of overtime work and/or increase project resources both labor and equipment in order to meet the project time.

A study conducted in Pakistan by Haseeb and Rabbani (2011) addressed some of the causes and effects of delays in the construction industry. The study revealed that delays in executing construction projects breed disputes, negotiations, lawsuits, total desertion, litigation, and project abandonment. It was also revealed that delays in construction project execution lead to demand for additional capital and extra time for the construction work. In addition, the study found that the loss of wealth, time, and capacity are among the prominent effects of delays in executing construction projects in Pakistan. The study further revealed that some negative effects of delays include loss of time, overhead expenses, and additional expenditures on material, equipment, and labor.

According to Al Hadi, Omran and Kadir (2009), delays in construction projects execution are a major cause for concern for most construction companies in Libya. The results of the study showed that delays in construction projects have adverse effects such as increased costs, loss of productivity and revenue, lawsuits between owners and contractors and contract termination. It further mentioned disputes and lawsuits that result from the misunderstandings from the project theme.

To sum up all the above studies proves that delay in construction projects has negative effect. It is therefore important to study the impact of project delay specifically on road construction projects. This has been done in the next chapter through collection of necessary data from different road construction projects in Addis Ababa.

2.6 Stakeholders in Road Construction Projects

Stakeholders can be defined as people who have the power to impact an organization or project in some way (Eden and Ackermann, 1998). Bryson (2004) in his influential book Strategic Management defines a stakeholder as any group or individual who can affect or is affected by the achievement of the organization's objectives. Newcombe (2003) studied the concept of the construction project stakeholders as multiple clients for construction projects and thought it was necessary to distinguish them from the term client, which referred to the financial sponsoring organization who is directly responsible for the production and development of a project. Project Management Institute (PMI 2008 in PMBOK, 2013) defined project stakeholders as individuals and organizations who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or successful project completion.

Construction projects have many Stakeholders whose composition is often large and include owners and users of facilities, project managers, project architects and engineers, designers, shareholders, local authorities, legal authorities, employees, subcontractors, suppliers, process and service providers, competitors, banks, insurance companies, media, community representatives, neighbors, general public, government establishments, visitors, customers, regional development agencies, the natural environment, the press, pressure groups, civic institutions, and the list is almost endless (Newcombe, 2003). According to Newcombe, project stakeholders are groups or individuals who have a stake in, or expectation of the project’s

performance. The number of stakeholders involved or interested in the project normally increases the complexity and uncertainty of the situation. Each stakeholder usually has different interests and priorities that can create conflict or disagreements with the project (Karlsen, 2002).

Stakeholders can be divided into internal and external, internal stakeholders being those directly involved in an organization's decision-making process (e.g. owners, customers, suppliers, employees) and external stakeholders being those affected by the organization's activities in a significant way (e.g. neighbors, local community, general public, local authorities (Atkin and Skitmore, 2008). In construction, there has been a strong emphasis on the internal stakeholder relationship such as procurement and site management, while the external stakeholder relationships to some extent have been considered a task for public officials via the rules and legislation that concern facility development (Atkin and Skitmore, 2008).

Table 1: Grouping of Stakeholders: External and Internal

External		**Internal**	
Public	**Private**	**Supply Side**	**Demand Side**
Regulatory Agencies	Local residents	Architects	Client
Local Government	Local Landowners	Engineers	Financiers
National Government	Environmentalists	Principle contractors	Client´s Employees
Public Agencies	Conservationists	Trade contractors	Client's Customer
	Archeologists	Materials	Client's Suppliers
	Other external stakeholders categories	Suppliers	

Source: Winch (2000)

2.7 Possible Actions for Minimizing Road Construction Delays

This section of the study addresses the objective of the study on identifying actions for averting delays in road construction projects in Addis Ababa. Some previous studies that addressed actions of minimizing delays in construction work were consulted as part of this literature

review. Some of possible actions and methods at various studies for delay problem are discussed below.

A study by Indhu and Ajai (2008) on delay management on ongoing construction projects in India. It was a case study that was geared towards identifying the strategies by which delays and associated effects on construction projects could be managed. It was revealed by the study that effects of delays can be avoided by improving managerial responsibility in project implementation and also that, the basic role of management such as planning, forecasting, organizing, supervision; sanctioning and monitoring regulating among others needs to be strengthened to reduce delays and attendant effects on the overall construction projects.

Methods on how to manage construction delays based on empirical evidence are generally inadequate. Nonetheless, some researchers have suggested that one of the possible ways of reducing delays during the implementation phase of construction project is to have an extensive and robust project management plan (Abdelnaser, Peter, Mahmood, Hussin and Aziz, 2005). A study carried out by Nguyen, Ogunlana and Thi Xuan Lan (2004) suggested factors that are needed to minimize the occurrence of delays are availability of resources, precise preliminary cost estimates and competent project team.

There exist some tools and techniques of project management that can be applied to enhance planning and scheduling of projects within road construction projects. These include Critical Path Method (CPM), Work Breakdown Structures (WBS), Critical Chain Method (CCM), Precedence Diagram Method (PDM), Program Evaluation Review Technique (PERT) and Gantt Chart (PMI, 2013). Again, to control the project‘s activities against the plan and the program, some tools and techniques like EVM, Project management information system, analytical techniques and schedule compression etc. have been recommended (APM, 2006).

Work breakdown structure is referred to as a common focal point for indicating the totality of a project from the higher hierarchy to the lowest (Haugan, 2002). It helps in the allocation of time to various tasks that are embedded in a construction project (Burke, 2013). Work breakdown structure can enhance timely completion and manageability of construction projects activities.

Generally, work breakdown allows easy planning and scheduling of a project and its activities (Lanford and McCann, 1983).

In addition to the WBS, CPM has been recognized as another project management tool or technique. CPM is regarded as an effective time management tool for complex project (PMI 2013). It helps in the logical display of the sequence and timing of each activity (Yamin and Harmelink, 2001). Also, CPM communicates interdependency and thus gives more effective time management technique for large and complex projects (Kallantzis, Soldatos and Lambropoulos, 2007). The approach of CPM includes dissecting the project into logical sequence of undertakings that are to be accomplished, calculating the time frame for each undertaking (PMI, 2013). CPM promote good planning and communication for effective management of time, help in the assessment and calculation of time to complete the project, indicate critical activities that may influence project duration, and indicate float times for all activities.

2.8 Conclusion and Knowledge Gaps

There are many studies about causes of delay in road construction projects. However there are few studies on causes of road construction delay in developing countries such as Ethiopia specifically in Addis Ababa City. Researchers investigated different factors that cause road construction delay, from project initiation up to project close out. When considering delay in context of public road construction projects there are additional factors that cause delay from different stakeholder perspective. This research tends to address this issue and add a fresh contribution to the scant literature that deals specifically with this question.

The review of literature found few research studies related to the analysis of delay factors in the Ethiopian road construction industry. However, it was also found that no studies to date have ranked the effects of delay in Addis Ababa city road construction projects. In addition, there were few studies carried out in relation to stakeholders' contribution for delay of road construction. Hence conducting study on causes of delay on road projects from limited stakeholders' side will not give complete solution to the problem.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

In academic research, Trow's advice that "the problem under investigation properly dictates the methods of investigation" should be used to approach the research problem (Trow, 1957, cited by Bryman, 1984). In the same token, in social science, methodology is assumed to follow the subject of its quest (Bryman, 1984). In other words, researchers need to apply the best possible method to analyze their subject.

3.1. The Research Design

Research design refers to the overall strategy that we choose to integrate the different components of the study in a coherent and logical way. Descriptive research design using quantitative method have been utilized in this research to explain perceived causes of road construction project delay in Addis Ababa city. And also, to describe existing road construction project status in the city. Descriptive research design helps provide answers to the questions of who, what, when, where, and how associated with a particular research problem (Yin, 2003). This design is used to obtain and describe information concerning the problem of road construction projects in Addis Ababa with respect to completion time.

3.2. Description of the Study Area

The target area of this study was 29 asphalt road construction projects which are under construction by AACRA until July 7, 2018, while the study respondents were managerial, supervisory, professionals and semi professionals' construction related profession employees of AACRA, participating in road construction projects in Addis Ababa City Roads Authority. Mugenda (2003) explained that the target population should have observable characteristics to which the study intents to generalize the result of the study. The main aim of choosing this type of population is to be able to get current and past information from people who have participated in the implementation of road construction projects and thus experienced the implementation delay challenges.

The population of the study comprises employee of AACRA, who took part in the construction process of asphalt road construction projects taken (considered) for the study. It aims to get possible reasons for delay in road projects. The survey questionnaires were distributed for all the above selected sample respondents.

3.3. Types and Sources of Data

Majority of data utilized for this particular study, is primary data which was collected from employees of road construction projects at AACRA. The reason for utilizing primary data is lack of enough secondary data on the causes of project delay in AACRA projects; thus finding relevant secondary data on project delay factors is difficult. The reason for selecting employees for source of data is that they are more familiar with road projects. They are positively or negatively affected through these projects and they are part of the projects, etc. In addition to find good response the researcher collected data by physically availing himself to the respondents' office and project sites.

Secondary information which was utilized for theoretical part and supporting/framing questionnaire preparation collected from different secondary source like, reports of the company, books, internets, journals, reports and other related documents.

3.4. Sampling Design and Technique

Sampling design refers to sampling techniques and sample size for the study. Along with the world views and research strategy adopted for this study, the sampling design was in a manner which compromise between the requirements of the quantitative sample which is called the representativeness.

For the purpose of this study, purposive sampling was used to increase external validity. A purposive sampling technique was utilized to select participants for quantitative strand. For quantitative strand, expert sampling technique employed on the 29 projects. AACRA has 102 professional construction profession related employees and 703 administrative and unskilled employees. In order to undertake the study all 102 managerial, supervisory, professional and semi professional construction related profession employees of AACRA determined as unit of

analysis for this study. Accordingly, all the above sample employee of AACRA selected for the study.

The number of questionnaire distributed and returned by the study participants is portrayed in Table 2 below.

Table 2: Number of Questionnaire Distributed and Returned

Questionnaires	Frequency
Total Questionnaire Distributed	102
Total Questionnaire Returned	95
Percentage of Responses	**93%**

As shown in the above table a total of 102 questionnaires were distributed amongst the selected AACRA employees for the survey. Out of these, a total of 95 completed responses were received from the study participants, with a response rate of 93%. The selected respondents were managers, supervisors, professionals and clerical employees of AACRA.

3.5. Data Collection Instrument

After selecting the research design, appropriate instruments must be selected for data collection. In this section, different tools are used for collecting data based on the type of research design. The most common associated tools with quantitative research are (Bryman, 2008, Haji-Kazemi, 2015) questionnaire/ survey, observation schedules, coding frames and existing document analysis. From these instruments survey questionnaire was utilized for this study. Questionnaire survey is utilized because it is the most typical and cost effective methods of data collection. Survey questionnaire provides huge quantities of descriptive information on the research questions to be answered. That is why the researcher based data collection instrument on survey questionnaire to find adequate information from large sample respondents on the problem studied.

3.6. Method of Data Collection

Data which is obtained from the questionnaires are analyzed with an appropriate method which resulted in the successful completion of the research. Data collection from questionnaire are analyzed and answered to the objective of the study. There are approaches of data collection namely field work (primary data collection) and deskwork (secondary data collection). Both fieldwork and deskwork are used in this research. The questionnaire survey is used to limit question that have been raised in the research. The questionnaire is structured to address causes of road project construction delay.

Lists of potential respondents were generated once the proposal is approved. Questionnaires were distributed to the respondents in two ways: on project sites and at project office. Upon completion of the questionnaires, the researcher collected physically from each offices and project sites. In addition the researcher collected secondary information, report of each projects in AACRA.

3.7. Data Processing and Analysis

For the purpose of this study, descriptive statistics were utilized to analyze quantitative data generated through questionnaire. The analysis of quantitative data was assisted by SPSS Version 20. Data was manipulated in order to change the data to the form that can be used to conduct analysis (Pallant, 2011). Therefore, various data manipulation activities were conducted in order to prepare the data for analysis depending on the data file, variables of interest and the type of research questions desired to address. Descriptive statistics were utilized to clean and scan data, preliminary analysis and final analysis.

Kometa, Olomolaiye and Harris (1994) and Sambasivan and Soon (2007) used RII method to determine the relative importance of the various factors. The same method was adopted in this study. RIIs is calculated for each factor as follows:

$$\text{RII} = \frac{\sum W}{(A * N)}$$

Where RII = Relative Importance Index

W = weights given to each factor by respondents (ranging from 1 to 5)

A = highest weight (i.e., 5 in this case) and

N = total number of respondents.

The RII value had a range of 0 to 1 (0 not inclusive); the higher the RII, the more important was the factor. The RIIs was then ranked, and the results are shown in different tables at next chapter four.

3.8. Ethical Issues

The research was guided by strict adherence to research ethics which do not allow the researcher to engage in deception or invasion of privacy. The respondents' rights not to respond to the questions not clear from the onset and consent sought from the word go. The secrecy of the respondents was assured and confidentiality guaranteed as an integral part of the study. The researcher maintains humility and conduct the research with utmost honesty avoiding distortions and misleading data manipulation. The researcher strives to uphold intellectual honesty and seek collaborative support which is duly acknowledged. The researcher also endeavored to arrive at conclusions based on objective inferences that are merely guided by the data collected. Letter of cooperation was found from St. Mary's University. AACRA has made cooperation for the study and the University.

3.9. Validity and Reliability

The instrument validity such as construct validity, content validity and face validity has been established. Construct and content validities of the instrument through reviewing of related research literatures established. Topic experts' review for establishing face validity of the questionnaire conducted done. Design validity achieved through ensuring internal and external validity. Thus, internal validity was established through precisely following research procedures. External validity has been conducted through selecting the appropriate sampling technique to draw the participants of the research.

In order to make questionnaire items generate the data needed for the study, it was important to get some evidence of reliability. In this regard, the questionnaire response conducted helped the researcher to check the internal consistency of close ended questions. The reliability of the questionnaire was tested based on the result of the study, which allowed testing of the instrument.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the results and discussion of the study and it is comprised of seven sections. The first section discusses socio-demographic characteristics of study participants. Perceived causes and effects of delay in road construction projects and the role of stakeholders in road construction projects have been presented. Study finding on the use of project time management tools and techniques and possible measures to minimize delays in road construction projects in Addis Ababa has been forwarded. Finally, interpretation and discussion of the results has been presented.

4.1 Socio-Demographic Characteristics of Respondents

Table 3: Demographic Characteristics of Respondents

	Demographic Characteristics	Frequency	Percent %
Gender	Female	20	21.1
	Male	75	78.9
Age Range	18 - 24	17	17.9
	25 - 34	45	47.4
	35 - 44	20	21.1
	45 - 54	10	10.5
	55 +	3	3.2
Position	Managing Director	1	1.1
	Project Manager	1	1.1
	Site Manager	2	2.1
	Supervisor	15	15.8
	Engineer	68	71.6
	Foreman	8	8.4
Education Level	MA/MSc.	15	15.8
	BA/BSc	71	74.7
	University/ College Diploma	6	6.3
	Certificate	3	3.2
Experience	Less than 1 Year	5	5.3
	1 - 5 Years	21	22.1
	6-10 Years	31	32.6
	More than 10 Years	38	40.0

Source: Own Survey, 2019

From table 3 in previous page, the response was dominated by male respondents who accounted 79% (n=75) while 21% (n=20) were female. Majority of the population that participated in the study was between ages 25-34 years making 47.4%. This was followed by 21.1% for ages that went for 35–44 years, ages 18-24 years followed with 17.9%, 45-54 years followed with a percentage of 10.5% and finally 55 + years followed with 3.2%.

As shown in table 3, respondents in this study have positions such as Managing Director 1.1%, Project Manager 1.1%, Site Manager 2.1%, Supervisor 15.8%, Engineers 71.6% and Foreman 8.4%. The study sought to establish the level of education of the respondents and the results indicated in the table above. Respondents with a degree education dominated at 74.7%. They were followed by those with Master's Degree at 15.8%, Diploma holders accounted 6.3%. Finally work experience of respondents revealed that majority of the study participants (n=38; 40.0%) have more than 10 years of work experience while one-third (n=31; 32.6%) had 6 to 10 years experience.

From the survey, it was found that 78.9% of the respondents were male, while the rest are females. This revealed that the organization managerial, professional and clerical employees are dominated with male. With respect to age of respondents, 47.4% of the organization work force is young with age range between 25 and 34. This will give comparative advantage for the company if it is properly utilized. Respondents in this study have positions such as managers, supervisors, engineers and foreman's. As per the result 71.6% of the organization professional workforce is occupied with engineer position. This has contributed to find good responses in relation to this study. This implies the company has good staff position related to the requirement of the projects. In relation to work experience of respondents at AACRA 72.6% of them have more than 6 years work experience. This gave a dependable data on the study because the respondents were familiar with road construction projects activity and therefore has the way in to all relevant data to answer the questionnaires effectively. This is an advantage to the company in order to implement projects if it is efficiently utilized.

4.2 Perceived Causes of Delay in Road Construction Projects in Addis Ababa City

Table 4: Relative Importance Index (RII) of Factors Contributed to Delay of Road Projects

Sr. No	Causes of Delay	RII	Rank
1	Delays in payments	0.878	5
2	Lack of manpower or Low productivity of manpower	0.773	21
3	Poor design	0.836	12
4	Severe weather condition	0.676	25
5	Slow decision making by AACRA and consultant	0.84	10
6	Poor site management and supervision	0.992	1
7	Shortage of materials in the market	0.8	16
8	Late procurement of materials	0.954	2
9	Price (material, equipment, etc.) fluctuations and inflation	0.874	6
10	Delays in site preparation/ site handover	0.838	11
11	Changes in Government regulations and laws	0.56	27
12	Poor contract management by different parties	0.88	4
13	Effects of subsurface conditions	0.796	19
14	Lack of team communication and teamwork	0.865	7
15	Delay in preparation and approval of tests and inspections	0.798	17
16	Rework of bad quality performance	0.604	26
17	Bureaucracy in Government agencies, AACRA, etc	0.811	15
18	Incomplete design at the time of tender	0.827	13
19	Change in the scope of the project	0.722	23
20	Accident in project site	0.503	28
21	Lack of high-technology equipment	0.798	18
22	Old construction methods	0.848	9
23	Congested construction site	0.794	20
24	Delay by sub-contractors and consultants	0.851	8
25	Political situation and interference	0.716	24
26	Late deliveries of materials by suppliers	0.827	14
27	Delays in the conversion and transfer of utility services	0.905	3
28	Difficulty in Budget availability for the project	0.766	22

Source: Own Survey, 2019

Table 5 below shows the ranking of delay causes according to the value of their Relative Importance Index (RII). The result shows that the first five major factors that cause road construction projects delay are “Poor site management and supervision”, “Late procurement of materials” ,“ Delays in the conversion and transfer of utility services (such as power lines, water lines, telecom data lines, etc)” , “Poor contract management by different parties (AACRA, sub – contractors, consultant, etc.)” and “Delays in payments to sub- contractors, machinery renters and contract employees” are the first five major causes with RII value of 0.992, 0.954, 0.905, 0.88 and 0.878 respectively.

Table 5: Top Five Causes for Delay (Relative Importance Index-RII)

Sr. No	Causes of Delay	RII	Rank
1	Poor site management and supervision	0.992	1
2	Late procurement of materials	0.954	2
3	Delays in the conversion and transfer of utility services (such as power lines, water lines, telecom data lines, etc)	0.905	3
4	Poor contract management by different parties (AACRA, sub – contractors, consultant, etc.)	0.88	4
5	Delays in payments to sub- contractors, Machinery renters and contract employees	0.878	5

Source: Own Survey, 2019

As per the survey result poor site management and supervision is the main reason for delay of road projects in Addis Ababa. This result is similar with the findings of Assaf and Al-Hejji (2006) study in different projects in Saudi Arabia to determine the most important reasons for delay in construction projects. This factor implies poor project management, monitoring and evaluation capability in AACRA. The second major cause of delay is late procurement of materials for projects. Procurement is one of the roles of internal stakeholder of project management in AACRA. Internal stakeholder like procurement body in project management is crucial as mentioned by (Atkin and Skitmore, 2008). Hence, procurement has a big role in delay of projects at AACRA.

Respondents selected delays in the conversion and transfer of utility services (such as power lines, water lines, telecom data lines, etc) is one of the main causes of delay. This implies until transfer of utility services it is difficult to continue road construction. This led to extend the period of project duration. Poor contract management by different parties (AACRA, sub – contractors, consultant, etc.) also selected by respondents as causes of delay. Project contract management is one of the main areas of project management function. As per the result of the study projects managed by AACRA lack good contract management practice. Hence, poor contract management practice has negatively contributed for delay of projects in AACRA.

Respondents ranked delays in payments to sub- contractors, machinery renters and contract employees as the fifth cause of delay with a relative importance index (RII) of 0.878. Delay in payment surely affects the activities of the contractor (Assaf & Al-Hejji, 2006). When payment to the contractor is delayed, most construction activities cannot be carried out and may stifle the contractor's cash flow (Sambasivan & Soon, 2007). This result agrees with Odeh and Battaineh (2002) who found that financial problems are the main factors that cause delay in construction projects in Jordan. The result of this work agrees with Fugar and Agyakwah - Baah (2010) who identified delay in honoring payment as the most important cause of delay of construction projects in Ghana. These results implies when payment is late project completion time will be affected. In addition this implies poor own financial capacity of sub- contractors, machinery renters and contractors.

Table 6 in next page shows the least five causes of delay according to the value of their Relative Importance Index (RII). The result shows the least five factors that cause road construction projects delay are "Political situation and interference", "Severe weather condition / Summer restriction on time of work" ,"Rework of bad quality performance" , "Changes in Government regulations and laws" and "Accident in project site" are the least causes of delay with RII value of 0.716, 0.676, 0.604, 0.56 and 0.503 respectively.

Table 6: Least Five Causes of Delay (Relative Importance Index - RII)

Sr. No.	Causes of Delay	RII	Rank
1	Political situation and interference	0.716	24
2	Severe weather condition / Summer restriction on time of work	0.676	25
3	Rework of bad quality performance	0.604	26
4	Changes in Government regulations and laws	0.56	27
5	Accident in project site	0.503	28

Source: Own Survey, 2019

4.3 Effects of Road Construction Projects Delay in Addis Ababa City

Table 7: Relative Importance Index (RII) of Effects of Road Construction Delay

Sr. No	Effects of Road Construction Projects Delay	RII	Rank
1	Cost overruns	0.651	1
2	Extension of time	0.638	2
3	Disputes between contract parties	0.124	7
4	Arbitration (mediation/negotiation)	0.017	17
5	Project abandonment	0.038	15
6	Litigation (Legal action)	0.023	16
7	Claims	0.122	8
8	Loss of profits	0.097	9
9	Loss of employees	0.093	10
10	Negative social impact	0.316	3
11	Idling of resources	0.276	4
12	Poor quality of works due to hurried works	0.08	12
13	Delaying clients in getting profits from the projects	0.08	13
14	Creation of stress on the project team	0.004	19
15	Damage to company's reputation	0.011	18
16	Lost productivity and efficiency	0.137	6
17	Rescheduling	0.084	11
18	Reduction of purchasing power of budget	0.185	5
19	Right of Way Problem	0.048	14

Source: Own Survey, 2019

Table 8 below shows Relative Importance Index (RII) of effects of road construction projects delay. The results show that the top five effects of road construction delay. Respondents selected the following five major effects of delay in projects. These are; 1st Cost overruns (0.651) , 2nd Extension of time (0.638) , 3rd Negative social impact (0.316) , 4th Idling of resources (0.276) and 5th Reduction of purchasing power of the allocated budget (0.185). These five effects are the consequences or the results of delay of completion of asphalt road projects construction in Addis Ababa City.

Table 8: Top Five of Effects of Delay (Relative Importance Index-RII)

Sr. No	Effects of Road Construction Projects Delay	RII	Rank
1	Cost overruns	0.651	1
2	Extension of time	0.638	2
3	Negative social impact	0.316	3
4	Idling of resources	0.276	4
5	Reduction of purchasing power of the allocated budget	0.185	5

Source: Own Survey, 2019

Respondents identified cost overrun as the most critical effect of delay with a relative importance index of (0.651). Cost overrun is a situation where the actual cost of a project far outweighs the estimated cost, or money spent on a particular project exceeds estimated cost (Singh, 2010). It was aver by Aibinu and Jagboro (2002) that the most frequent effect of delay in construction projects is cost overrun. The position of cost overrun as ranked by this study is further supported by Amoatey, Ameyaw, Adaku and Famiyeh (2014) who also found cost overrun the most important effect of delay in the Ghana construction industry. This implies most road projects in Addis Ababa suffered with cost overrun.

The second most essential effect of delay was extension of time with a relative importance index of 0.638. This result confirms the studies of Alzan, Smit, Pittt, and Chan (2011) and Aibinu and Jagboro (2002). This implies delay of road projects in Addis Ababa led to extension of completion time from the initial planned period. The third effect of delay in road projects is negative social impact with a relative importance index of 0.316 by respondents of the study. This is confirmed by Kikwasi (2012) in his study on causes and effects of delays and disruptions

in construction Projects in Tanzania. This implies delay has not only affect economy but also social condition of population in the city. From these findings it is clear that delay of road projects has negative impacts in terms of cost overruns, extension of time, negative social impact, idling of resources and reduction of purchasing power of the allocated budget.

Table 9 below shows Relative Importance Index (RII) of effects of road construction projects delay. The results show that the least five effects of road construction delay. Respondents selected the following least five effects of delay in road construction projects. These are; Project abandonment (0.038), Litigation (Legal action) (0.023), Arbitration (mediation/negotiation) (0.017), Damage to company's reputation (0.011) and Creation of stress on the project team (0.004). These five effects are the least consequences of delay of completion of asphalt road projects construction in Addis Ababa City.

Table 9: Least Five Effects of Delay (Relative Importance Index-RII)

Sr. No	Effects of Road Construction Projects Delay	RII	Rank
1	Project abandonment	**0.038**	15
2	Litigation (Legal action)	**0.023**	16
3	Arbitration (mediation/negotiation)	**0.017**	17
4	Damage to company's reputation	**0.011**	18
5	Creation of stress on the project team	**0.004**	19

Source: Own Survey, 2019

4.4 The Role of Stakeholders in Road Construction Projects Delay in Addis Ababa

Table 10: Role of Stakeholders in Road Construction Projects Delay in Addis Ababa

Sr. No	Stakeholders	RII	RANK
1	AACRA	0.836	4
2	Consultant	0.819	6
3	Sub- Contractor	0.794	8
4	Design Authority	0.811	7
5	Donor/Financier	0.535	11
6	Land Management Office	0.848	3
7	Local Authorities	0.623	10
8	Environment control Office	0.505	12
9	Media	0.373	14
10	Ethiopian Electric Power Corporation	0.829	5
11	Ethio Telecom	0.853	2
12	Water Supply and Sewerage Services	0.865	1
13	Peoples Representative	0.423	13
14	Finance & Economic Development Office	0.684	9

Source: Own Survey, 2019

Table 10 above shows respondents' choice of stakeholders who have a negative role in road construction time schedule management. These stakeholders have contributed for delay of road projects at different level.

Table 11: Top Five Stakeholders Contributed for Road Projects Delay

Sr. No	Stakeholders	RII	Rank
1	Water Supply and Sewerage Services Authority	0.865	1
2	Ethio Telecom	0.853	2
3	Land Management Office	0.848	3
4	AACRA	0.836	4
5	Ethiopian Electric Power Corporation	0.829	5

Source: Own Survey, 2019

Table 11 in previous page presented ranking of stakeholders contributed for delay based on the results of the survey responses of the respondents. It was noticed that the top 5 stakeholders contributed for delays on construction of road projects in Addis Ababa. The top 5 stakeholders are: (1) Water Supply and Sewerage Services Authority, (2) Ethio Telecom, (3) Land Management Office, (4) AACRA and (5) Ethiopian Electric Power Corporation. These five stakeholders has significant role for delay of road construction projects. The above stakeholders are listed as per their major contribution for delay of projects ranked from 1^{st} to 5^{th}.

The result from the survey shows including AACRA and the following four stakeholders; Water Supply and Sewerage Services Authority, Ethio Telecom, Land Management Office, and Ethiopian Electric Power Corporation have a significant impact on delay of projects. As per Project Management Institute (PMI 2008 in PMBOK, 2013) definition of project stakeholders as individuals and organizations who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or successful project completion. This implies, managing stakeholder is very important for the success of project like road construction. This result is consistent with the causes of delay mentioned above "delays in the conversion and transfer of utility services (such as power lines, water lines, telecom data lines, etc) ". These utility lines are mainly managed by the above stakeholders mentioned in the study. This implies working closely with stakeholders in each project is important for the success of projects.

Table 12 in next page shows that the least five stakeholders contributed for delay of road projects in Addis Ababa. Respondents ranked "Local Authorities" in the tenth place out of fourteen stakeholders with a relative importance index of 0.623. The eleventh stakeholder which was ranked by respondents was "Donor/Financier" with RII = 0.535. Environment control Office, Peoples representative and Media are the bottom stakeholders with a rank of 12^{th}, 13^{th} and 14^{th} with RII value of 0.505, 0.423 and 0.373 respectively.

Table 12: Least Five Stakeholders Contributed for Road Projects Delay

Sr. No	Stakeholders	RII	Rank
1	Local Authorities	0.623	10
2	Donor/Financier	0.535	11
3	Environment control Office	0.505	12
4	Peoples Representative	0.423	13
5	Media	0.373	14

Source: Own Survey, 2019

4.5 The Use of Project Time Management Tools and Techniques in AACRA

Table 13 below presented the survey data related to project time management tools and techniques utilized in AACRA. From the survey, it was found that respondents utilized different types of project time management tools and techniques. MS Excel was selected by 87 respondents (91.6%) from 95 respondents, while Meeting and Breakdown (Decomposition) of activities were selected by 86 (90.5%) and 77 (81.1%) respondents respectively. A further 76 (80%) respondents had selected Expert judgment tools and techniques for project time management.

Table 13: Most Utilized Project Management Tools and Techniques

Project Time Management Tools and Techniques	Total	Yes	
		Frequency	%
MS Excel	95	87	91.6
Meeting	95	86	90.5
Breakdown (Decomposition) of activities	95	77	81.1
Expert judgment	95	76	80

Source: Own Survey, 2019

As per the results of the study the organization is familiar with MS Excel, Meeting, Breakdown (Decomposition) of activities and Expert judgment project time management tools and techniques. This supports the theory "project time management is the processes required to manage timely completion of the project" (PMI, 2013). However, even if the company utilized

the above time management tools and techniques still delay in completion of road projects existed. This implies the organization lacks efficiency in proper implementation of project time management tools and techniques.

Table 14 below shows that less than 50 % of respondents selected or utilize the following project time management tools and techniques. These are " Scheduling tool (Activities Sequence tool) 49.5% " , " Other project management software 45.3% " ," Precedence (priority) diagramming method (PDM) 45.3% " , " Analytical techniques (Analyzing facts and problems to manage time) 38.9% " and " Dependency determination 35.8%"

Table 14: Less Utilized Project Management Tools and Techniques

Project Time Management Tools and Techniques	Total No of Respondents	Yes	
		Frequency	%
Scheduling tool (Activities Sequence tool)	95	47	49.5
Other project management software	95	43	45.3
Precedence (priority) diagramming method (PDM)	95	43	45.3
Analytical techniques (Analyzing facts and problems to manage time)	95	37	38.9
Dependency determination	95	34	35.8

Source: Own Survey, 2019

4.6 Possible Measures to Minimize Delays in Road Construction Projects

In Table 15 next page presented the respondents choice of possible measures to minimize road construction projects delay in Addis Ababa city. The choice of respondents for each factor are summarized and measured with relative important index. The higher the RII value implies the importance of the measure for the problem.

Table 15: Possible Measures to Minimize Delays in Road Construction Projects

Sr. No.	Measures to Minimize Delay	RII	Rank
1	Effective and efficient management of project sites and supervision works	0.474	1
2	Effective strategic planning	0.272	6
3	Proper project planning and scheduling	0.291	5
4	Coordination between the construction team	0.204	8
5	Complete and proper designs at the project commencement	0.253	7
6	Employing appropriate construction methods	0.059	12
7	Use of accurate cost estimates when formulating tender documents	0.034	15
8	Constructing according to issued drawings	0.032	16
9	Use of proper and modern equipment	0.036	14
10	Use of proper methods in procuring construction materials	0.061	11
11	Adherence to construction specifications	0.063	10
12	Conducting frequent progress meetings	0.002	18
13	Establishing clear communication channels	0.053	13
14	Fast-tracking construction works	0.015	17
15	Use of up to date technology	0.425	2
16	Collaborative working spirit by the construction team	0.076	9
17	Training of project staffs	0.316	3
18	Free of occupation land preparation	0.299	4

Source: Own Survey, 2019

Table 16 next page presents the respondents' top five idea regarding how to minimize delay of road construction projects. Respondents selected the following measures as a solution for the problem. First "Effective and efficient management of project sites and supervision works " ,

Second " Use of up to date technology " , third "Training of project staffs ", fourth " Free of occupation land preparation " and the fifth one is " Proper project planning and scheduling ".

Table 16: Top Five Possible Measures to Minimize Delays in Road Construction

Sr. No.	Measures to Minimize Delay	RII	Rank
1	Effective and efficient management of project sites and supervision works	0.474	1
2	Use of up to date technology	0.425	2
3	Training of project staffs	0.316	3
4	Free of occupation land preparation	0.299	4
5	Proper project planning and scheduling	0.291	5

Source: Own Survey, 2019

Table 17 below show respondents' low preference as a solution for the problem of road construction projects delay in Addis Ababa. These measures are less important for the problems and effects mentioned above as a result of delay. These measures are ranked from 14^{th} to 18^{th} from a total of 18 possible measures. Here are the list of preference result as per RII value "Use of proper and modern equipment RII = 0.036 ", "Use of accurate cost estimates when formulating tender documents RII = 0.034", "Constructing according to issued drawings RII = 0.032", "Fast-tracking construction works RII = 0.015" and "Conducting frequent progress meetings RII = 0.002".

Table 17: Least Five Possible Measures to Minimize Delays in Road Construction

Sr. No	Measures to Minimize Delay	RII	Rank
1	Use of proper and modern equipment	0.036	14
2	Use of accurate cost estimates when formulating tender documents	0.034	15
3	Constructing according to issued drawings	0.032	16
4	Fast-tracking construction works	0.015	17
5	Conducting frequent progress meetings	0.002	18

Source: Own Survey, 2019

Effective and efficient management of project sites and supervision works are the most preferred solution for the problems. This finding is consistent with the above finding cause of delay “Poor site management and supervision”. This implies there is project management problem in projects managed by AACRA. Hence, efficient and effective project management has significant role for on time completion of projects.

Another possible measures recommended by respondents are use of up to date technology and training of project staffs. This implies the company investment on technology is very weak. This is against the current demand of technology supported project management. With respect to training, it implies the company has given low attention and investment on staff capacity development to perform their duty. The more a company train its staff better result can be achieved.

Finally respondents recommend free of occupation land preparation and proper project planning and scheduling as a solution for the problem. As per the researcher observation on different projects free project land is a serious problem for performing projects. This problem is directly linked with the above finding of negative impact of land management office as a stakeholder to prepare free land for the project. Proper project planning and scheduling as possible ways of reducing delays during the implementation phase of construction project is also supported by another study in Malaysia (Abdelnaser, Peter, Mahmood, Hussin and Aziz, 2005).

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This section takes the final point of view about the topic and suggests solutions to the problem. First, summary of the study presented and secondly conclusion remarks are provided based on important topics discussed in this thesis. Afterwards, recommendations for the problems are given. Finally, limitations of the study are presented in detail.

5.1. Summary

The main objective of this study was to identify the causes of delay in road construction projects in Addis Ababa. And also to study the effects of delay in road construction projects, to study the present use of project management tools and techniques in managing delays and to investigate the role of stakeholders in delay of road projects.

The research approach that was selected for this study is deductive approach with questionnaire survey as a method for data collection. Questionnaire surveys were used to obtain information on the problem. Deduction method is preferred using structured quantitative research method as this research tries to generalize the finding for the purpose of representing the whole population. Descriptive research design utilized in this research to explain perceived causes of road construction project delay in Addis Ababa city.

The result of the study reveals that the first five major factors that cause road construction projects delay are first " Poor site management and supervision ", second " Late procurement of materials " ,third " Delays in the conversion and transfer of utility services (such as power lines, water lines, telecom data lines, etc) " , fourth " Poor contract management by different parties (AACRA, sub – contractors, consultant, etc.) " and fifth " Delays in payments to sub-contractors, machinery renters and contract employees " are the first five major causes with RII value 0.992, 0.954, 0.905, 0.88 and 0.878 respectively.

The study found that the following five major effects of delay, these are; Cost overruns, extension of time, negative social impact, idling of resources and reduction of purchasing power of the allocated budget. Major stakeholders contributed for delays of construction of road

projects in Addis Ababa city are: (1) Water Supply and Sewerage Services Authority, (2) Ethio Telecom, (3) Land Management Office, (4) AACRA and (5) Ethiopian Electric Power Corporation. These five stakeholders have significant role for delay of road construction projects. The above stakeholders are listed as per their major contribution for delay of projects ranked from 1^{st} to 5^{th}.

Finally, it was found that respondents are utilizing different types of project time management tools and techniques. MS Excel was selected by 87 respondents (91.6%), while Meeting and Breakdown (Decomposition) of activities were selected by 86 (90.5%) and 77 (81.1%) respondents respectively. A further 76 (80%) respondents had selected Expert judgment tools and techniques. Respondents also selected the following measures as a solution for the problem. First “Effective and efficient management of project sites and supervision works ” , Second “ Use of up to date technology ” , third “Training of project staffs ”, fourth “ Free of occupation land preparation ” and the fifth one is “ Proper project planning and scheduling ”.

5.2. Conclusions

It was found from the study that the five most influential causes of road project completion delay are: “ Poor site management and supervision ”, “ Late procurement of materials ” ,“ Delays in the conversion and transfer of utility services (such as power lines, water lines, telecom data lines, etc) ” , “ Poor contract management by different parties (AACRA, sub – contractors, consultant, etc.) ” and “ Delays in payments to sub- contractors, machinery renters and contract employees ”.

The study identified cost overruns, extension of time, negative social impact, idling of resources and reduction of purchasing power of the allocated budget as the major effects of road project delays. These five effects are the consequences or the results of delay of completion of asphalt road projects construction in Addis Ababa City.

The results show that AACRA is familiar with the following project time management tools and techniques; MS Excel, Meeting, Breakdown (Decomposition) of activities and Expert judgment. This supports the theory “project time management is the processes required to manage timely completion of the project” (PMI, 2013). However, even if the company utilized the above time

management tools and techniques still delay in completion of road projects existed. This implies the organization lacks efficiency and effectiveness in proper implementation of project time management tools and techniques.

The results also showed that including AACRA and the following four stakeholders; Water Supply and Sewerage Services Authority, Ethio Telecom, Land Management Office, and Ethiopian Electric Power Corporation have a significant impact on delay of projects. This implies, managing these stakeholders is very important for the success of road projects.

Finally the result showed free of occupation land preparation and proper project planning and scheduling as a solution for the problem. Proper project planning and scheduling as possible ways of reducing delays during the implementation phase of construction project is also supported by another study in Malaysia (Abdelnaser, et al., 2005).

5.3. Recommendations

The following suggestions and recommendations are proposed. These recommendations have been established based on the results and findings of the study through survey questionnaires on causes, effects and stakeholders of road construction projects delay.

Proper and continuous project monitoring and evaluation will lead to effective and successful project implementation. Hence, AACRA should work on strengthening, training, developing and re-establishing of Monitoring and Evaluation team on each project as a major task.

Effective and efficient material procurement systems should be established within projects. Material procurement has the potential to cause major delays to construction projects. Therefore, material procurement process should be executed properly by planning procurement need and perform as per the plan to avoid supply delays.

The organization should work closely with stakeholders mentioned above to ensure that on time conversion and transfer of utility services. This can be achieved through involving and participating stakeholders from initial project initiation up to closing stage.

AACRA should ensure and allocate adequate funds before projects are started. This can be achieved initially by requesting adequate budget approval and allocation from Addis Ababa Finance and Economy office. Hence sub- contractors, machinery renters and contract employees can be paid in accordance with the contract agreement which will enhance the timely delivery of road projects.

AACRA should follow up the proper implementation of project planning and scheduling technique in each project in order to avoid cost overruns. This can be achieved through properly functionalization of Monitoring and Evaluation team of the organization.

Members of construction project team should implement the above identified measure for minimizing extension of time in road construction projects at all stages of a project to minimize delay in road construction projects.

All the stakeholders in AACRA projects have to contribute as a team to ensure timely completion of road projects. This can be achieved through participation of stakeholders from initial project initiation up to closing stages.

AACRA should apply appropriate project time management tools and techniques in all projects to protect delay of project implementation. This can be done through investing resources on training of project staffs on the tools and techniques.

This study mainly focused on the current causes of road construction projects. Hence future studies on delay causing factors could be done constantly with their mitigation measures. Specific studies in specific projects that experienced significant delay could also be conducted using similar approaches used in the current study. Also studies based on project size and duration may result in remarkable findings.

5.4. Limitations of the Study

The following are some of the limitations of the current study:

- The study is subject to recall bias as the study participants may not remember the actual events for the problem under study.
- These study findings may not be generalizable to all types of construction projects as the current study focuses on road construction projects.
- These study findings may not be applicable to other regional areas in Ethiopia as the study focuses on road projects in Addis Ababa only.

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Appendix A
Questionnaire Survey Questions

ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES

MASTER PROGRAM IN PROJECT MANAGEMENT

QUESTIONNAIRE

DEAR SIR/MADAM,

The purpose of this questionnaire is to collect data for the study entitled **Perceived Causes of Project Implementation Delay in Road Construction Projects: A Case of Addis Ababa City Roads Authority** for partial fulfillment of M.A in Project Management. The genuine responses you forward will be used as input for the study and have great contribution to the success of the study. Your privacy will be kept anonymously and, therefore, no one knows who provided the information. Furthermore, any information you provide in the questionnaire will be kept confidential and only used for the purpose of the study. Therefore, you are kindly requested to provide your genuine responses to different questions listed below.

Thank You in advance for your cooperation!

If you have any question concerning this questionnaire, please feel free to contact me: Yared Mirga; Tel.0913108016; E-mail: yaredmirga@gmail.com.

The questioner has six sections. Here, I kindly request you to give honest and genuine answers to all the questions without which the research will not succeed. It will take maximum of 30 minutes to answer all the questions.

General Instruction: Please, tick **"✓"** in the appropriate columns for your response for closed - ended questions among the provided alternatives but write your response in the space provided for open-ended questions.

Note: AACRA refers Addis Ababa City Roads Authority

SECTION A: Demographic Data

Instruction: Please tick [✓] appropriately

1. Gender: Female [ ] Male [ ]

2. Age Range: 18 – 24 [ ] 25 – 34 [ ] 35 – 44 [ ] 45 – 54 [ ] 55 + [ ]

3. What is your current position in AACRA?

Managing Director [ ] Project Manager [ ] Site Manager [ ]

Supervisor [ ] Engineer [ ] Foreman [ ]

Other, please specify_____

4. What is your highest level of education?

PhD. [ ] University / College diploma [ ]

MA/MSc. [ ] High school complete [ ]

BA/BSc [ ] Certificate[ ]

5. How long have you been working in AACRA?

Less than 1 year [ ]6-10 years [ ]

1-5 years [ ]More than 10 years [ ]

SECTION B

Objective of the study: to identify perceived causes of project implementation delay in road construction projects in Addis Ababa City

Instruction: Please, tick **"✓"**in the appropriate columns to indicate how much you agree that the following listed factors cause delay in road construction projects in Addis Ababa City

Causes of Delay	**1 Strongly Disagree**	**2 Disagree**	**3 Undecided**	**4 Agree**	**5 Strongly Agree**
Delays in payments to sub-contractors, Machinery renters and contract employees					
Lack of manpower or Low productivity of manpower (skilled, semi-skilled, unskilled labor, technical, professional, etc.) in AACRA, consultant and sub-contractor					
Poor design (ambiguities and mistakes in specifications and drawings, mistakes and discrepancies in design documents, etc)					
Severe weather condition / Summer restriction on time of work					
Slow decision making by AACRA and consultant					
Poor site management and supervision					
Shortage of materials in the market					
Late procurement of materials					
Price (material, equipment, etc.) fluctuations and inflation					
Delays in site preparation/ site handover					
Changes in Government regulations and laws					
Poor contract management by different parties (AACRA, sub – contractors,					

consultant, etc.)					
Effects of subsurface conditions (type of soil, utility lines, water table)					
Lack of team communication effectiveness and teamwork in different parties (AACRA, consultant, sub – contractors, etc.)					
Delay in preparation and approval of tests and inspections					
Rework of bad quality performance					
Bureaucracy in Government agencies, AACRA, consultant and sub-contractor					
Incomplete design at the time of tender					
Change in the scope of the project					
Accident in project site					
Lack of high-technology equipment					
Old construction methods					
Congested construction site					
Delay by sub-contractors and consultants					
Political situation and interference					
Late deliveries of materials by suppliers					
Delays in the conversion and transfer of utility services (such as power lines, water lines, telecom data lines, etc)					
Difficulty in Budget availability for the project					
Other, please specify_____					

SECTION C

Objective of the study: To investigate effects of road construction projects delay in Addis Ababa City

Question: Listed below are the effects of delay in road construction projects.

Please select the five likely effects of delay in road construction projects in Addis Ababa and rank them from **1 (most effect) to 5 (least effect).**

(a) Cost overruns

(b) Extension of time

(c) Disputes between contract parties

(d) Arbitration (mediation/negotiation)

(e) Project abandonment

(f) Litigation (Legal action)

(g) Claims

(h) Loss of profits

(i) Loss of employees

(j) Negative social impact

(k) Idling of resources

(l) Poor quality of works due to hurried execution of works

(m) Delaying clients in getting profits from the projects

(n) Creation of stress on the project team

(o) Damage to company's reputation

(p) Lost productivity and efficiency

(q) Rescheduling

(r) Reduction of purchasing power of the allocated budget

(s) Other, please specify_____

Ranking of Possible Effects of delay in Road Construction Project in Addis Ababa				
1	**2**	**3**	**4**	**5**

SECTION D

Objective of the study: To explore the role of stakeholders in road construction projects delay in Addis Ababa

Question: Please, tick **[✓]** in the appropriate columns to indicate how much you agree that the following listed stakeholders have role in road construction projects delay in Addis Ababa City.

Stakeholders	**1 Insignificant**	**2 Minor**	**3 Moderate**	**4 Major**	**5 Sever**
AACRA					
Consultant					
Sub- Contractor					
Design Authority					
Donor/Financier					
Land Management Office					
Local Authorities					
Environment control Office					
Media					
Ethiopian Electric Power Corporation					
Ethio Telecom					
Water Supply and Sewerage Services					
Peoples Representative					
Finance and Economic Development Office					
Other, please specify_____					

SECTION E

Objective of the study: to study the present use of project time management tools and techniques in managing road construction projects.

Question: Please, tick **"✓"** on **Yes or No** column to indicate that the following project time management tools and techniques are **utilized or not** in AACRA road projects.

Project time management tools and techniques	**1 (Yes)**	**2 (No)**
Expert judgment		
Analytical techniques (Analyzing facts and problems to manage time)		
Meeting		
Breakdown (Decomposition) of activities		
Precedence (priority) diagramming method (PDM)		
Dependency determination		
MS Excel		
Scheduling tool (Activities Sequence tool)		
Other project management software		
Other, please specify_____		

SECTION F

Objective of the study: To identify possible measures to minimize delays in road construction projects in Addis Ababa.

Please select five likely measures which can minimize the occurrence of delay in road construction projects in Addis Ababa and rank them from **1 (most effective) to 5 (least effective)**

(a) Effective and efficient management of project sites and supervision works

(b) Effective strategic planning

(c) Proper project planning and scheduling

(d) Coordination between the construction team

(e) Complete and proper designs at the project commencement

(f) Employing appropriate construction methods

(g) Use of accurate cost estimates when formulating tender documents

(h) Constructing according to issued drawings

(i) Use of proper and modern equipment

(j) Use of proper methods in procuring construction materials

(k) Adherence to construction specifications

(l) Conducting frequent progress meetings

(m) Establishing clear communication channels

(n) Fast-tracking construction works

(o) Use of up to date technology

(p) Collaborative working spirit by the construction team

(q) Training of project staffs

(r) Free of occupation land preparation

(s) Other, please specify_____

Ranking of possible measures to minimize delay in road construction project in Addis Ababa				
1	**2**	**3**	**4**	**5**

Appendix B

Relative Importance Index (RII) of Factors Contributing to Delay of Road Projects

Sr. No	Causes of Delay	RII	Rank
1	Delays in payments to sub- contractors, Machinery renters and contract employees	0.878	5
2	Lack of manpower or Low productivity of manpower (skilled, semi-skilled, unskilled labor, technical, professional, etc.) in AACRA, consultant and sub-contractor	0.773	21
3	Poor design (ambiguities and mistakes in specifications and drawings, mistakes and discrepancies in design documents, etc)	0.836	12
4	Severe weather condition / Summer restriction on time of work	0.676	25
5	Slow decision making by AACRA and consultant	0.84	10
6	Poor site management and supervision	0.992	1
7	Shortage of materials in the market	0.8	16
8	Late procurement of materials	0.954	2
9	Price (material, equipment, etc.) fluctuations and inflation	0.874	6
10	Delays in site preparation/ site handover	0.838	11
11	Changes in Government regulations and laws	0.56	27
12	Poor contract management by different parties (AACRA, sub – contractors, consultant, etc.)	0.88	4
13	Effects of subsurface conditions (type of soil, utility lines, water table)	0.796	19
14	Lack of team communication effectiveness and teamwork in different parties (AACRA, consultant, sub – contractors, etc.)	0.865	7

15	Delay in preparation and approval of tests and inspections	0.798	17
16	Rework of bad quality performance	0.604	26
17	Bureaucracy in Government agencies, AACRA, consultant and sub-contractor	0.811	15
18	Incomplete design at the time of tender	0.827	13
19	Change in the scope of the project	0.722	23
20	Accident in project site	0.503	28
21	Lack of high-technology equipment	0.798	18
22	Old construction methods	0.848	9
23	Congested construction site	0.794	20
24	Delay by sub-contractors and consultants	0.851	8
25	Political situation and interference	0.716	24
26	Late deliveries of materials by suppliers	0.827	14
27	Delays in the conversion and transfer of utility services (such as power lines, water lines, telecom data lines, etc)	0.905	3
28	Difficulty in Budget availability for the project	0.766	22