

ADDIS COLLEGE



**DEPARTMENT OF CONSTRUCTION TECHNOLOGY AND
MANAGEMENT
POSTGRADUATE PROGRAM**

**Assessments on Road Construction Delay and Its Impact:-
The Case of Lamberet Kotebe to Kara**

BY: ENSMAWU KEFIA ID NO GSR 118/2013

Advisor: - DAGNACHEW ADUGNA (PHD)

April, 2023

ADDIS ABABA, ETHIOPIA

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A Thesis submitted to Addis College in partial fulfillment of the requirements for
the award of a master's degree in construction technology and management

BY: ENSMAWU KEFIA ID NO GSR 118/2013

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ABSTRACT

Many road construction projects have been undertaken in Addis Ababa city and in these constructions it is becoming common experiencing a project delay problem in road construction projects. This project time delays usually lead to adverse effects on the growth of national economies, contribute to major financial losses, and hold back the development of the Addis Ababa city. Time is a very critical indicator, a key resource, in the life cycle of project management and a crucial criterion for the success of a project in the construction industry. In construction industry, delay can be expressed as an elongation of time beyond what the contracting parties have agreed upon for the total completion of the project. It is well recognized that most road construction projects are exposed to time and cost overruns in Ethiopia and Addis Ababa region or both. As a number of delays rise from time to time, the need to assess and identify the cause of these delays and their effects also rises. Hence, the objective of this study is to identify the causes and effects of delay road project run by the Addis Ababa City Road Authority road projects. To achieve the objective of this study to collect quantitative data which can be analyzed quantitatively using descriptive as the nature of the study is descriptive. Using a survey strategy give more control over the research process and sampling 36 potential delay causes and 16 effects were selected from the reviewed literature and the causes were divided into 5 as client related factors, consultant related factors, contractor related factors, material and equipment related factors and external related factors. These factors were ranked using the Likert scale by a total of 105 professionals from 3 target population and analyses using Relative Importance Index (RII). The finding of the study indicated that the top major causes of delay in selected road project construction were delay in relocating utilities, escalation of the material price, and delay in paying compensation to land owners, shortage of foreign currency for importation of materials, inadequate management & supervision by contractors. In addition to these, lack of high-technology mechanical equipment, shortage of construction materials, late in revising and approving design documents, slow decision making and ineffective resource management were mentioned among the top major causes of delay. The study further determines that the major effects of delay were time overrun, cost overrun, financial loss, poor quality of work, compromised quality, company's bad reputation, loss of other facilities, disputes, loss of wealth and capacity and breaches of contract.

Keywords: Road construction, Delay, Causes of delays, Effects of delay

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School of graduate studies
Construction Technology and Management Stream

Assessments on Road Construction Delay and Its Impact:-
The Case of Lamberet Kotebe to Kara

By

ENSMAWU KEFIA

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School of PG	Signature	Date

DECLARATION

I declare that I have wholly undertaken the research reported here under the supervision and to the best of my knowledge, it contains no materials previously published except where references have been duly acknowledged.

Signature

Date

Ensmawu Kefia

I declare that I have supervised the student in undertaking this study and confirm that the student has my permission to submit it.

Advisor

Signature

Date

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LETTER OF CERTIFICATION

The undersigned certified that he has read and recommends hereby for acceptance by Addis college school of graduate studies entitled: Assessment on road construction delay its impact : The case of Lamberet Kotebe to Kara in fulfillment of the requirement for the Degree of Masters of Arts in Construction Technology Management.

Date

Signature

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LIST OF ACRONYMS

AACRA	-	-----	Addis Ababa City Road Authority
PMI	-	-----	Project Management Institute
RII	-	-----	Relative Importance Index
SPSS	-	-----	Statistical package for the social science
CPM	-	-----	Construction Project Management
ICT	-	-----	Information and Communication Technology
UK	-	-----	United Kingdom
USA	-	-----	United State of America

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

The construction of the first roads in Addis Ababa dates back to the foundation of the city in November 1886 by Emperor Menilik II and Etegie Taitu. The first roads served to link Sefers (villages within bigger settlements) by non-motorized modes of transport. The construction of modern roads was intensified during the beginning of the reign of Emperor Haile Selassie. The construction of roads during that period was carried out by the Public Works Department of the Municipality of Addis Ababa.

The road construction sector in particular is very important for the development and economic growth of any developing country (M.Haseeb, 2011) . In developing countries such as Ethiopia, a road transport industry plays an immense role in fuelling the process of economic development by providing a market access incentive for agricultural goods, production outputs in a regular consumption decision. Road infrastructure's role in expansion of education, social and health facilities, trade facilities and providing access to employment is tremendous. Roads contribute to economic growth and poverty reduction.

Road development affects total economic growth, agricultural growth, population growth, urban poverty reduction and rural poverty reduction. Efficient markets, adequate health services, a diversified rural economy and balanced industrial development would remain irrelevant without infrastructure.

Following the establishment of the Addis Ababa City Road Authority (AACRA) in 1998, large scale road construction had commenced. The total length of roads in the city almost doubled (to 3,731km) between 1992 and 2012, and road density reached 12.9% (AA city structural plan, 2017-2027).Currently, the road authority staffed with 1780 permanent and 4892 contract employees with data obtained from Human resource of the authority as of June 07,2019. As it is known, the development of every country including Ethiopia rest on the hands of the level infrastructural development in general and availability of road in particular, a country's transportation network, quality, performance, safety and every aspect which enable the road to provide the required transportation service for passengers determine economic development of a country. However, a roads project delays are challenging the developments of social and economy of a countries. These are as a result of different factors which are considered as causes for delay of road project construction in

Ethiopia in general and in Addis Ababa in particular which emanate from different sources such as government side, contractors side (weak financial capabilities, lack of experience, skill and knowledge in relation with project management, poor forecasting, poor estimation/analysis of the required inputs like financial resource, time resource, be over optimist. External factors like weather conditions, topography of the country, market-related factor (availability of key inputs domestically, market price fluctuation of input etc.) as reported on Road Sector Development Program RSDP 13 years“ performance and future plan report, (2011).

Lamberet Kotebe to Kara road project, which was launched in February 2017 with a budget of 534 million Br and schedules of being completed in two and half years. The first contract lot of the project, which extends from Lamberet Kotebe to Kara with 3.4 Km length was awarded to Diriba Defersha Genral contractor for 273 million Br .The company was supposed to finish the construction of the road in October 2019.Tekleberhan Ambaye construction Plc, another prominent local firm was award the second lot that cover the 2.8 Km section between Koteba College and Kara 261 million Br .The Lamberet Kotebe to Kara several others have been delayed as well. Multiple factor cause the delay mobilation the site using the area as marketplaces by the local community, design revision, problem with material supply and lack of skilled human resources are the major factor for the delay. Along with boundary demarcation issues, design revision and the underperformance of contractor are the general causes of road delays.

All around the world many construction projects face one of the biggest construction problems which is the delay, delays differ from a country to another, from a construction project to another and from construction type or cost to another due to every project circumstances. Road construction which is one and focal among construction industry, also a noticeable area where project delays are a common phenomenon which needs an immediate attention. Time is money; delay in a certain construction project affects time and thus money, which is the lifeblood of any economy. Time delays and cost overruns usually lead to adverse effects on the growth of national economies, contribute to major financial losses, and hold back the development of the construction industry (Ahmed Senoucia, Alaa Ismailb, Neil Eldina, 2016).

In construction projects, delay could be defined as the time overrun either beyond the contract date or beyond the date that the parties agreed upon for delivery of project outcomes ((Al-Hejji,and Assaf, 2006). Delays can be broadly classified in to: compensable

delays (caused by the client) and non-excusable delays (caused by the contractor), critical or noncritical delays, and concurrent or non-concurrent delays. The identification of the types of delays helps to recognize the causes of delays and makes adopting mitigation strategies easier.

This thesis would examine the cause and impact community of road construction delay focusing and also develop strategic on Addis Ababa city road authority in the case of Lamberet Kotebe to Kara which is also a part of highway, street and bridge construction contractor's industry in Ethiopia. The perceived causes and effects of delay regarding road construction projects of Addis Ababa City Road Authority will be assessed and identified. Recommendations based on the findings will be given to promote successful completion of the projects.

1.2. Statement of the Problem

Managing uncertainty is one of the most challenging tasks of a project manager at any level. Construction project is a project that is bounded by limited time, physical resources, budget and uncertainty. One of the usual that happen due to various uncertain events in a construction project is project delay. According to Bramble,A and Callahna,M, (2011) project delay is defined as the duration in which the total project or some part of it has been elongated or not finished due to various unpredictable or uncertain situations

Construction projects have troubles with construction methods and administration as well as limitation of resources, budget and time. The critical problems are failure to complete the projects on schedule and budget. In recent years, delay of construction projects is common in most of the civil engineering projects. Delays in a construction project is counted as a common problem and became a cause for projects completion with huge cost overrun (requiring higher budget than estimated), extended completion time, inferior quality deliverables and contract termination. The delays in construction projects happen because of various factors or causes. These causes lead to the delay in construction completion, and this delay ultimately leads to negative effects on the construction project. In Ethiopian construction practice, it is very rare that construction projects are completed on the time specified or agreed upon. There are many road construction projects in Addis Ababa city administration construction bureau, which suffered delay or in some cases suffered suspension or abandonment

The delay in road construction project have negative impacted on both the social and economic benefits in Ethiopia that would have accrued if the project were completed on time Social impact assessment involves identifying: significant potential positive and negative changes in peoples' cultural traditions and lifestyles, their physical and psychological health, their families, their institutions and their community. And, it identifies ways of avoiding, mitigating, and enhancing or managing those changes (e.g., monitoring and impact agreements). Impacts on Residents During the construction phase, residents may be disrupted and inconvenienced by detours, local road closures, dust, noise, heavy equipment traffic on existing roads, changes in the level of service, safety hazards, and interference with emergency services. Occasionally, there is vibration damage to near-by structures. Impacts on Businesses and Community Services Socio-economic impacts on businesses and community services can be positive and negative, during the construction phase, some businesses and community services may lose clients. Other businesses may obtain additional business. When the roadway is operational, changes in traffic patterns may increase or decrease the clients for some businesses and community services (Bangeladsh, 2022).Impacts on the Community:-Community impacts can be positive or negative. The most significant impacts are likely to result from the displacement of residents, businesses and community services. This, in turn, affects the community as customers, and members of businesses and community services, jobs and social relationships are lost. The loss of residents can have an additional effect of disrupting the social relationships in the community, creating a further loss for those who remain. And, the disruption of residents can lead to a loss of satisfaction with life in the community and reduced participation in community activities.

Construction projects have problems with construction techniques and management as well as limitation of funds and time. The dangerous problems are powerlessness to complete the projects on schedule, low quality work and cost overrun. In wide-ranging, most construction projects knowledge time and cost overruns during their execution phase. Thus clearly there are factors which play into account to affect completion of construction projects. This is since it is a global singularity that construction projects have not relished a smooth implementation all the way to completion. It is a major concern for every shareholder in a project to comprehend these factors. This research study therefore looks at the factors that will affect completion of construction projects that the stakeholders will need to address. It is hoped that in addressing these factors, the success in completion of construction projects

will greatly be enhanced. In developing countries like Ethiopia, projects are the life line of construction plan or programs. Failure of projects irrespective of the sector, whether public or private contribute to irreparable loss to society and to the economy as whole.

A preliminary informal review by the researcher on the construction projects in road projects the case of Addis Ababa city road authority lot one Project revealed that most of the projects are not completed on schedule while others are abandoned before completion because of many problems and complex issues of performance such as cost, time, poor planning and safety. Delays and non-completion of projects from initial cost plan has been common on construction sites. However, little or no efforts have been made to curtail the phenomenon. There have been numerous documented studies on unsuccessful or stalled construction projects. However, there has not been that much particular research to address determinants of timely completion of road projects the case of Addis Ababa City road Authority lot one projects (Gonzalaz, P.,V.Molenaar,k.\$ Orozco,F., 2014).

1.3. Research Questions

- What are the causes of delay in road construction projects of lamberet kotabe-kotabe to Kara in Addis Ababa City Road Authority?
- What are the consequences of delay road construction projects in lamberet kotabe - kotabe to Kara in surrounding community ?
- What are strategies for the timely completion road construction projects?

1.4. Research Objective

1.4.1. General objective

The general objective of the research is to identify the causes of delay in construction of road projects run by the Addis Ababa city Road Authority from lamberet kotebe- kotebe to Kara and develop strategic tools for timely road project completion.

1.4.2. The Specific Objectives

- To identify the causes of delay for the road projects from lamberet kotebe- kotebe to Kara
- To identify the impact of delay of the road construction from Lamberet Kotebe-kotebe to Kara on the surrounding community and the Addis Ababa City Road Authority

- To develop strategic tools for the timely completion of road project

1.5. Significance of the Study

Road is one of the key economic sectors and is the main force which facilitate the growth of national economy our country Ethiopia. However, it suffers from a number of problems that affect time, cost and quality performances. By putting such facts in mind, the study makes an effort to describe the factors which are a foundation for road project delay. There are several valuable benefits expected by implementing this study. The significance of establishing the issues related to the road construction project delays is to provide a greater insight and understanding on the causes of delays particularly among the main project players: contractors, client and consultants. This can be achieved by applying theoretical concepts discussed in many literatures into practice in real projects. It is hoped that these findings will guide efforts to improve the performance of the road construction projects and will be useful to the construction players. Therefore, these findings might encourage the practitioner to focus on delay problem that might have existed in their present or future projects. Thus, based on the study, the responsible bodies will design their strategy accordingly to manage the factors which contribute for project to be delay. Because actively managing these factors is depend to the extent how much the factors are clearly identified as a factor. Furthermore, the study could show a direction for further study for interested person/s and also will serve as a reference for future study in this thematic area

1.6. Scope of the study

The spatial scope of this research is limited to the road project that stretches from lamberet kotebe- kotabe to Kara in Addis Ababa city. The thematic scope is limited to the causes and impact of the road construction delay on the same project and strategic tools for minimizing delay.

1.7. Limitation of the study

The major limitation of the study was the lack of willingness of professionals to complete and return the questionnaire which took too long time than expected. A series of briefings on the questionnaire was conducted to motivate respondents for completing the questionnaire as its findings are for academic purpose.

1.8. Organization of the paper

The paper contains five chapters and organized as follows: the first chapter contains introduction part of the study, which includes statement of the problem, research questions, and objective of study, significant of the study, scope and limitation of the study. While, chapter two is the review of theoretical and empirical literatures; the methodology was stated on chapter three and on chapter four, data analysis and interpretation. Lastly the paper has presented conclusion of the result and recommendation as chapter five.

CHAPTER TWO

LITERATURE REVIEW

2.1. General

Construction delay is a worldwide problem in the construction industry. Delay is a consequence of non-performance of critical activities on timely basis, which prolongs the completion date of the project (Ahmed, 2016). The success of a project is measured in terms of timely completion, cost, and quality. Some projects, which are properly planned and managed, are successfully completed. However, many projects are delayed due to causes related to the owner,

2.2. Definition of key terms

Project: - defines a project as “a temporary endeavor undertaken to produce a unique product, service, or result”.

.A project is essentially the response to a need, the solution to a problem. Further, it is a solution that promises an advantage which is usually a financial advantage. For most ventures, the basic aim is either to make money or save money. It is an investment plan to build and/or grow such facilities to improve the development of products and/or services in a society for a certain period of time. The quality guru also defines a project as a problem scheduled for solution.

Definition of delay: - Construction delay may be described as a time overrun past the time negotiated by the construction parties for the project or the contract date to be finished.. Construction delay also applies to the period spent on the completion date or time specified in the completion and submission of the construction project decided by both parties. (Al-Hejji, and Assaf , 2006). In the road construction industry, project delays may occur due to the elongation of the construction time as a result of various troubling factors that influence the construction workflow.

Construction Project: - Construction projects are those projects on which the construction of structures, roads and special-purpose services are planned. Classically, tasks are characterized by the requirement to complete a work on schedule, on budget and with acceptable consistency.

Construction Delays:- (Al-Hejji, and Assaf , 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 defined delays as the time overrun beyond the contract date or the date that the critical activities have been delayed.

Parties in construction Project:-In every sector, there are multiple players interested in achieving the desired objective or aim successfully. The following are the most frequent participants in road construction projects.

Client/owner: - are those who finance the project and also provide supplies and equipment, and who may eventually be the owner of the project after completion.

Contractors:- are responsible for undertaking the actual construction of projects. Based on the form of contract, the contractor will be responsible for the planning, management, supervision, maintenance of the building site, furnishing of the supplies, machinery and manpower required for the project to be successfully completed. The contractor also

Consultants: - Construction consultants help clients make effective plans for their future projects to ensure that the work is completed by contractors with cost efficient manner. They provide cost forecasts, draw schedules, pick vendors, manage building contracts and address disputes between contractors and owners of projects.

Designer: - It is the party that transforms the owner's vision into a real life project (blue print). It is responsible for the implementation of the project's original concept. The design incorporates all the project's architectural, structural, sanitary and electrical elements.

Impacts on the Community:-Community impacts can be positive or negative. The most significant impacts are likely to result from the displacement of residents, businesses and community services. This, in turn, affects the community as customers, and members of businesses and community services, jobs and social relationships are lost.

2.2.1. Types of delay

Several studies have tried to identify the types of delay is grouped in to three major categories.

1. Concurrent Delay

Concurrent delay is an issue that occurs in most construction industry programs. In this case, both the owner and the contractor are responsible for the delay. Simultaneous delays involving either two or three excusable delays result in extended time. When excusable delays with compensation and non-excusable delays are concurrent, an extension of time can be issued or the cost of delay can be distributed between the owner and the contractor.

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

2. Intrinsic and Extrinsic delays

A variety of factors impact construction projects from the planning process to the point when the project is finished. These factors can be categorized into intrinsic and extrinsic factors. Factors that contribute to construction organizations are intrinsic factors, while extrinsic factors comprise diverse aspects varying from the socio-cultural, technical, economic and political contexts in which these organizations work. Extrinsic causes of delay are difficult to monitor, whereas proactive project management may resolve the inherent causes of delay. Extrinsic causes such as geopolitical risk, inflation and exchange rate declines have been often called global risk factors. Global risk factors range from region to region and each region is considered to have its own region-specific causes of construction project delays.

3. Excusable and Non-Excusable

Delay Excusable delay Excusable delays are triggered by circumstances that are reasonably unforeseeable and not under the contractor's power. There are two types of excusable delays:

Non-compensable delays:

It is a delay which is caused by neither the client nor the contractor. No one is held accountable for accidents and both the owner and the contractor are not in charge of the case. These delays are commonly called "acts of God" because they are not the responsibility or fault of any particular party. Examples include natural disasters, unhealthy conditions and mass misconduct (labor force revolt, explosions, government actions beyond their sovereign capacity, unexpected late delivery of supplies, and unexpected late delivery of materials) Owing to this; contractor gets extension in time and does not pay any fee to the owner and contractor for delay damages.

Compensable delays: There are delays that are due to an unexpected occurrence outside the control of the contractor or the subcontractor and normally induced by the representatives of the owner or the owner. If contractors face this form of delay, they are entitled to time

extension as well as monetary compensation. An example could be inability of the owner's architect to complete sketches in the necessary period that contributes to the extension of the timeline which in turn causes economic harm on the owner. In this condition, the contractor would have to bear additional indirect expenses for both expanded field office and home office. (N. Hamzaha, M.A. Khoiry, I. Arshad, N. M. Tawil, A. I. Che Ani, 2011) .

Non –excusable delay

The contractor or its vendors are responsible for an inexcusable delay. This often arises when the contractor violates negotiated terms in the building contract. Clients will claim a loss as it is spelled out in the contract document. On the grounds of either liquidated losses or direct damages, the contractor will pay. Liquidated penalties are based on the daily average expense amount that the owner of the contractor is expected to suffer in the delay of building contracts (Muhammad A. A., Ali R. K., Uroosa M., & Shabeer H. K., 2017). Late subcontractor results, late supplier performance, the contractor's inefficiency in handling the building site, the contractor's mismanagement of project finances, lack of labor, inability to manage work according to contract schedule are some of the non –excusable delays. In addition to these, regular but avoidable mistakes or failure by the contractor or subcontractors to follow the owner's request defective workmanship, a project-specific labor strike triggered by either the reluctance of the contractor to bargain or unequal work procedures could also result this type of delay.

2.3. Causes of road construction delay

Many parties involve in construction industry which creates numerous problems and subsequently, the industry is turned as a high-risk trade sector. Every project is designed with predefined schedule, budgeted cost, and expected quality. All these are mentioned in the contract documents. Due to improper contract management and some other unexpected events, so many claims and disputes are raised by the parties. Delay is one of the major sources of claim and frequently encountered problem in construction arena where its attributes are well known but fundamental factors and subsequent impacts are not understood by the experts. Therefore, many projects are suffering by schedule delay. Due to lack of improper management, delays may arise at feasibility stage of the project and continue till to the end of construction work. In the lifecycle of a construction project three parties e.g., owner, consultant, and contractor are closely involved. Thus, they are the key players of schedule delays of a project. Thus, identification of the potential factors causing

delays is a prerequisite to improving project schedule performance. A number of studies across the globe have investigated Issues related to project delays, and the reasons behind them. There are two kinds of cause for delay in construction projects, mentioned as Internal causes; and External causes. Internal causes of delay include the causes arising from four parties involved in the project. These parties include:-The owner, Designers, Contractors, and Consultants. Other delays, which do not arise from these four parties, are based on external causes for example from the government, materials suppliers, or the weather (Ahmed, 2016). However, different numbers of delay causes for each types of construction in road construction could be identified as number of delay causes studied in different research's ranging from 293 delay causes in Egypt (A.Abdel-Hakam, Remon F.Aziz \$ Asmaa, 2016) to 47 . Causes of delay in road construction projects taken to this study purpose to widen the research's studying the road projects since the timely completion of road construction projects plays a significant role for both economic and social aspect of the country.

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

However, Ismael describes that a project can be classified in to three phases: project conception, project design, and project construction.

Thus, we generally categorize events that cause delays in to two:

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

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

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

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

According to Girma et al, the major events that may result in delay arising from pre-construction stage are Contract document preparation, Design preparation, and Tender document preparation, Process of tendering and Contract negotiation process

Also, (Wubishet, J.M., 2017) noted that the causes of delay and cost overruns arising from pre-construction stage that lead to claims and disputes are resulted due to the existence of high uncertainty during the early phase of a project, which possesses the most probable influencing power on the project. Accordingly, Sami et al explained as decisions made early in the life of the project have the most profound effect on the project's objectives of delivering a safe, quality project within the time and budget allocated .

b) Causes of Delay Due to Events during Construction Stage

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

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

2.4. Identification of Causes of Delay

Many researches and articles have been carried out on identification of causes of delay in construction projects. According to Syed et al, there are two kinds of causes of delays in construction projects: external and internal cause.

Internal causes of delays include the causes, which come from four parties involved in the project - Owner, Designer, Contractors, and Consultant. Other delays, which do not come from these four parties, are based on external causes for instance from the government, material supplier, weather.

According to FIDIC 87 also that, delays in construction work mainly occurring during implementation stage are due to Delay in site hand over,. Late approval of payment certificates, Changing the scope of the work, Low contractor's financial and technical capacity, Delay of drawings or instruction., Unforeseeable physical condition.

Suspension of work up on the engineer's instruction

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

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

Delays caused by the Contractor

According to the literatures reviewed in related to the study, some of the following causes of delay can be attributed under contractor's risk: Planning failure, Organization failure, Scarcity of resources, controlling failure, Coordination failure, Lack of qualified engineers and Failure to hold cash flow for cast

Delays Caused by the Client

The client delays completion of the work in various ways. Among these, the following are the main ones as a report published by the construction industry council of UK: Rigid budgets, Changes of mind during construction, ordering extra which delay the work, Delay to provide the right of way, Differing site conditions and Suspension

Delays Caused by the Consultant

Ismael in his study and also Fisk in his text include the following causes of delays as a major cause of delays that are caused by the consultant side: Late approval of laboratory tests, Design changes, late approval of payment, Poor briefing of document (I.e. specification, bill of quantity.), Postponement of work and late approval of shop drawings
By Neutral Delays caused Events. Neutral events are those for which neither the employer nor the contractor is responsible, e.g. exceptionally adverse weather conditions.

According to Fries, events which considered as outside the control of either party to the contract are: Force majeure, Exceptional adverse weather condition, civil commotions or strikes use of fuel or labor, Material market instability and Government legislation change

Government statutes that restrict use of fuel or labor before analyzing construction delays, a clear understanding of the general types of delays to better identification the cause and effect relationship among the different causes of delays is necessary.

2.5. Cause of Road Construction in Developed Country

2.5.1. USA

(S.M.Ahemed, S.Azhar,M.Castillo,P.Kappagantula, 2001) Identified as major causes of delay in construction projects in Florida, USA, and the construction permits approval, change orders (variations), changes in drawings, incomplete documents, inspections and changes in specifications is one of the early studies to clearly present the causes of delays in construction in the USA. They identified 17 delay factors where the top five were weather, labor supply, subcontractors, design changes, shop drawings and foundation conditions. Delays caused by the client such as late submission of drawings and specifications, frequent change orders, and incorrect/inadequate site information generate claims from both the main contractors and subcontractors which many times entail lengthy court battles with huge financial (A.Abdel-Hakam, Remon F.Aziz \$ Asmaa, 2016)

2.5.2. UK

The UK, the study of Sullivan and Harris (1986) established 19 causes of delays, with waiting for information, variation orders and ground problems ranked highest. Produced a critical review on the causes of delays observed in literature. Hamzah et al. (2011), and concluded their critical review on causes of road construction delay by identifying the main causes; these include, poor planning, poor site management, financial issues, delay of material delivery and management problems.. Sbelieved that these main causes can be grouped into three categories, which are, input factors (concerned with labour, material and equipment), internal environment (contractor, owner and consultants) and exogenous factors (weather and government regulations).the presented 19 study reviews including his study on causes of delays around the world.

Construction literature found scarcely any. Surprisingly, a search on Association of Researchers in Construction Management, which is one of the largest construction

management research depositories in the UK, produced 573 results for “causes of delay, UK” but none of them was directly a study in the UK in recent decades. In this study, the authors examined large construction projects in the UK where 19 causes were identified; of these waiting for information, variation orders and ground problems were ranked highest. However, the construction industry has moved on and there have been changes which include the 2008 economic recession. Yet, delays still remain a cornerstone problem in the UK construction industry thus worth researching.

2.5.3. AUSTRALIA

recent study carried out in Australia found that the main reasons for time issues in major Austria projects are the poor planning, slow/poor decision-making process, project organizations’ internal administrative procedures and bureaucracy, resources shortage (human resources, machinery and equipment), parties poor communication, change orders, client lack of commitment (goals and objectives) and late/improper design.

(Ahmed, 2016) Identified as major causes of delay in construction projects in Austria, the road permits approval, change orders (variations), changes in drawings, incomplete documents, inspections and changes in specifications. main causes of delays the design changes, design errors, poor communication, customer/end-user related issues, subsurface investigation inadequacies, issues regarding permissions/approvals, weather conditions, procurement delays, site management problems, rework and cultural heritage management issues .

2.6. Developing country

Construction delay is one of the basic constrains to achieve the project objectives in developing countries. This study aims to find the causes and effects of construction delays in developing countries. A thorough literature review has been done following the content analysis method. The relevant literature of 28 developing countries was collected from the scholarly journals published in the period of 2006 to 2016. The different developing countries are grouped into three geographic regions, i.e. South and Southeast Asia, Middle East, and Africa. In these regions, total 53 potential causes of delay under 8 major groups are identified. Frequency and ranking of these factors have been done. The factors, delay in progress payment by owner, contractors’ cash flow problem, improper planning and scheduling, poor site management, and change order by owner during construction, are acknowledged as critical causes of delay in developing countries. This study will assist both

academic and professional experts providing more insight about the construction delays and project management in developing countries.

Construction projects have been observed to have problems road project delays and disruptions and the South African construction industry is not an exception. This identified causes and effects of project delay and disruption through a desktop study. Subsequently, a questionnaire was designed and used to conduct a survey to obtain the views of the three main road construction project participants – clients, consultants, and contractors In South Africa,) researched on causes of construction cost and time overruns and revealed that the following were the most important causes of time overruns: Incomplete drawings; Design changes; Clients' Slow decision-making; Late issue of instructions; and Shortage of skilled labor. (Alaghbari, 2007) Studied the significant factors causing delay of building construction projects in Malaysia and found out that the major Causes of delay road were: Owners' financial difficulties and economic problems; Contractors' financial problems; Late supervision and slowness in making decisions; Consultants' slowness in giving instructions; and Lack of materials on market Delay is one of the major problems in Nigeria construction industry.

2.6.1. GHANA

They analyzed and ranked the main factors affecting the construction time, and classified them into two groups: the role of the parties in the local construction industry and the type of projects. Based on their survey results, they indicated that the five major causes of delays were: poor site management and supervision, unforeseen ground conditions, low speed of decision making involving all project teams, client initiated variations and necessary variations of works. The causes of delays in road construction projects in Ghana there analysis, they concluded that the delay in honoring certificates, underestimation of the costs of projects, underestimation of the complexity of projects, difficulty in accessing bank credit, poor supervision, underestimation of time for completion of projects by contractors, material shortage, poor professional management, fluctuation of prices/rising cost of materials and poor site management were found to be the top ten most important factors affecting the construction time. The study of (Bassioni, H.A. & El-Razak, 2008) was carried out to determine the causes of delay in road construction projects in Ghana. A questionnaire survey was carried out to confirm the causes and identify the most important delay factors. Based on the survey results, the top five delay causes were: financing by contractor during construction, delays in contractor's payment by owner, design changes by owner or his

agent during construction, partial payments during construction and non-utilization of professional construction management.

2.6.2. SOUTH AFRICA

Construction projects have been observed to have problems road project delays and disruptions and the South African construction industry is not an exception. This identified causes and effects of project delay and disruption through a desktop study. Subsequently, a questionnaire was designed and used to conduct a survey to obtain the views of the three main construction project participants – clients, consultants, and contractors.

In South Africa, causes of construction cost and time overruns and revealed that the following were the most important causes of time overruns: Incomplete drawings; Design changes; Clients' slow decision-making; late issue of instructions; and Shortage of skilled labor. (Alaghbari, 2007) studied the significant factors causing delay of building construction projects in Malaysia and found out that the major causes of delay were Owners' financial difficulties and economic problems; Contractors' financial problems; Late supervision and slowness in making decisions; Consultants' slowness in giving instructions; and Lack of materials on market.

2.6.3. KENYA

Delays in construction projects are still very common in most parts of the world even with the introduction of modern management techniques. Studies conducted on the causes of construction project delays in 22 different countries of the world have been examined. (Tushar Khattri, Sohith Agarwal, Vaishant Gupta & Mukesh Pandey, 2016) carried out an investigation into factors causing construction project delays in Kenya and found out that the major causes of delay .the causes of delay were: Approval of shop drawings; Delays in payments to contractors and the resulting cash-flow problems during construction; Design changes; Conflicts in work schedules of subcontractors; and Slow decision making and executive bureaucracy in the Owners' organizations. The causes of delay and cost overruns in construction projects in Kenya and the results showed that the most important factors were: Financing and payment for completed works; Poor contract management; Materials shortages; and Improper planning.

This the theoretical and conceptual framework of timely completion of road construction projects in Kisumu County. It also discusses the literature related to determinants for timely completion of road construction projects funded by Kenya Roads Board in Kisumu County.

It particularly focuses on establishing the extent to which top management support , effective procurement process, disbursement of fund procedures and external environment determine timely completion of road projects in Kisumu county. These are considered the pillars whose study will unravel which of them will be most influential in successfully completing construction projects.

2.6.4. NIGERIA

Delay is one of the major problems in Nigeria construction industry. Delay lead to many negative effects such as disputes between clients and contractors, increased costs, loss of productivity and revenue, and termination of contract. The aim of the paper is to investigate the causes of delay in Nigeria construction industry. The survey method was adopted for this work through questionnaire; the questionnaire was distributed to contractors, clients and consultants etc. in the construction industry in Nigeria. The data collected was analyzes in rating form to determine the most causes of delay in the construction projects. However the results obtained from ranking analysis shows that improper planning, lack of communication, design errors and shortage of supply are rank high on the causes of delays in Nigeria construction industry. The paper concluded that delays causes more harm than good in construction project, therefore action should be taking to avoid such delay in construction projects in order to improve the efficiency and effectiveness of the industry. Consequently it was recommended that adequate planning; coordination; and proper monitoring of the construction projects by an experience and qualify professionals should be encourage to reduce the impact of delays on construction projects.

2.6.5. ETHIOPA

(Werku Koshe and K.N.Jhan , 2016) conducted a questioner survey in Ethiopia to investigate causes of construction delay in order to assess the opinions of clients, design engineers, consultants, and contractors in order to evaluate the frequency of occurrence and degree of severity of the 88 cause of construction delay factors classified into eight broad categories: client related, consultant/supervisor related, contractor related, designer related, labor related, material related, and other. According to the study's findings, the five most significant factors that cause delays in Ethiopian public building construction have been identified. According to the study results, the five key factors identified for construction project delays were contractor financial difficulties, material price escalation, ineffective planning and scheduling by contractors, delay in progress payments for completed works,

and a lack of skilled professionals in construction project management in contractor organization. (Wubishet, 2017) .Conducted a survey and case study in the Causes of Cost Overruns in Ethiopian Federal Road Projects in the Southern District. The study identified six top-rated factors for project cost overruns, which were material price fluctuation, cost underestimation, delay in supply of raw materials, inadequate review of contract documents, lack of coordination during the design phase, and lack of cost planning during the pre- and post-contract stage, as having the greatest impact on the performance of project costs from the client's, consultants', and contractors' perspectives.

Construction delays are a common problem in Ethiopian construction projects of all sizes and stages. Ethiopia's construction industry is thriving, and road networks are being built throughout the country. However, historical data on completed road projects shows that none of them were completed on time and within budget (P, Sambel G.T \$ Dixit, 2018). According to (Werku Koshe and K.N.Jhan , 2016), construction delays occur at all stages of a construction project and are common issues in Ethiopian construction projects, and this is one of the leading causes of project failure. In Addis Ababa, there are many road projects constructed, under construction and planned to be constructed. The Ethiopian Construction Works Corporation (ECWC) was awarded a 4.5-billion-birr road project to be built here in Addis Ababa on November 18, 2020. It is the first mega project floated by the Addis Ababa Road Construction Authority (AACRA) that ECWR won in recent years.

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.

2.7. Impact of road construction delay

The delay in construction projects had enormous impacts on time and cost overrun. It also creates problematic situation between owner and contractor such as dispute, litigation, arbitration, and sometimes total abandonment of the project. Assessment of Project Performance in Terms of Time Cost and Quality and it showed that the most important

effects of time overrun in merit were found to be Cost Overrun, Idling capital and Resources, Disputes between contracting parties, Poor quality of work, Arbitration, Negative social impact, Total abandonment, Litigation, Negative impact to other projects and Loss of labor productivity.

Construction delays are insidious often resulting in time overrun, cost overrun, disputes, litigation, and complete abandonment of projects. Many projects are of such a nature that the client will suffer hardships, expenses, or loss of revenue if the work is delayed beyond the time specified in the contract. Then again, construction delays have cost consequences for the contractor: standby costs of non-productive workers, supervisors, and equipment, expenses caused by disrupted construction and material delivery schedules and additional overhead costs.

Time Overrun

The argued that both contractor related factors and client related factors such as inadequate contractor experience and owner interference have impact on time overrun..

Rescheduling

According to rescheduling is the change of original schedule of time in order to respond to disruption and problems which have occurred. In the construction industry, schedules may be updated in order to monitor the time and work in construction projects). The importance of schedule updates is as mentioned by include:

- compare the original schedule with the actual progress of the project;
- identify all delayed activities;
- identify who or what is responsible for delays; and
- Forecast and modify projected work progress based on actual progress.

Based on the schedule update, delayed activities can be identified and usually, rescheduling is required due to the delayed work. Thus, rescheduling is one of the effects of delay in construction projects.

Cost Overrun

The causes and effects of construction delays in government construction project and identified cost overrun as one of the effects of construction delays in Malaysia. Regarding cost overrun identified three main causes that were contractor related problems, material-

related problems, and owners financial constraints, whereas identified the most critical factors included: high inflation, increased material price; design change by client; defective design; weather conditions; delayed payment on contracts and defective construction work inflation, increased material price; design change by client; defective design; weather conditions; delayed payment on contracts and defective construction work

Disputes

During the construction process amongst the project parties. Lack of communication on contractual obligations may lead to misunderstandings, conflicts and disputes. The factors of communication between the various parties, problem with neighbors, unforeseen site conditions, delay in payments for completed work, improper construction methods, delays caused by subcontractors and discrepancies in contract documents will give rise to disputes between the various parties. Furthermore, if the disputes cannot be solved amicably or easily it can lead to arbitration or litigation

Litigation

when construction delays are caused by client related, contract related, labor related, external related factors and contract relationship related factors such as delay in payment for completed works, problems with site conditions and less of labor supply where eventually rise the disputes to be settled by the litigation process. The parties involved in the construction projects use litigation as a last alternative to settle the disputes.

Total Abandonment

The most critical adverse effect of construction delays on construction projects is abandonment that could be temporary or in worse conditions total abandonment. The major causes of construction delays such as client related, consultant related, contractor related and external related may lead to project abandonment that will lead to delays in construction projects. The effects of construction delays on project delivery in Nigerian construction industry and identified total abandonment as one of the major effects of construction delays.

2.7.1. Community Impacts

Community impacts can be positive or negative. The most significant impacts are likely to result from the displacement of residents, businesses and community services. This, in turn, affects the community as customers, and members of businesses and community services, jobs and social relationships are lost. The loss of residents can have an additional effect of

disrupting the social relationships in the community, creating a further loss for those who remain. And, the disruption of residents can lead to a loss of satisfaction with life in the community and reduced participation in community activities (African Development Fund, 2007). The delay in road construction project has negatively impacted on both the social and economic benefits in Addis Ababa that would have accrued if the project were completed on time. Social impact assessment involves identifying: significant potential positive and negative changes in peoples' cultural traditions and lifestyles, their physical and psychological health, their families, their institutions and their community. And, it identifies ways of avoiding, mitigating, and enhancing or managing those changes (e.g., monitoring and impact agreements). Impacts on Residents During the construction phase, residents may be disrupted and inconvenienced by detours, local road closures, dust, noise, heavy equipment traffic on existing roads, changes in the level of service, safety hazards, and interference with emergency services. Occasionally, there is vibration damage to near-by structures. Impacts on Businesses and Community Services Socio-economic impacts on businesses and community services can be positive and negative, during the construction phase, some businesses and community services may lose clients. Other businesses may obtain additional business. When the roadway is operational, changes in traffic patterns may increase or decrease the clients for some businesses and community services (Bangladesh, 2022)

Road projects impact assessment as per the Comprehensive guide for Social Impact Assessment Good Governance is that, Social problems arise largely due to conflicts between economic development and natural resources. Economic losses and social costs from environmental degradation often occur long after the economic benefits of development have been realized. Most often, the development projects provide economic benefits and better living environment, but they also affect local people adversely. Social impact assessments help in understanding such impacts.

2.8. Strategies for the timely completion of road project

According to the basic definition of (Kerzner & Harold, 2012), a project involves a limited budget, a specified set of performance and a defined time frame to its completion. The time allocated to complete the actual project, starting from the time the tender was awarded to the delivery of the project is known as the project contract time. The time frame of the project is fixed by allowing for the time needed to procure equipment for the construction,

deployment of labor and capability. It is also fixed by predictable weather, flow of finances and the ability of the management to drive the project.

This would be accelerated by ensuring that the projects are completed within the allocated budget, time, scope and quality.

Top Management Support

Top management needs to constantly monitor the progress of the project and provide direction to the implementation team. that top management has "an overall responsibility for accepting and approving the project initiatives outlined in the information technology strategic plan, including funding and prioritization of projects before they are initiated". In the context of small business proposed and validated a measure of top management support. Their measure consists of: level of support for the project; frequency of attendance at project meetings; level of involvement in information requirements analysis; and level of involvement in decision-making relating to the project.

Effective procurement process

Procurement is the acquisition of goods, services and/or infrastructure at the best possible total cost of ownership in the right quantity and quality, at the right time, in the right place for the direct benefit or use of governments, corporations or individuals, generally via a contract. The procurement is the entire process of acquiring materials, property and services required for a particular project. The process starts with the identification of need, followed by a decision on procurement requirements. The process continues through risk assessment, identification and evaluation of alternative solutions, contract award, delivery and payment of the property or service. The critical success factor components of effective procurement are: (i) Transparency in the procurement; (ii) Competitive procurement process; (iii) Good governance; (iv) Well committed public agency; (v) Social support and (vi) Thorough and realistic assessment of the cost and benefits.

Early payment

The conducted a research and concluded that construction delays were badly affecting the large construction industries of different countries and it was needed to find solutions for countering construction delays. Since they identified financial problems as the main cause of construction delays, they suggested that financial problems should be avoided by making the payments on time. Their argument was that clients should make timely payments to the contractor and contractor should make the timely payments to the subcontractors, suppliers

and labor. Furthermore identified ensuring an adequate source of project finance as a method of minimizing construction delays.

Acceleration of site activities

In Nigeria, identified two methods of minimizing delays amongst which acceleration of site activities was noted out. This was further supported and he defined acceleration is action taken by the main contractor in order to speed up the progress of the project to accomplish early completion or to make up for lost time. In addition identified it as the procedures taken by the contractor as to the recovery of construction delays.

Reinforcement of liquidated damages clauses

A contract must be specific in terms of the time required to perform the work. Reinforcement of liquidated damages clauses can minimize construction delays. Liquidated damages clauses are enforceable. For a liquidated damages clause to be enforceable, it must satisfy the parties. Because of this, construction parties tend to delay progress of construction activities, therefore reinforcement of this clause encourages timely completion of projects.

Proper pre-construction planning

In order to avoid delays during construction stage, the construction parties should make proper planning. Furthermore identified some of the methods of minimizing construction delays in Kuwait. They were pointing out that; performance of pre-construction planning, allocation of sufficient time and finances during the design phase, hiring of independent supervising engineers to monitor progress of work, ensuring timely delivery of materials and selection of competent and reliable consultants to carry out the work will minimize the occurrence of construction delays. This was also supported in his researches identified proper project planning and scheduling as some strategic measures to enhance successful project delivery. In addition the design stage, attention should be paid to adequate briefing, confirmation of client financial capability, and design quality assurance/constructability reviews and these will help in minimizing construction delays. that at design stage, project parties should ensure the availability of resources, hiring a competent project manager and utilization of appropriate construction methods, incentive offer for early project completion and emphasizing on the availability of resources.

Management during construction

The project management competence represents only one of many criteria upon which project performance is contingent. Construction delays, large number of claims and litigation result to a large extent from not selecting the best contractor to construct the facility. Quality of management during construction concerns the steps taken to ensure that products are in 25, Accordance with the quality standards and measure the effectiveness/competency of consultants and contractors. The factors that contribute to quality of management during construction are forecasted planning data such as analysis of construction methods; analysis of resource movement to and within site; analysis of work sequencing to achieve and maintain workflow; monitoring and updating of plans to appropriately reflect work status; responding to, and recovering from problems or taking advantage of opportunities present; effective coordination of resources, and the development of appropriate organizational structure to maintain workflow.

Contingency allowance

Contingency sums are allowances of project cost included in the pre-contract estimate for the purpose of ensuring that the budget set aside is realistic and sufficient to contain the risk of unforeseen cost increases during construction. Investigation by these authors revealed that 5–10% contingency allowance is a common practice in Nigeria. Provision of adequate contingency sum at the pre-contract stage could buffer the extra financial burden arising from project uncertainties.

Motivation of staff

Productivity in the construction industry has been steadily declining and labor efficiency has been cited as poor, resulting in construction delays. Several techniques can be used to positively influence workers' behaviour. Two of these techniques are the behavioural and economic approaches. The former views motivation from the workers' psychological requirements and the second views it from the economic approach, placing emphasis on monetary. Motivation variables that could impact on construction time are: pay and allowances; job security; a sense of belonging and identification with the project team; recognition of contribution made; opportunity to extend skills and experience through learning; equitable rewards relative to others' input into the project, and the exercise of power and opportunity for career advancement for future benefit.

2.8.1. Developed countries

Germany like the other developed countries has Effective procurement process and timely completion of road construction projects Procurement is the acquisition of goods, services and/or infrastructure at the best possible total cost of ownership in the right quantity and quality, at the right time, in the right place for the direct benefit or use of governments, corporations or individuals, generally via a contract. The entire process of acquiring materials, property and services required for a particular project. The process starts with the identification of need, followed by a decision on procurement requirements. The process continues through risk assessment, identification and evaluation of alternative solutions, contract award, delivery and payment of the property or service. World Health Organization report explains that an effective procurement process ensures that materials are available at the right time, right quantity, for the right client, and at a reasonable price. further emphasizes that it does not merely entail the act of buying, but a wide range of business, operational, information technology, legal systems, safety and risk management, all undertaken to address an organization's needs. The ability to satisfy desired needs depends on the speed at which the good is delivered; otherwise a negative externality is created on the end users. The recipient to follow specific rules (i.e., procurement guidelines) for identifying the contractor who constructs the road and to set up specific financial management systems to oversee the use of donor funds. These often donor specific rules and guidelines are meant to ensure that donor resources are used efficiently and economically, but at the same time can lead to fragmentation and aid complexity. Procurement is an important aspect and if not managed well, then project aid can be withheld, disbursements can be delayed, contracts can be cancelled and worse still contractors debarred from doing business with development partners which can be a costly affair. the critical success factor components of effective procurement are: (i) Transparency in the procurement; (ii) Competitive procurement process; (iii) Good governance; (iv) Well committed public agency; (v) Social support and (vi) Thorough and realistic assessment of the cost and benefits.

2.8.2. Developing countries

Kenya like the other developing countries has had its fair share of delayed infrastructure projects. The delays negatively impacted on both the social and economic benefits that would have accrued if the projects were completed on time. The Rural Access Road project delayed for 3.5 years. The objective of this project was to develop farm to market center

access. The aim was to increase the growth rate of agriculture production in the affected districts, which would in turn improve the livelihoods of the people, provide access to critical facilities like health and education centers. According to the Project Completion Report, other than the delayed completion, only 56 percent of the construction target was achieved. This therefore means, the districts were deprived of the expected benefits that they would have enjoyed had the project been completed according to schedule. The Trunk Roads, feeder and settlements project as well as the second highway project also experienced long delay extending to three years. The International Journal of Economics, Commerce and Management, United Kingdom Licensed under Creative Common Kakuma-Lokichokio Road project is an infrastructure project that was affected by delayed completion. This was a project by the African Development Bank. The loan was signed in December 1983, declared effective in March 1987, works commenced 26 months later than the expected time and the overall delay at completion was 32 months. The objective of the project was to provide access to the Turkana District which is a remote isolated location whose population had no access to critical facilities (World Bank, 2011). Sondu Miriu Hydro Power Infrastructure Project in Kisumu County stalled for a period of four years. The purpose of this project was to stabilize power and ease energy crisis in Nyakach, Kasipul-Kabondo and Kano Planes. This had an adverse effect to the industries and households. These delays were a cost to the government, development partners and the community with the subsequent social and economic losses.

2.8.3. Ethiopia

The concept of timely completion of road construction projects in Ethiopia Due to the importance of construction sector to a nation, many researchers have studied this sector's operations and their findings have indicated that most projects are never completed on time due to delays. According to (S. Faradi, & S.M. El-Sayegh, 2006), delay is considered one of the most frequent problems in the construction industry and these delays have an adverse impact on project completion in terms of time, cost, quality and safety. Factors contributing to these delays have been identified as inadequate readiness for implementation causing delays in procurement of contractors, loan conditionality's affecting late release of funds, poor performance of contractors, low capacity of the implementing agencies, poor supervision of works and contract management in responding quickly in resolving contractual issues when they arise. In addition, failure by government and other funding agencies to release counterpart funds in good time, delays in payment to contractors and the

resulting cash problems during construction, design changes, conflicts in work schedules of sub-contractors, slow decision making and executive bureaucracy in owner's organizations, design errors, labor shortage and inadequate labor skills among others. the reasons for time overruns as reported by various project implementing agencies are delay in land acquisition, delay in equipment erection, inadequate mobilization by the contractor, delay in forest clearance, fund constraints, change in scope of work, cancellation of tender, law & order problem, delay in supply of equipment, slow progress of civil work, escalation in cost.

2.9. Research gap

Previous researches similar to this study show that the main causes of delay are finance and payments, improper project management, escalation of the materials price and claims. The effects were mentioned to be time overrun, cost overrun, abandonment and disputes which impacts all the parties involved in the project. However, the causes and of these impact delay factors in the road construction industry vary from country to country, due to various environmental situations, financial capacity and the technological advancements used in the construction processes. Therefore, identifying the actual causes and effects of delay in order to minimize and avoid the delays and their corresponding expenses is crucial since delay in government road construction projects has a significant impact on economic and social activities of the country.

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 some studies to date have ranked the causes of delay in Addis Ababa city road construction projects and develop strategic tools timely completion road project. 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

This thesis will examine the cause and its impact of road construction delay focusing on lamberet koteba Kotebe to kara in Addis Ababa city road authority, which is also a part of road construction project contractor's industry in Addis Ababa. The perceived causes and impact of delay regarding road construction projects of Addis Ababa City Road Authority will be assessed and identified. Recommendations based on the findings will be given to promote successful completion of the projects.

2.10. Research Hypothesis

The hypothesis was developed from the empirical review (M.Haseeb, 2011), (Dr. Ashraf Samarah & Dr.Ghanim A. Bekr, 2016), (Werku Koshe and K.N.Jhan , 2016). Based on reviewed literatures the research hypothesis is identified as follows.

H01: Slow and late payments by the clients have no impact on road construction project delay.

H1: Slow and late payments by the clients have a significant negative impact on road construction project delay.

H02: Inadequate experience of consultants does not affect the completion time of a road construction negatively.

H2: Inadequate experience of consultants is expected to affect the completion time of a road construction negatively.

H03: Inadequate management and supervision by the contractor has no impact on road construction project delay.

H3: Inadequate management and supervision by the contractor has an impact on road construction project delay.

H04: Escalation of the materials price has no impact on road construction project delay.

H4: Escalation of the materials price have a significant negative impact on road construction project delay.

H05: Company's bad reputation is not expected to be the effect of road construction delay in AACRA.

H5: Company's bad reputation is expected to be the effect of road construction delay in AACRA.

H06: Compromised quality is not expected to be the effect of road construction delay in AACRA.

H6: Compromised quality is expected to be the effect of road construction delay in AACRA

2.11. Conceptual framework

In relation to the literature review, the conceptual framework has underlined a number of factors that determine the rate of project execution at which the projects are completed. It outlined variables in road construction projects that affect the road construction performance. The variable in this case is the factors of delay of road construction projects implementation in the road construction sector and the subsequent outcomes is delays with time overrun, cost overrun, disputes between parties, underutilization and wastage of resources and total abandonment etc. From the literature reviews, the researcher has adopted the following 36 independent variables and categorized them in to client, contractor's consultant and external related factors as the basis of the questionnaire for the present study.

The aim of this section is to summarize the idea of the past literatures described above and to bring out the contribution for this study area. A number of studies have been conducted in regard to road construction delays and the effects they have. From the literature reviewed 36 causes and 16 effects are identified. According to (Remon F. Aziz & Asmaa A. Abdel-Hakam, 2016) the causes of road construction delays are grouped as equipment related group, design related group, contractor related group, material related group, contract related group, consultant related group, financing related group, site related group, scheduling and controlling related group, owner related group, contractual relationship related group, labor related group, project related group, external related group and rules and regulations related group. (Khalid Khair, Hazir Farouk, 2016), Summed up these groups in to contractor related, owner related, consultant related, government and external related factor.

Therefore, this study re-clustered these factors in to 5 categories as client related, consultant related, contractor related, material and equipment related and external related factors. As per the reviewed literatures, the effects of road construction delay are mentioned to be cost - overrun, time-overrun, compromised quality, arbitration, disputes, negotiations, court cases, litigation, low profit margin or financial loss, revocation of contract, total abandonment of

project, loss of wealth and capacity, breaches of contract, poor quality of work and company's bad reputation and loss of other facilities.

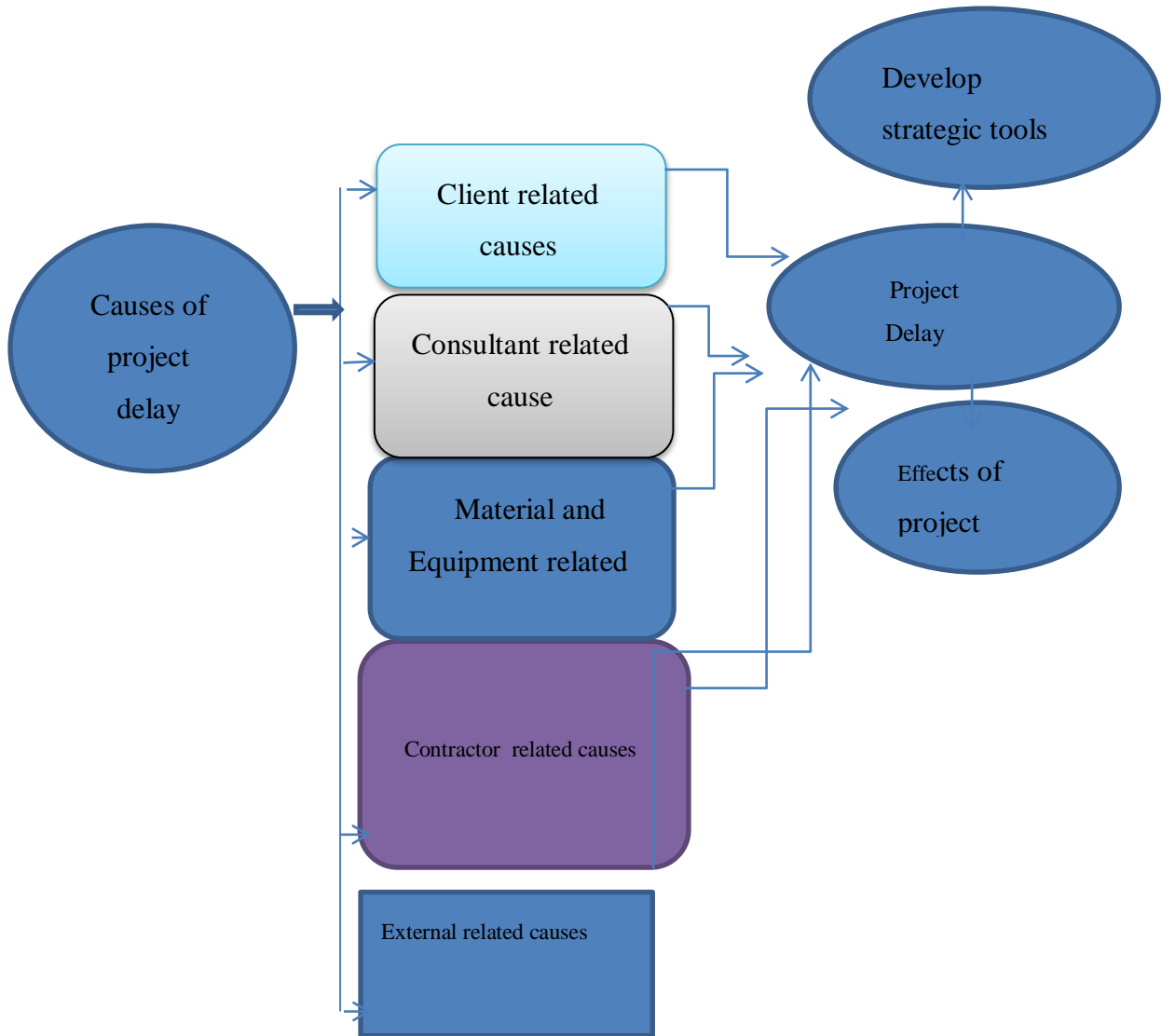


Figure 1-1:-Conceptual Frame work

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Study area

The study conducted on the road segment that stretches from lamberet kotebe-kotebe to kara, Addis Ababa. The location map of the road segment is shown in figure 2-1

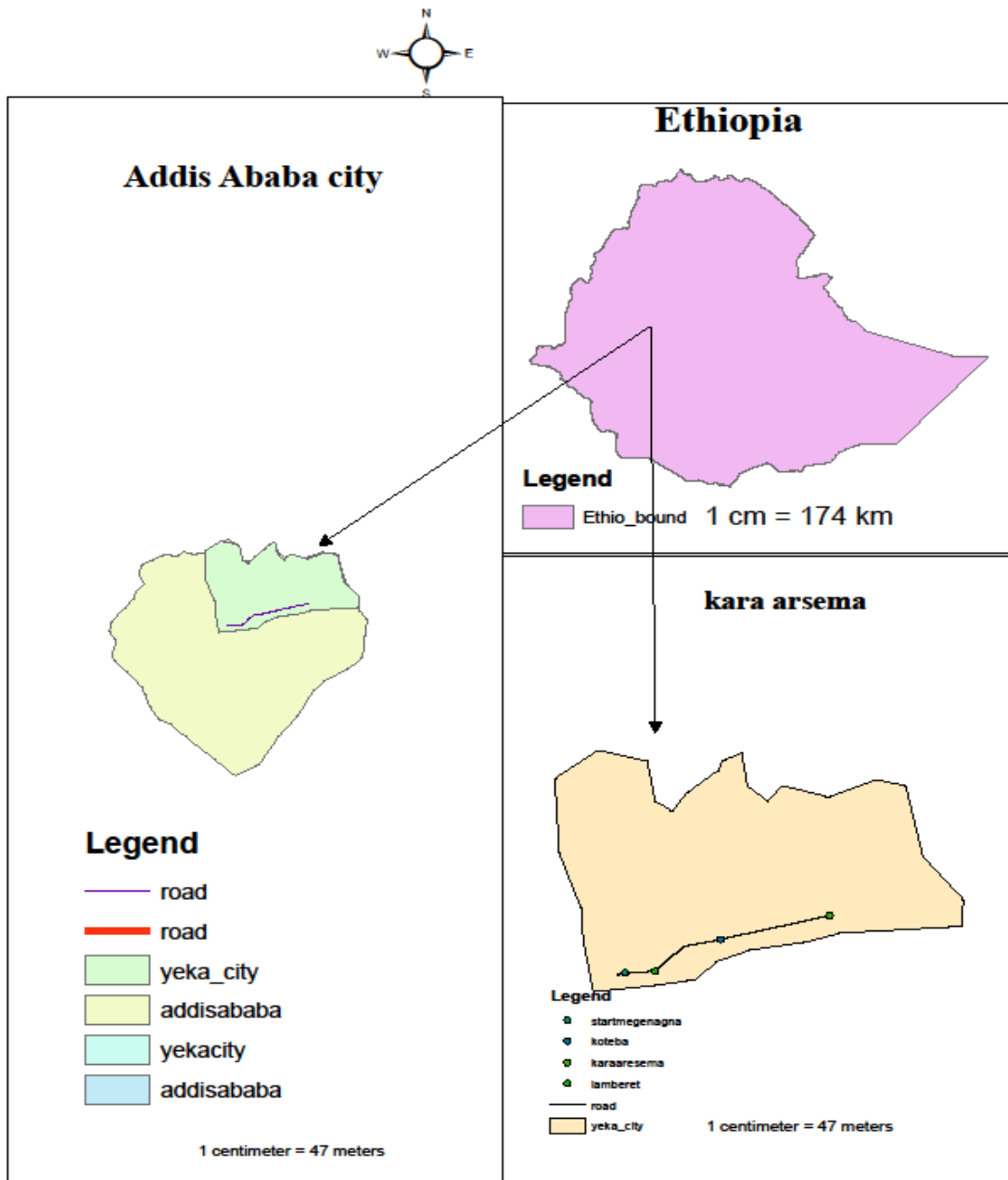


Figure 2-1:-Site Layout Lamberet Kotebe to Kara

3.2. Research Design

In this study descriptive type of data design would be employed by combining quantitative and qualitative data. That is mixed research approach would be used to acquire the qualitative data from the perceptions of the respondents. On the other hand those data which will be quantified in terms of numerical value are collected through different data collections.

3.3. Source of data

Both primary and secondary data collected from primary and secondary sources. The primary data are collected from respondents through questioners, and interview. Moreover, the researcher collect additional primary data thought filed observation. Conversely, the secondary data are collected from both published and unpublished materials such as articles, books, and report.

3.4. Sampling design

3.4.1. Sampling technique

A target population of the sampling contains different team (Human resource team, procurement, Finance team, logistic, and the like) with varying information on the research topic with their nature of job, it would be better to select groups who have related job on the subject matter. Therefore, in order to minimize representation that might occur, the researcher obliged to be undertaken considering purposive sampling technique, which may best represent roads in the region. In this regard, some literatures also reinforce the reason and advantages of purposive sampling, in such a way that “purposive sampling is a useful sampling method which allows a researcher to get information from a sample of the population that one thinks knows most about the subject matter state if the sample to be selected is very small and a focus group is a target, a purposive sampling technique enables to select the one who knows most about the subject matter. According to Saunders, Purposive or judgmental sampling enables to use your judgment to select cases that will best enable you to answer your research question(s) and to meet your objectives

3.4.2. Sample Population

The focus populations of this study were among the client/owner, consultants, contractors, the project managers, office engineers, site engineers and supervisors with an experience in the road construction industry and currently involved in AACRA projects.

3.4.3. Sample size determination

Sampling is an illustration of inductive rationale by which conclusion is derived on the basics of a small number of examples. Inductive thinking base on sampling is more like part of our daily activity.

Sample size: Theoretical aspect, formula

Simplify formula for proportions (Taro Yamane)

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

Where: n =the sample size

N =the population size

e = the acceptable sampling error (95%) confidence level and p=0.5 are assumed

The study participants are composed of 105 professionals from the 3-target population who have been engaged in AACRA road construction projects. From the target population the researcher has purposively distributed 49 questionnaires to the client to reach out the population with adequate engineering background that were able to answer the research questions and 30 questionnaires were distributed to the contractor and 26 to the consultant for those who have been actively engaged in the AACRA road construction projects.

3.5. Data Collection techniques

The data for this study were gathered from the main construction parties (clients, contractors, and consultants) who took part in the road construction project via questionnaire and document review. The questionnaire's questions are all closed-ended. Based on a literature review and some additional suitable questions developed with expert assistance in the field under study, the questionnaire used in this study was adapted from the questionnaire. Project performance, leadership-related factors, resource/fund availability, and design change, as outlined in the questionnaire. The questionnaire was designed to assess respondents' perspectives on the importance/severity and likelihood/frequency of occurrence of delay causes from each group (clients, consultants, and contractors).

To get primary data a structured questionnaire was developed by the researcher which helped to obtain direct information from the targeted population. Thus, five points Likert rating scale ranging from strongly disagree (1) to strongly agree (5) was used in the study which is shown in the table 1 and 2 below. Among the available techniques of secondary

data collection methods, document review was employed to collect relevant secondary data from secondary sources (project completion reports, books, articles, magazines, internet, reports, contract documents and other’s research papers). The information, which is relevant, was used as a benchmark against primary data which was collected to support the research.

Table 3-1:-Likert scale for frequency of occurrence of related delay causes

Category	Never	Rarely	Sometimes	often	Greatly often
Rating	1	2	3	4	5

Table 3-2:-Likert scale for most influential effects of delay

Category	Strongly Disagree	Disagree	Slightly Disagree	Agree	Strongly Agree
Rating	1	2	3	4	5

3.5.1. Interview

The interview of questionnaire of questions of causes with responsible parties for the causes carefully design from literatures conducted in construction projects. It would be organized in the form of a priority scaling (1= strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = strongly agree).

3.5.2. Questionnaire

The questionnaire prepared to address the cause of delay and to identify responsible parties for causes of delay and its consequence. Secondary data would collect from the selected Addis Ababa construction road authority office document. In general, the data collection used to identify the root causes of delay road construction projects, assess the impacts and forward solutions which applied by the Addis Ababa construction road authority in minimization of claims and disputes

3.5.3. Filed observation

The researcher collect data though observation. Some of the data which collected through field observation incudes the researcher use the data from customers collected through questionnaire, interview permission must be obtained from the customers. To maintain the

confidentiality of the information provided by the respondents, the respondents will be instructed not to write their names on the questionnaire and assured that the responses would be used only for academic purposes and kept confidential. Finally, respondents included in the study were based on their free

3.6. Methods of data Analysis

The collected data was analyzed using Microsoft Excel and SPSS package to determine the validity of the study occurrence of the causes and effects of road construction delay.

A critical review of relevant literature will be done coupled with questionnaire survey to collect information on potential causes of delay factors in road projects. The results were presented in tabular and graphical forms and the analysis and discussions would also be made on the research findings both qualitatively and quantitatively. Consequently, analysis of the data obtained from questionnaires and interviews has a process which involves a simple statistical approach, examining, tabulating and categorizing based on the chosen measurement scale. After the collected data is analyzed, findings and results are discussed. The procedure used in analyzing the data was aimed at establishing the relative importance of various factors that contribute to causes, effects and methods of minimizing road construction projects from the perspective of the Employer.

Finally, the researcher will give his conclusion and recommendation, based on the analysis and discussion. The analysis part combined (is based on) all groups of respondents (contractors, consultants and owners) in order to obtain significant results. The data is analyzed by calculating the relative importance index model to rank the hypothesized factors based on their importance and frequency which is derived from the views of the respondents of the three groups. Calculation of Relative Importance Index (RII): Kometa et al, Aibinu et al. and Faridah used the relative importance index (RII) method in their research. The same method was adopted in this study for analysis of causes of delays within various groups (client, consultants and contractors). The five-point scale ranged from 1 (Not Critical at all) to 5 (Most Critical) was transformed to relative importance index (RII) for each factor as follows:

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

Where:

RII= Relative Important Index

n_1, n_2, n_3, n_4, n_5 = Number of respondents answer each factor

$W = 1, 2, 3, 4, 5$ = weight given for each factor (ranging from 1 to 5),

N = the total number of respondent

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

Where, W is weighting given to each factor by the respondents (ranging from 1 to 5), A is the highest weight (in this case is 5) and N is the total number of respondents. The RII value is range from 0 to 1 which the higher the value of RII, the more important was the cause of delays. The RII was used to rank the different causes. The RII is then being classified based on the RII classification table as shows in table 3.3. The discussion would be made when the RII was classified as most critical causes of delay only.

Table 3-3:-Classification of RII

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

3.7. Data presentation

The data analysis is determined to establish the relative importance of various factors that contribute to causes and effects of construction delays and its impact.

This deal with the analysis of the information gathered from the desk study and questionnaire survey, and includes identification of rate of occurrences and impacts delay, identification of responsible parties and identification and analysis of case study projects. The projects are recognized and analyzed while processing the questionnaire, and also

analysis of the case of selected projects is carried out through document study. Analysis of the experience of respondents is carried out through questionnaire; and the analysis is carried out based on the responses of the participants, giving special attention to causes, of delays. Discussions are made based on the analysis done on the gathered data to draw conclusions and answering the question of the problem statement of the study. Conclusion is produced from the analysis made in the research and recommendations are given for avoiding project delay. The research is a practical problem developed from the observation of construction projects and the research questions are oriented to investigate the cause of delay, their consequence and resolutions.

3.8. Validity

In order for assessments to be sound, they must be free of bias and distortion. Reliability and validity are two concepts that are important for defining and measuring bias and distortion. Reliability refers to the extent to which assessments are consistent and also validity refers to the accuracy of an assessment whether or not it measures what it is supposed to measure. The present study try to present a detail evidence of their search plan (i.e. details of the research site, method of sample selection, instruments used) and its implementation in the methodology section to assure the study's reliability.

3.9. Validity and reliability of instrument

According to Kothari (2004) validity is defined as the extent to which a test to measure what is the actual accuracy and precision of a measurement procedure. Validity of content is also mentioned to be the degree to which the content element of the questionnaire instrument covers the concept being evaluated. The validity of data collection instruments was checked against the available literatures. Moreover, to check the validity of the contents enclosed in the questionnaires, the advisor and other responsible parties were asked whether the issues in the questionnaire satisfactorily covered the important aspects in the assessment on road construction projects delay and its impact the case of Lamberet kotebe- kotebe to Kara. The questionnaires reliability was checked by the Cronbach's Alpha test coefficient using SPSS software. The values of Cronbach's alpha have a range between 0 and 1. The lower values represent lower internal consistency and larger values represent greater internal consistency. The criteria introduced by (Nunally, 1978,) for the interpretations of this coefficient were considered to evaluate the results of the analysis. $C\alpha > 0.8$, 'Excellent'; $0.8 > C\alpha > 0.7$ 'Good'; $0.7 > C\alpha > 0.5$ 'Satisfactory' and $C\alpha$

Table 3-4:-Cronbach's Alpha test result of causes and effects of delay

Scale	Cronbach's Alpha
Client related causes of delay	0.733
Consultant related causes of delay	0.856
Contractor related causes of delay	0.870
Material and Equipment related causes of delay	0.710
External related causes of delay	0.576
Effects of delay	0.914
Average	0.727

3.10. Research Ethics

The researcher had followed ethically and morally acceptable processes throughout the research process. The data was collected with the full consent of the participants and they were aware about the purpose of the study. Documents reviewed from the organization remained confidential. The findings and results from this study not are used for another purpose. During this study respondents were free to respond their own opinion from their experience, and their personal information such as name and detailed information was not mentioned.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1. Basic Information of the respondents

4.1.1. Survey Responses

A total of 105 questionnaires (49 to the client,30 to the contractor,26 to the consultant) were distributed to the respondents. Among the distributed questionnaire 88 were returned. There of them were making 88 responses applicable in the data analysis which makes a percentage of 74 return rates. The general characteristics of the respondents is presented below

Table 4-1:-Rate of response

Group Respondent	Quaternary Distribution	Quaternary Collected	percentage
Owner/client	49	48	54.5
Contractor	30	21	23.9
Consultant	26	19	21.6
Total	105	88	100

4.1.2. Demographic distribution of the respondents

The demographic characteristics of the respondents were presented in terms of frequency and percentage distribution. The variables included under this section were sex, age, and respondent designation, level of education and years of work experience of respondents.

Table 4-2:-Distribution of Respondents by Sex and Age-Distribution of Respondents by Sex and Age

S. No	Demographic variable	Category	Frequency	Percentage (%)
1	Sex	Male	74	84
		Female	14	16
		Total	88	100
2	Age	18-30 year	53	60
		31-40 year	27	31
		41-50 year	6	7

		51-60 year	2	2
		Above 60 year	0	0
		Total	88	100

As shown in table 4.2 the majority of the respondents 74 (84%) were male while 14 (16%) were female respondents. In terms of age category, the data shows that the majority of population that participated were aged between 18-30 years making 60 %, and those aged between 31-40 years made 31% out of the total respondents, followed by those aged between 41-50 years accounting 7%, and 2% of the respondents were aged between 51-60 years .On the other hand, there were no respondent above the age category of 60 years. Table 4.3 below presents the distribution of respondents in terms of respondent designation, level of education and years of experience .Accordingly respondents who are resident engineers were 44 in number with a percent of 50, 3(3.4 %) of the participants were the owners, 7 (8 %) of them were the project managers, 17 of them holding 19.3% were supervisors,9 (10.2%) of the respondents were the site engineers and 8(9.1%) of them were participants having other designation.

In terms of level of education, respondents with a first degree dominated the study with a number 53 having a percent of 60; they were followed by respondents having masters with a frequency 30 and a percentage of 34. Only 5 (6%) respondents had a diploma which implies that the majority of the participants attained the intended qualification to be able to accomplish their job. Moreover, the respondents were amongst the employees with engineering educational background, which indicates the respondents had enough knowledge of the construction industry with issues related to causes and effects of delay.

Table 4-3:-Distribution of Respondents by Designation, Level Of Education and Years of Work Experience

S. No	Demographic Variable	Category	Frequency	Percentage (%)
1	Respondent Designation	Owner	3	3.4%
		Residence Engineer	44	50%
		Project Manager	7	8%
		Supervisor	17	19.3%
		Site Engineer	9	10.2%
		Other	8	9.1
		Total	88	100%
2	Level of Education	Diploma	5	6%
		First Degree	13	60%
		Master	30	34%
		Total	88	100%
3	Years of work experience	1 -5 year	45	51%
		6 -10 year	24	28%
		11 -15 year	10	11%
		>15 year	9	10%
		Total	88	100%

In terms of work experience respondents percentage shows that 45(51%) of the respondents had 1-5 years of experience, 24(28%) of the respondents had 6-10 years of experience, 10 (11%) of the respondents had 11-15 years of experience and 9(10%) respondents had an experience which is greater than 15 years. This implies that most of the respondents were having the necessary work experience to be able to perform their job.

4.1.3. Respondents Perception

After the data has been collected from the required respondents and document review, the datum was analyzed quantitatively by the help of statistical package for the social science (spss) software and a Microsoft excel. The analyzed data are presented in sub sections

which are in direct relationship of the objective of the study and the items asked in the questionnaire. The first objective of the study was related to identifying the delay causing that currently exist in the road construction project Lambert Kotebe to Kara of Addis Ababa City Road Authority that have been identified and grouped in to five major groups. These delay causing factors were ranked in each group based on their Relative Importance Index (RII). The following is the detailed description of the importance and ranking of delay causing factors.

4.2. The Importance and Ranking of causes of delay

Delays in road construction projects happen due to various causes and factors. A total of 36 delay causing factors were identified and grouped in to 5 as client related factors, consultant related factors, contractor related factors, material and equipment related factors, and external related factors. Regarding to this respondents were asked to rank the delay causing factors based on the frequency of occurrence in road construction projects by using five points likert scale.

From table 4.4 the results show that the most important client related delay causes of road construction projects in Addis Ababa city road Authority were delay in paying compensation to land owners(RII=0.761), slow decision making(RII=0.711),type of project bidding and award (lowest bidder)(RII=0.690), change orders (changes about design or working process)(RII=0.679), slow and late payments by the clients(RII=0.613), delay in site mobilization(RII=0.611), bureaucracy in client organization(RII=0.604), and lack of sufficient cash for project implementation(RII= 0.568).

Hence, The hypothesis H1: slow and late payments by the clients have a significant negative impact on road construction project delay is proven to be correct since slow and late payments by the clients is ranked to be the 5th client Related Delay Cause while the null hypothesis H01: slow and late payments by the clients have no impact on road construction project delay is proven to be incorrect.

Table 4-4:-Importance and ranking of Client related delay causes

Client Related Delay Causes	RII	Rank
Delay in paying compensation to land owners	0.761	1
Slow decision making	0.711	2
Type of project bidding and award (lowest bidder)	0.690	3
Change orders (changes about design or working process)	0.679	4
Slow and late payments by the clients	0.613	5
Delay in site mobilization	0.611	6
Bureaucracy in client organization	0.604	7
Lack of sufficient cash for project implementation	0.568	8

According to table 4.5 the most important and highly ranked consultant related causes of road construction projects in Addis Ababa city road Authority were late in revising and approving design documents(RII=0.718), inaccurate cost estimation(RII=0.697), improper project planning and scheduling(RII=0.686), inaccurate initial project scope estimate(RII=0.661), inadequate experience of contractor/ consultants(RII=0.656), insufficient data collection and survey before design(RII=0.65), design and contract document error(RII=0.609), non-availability of consultant's staff on site(RII=0.588), and no approval of contractor submittals(RII=0.552). Therefore, the hypothesis H2: Inadequate experience of consultants is expected to affect the completion time of a road construction negatively is proven to be right since Inadequate experience of consultants is the 6 th consultant related delay cause while the null hypothesis H02: Inadequate experience of consultants does not affect the completion time of a road construction negatively is proven to be wrong.

Table 4-5:-Importance and ranking of consultant related delay causes

Consultant Related Delay Causes	RII	Rank
Late in revising and approving design documents	0.718	1
Inaccurate cost estimation	0.697	2
Improper project planning and scheduling	0.686	3
Inaccurate initial project scope estimate	0.661	4
Inadequate experience of consultants	0.656	5
Insufficient data collection and survey before design	0.650	6
Design and contract document error	0.609	7
Non-availability of consultant's staff on site	0.588	8
No approval of contractor submittals	0.552	9

According to table 4.6 the most important and highly ranked contractor related causes of road construction projects in Addis Ababa city road Authority were inadequate management and supervision by the contractor (RII=0.727), ineffective resource management(RII=0.711), utilization of old techniques and methods for construction(RII=0.677), lack of adequate training on construction management techniques for contractor’s staffs(RII=0.670), delays in sub-contractors work(RII=0.652),incorrect construction methods followed by the contractor(RII=0.643), inadequate experience of contractor (RII=0.631) and rework due to faults during construction(RII=0.613).Accordingly the hypothesis H3: Inadequate management and supervision by the contractor has an impact on road construction project delay is proven to be correct since inadequate management and supervision by the contractor was ranked 1st among the contractor related delay causes, and the null hypothesis H03: Inadequate management and supervision by the contractor has no impact on road construction project delay is proven to be incorrect.

Table 4-6:-Importance and ranking of contractor related delay causes

Contractor Related Delay Causes	RII	Rank
Inadequate management and supervision by the contractor	0.727	1
Ineffective resource management	0.711	2
Utilization of old techniques and methods for construction	0.677	3
Lack of adequate training on construction management techniques for Contractor’s staffs	0.670	4
Delays in sub-contractors work	0.652	5
Incorrect construction methods followed by the contractor	0.643	6
Inadequate experience of contractor	0.631	7
Rework due to faults during construction	0.613	8

According to table 4.7 the most important and highly ranked material and equipment related causes of road construction projects in Addis Ababa city road Authority were escalation of the materials price(RII=0.79), lack of high-technology mechanical equipment(RII=0.727), shortage of construction materials(RII=0.725), insufficient equipment(RII=0.706) and quality of material(RII=0.647).Thus the hypothesis H4: Escalation of the materials price

have a significant negative impact on road construction project delay is proven to be correct since escalation of the materials price was ranked 1st among the material and equipment related causes while the null hypothesis H04: Escalation of the materials price has no impact on road construction project delay is proven to be incorrect

Table 4-7:-Importance and ranking of material and equipment related delay causes

Material and Equipment related causes	RII	Rank
Escalation of the materials price	0.790	1
Lack of high-technology mechanical equipment	0.727	2
Shortage of construction materials	0.725	3
Insufficient equipment	0.706	4
Quality of material	0.647	5

According to table 4.8 the most important and highly ranked external related causes of road construction projects in Addis Ababa city road Authority were delay in relocating utilities (RII =0.818), shortage of foreign currency for importation of materials (RII =0.743), unforeseen site conditions (RII=0.615), effect of local community (RII=0.597), bureaucracy and changes of government regulations (RII=0.529) and natural disasters (RII=0.425)

Table 4-8:-Importance and ranking of external related delay causes

External related causes	RII	Rank
Delay in relocating utilities	0.818	1
Shortage of foreign currency for importation of materials	0.743	2
Unforeseen site conditions	0.615	3
Effect of local community	0.597	4
Bureaucracy and changes of government regulations	0.529	5
Natural disasters	0.425	6

4.3. Top Delay Causes

As mentioned in table 4-9 below, the top ten delay causing factors of road construction regarding in the case of Lamberet Kotebe to Kara Addis Ababa City Road Authority are ranked and summarized in the table by analyzing the data collected from the respondent's perception. Delay in relocating utilities is suggested to be the most important factor causing delay with RII=0.818 followed by escalation of the material price with RII= 0.790. Delay in

paying compensation to land owners with RII=0.761 and shortage of foreign currency for importation of materials with RII=0.743 was ranked to be the 3rd and 4th important delay causing factors respectively. Inadequate management & supervision by contractors and lack of high-technology mechanical equipment was ranked to be the top 5th and 6th delay causing factors having the same RII value of 0.727. This is closely followed by shortage of construction equipment with RII=0.718. Late in revising and approving design documents with RII=0.715 comes 8th followed by Slow decision making and ineffective resource management with equal RII value of 0.711.

Table 4-9:-Top ten delay causing factors

Top ten delay causing factors	RII	Rank
Delay in relocating utilities	0.818	1
Escalation of the material price	0.790	2
Delay in paying compensation to land owners	0.761	3
shortage of foreign currency for importation of materials	0.743	4
Inadequate management & supervision by contractors	0.727	5
Lack of high-technology mechanical equipment	0.727	6
Shortage of construction materials	0.725	7
Late in revising and approving design documents	0.718	8
Slow decision making	0.715	9
Ineffective resource management	0.711	10

4.4. Impact of road construction delay

The delay in construction projects had enormous impacts on time and cost overrun. It also creates a problematic situation between owner and contractor such as dispute, litigation, arbitration, and sometimes total abandonment of the project. Construction delays have cost consequences for the contractor: standby costs of non-productive workers, supervisors, and equipment, expenses caused by disrupted construction and material delivery schedules and additional overhead costs.

4.5. Impact community

Road projects impact assessment as per the Comprehensive guide for Social Impact Assessment Good Governance is that, Social problems arise largely due to conflicts between economic development and natural resources. Economic losses and social costs

from environmental degradation often occur long after the economic benefits of development have been realized.

4.6. Strategic Tools for the timely completion road project

Effective procurement ;- is the acquisition of goods, services and/or infrastructure at the best possible total cost of ownership in the right quantity and quality, at the right time, in the right place for the direct benefit or use of governments, corporations or individuals

Top management;- overall responsibility for accepting and approving the project initiatives outlined in the information technology strategic plan, including funding and prioritization of projects before they are initiated”. In the context of small business

Early payment; - they identified financial problems as the main cause of construction delays; they suggested that financial problems should be avoided by making the payments on time. Their argument was that clients should make timely payments to the contractor and contractor should make the timely payments to the subcontractors, suppliers and labor. Furthermore identified ensuring an adequate source of project finance as a methods of minimizing construction delays.

Proper pre-construction planning; - identified some of the methods of minimizing construction delays in Kuwait. They were pointing out that; performance of pre-construction planning, allocation of sufficient time and finances during the design phase, hiring of independent supervising engineers to monitor progress of work, ensuring timely delivery of materials and selection of competent and reliable consultants to carry out the work will minimize the occurrence of construction delays.

Contingency allowance

Contingency sums are allowances of project cost included in the pre-contract estimate for the purpose of ensuring that the budget set aside is realistic and sufficient to contain the risk of unforeseen cost increases during construction.

Minimization Road cause delay

- Selection of appropriate contractors and consultants who have a good work ethics and Experience.
- Creating a system to control project scope and design change issues.

- improving the capacity of the employer with better professionals and well-developed structures in order to manage all the city's road projects from design to construction stages.
- Project management should be modernized and the construction process should stick to the schedules provided.
- A good relationship and communication between the construction parties must be Promoted

4.7. Discussion of the findings

The main purpose of this study was to identify the causes and strategies tools not timely completion of road construction projects in Addis Ababa City Road Authority the case of Lamberet Kotebe- Kotebe to Kara. Accordingly, the first objective of the research was to identify the delay causing that currently exists in the road construction projects of Lamberet Kotebe-Kotebe to Kara. Results of the data analysis that the first influential factor for the cause of delay is found to be delay in relocating utilities with RII value of 0.818 which was included in external related causes of delay.

As per the research of (M J Kamanga & W J v d M Steyn, 2013) delay in relocating utility was ranked as the sixth important factor among the top 10 causes of delay. Escalation of the material price, which is the second common and critical factor with RII value of 0.790 grouped under material and equipment related causes of delay, is also ranked to be the second influential factor on the study of (Werku Koshe and K.N.Jhan , 2016). Delay in paying compensation to land owners, the third important factor with RII value of 0.761 grouped under the client related factors and the fourth influential factor which is shortage of foreign currency for importation of materials with RII value of 0.743 under the category of external related were also ranked to be the eighth and third top causes of delay respectively on the study made by (M J Kamanga & W J v d M Steyn, 2013)

Inadequate management and supervision by contractors, which is the fifth important cause of delay in the study is also mentioned to be the prominent factor on researches made by (Tolera, 2013), (Bangladesh, 2022), (Dr. Ashraf Samarah & Dr.Ghanim A. Bekr, 2016), (Obodoh D.A & Chikasi Obodoh., 2016), and (M.Haseeb, 2011).On the study made by (Eyasu, 2013), and (Bangladesh, 2022), (M.Haseeb, 2011) the factor is similarly mentioned to be the fifth important factor of delay. While on the studies of (Dr. Ashraf Samarah &

Dr.Ghanim A. Bekr, 2016) and (Obodoh D.A & Chikasi Obodoh., 2016) the factor was ranked to be the first, fourth and sixth important factor of delay respectively.

The sixth important factor as per ranked in the study, Lack of high technology mechanical equipment with RII value of 0.727, is also consistent with the ranking of the factors of delay on the study made by (Yosef Amare, 2017) and shortage of construction materials with RII value 0.725 which is the seventh significant factor of delay is mentioned to be the eighth important factor on the study made by (Obodoh D.A & Chikasi Obodoh., 2016). The eighth vital factor, late in revising and approving design documents with RII value of 0.718 is also mentioned on the research result of (Yosef Amare, 2017) in which the factor is ranked to be the fifth vital cause of delay on the study.

Slow decision making, the ninth important cause of delay with RII value of 0.711, was mentioned to be the second important cause of delay on the study (Seboru, Msafiri Atibu, 2015) and the tenth important causes of delay, ineffective resource management was ranked as the fourth important cause of delay on the study made by (Werku Koshe and K.N.Jhan , 2016). However, the overall ranking of the causes of delays of the study does not consider with the top rankings of the other studies. Since project is a unique endeavor, delay causing factors and their rankings may vary from country to country and also from project to project. Hence, the ranking of the causes and their classification of their group as client related, consultant related, contractor related, material and equipment related and external related also varies with other studies.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

5.1.1. Causes of delay

The study established that Delays are one of the most serious challenges that usually occur in road construction projects and the severity of these delays varies greatly from country to country and from project to project. Thus, identifying sources of delay and analyzing them is the basic requirement for reducing or avoiding delays in project execution. Therefore, this research was aimed at identifying the major cause and effects of delay at AACRA in the case of Lamberet Kotebe to Kara projects through a survey. The analysis was made based on the perceptions of the responsible parties involved in the construction process, namely, the client, consultant and the contractor.

Based on the literature reviews and the outcomes of the questionnaire responses the following conclusions are drawn.

The following causes are identified as a top delay causes of Lamberet Kotebe to Kara Authority projects as per there categories.

Client related causes: Delay in paying compensation to land owners & slow decision making were ranked to be the 3rd and 9th top delay causing factors respectively.

Consultant related causes: Late in revising and approving design documents was ranked to be the 8th among the top ten delay causing factors.

Contractor related causes: Inadequate management & supervision by contractors was ranked 5th among the top delay causing factors. And Ineffective resource management was ranked to be the 10th important cause of delay.

Material and equipment related causes: Escalation of the material price, Lack of high-technology mechanical equipment and Shortage of construction materials were ranked to be the 2nd, 6th and 7th among the top 10 delay causing factors respectively.

External related causes: Delay in relocating utilities which were found to be the most influential cause was ranked 1st and shortage of foreign currency for importation of materials were ranked to be the 4th important cause of delay

5.1.2. Impact of delay

After evaluating the responses, it is easily to conclude that Lamberet kotebe - kotebe to Kara identification of the impact of road construction delay was also made based on 16 factors. Those factors were time overrun, cost overrun, financial loss, poor quality of work and compromised quality were found to be the top five important effects of delay

5.1.3. Community impact of delay road project

The study revealed delay in road construction project have negative impacted on both the social and economic benefits in Addis Ababa Road Authority in the case of Lamberet Kotebe- Kotebe to Kara that would have accrued if the project were not completed on time. Impacts on Residents During the construction phase, residents may be disrupted and inconvenienced by detours, local road closures, dust, noise, heavy equipment traffic on existing roads, changes in the level of service, safety hazards, and interference with emergency services. Occasionally, there is vibration damage to near-by structures. Impacts on Businesses and Community Services Socio-economic impacts on businesses and community services can be positive and negative, during the construction phase, some businesses and community services may lose clients. Other businesses may obtain additional business.

5.1.4. Strategic Tools for the timely completion road project.

The study top management support in timely completion of road construction projects. The research undertaken established that top management support a strong influence in early competition of roads top most determinant in timely completion of road construction in the study area.

Top management determining timely completion of road construction projects, arranged in decreasing order of criticality were; supportive work conditions, good communication and control and providing staff with opportunities for advancement and growth.

5.4. Recommendations

In the light of the identified causes, this study draws the following recommendation.

- The procurement team must choose a competent contractor who is capable of completing the project on time. While selecting the contractors, the procurement teams have to make sure that the contractors are not selected based only up on the lowest bid. The selected 54 contractor must have sufficient experience, technical capability, financial capability, and sufficient manpower to execute the project.
- Escalation of material price: Contractors usually increase their bid price to account for the anticipated escalation of material price for the projects already in contract. However, it causes hindrance on the overall performance of the project since it is a direct threat to contractors profitability, hence the remedy to this issue could be an addition of material escalation clauses on the construction contract. Since material escalation clauses provide an adjustment of the contract price if an escalation occurs above the agreed threshold.
- Delay in paying compensation to land owners: The client has to resolve the right of way issues before the commencement of the project since it is time taking to discuss with society found along the proposed project. Therefore, the compensation payments have to be made before the handing over of the project to the contractor.
- Shortage of foreign currency for importation of material: the availability of hard currency has made it difficult to import a different construction material which is found to be among the top causes of delay based on the study. Therefore, the responsible sector of the government has to find a way to make the exchange process easier for the road construction and other industries. In relation to this, lack of high technology mechanical equipment is also among the top ten causes. Similarly, the government has to motivate the use of high technology mechanical equipment to fasten the progress of the construction to increase the quality and be efficient and effective.

- The client should make ready the site of work along with appropriate design before all and make ready for the proper planning, and allocate appropriate budget, that align with the schedule of the construction contract.
- The implementing agencies in road construction projects should commit to embracing the top management support related factors as very critical in successful delivery of road construction projects in a timely manner. Top management should provide the necessary support to both technical and operational staff in the road construction activities for effective achievement of goals. Specific emphasis should be on the need to accord supportive work conditions to all project participants because employees in companies with supportive work conditions.

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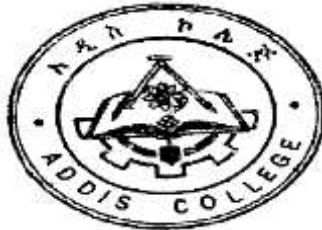
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APPENDIX: QUESTIONNAIER
QUESTIONNAIER
ADDIS COLLEGE



DEPARTMENT OF CONSTRUCTION TECHNOLOY MANAGEMENT

***Research Questionnaire on Perceived Assessment on road construction delay and its impact:-
The Case of Lamberet Kotebe to Kara in Addis Ababa City Road Authority***

Dear Respondent

in this aspect is highly appreciated. Thank you for sharing your precious time. My name is Ensmawu Kefia. I am currently doing my MA in construction technology management at ADDIS COLEGE School of graduate studies. I am conducting a research about perceived assessment on road construction delay and its impact. The focus of the study is lamberet kotebe to Kara road construction project in Addis Ababa city road Authority. I believe that your experience and knowledge related to road construction projects will help me acquire valuable information on the cause of road construction delay and effect. I kindly invite you to help me in completing the attached questionnaire as honestly as possible. I guarantee that your identity will be kept confidential and the information will only be used for academic purposes. Your kind assistance

Note: Writing your name is not necessary.

Yours sincerely

Ensmaw Kefia

Graduate Student, Construction technology Management

Tel: +251922553191 Email: Ensmawkefia66@gmail.com

Advisor: Dr. Dagnachewu.A

SECTION A: General Information

1. Gender

Male Female

2. Age

18-30 yrs. 41-50 yrs.

31-40 yrs.' 51-60 yrs.'

Over 60 yrs.

3. Responsibility of state Respondent

Client Contractor Consultant

4. Respondent Designation in the company

Owner Project Manager Site Engineer

Resident Engineer Supervisor other, specify _____

5. Level of Education

Diploma 2nd Degree

1st Degree PHD

6. Relevant working Experience (years)

1-5 Years 11-15 years

6-10 years Greater than 15 years

SECTION B: Causes of Delays

Please rank the delay causing factors below based on frequency of occurrence in road construction projects.

Category	Never	Rarely	Sometimes	Often	Greatly often
Rating	1	2	3	4	5

Please indicate on boxes using the following criteria

Causes of Delay		Frequency				
		1	2	3	4	5
1. Client Related	1. Slow and late payments by the clients					
	2. Change orders (changes about design or working process)					
	3. Delay in paying compensation to land owners					
	4. Lack of sufficient cash for project implementation					
	5. Bureaucracy in client organization					
	6. Type of project bidding and award (lowest bidder)					
	7. Delay in site mobilization					
	8. Slow decision making					
2. Consultant Related	1. Late in revising and approving design documents					
	2. Inaccurate cost estimation					
	3. Design and contract document error					
	4. No approval of contractor submittals					
	5. Non-availability of consultant's staff on site					
	6. Improper project planning and scheduling					

	7. Inaccurate initial project scope estimate					
	8. Insufficient data collection and survey before design.					
	9. Inadequate experience of consultants					
	1. Delays in sub-contractor's work					
	2. Utilization of old techniques and methods for construction					
3. Contractor Related	3. Inadequate management and supervision by the contractor					
	4. Rework due to faults during construction					
	5. Incorrect construction methods followed by the Contractor					
	6. Lack of adequate training on construction management techniques for Contractor's staffs					
	7. Ineffective resource management					
	8. Inadequate experience of contractor					
4. Material and Equipment Related	1. Quality of material					
	2. Shortage of construction materials					
	3. Lack of high-technology mechanical equipment					
	4. Escalation of the materials price					
	5. Insufficient equipment					
	1. Unforeseen site conditions					
5. External Related	2. Natural disasters					
	3. Bureaucracy and changes of government regulations					
	4. Effect of local community					
	5. Shortage of foreign currency for importation of materials					

	6. Delay in relocating utilities						
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If you have any comments or suggestion regarding the causes of delay on Lamberet Koteba to Kara road construction projects of Addis Ababa city road Authority or their importance, please specify here

If you have any comments or suggestion regarding the Effects of delay on road construction projects, please specify here

SECTION D: 4. Strategic Tools for Timely Compilation Road Project

Please suggest your recommendation to strategies tools for timely completion project. What you recommend for clients, consultants, and contractors in order to timely completion projects.

What are expected from top management for timely completion project?

2) What are the relation procurement process and timely completion of road construction projects?

Thank you!