



**ASSESSMENT OF ROAD PROJECT DELAY FACTORS
(CASE STUDY OF ADDIS ABABA ROAD AUTHORITY)**

**PROJECT WORK
BY
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AUGUST, 2019 G C

ADDIS ABABA

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(CASE STUDY OF ADDIS ABABA ROAD AUTHORITY)**

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REQUIREMENTS FOR THE DEGREE OF MASTER IN PROJECT
MANAGEMENT**

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ADDIS ABABA

DECLARATION

I hereby declare that this thesis entitled "ASSESSMENT OF ROAD PROJECT DELAY FACTORS IN THE CASE OF ADDIS ABABA ROAD AUTHORITY" has been carried out by student researcher under the guidance and supervision of Dr. Wubeshet. Therefore, the thesis is original and has not been submitted for the award of any degree or diploma to any university or institution.

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This is to certify that the thesis entitled "ASSESSMENT OF ROAD PROJECT DELAY FACTORS IN THE CASE OF ADDIS ABABA ROAD AUTHORITY" is a genuine work done by Mr. Shimelis Miresaa under my guidance and supervision and only submitted to Addis Ababa, School of Commerce for the award of the Degree of Master of project management. Therefore, I kindly declare that no part of this thesis has been submitted to any other university or institution for the award of any degree or diploma.

Signed by the Examining Committee

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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. Therefore, it is essential to study and analyse causes of road construction project time delays. This paper studied a list of road construction delay causes (74 factors) gathered from literature having different types of construction, different countries, different periods and different numbers of delay causes. The questionnaire survey was distributed to 120 participants (clients, contractors, and consultants) and 83 were collected. Relative Importance Index (RII) was calculated and accordingly the top twenty and the least twenty delay causes of construction projects have been identified. A case study on two projects have been analysed and identified a common factor for project time delay. From the overall relative importance index analysis, most critical factors of road construction delay have been identified as (1) Slow land expropriation due to resistance from occupants / Slow site clearance; (2) Delays in contractor's progress payment by owner; (3) Shortage of materials/Equipment's on site; (4) Difficulties in financing the project by contractor; (5) Delay to deliver the site among the top five factors contributing to road construction project time delay in the city. Spearman ranking correlation coefficient has been employed to test the agreement level of the project parties on the identified delay factors and accordingly the test results reveal good agreement on the causes between owners and consultant has been revealed and a somewhat low correlation between contractors and with both owner and consultants. In order to optimally overcome the road construction delays in the city, a recommendations partially a strategic planning integrations in order to overcome the impact of dependency from different parties are forwarded.

Key words: - Road projects, Project Delay Factors, Addis Ababa road Authority, Causes of project delay

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Chapter One

Introduction

1.1. Background of the study

Road construction is a key economic sectors and is a driving factors of a national economy of a countries. The construction industry is a significant contributor of economic and social development in developed and developing countries. This construction industry tends to fluctuate with the general economy, and it has quick response to the changes in the economy (Abdullah Alhomidan, 2013).

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 Senouci, et al, 2016).

There are number of studies have been carried out regarding the effects of project delay in different countries in different time. Study by Wijekoon, S. (2013) identifies cost the major effect of project delay; cost is among the major considerations throughout the project life cycle. Mahamid I., (2013) identifies that the top risks affecting time overrun in road construction projects in Palestine are: financial status of the contractors, payment delays by the owner, the political situation, poor communication between construction parties, lack of equipment efficiency and high competition in bids and others study by Azlan Shah Ali et al, (2011), Rohaniyati salleh, (2009), Ondari Peter Omayo, et al, (2013), Saleh Samir Abu Shaban (2008) on the contributing factors for construction project postponement in different area and they identify different factors based on the result they have found. But if it is managed properly, the performance of a road sector plays a vital role in growing economy and it has its own significant contribution on GDP of a countries. In developing countries, like Ethiopia, the construction industry is the backbone of the economic and social development. The construction industry is the main contributor to economic development and a significant share of country national

economy. The construction industry is a significant contributor to the economic development but encounters with various challenges, such as delay, lack of productivity, and cost overruns.

In the context of Ethiopia's geography, pattern of settlement and economic activity, transport plays a vital role in facilitating economic development. Recognizing the importance of the road transport in supporting social and economic growth and its role as a catalyst to meet poverty reduction targets, the Government of Ethiopia has placed increased emphasis on improvement of the quality and extent of road infrastructure in the country. Following these basic points, to address constraints in the road sector, related to restricted road network coverage and poor condition, the Government formulated the Road Sector Development Program in 1997. The program was initiated with an objective of improving transport efficiency and rural accessibility among others and has been in implementation since then through four phases until 2015 and fifth phase underway at country wide.

Ethiopia's road network has been improving each year. In the past years, the government of Ethiopia has been vigorously engaged in new road construction as well as expansion of the existing road network through Ethiopia's Road Sector Development Programs (RSDP). During the GTP II period covering 2015/16 to 2019/20, the GOE anticipates a further expansion of the country's road network to 220,000 kilometers (136,701 miles). According to ERA's 2016 report the total road network of federal road reached to 28,032 km of which 14,632 km paved with asphalt and 13,400 km unpaved. Over the past years of RSDP history the performance was improved but still there is a big gap for improvement.

Despite the growth of road construction and its high contribution to the overall national economy, several challenges are being noticed in the sector and hence require solutions to sustain and maintain the growth rate in the sector into the foreseeable future. One of these significant problems, which need to be resolved, in the sector is delay of project implementation which can hold back or impair planned economic development.

History of Road Building in Ethiopia

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

In the 18th century, especially during the reign of Emperor Tewodros, although the technology was primitive it was believed that planned road construction efforts were made. It is also believed that Emperor Yohannes IV, who succeeded Tewodros, was engaged in road building. However due to the danger of invasion by Egyptians, Derbush and Turkish the Emperor was not able to achieve his desires.

It was prior to the second Italian occupation i.e. between the years 1896 and 1936 that a great success was made in road construction. Emperor Menilik was said to be a successful road builder participating himself in the construction. In 1903 the road from Eritrea to Addis Ababa and the road from Addis to Addis Alem were built. In addition it was during this time that the first Asphalt roads appeared in Addis. During the 5 years of Italian occupation about 6000km road were built by them, approximately 2500 km of them were given a single asphalt surface treatment, drainage structures were usually of stone masonry and at least three tunnels were built.

From the time the Italian packed off to home to the eventual creation of the Imperial Highway Authority (1941 to 1951) road construction or maintenance activity was almost subsided for a stagnation period of one decade because of lack of funds, equipment and expertise. Following the eviction of the Italian occupiers, the Imperial Ethiopian Government was convinced that a Road Agency solely responsible for rehabilitating/restoring and expanding the road network throughout the country had to be established. Accordingly, the Imperial Highway Authority (IHA) was established under proclamation No. 115/1951 as a semiautonomous agency with specific duties to plan, design, construct, and maintain roads. Responsibilities for construction and maintenance of roads remained under a single autonomous authority (IHA) for 26 years (1951-1977). The Ministry of Transport and Communication turned out to be the supervising authority of ERA. The Ethiopian Roads Authority has been reestablished under proclamation 133/1978 incorporating, among others, the Rural Roads Department in addition to the Highway Department. In 1980, the Military Government that took power in 1974 reformed the agency into the Ethiopian Transport Construction Authority (ETCA) by proclamation No. 189/1980 and became answerable to the newly formed Ministry of Construction. The proclamation enlarged

responsibility of the Authority by expanding its task to incorporate the construction of Airports, Seaports, Railways, and Municipal Roads.

Organizational Profile

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.

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).

1.2. Statement of the problem

In today's highly competitive economic environment, the need for completing road construction projects within the stipulated cost, time frame, and expected performance expectations is becoming increasingly important. No doubt that the performance of the road sector plays a vital role in growing the economy of every country irrespective of the level of development. However, the problem of project delays in the construction sector in general and road construction in particular is becoming a common phenomenon that an industry is facing. In fact, the goal of all parties involved in it: project owner, contractors, engineers and consultants in the sectors is to successfully complete the project as scheduled time, planned budget, with specified qualities and in safe manner. But due to different factors which emanate from diverse sources, it is commonly noticeable phenomena in developing countries like Ethiopia experiencing a project delay in road construction.

According to Islam and Trigunarysyah (2017), Construction delay is one of the basic constrains to achieve the project objectives in developing countries. 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 economy and construction industry, Ahmed Senouci, et al, (2016). Different study has identified different causes and different groups causing delays across/within a continent/countries and set different ranking for causes and groups. Causes and groups causing delays are country, location and project specific and there are no root causes that can be taking for granted to be the most effective or the least effective delay causes (Remon F. Aziz, et al, 2016).

Public construction projects in Ethiopia are parts of the country's development initiative. It shares considerable amount of the country's scarce financial resources. In Ethiopia, the construction industry is the highest recipient of government budget in terms of government development program. Consequently, public construction projects consume an average annual rate of nearly 60% of the government's capital budget

According to the study conducted on Ethiopian construction industry by Werku Koshe, K. N. Jha, (2016) shows that in Ethiopia only 8.25% projects have been finished to the original targeted completion date. According to this study, the remaining 91.75% delayed off its contractual time. In regard to Addis Ababa road construction, delay is becoming the major challenges that the authority is facing and challenging the life of the residents. The impacts of

project time delay varying with respect to the involved parties' view for instance owner thinks delay means loss of revenue and lack of services, alternatively contractor considers it as loss of money (Kikwasi, G.J, 2012). Hence the impact of road project delay especially in Addis Ababa costs more the city and the country both economical and social aspect of the resident while it measured in terms of loss of revenue and lack of services not only in terms of cost overrun. According to data from AA road authority, contract administration (2018/19) even from the 23 project currently the authority is running and of which 3 is street light and of the remaining 20 road projects almost 17 projects are running out of schedule and 2 projects are new and one project is at its completion stage. Which mean out of 20 road projects about 85% of the project is experiencing a project delay. And If the delay is not identified and the corrective project management decision is not taken in time a project may incur extra cost and extension of project time, which gives rise to dissatisfaction to all the parties involved (Werku Koshe, K. N. Jha, (2016),.

From the few published studies conducted on construction delays in Ethiopia, most of them have been conducted on construction industry as whole (Werku Koshe, K. N. Jha, (2016) on Ethiopian construction, Wubishet, J. M., (2004) on public construction, Meaza A, (2015) on Ethiopian electricity utility enterprise) and to specific to road construction a few studies conducted on road construction have taken Ethiopian road authority as case studies whereas others are not a published articles.

So, with the viewed above facts the main intention of the study is to identifying the major causes for project delay in the study area that could be an input for next and enable to optimize a road project delay in a construction industry by providing answers for the following questions.

1.2.1. Research questions

- What are the main factors which contribute for road construction project delay in AA?
- Which factor/s is/are highly influential on time delay of the projects?
- Do the road construction project parties have common agreement on the factors causing project time delay?

1.3. Objective of the study

The general objective of the study is to assessment of road project delay factors in the case of Addis Ababa road authority

Specifically, the study is aimed to attain the following specific objectives:

- To identify the major factors causing delay on a road projects that could help as experience for improvement of project management.
- To Identify the delay factors from contractor, owner, consultant and site/design engineer's perspective;
- To rank the overall and stakeholders factors according to their contribution to project delays based on stakeholders opinion.
- Draw a possible recommendation to optimize the delay to road construction project

1.4. 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.

1.5. Delimitation of study

There are many reasons that cause delays. According to Ogunlana (2008), although the principle reasons for delays are comparable across developing countries, several factors pertaining to local industry, social-economic, cultural issues and project characteristics also contribute to delays. Delays may occur as a result of the actions or inaction on the part of owner, contractor, subcontractors, consultants or the government. In addition, delays are always interrelated which led to the more complicated situation.

Hence, the scope of the study is limited to assessing the main causes for project delay result of the actions or inaction on the part of owner, contractor, subcontractors, consultants or the government infrastructure with external related factors **in terms of time** and the study doesn't focus on the consequence of the delay. And in addition to that the study focus mainly **identify** and **ranking** of the delay factors for only **road construction** projects **in Addis Ababa**. And the group of respondents for this research involves client, consultant and contractor companies that involved directly in the project. This would be done based on secondary and primary sources of data which would be obtained from Addis Ababa Road Authority, consultants, and contractors mainly assuming those involved in the construction of roads in Addis Ababa city administration.

1.6. Limitation of the study

There are two major constraints of the study which influence the efficient accomplishment of the intended objective of the study; no doubt that the realization of the objective of the study is hinge on the quality as well as availability of adequate data about the foundation for road project delay in the study area, but there would be not organized data available as the study requires from all a stakeholder. Because most of the propose respondents for the study may full of activity and they could not in a position to fill the questionnaires as it necessitate. This study doesn't focus on the consequence of project delay and limited to Addis Ababa Road Authority, consultants, and contractors

1.7. 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, 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

Review of related literature

2.1. Review of theoretical literature

2.1.1. Introduction

In the fast-paced, deadline-driven world we live in today, time is often cited as a crucial benchmark for assessing the performance of projects, Farhad Eizakshiri, et al (2015). Construction time often serves as a benchmark for assessing the performance of a project and the efficiency of a project management as the main objective of the project management principle is to complete the project on time, within its budget, and according to the required quality/specifications. Timely completion was one indicator for successful project. Time is money; delay in a certain construction project affects time and thus money, which is the lifeblood of any economy, Remon F. Aziz, et al, (2016). The timely completion of road construction projects is considered one of the most important factors referring to the project success, as well as the quality and the safety. However, in current dynamic construction industry, Construction project delays are becoming a common phenomenon including road construction projects.

Construction industry has a very poor reputation in coping with delays. Time delay is a very frequent phenomenon and is almost associated with nearly all constructing Projects. According to Sullivan F.(1986) as cited on Remon F. Aziz, et al, 2016), 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. And delay affects every party in the construction project in a different way as for the owner or the contractor it affects differently but not the same as the consultant who is considered the least affected party of all. Along with delay, the frequently faced consequences are project failure, reduction of profit margin, and loss of belief of citizen in government funded projects, and overall it causes a multitude of negative effects on the organizations and social economy of a country.

2.1.2. Project management

Businesses regularly use project management to accomplish unique outcomes with limited resources under critical time constraints. Therefore, managing project requires a specialized management technique necessary for planning, organizing, and control of projects under one strong point of responsibility with many challenges according to S.M. Ahmed, et al (2001).

When a project is for construction and implementation of civil work physical infrastructures, the extents of project management difficulties become even more complex to achieve project success criteria factors of cost, schedule and performance quality according to the description of Bentator & Thumann (2003). The difficulties in construction project management arise from the inherent nature of construction projects; such as complex and unique activities, mobile workforce, ingrained work cultures, environmental conditions, project-based setup, involvement of diverse sub-contractors and suppliers.

2.1.3. Definition project delay

Different definitions of delay were found, and the delay is the most common, costly, complex and risky problem encountered in construction projects, S.M. Ahmed, et al (2001). The delay is the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project, S.A. Assaf, S. Al-Hejji (2016). Time is an integral part of every plan a company develops for performing contract work. There is a relationship between the schedule, the scope of work, and project conditions. Furthermore, construction delays can be defined as the late completion of work compared to the planned schedule or contract schedule, Werku Koshe, K. N. Jha (2016). Completing projects on time is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors, which result from many sources. These sources include the performance of parties, resources availability, environmental conditions, involvement of other parties, and contractual relations. It rarely happens that a project is completed within the specified time. The construction industry is large, volatile, and requires tremendous capital outlays. Even with today's advanced technology, and management understanding of project management techniques, construction projects continue to suffer delays and project completion dates still get pushed back.

2.1.4. Type of delay

From the design stage to the stage where project is completed, a numerous factors affects construction projects (Baloia S, 2001). Different writers on the area classify the causes into different categories with different basis.

2.1.4.1. Intrinsic and Extrinsic delays

According to Ahmed A. (2003) delay causes are classified into two groups; internal causes and External factors where as these factors could be renamed with other authors as Intrinsic and extrinsic factors. Whereas, external factors which occur as a result of unforeseen factors, it is beyond the control of a management. These factors arise not from the project participants. They can be termed act of God and may include the followings; weather conditions, natural disasters, government actions and material supplies.

On other way this could be described by classification of intrinsic and extrinsic factors. Intrinsic factors are factors that relate to construction organizations; whereas extrinsic factors involve various elements ranging from the socio cultural, technological, economic and political environments within which these organizations function. Extrinsic causes of delay are difficult to influence or control, whereas the intrinsic causes of delay can be addressed by efficient project management. Extrinsic causes such as geopolitical risk, inflation and currency rate drop have been often called ‘global risk factors’ (Baloia S. 2001).The internal causes which arises from within the project stakeholders (clients, contractors and consultants).

2.1.4.2. Critical and Non Critical Delays

Based on the activity nature/type on the project planning the delay cause can be classified to different and Dinakar, (2014) has categorized it into three types accordingly: 1- Critical and noncritical. 2- Excusable and Non-excusable 3- Compensable and non-compensable. Construction project contracts are concerned with delays that may result in the works being delayed in reaching practical completion: that is to say, delays to ‘critical’ activities (Goldfayl. G., 2014). These are activities which are on the ‘critical path’ of a construction program for the project. Their start and finish dates are fixed, so that they have no ‘float’ or discretionary time. The contractor has no time flexibility in implementing such activities. Thus, a delay in a critical activity necessarily lengthens the critical path, thereby lengthening the minimum time required for the completion of the works, which are required to be completed by the date for practical completion.

Non critical delays can be seen as those delays that do not impact the completion date of the project but in a way, affect the progress of the work. It can therefore be said that both excusable and non-excusable delays are all critical delays. This leaves non critical delays as a standalone delay classification (Trauner, 2009).

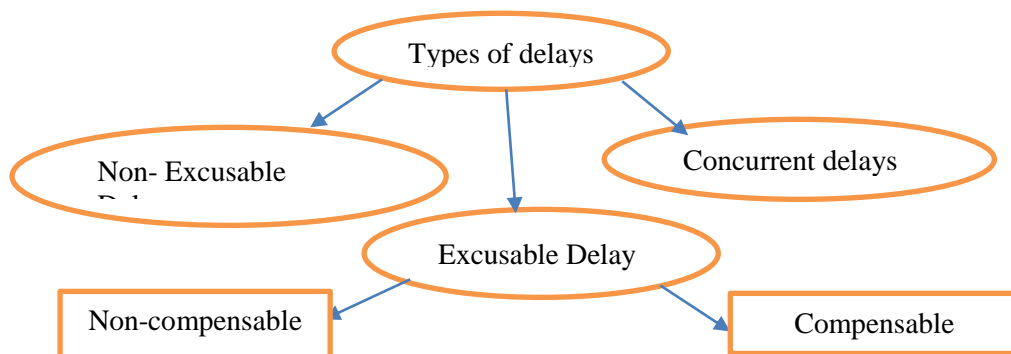
Based on the responsibilities for delay happening, any delaying event in construction could happen from the fault of the employer, consultant, or the contractor or for a condition that is beyond the control of all parties. In this respect classified delays into three categories.

- Those over which neither party to the contract has any control
- Those over which the client (or his representative) has control
- Those over which the contractor (or any subcontractor) has control.

Such classifications are defined for the purpose of defining the responsibility and subsequent entitlement for compensation of the impact of any delay event in the context of the conditions of contract provisions. Accordingly Wa’el A., (2005) and Wa’el A., et al., (2007) has categorized the causes into four types: 1- Excusable non-compensable delays. 2- Non- excusable delays. 3- Excusable compensable delays. 4- Concurrent delays as detailed below. Whereas, Hamzah et al., (2011) have categorized delay types into two types: 1- non-excusable delays 2- excusable delays. Briefly, excusable non-compensable delays are those, which are beyond the control of both the owner and the contractor. Excusable compensable delays are delays. According to Wa’el A., et al., (2007), the delay type has been discussed as Non-excusable delays, Excusable non-compensable delays, Excusable compensable delays; and Concurrent delays (Ahmed et al., 2003).

Whether a delay is compensable depends primarily on the terms of the contract. In the most cases, a contract specifically notes the kinds of delays that are non-compensable, for which the contractor does not receive any additional money but may be allowed a time extension Categories

Figure 1: Types of delays



Source: (Wa’el A., et al., 2007)

2.1.4.3. Excusable and Non-excusable delays

Basically, these delays are caused by contractors or subcontractors or materials suppliers, through no fault of the owner, Wa'el A., et al, (2007). The contractor might be entitled to compensation from the delaying subcontractor or supplier, but no compensation is due from the owner. A non-excusable delay is delay caused by the contractor or its suppliers, through no fault by the owner, N. Hamzah et al, (2011). According to N. Hamzah et al, the contractor is generally not entitled to relief and must either make up the lost time through acceleration or compensate the owner. Werku Koshe, K. N. Jha, (2016) also defined this delays as delays, which the contractor either causes or assumes the risk for. These delays are caused by lack of performance of the contractor on the construction project such as a contractor failure to provide an adequate material to complete their job.

To the specific, according to Meaza A, (2015) these delays can be caused by underestimates of productivity, improper project planning and scheduling, poor site management and supervision, wrong construction methods, equipment breakdowns, unreliable subcontractors or suppliers, late performance of sub-contractors, untimely performance by suppliers, A project-specific labor strike caused by either the contractor's unwillingness to meet with labor representative or by unfair labour practices as some example. Therefore, it is contractor's responsibilities to continue their work with no entitlement to claim for extension of time or delay damages until they completed the project. So, non-excusable delays usually result in no additional money and no additional time being granted to the contractor.

Excusable delay is a delay that is caused due to an unforeseeable event beyond the contractor's or the subcontractor's control. Excusable delays, also known as "force majeure" delays, (Wa'el A., 2005) as cited on Wa'el A., et al, (2007). Most contracts allow for the contractor to obtain an extension of time for excusable delays, but not additional money. Usually, based on common general provisions in public agency specifications, delay resulting from the following events would be considered excusable such as fires, floods, owner directed changes, errors and omissions in the contract drawing, unusually severe weather and etc. Excusable delays are divided into two:- compensable and non-compensable delays.

2.1.4.4. Excusable delays with compensation

A compensable delay is a delay where the contractor is entitled to a time extension and to additional compensation, Meaza A, (2015). Compensation delays are caused by the owner or the owner's agents. An example of this would be the drawings late release from the owner's architect. Relating back to the excusable and non-excusable delays, only excusable delays can be compensable. Non-compensable delays mean that although an excusable delay may have occurred, the contractor is not entitled to any added compensation resulting from the excusable delay. An excusable, compensable delay normally leads to a schedule extension and exposes the owner to financial damages claimed by the contractor. In this scenario, the contractor incurs additional indirect costs for both extended field office and home office overhead and unabsorbed home office overhead.

2.1.4.5. Excusable delays without compensation

Non-compensable delays are caused by third parties or incidents beyond the control of both the owner and the contractor. These delays are commonly called “acts of God” because they are not the responsibility or fault of any particular party (Wa’el A., 2007; Saleh Al Hadi Tumi 2009) cited on N. Hamzah et al, (2011). Non-compensable delay is a delay that is caused by third parties or incidents beyond the control of both the owner and the contractor. Examples typically include: unusual weather, strikes, fires, and acts of government in its sovereign capacity, etc. In this case, the contractor is normally entitled to claim extension of time but no compensation for delay damages. According to Ethiopian civil law/code Article 1973, Strikes that are foreseeable at the time of signing the contract are not considered excusable causes of delay.

2.1.4.6. Concurrent Delay

Concurrent delay is a problem that happens on most of the construction industry project. If there is there only one factor is delaying the construction project; it is usually quite easy to calculate both the time and money resulting from that single issue. Concurrent delay is a more complicated and this is very typical in construction project. This situation happened when more than one factor delays the project at the same time or in overlapping periods of moment, N. Hamzah et al, (2011). In this situation, both owner and contractor are responsible for the delay. Commonly concurrent delays which involve any two or more excusable delays result in extension of time. When excusable delays with compensation and non-excusable delays are concurrent, an extension of time can be issued or the delay can be distributed between the owner and the contractor. Concurrent delay can be categorized in three types of delays:

- If excusable and non-excusable delays occur concurrently, the contractor can only claim for 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.

2.2. Delay of Construction Projects in Ethiopia

In Ethiopia, the construction industry is blooming and the road networks increasing from time to time all over the country. However the historical data of completed road projects shows that, none of the projects was completed as planned and within the estimated cost (Shambel and D. Patel, 2018). According to Werku and Jha 2016, Construction delays are occurring in every phase of a construction project and are common problems in construction projects in Ethiopia, and this is the major causes of project failure. Werku and Jha on their studies of ‘investigate causes of construction delay’ found five most significant factors that cause delay in Ethiopian public building construction have been identified. According to the study result, contractor's financial difficulties, escalation of material price, ineffective planning and scheduling by contractors, delay in progress payments for completed works, lack of skilled professional in construction project management in contractor organization were the five key factors identified for delay of construction projects.

2.3. Causes of construction projects delay source.

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 (Islam and Trigunaryah,

2017). In addition, some other factors for example country's general economy, inflation of resource prices, lack of managerial service, environmental factors etc. are the causes of project delays, S. A. Assaf and S. Al-Hejji (2006). As a result of delay, many projects fail to earn sufficient revenue. Besides, delays have negative impacts on business for both contractors and developers, for example, it degrades the reputation of the companies. It also increases construction cost by the influence of several factors such as escalation of resources price, economic recession, extreme weather, political unrest etc. Along with cost performance and quality, schedule performance is one of the significant cornerstones of project success. However, there are several factors, due to various reasons throughout the project life cycle that may cause delays. The first step towards minimizing delay in a project is to identify these causative factors, and then either eliminate or take measures to control them. 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, Wa'el A., et al, (2007) 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 et al., 2003) cited on Wa'el A., et al, (2007). 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 (Remon F. Aziz, et al, 2016) to 47 delay causes in Bahrain (Rehab Hasan, et al, 2014) and same concept is true in general construction type. 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.

2.4. Delay factors of road construction project

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. A number of studies have been conducted on identification of delay factors of construction projects and as a result, numerous causative factors have been identified over the last decades. And Identification of a set of causes of delay has been acknowledged by the majority of researchers as a valid method of improving the schedule performance of a project. While some authors have highlighted that lessons can be learned from similar causes of delay (Durdyev et al., 2017; Gündüz et al., 2013), some consider that they should be specific to the project conditions or the country where the project is being undertaken (Hampton et al., 2012; Ogunlana et al., 1996) cited on Remon F. Aziz, et al (2016) . However, a review of the literature on the subject shows that there are common causes that have been reported by the majority of researchers in this area, and these are presented below. It is worth mentioning that the identified cause of project delays may result in various types of project delays (internal types particularly i.e in owners, contractors and consultant).

After a deep reviewing a number of studies across different countries, a number of causative factors of construction project pointed out have been identified for this study. Among the reviewed studies conducted at different countries, in Egypt, Remon F. Aziz, et al (2016) on their study of exploring delay causes of road construction project identified 293 delay causes categorized under 15 groups have been evaluated through literature review and M.M. Marzouk and T.I. El-Rasas, (2014) has identified 43 delay causes which were grouped to seven categories: owner related, consultant related, contractor related, material related, labor and equipment related, project related, and external related on his study of analyzing delay causes in Egyptian construction projects. . Dinakar A. (2014), has identified about 63 causes for delays which have been divided into 7 categories containing 9 causative factors each. S.A. Assaf, S. Al-Hejji (2006) on his study entitled Cause of delay in large construction project in Saudi Arabia has identified 43 delay causes which were grouped to nine categories: Project, owner, contractor, consultant, Material, design, Equipment, labor, and external factors. In Tanzania, Kikwasi, G.J. (2012) on its study presented on Conference Series with a title of ‘Causes and effects of delays and disruptions in construction projects in Tanzania’ has identified 23 cause of delay in construction project and In India, Prasad, K.V, et al (2019) analyzed causes of project delays and mitigation

measures in Indian construction projects with a survey comprised 60 causes/factors of delay that were clustered into 7 main groups: planning, design and engineering related factors, Procurement related factors, financial related factors, human resource related factors, project execution related factors, contract management and external related factors. In Ethiopian too Werku Koshe, K. N. Jha, (2016) conducted a questioner survey of the 88 cause of construction delay factors under eight broad categories namely client related, consultant/supervisor related, contractor related, designer related, labor related, material related, equipment and external related categories. In addition from the listed studies conducted in different countries by deep review of studies like Ahmed et al.(2003) and Wa'el A., et al (2007)and so much more as indicated on empirical review of this study, the study has identified the following factors causing delays in construction projects for the study purpose and have categorized the factors that cause delays in the four categories as below;

1) **Contractor's responsibility:** - The factors that are related to contractor's responsibility are:

- Poor site management and supervision by contractor
- Improper construction methods implemented by contractor
- Inadequate contractor experience causing error
- Ineffective planning and scheduling of project by contractor
- Poor subcontractor performance/delays
- Conflicts in sub-contractors schedule in execution of project
- Shortage of site labor
- Poor qualification of the contractor's technical staff
- Coordination problems with others
- Construction mistakes and defective work
- Shortage of materials/Equipment on site
- Delay in commencement
- Reworks due to defects/ in construction materials
- Financing by contractor during construction
- Delay in site mobilization by contractor
- Often change of subcontractors
- Contractors inefficiency in handling resources

Owner responsibility: The factors that are related to owner's responsibility are:

- Slowness of the owner decision making process

- Change orders by owner during construction (variation)
- Owner financial problems/client finance/economic ability for the project
- Slow land expropriation due to resistance from occupants Owner
- Design changes by owner or his agent during construction Owner
- Delay to deliver the site
- Delays in contractors progress payment by owner
- Delay in approval of completed work by owner/client
- Excessive bureaucracy in project owned operation
- Poor scope definition/ Changes in client's requirements
- Type of project bidding and award (negotiation, lowest bidder)
- Mistakes and discrepancies in contract documents
- Poor contract management
- Unclear contract conditions/terms
- Complicated administration process of client
- Bribes (kickbacks) & personal interest (prejudices) “corruption”; Fraudulent practices;
- Lack of coordination with the contractor and utility providers
- Poor communication and coordination of the owner with other parties.
- Inadequate progress review;

Consultant responsibility: The factors that are related to consultant's responsibility are:

- Delay of design submittal from consultant
- Delay in approving major changes in the scope of work
- Inspection delays (delay in performing inspection and testing by consultant)
- Lack of experience of consultant in construction projects;
- Poor communication and coordination of the consultant with other parties
- Lack of consultant's site staff
- Mistakes and discrepancies in design documents
- Rework due to change of design or deviation order
- Wrong or improper (poor) (inappropriate) design

External related factors

- Poor weather conditions
- Conflict, war, revolution, riot, and public enemy External
- Poor government judicial system for construction dispute settlement

- Changes in laws and regulations, transportation delays
- External work due to public agencies (utilities and public services) and
- Delay in providing services from utilities (such as water, electricity)
- Obtaining permits from municipality (government)
- Exchange rate (Price) fluctuation/economies
- Material and labor wage escalations (inflation)
- Shortage (availability) in construction materials;
- Unreliable suppliers
- Social, religions and cultural factors;
- Political situation
- Unexpected underground condition

2.5. Effect of construction project delay

There are numerous consequences of construction delays on project performance. Kikwasi, G.J, (2012) stated that the impacts of delay are varying with respect to the parties' view for example owner thinks delay means loss of revenue and lack of services, alternatively contractor considers it as loss of money. The delay in construction projects has enormous impacts on time and cost overrun. It also creates caustic situation between owner and contractor such as dispute, litigation, arbitration, and sometimes total abandonment of the project (S. A. Assaf and S. Al-Hejji, 2006). However, cost overrun is considered as the most significant effect which may suspend or even terminate the project before completion. Due to project delay in long term, prices of materials and equipment, and labor costs. Besides, economic inflation, extra amount of bank interest, and indirect cost like salaries of the staff, and rental price of project offices increase. All these effects incurred good amount of cost and directly increase project cost.

Time delays and cost overruns of projects 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. A long-term study of a number of public works projects, which was conducted in the state of Nevada in the United States, showed the negative and costly impacts of time delays (Senoucia, A., et al, 2016). The construction industry is very large, complex, and requires huge capital investments. Delay in the completion of a construction project are one of the biggest problems facing by the construction industry and can be a major problem for construction's project participant leading to costly disputes and adverse relationships amongst project participants, Werku Koshe, K. N. Jha (2016).

A study by Aibinu and Jagboro, (2002) reveals six effects of delay on project delivery in Nigerian construction industry which are: time overrun, cost overrun, dispute, arbitration, total abandonment and litigation. Sambasivan cited on Kikwasi, G.J, (2012). Construction project delays also result in conflicts and mistrust among concerned parties (designer, contractor worker, and consultant). This delays problems causes a multitude of negative effects on the project and its participating parties. Along with delay, the frequently faced consequences are project failure, reduction of profit margin, and loss of belief of citizen in government funded projects, etc. When delays do occur, they are either accelerated or have their duration extended beyond the scheduled completion date. These are not without some cost consequences. Delays also give rise to disruption of work and loss of productivity, late completion of project increased time related costs, third party claims, abandonment and termination of contract (Abdul H., 2006).

2.6. Empirical Review

The construction industry is very large, complex, and requires huge capital investments. Delay in the completion of a construction project are one of the biggest problems facing by the construction industry and can be a major problem for construction's project participant leading to costly disputes and adverse relationships amongst project participants. Delays occur in every construction project and the significant of these delays varies considerably from project to project. Many researchers have studied the causes of project delays in public construction industry. The findings of such studies have been reviewed for this research.

In Egypt, a study of exploring delay causes of road construction project has been conducted by Remon F. Aziz, et al (2016). This study sought to accomplish the following objectives: a. identifying the most important and less important causes of delays that affect highway constructions, b. Identify the severity of the delay causes from stakeholder's perspective. By using a questionnaire survey 293 delay causes categorised under 15 groups have been evaluated through literature review. And the study revealed that from overall results, it was found that the owner financial problem was considered the first cause affecting delay in road projects in Egypt. Shortage in equipment, inadequate contractor experience, shortage in materials, equipment failure, design errors, mistakes in soil investigation, poor subcontractor performance, rework due to change in design, poor site management and supervision by contractor were the prominent delay causes identified by study.

In Tanzania, Kikwasi, G.J. (2012) on its study presented on Conference Series with a title of 'Causes and effects of delays and disruptions in construction projects in Tanzania 'indicated

seven highly ranked causes as design changes, delays in payment to contractors, information delays, funding problems, poor project management, compensation issues and disagreement on the valuation of work done as the most causes of delays in construction project and the following factors as medium rank: conflicts among the involved parties, project schedule changes, supply / procurement problems, bureaucracy, multiple projects by contractors and incompetent contractors.

In Egypt, a study of ranking delay factors in construction project after Egyptian revolution by Remon F. Aziz, (2013) has ranked contractors related factors on the first and Equipement related factors were ranked on second. And owners related factors, project related factors, design related factors, consultant related factors, external related factors, Material and labor related factors are the factors ranked from third to the last. These studies has set identifying delay factors, categories, rank and address the most contributing factors as the objective of the research. By using a questionnaire survey 99 delay factors categorized under 9 groups reviewed through literature have been evaluated in the study. The study has also used case study as methodology of ranking the factors.

In India, Prasad, K.V, et al (2019) analyzed causes of project delays and mitigation measures in Indian construction projects. The survey comprised 60 causes/factors of delay that were clustered into 7 main groups: planning, design and engineering related factors, Procurement related factors, financial related factors, human resource related factors, project execution related factors, contract management and external related factors. The research findings indicate finance-related causes as the most critical causes of delay in Indian projects. Delay in settlement of claims, contractor's financial difficulties, delay in payment for extra work/variations by owner, late payment from contractor to subcontractor or suppliers, variation orders/changes of scope by owner during construction and changes in design by owner were the highly ranked delay causes. In respective to project type, Land acquisition and utility-related delays were the main reasons in transport projects identified by the study in specific to road projects.

In Bahrain, Rehab Hasan, et al, (2014) investigated causes of delays in road projects. The study aimed to identify and rank the causes of delay based on their frequencies of occurrence and their severity in road projects. Accordingly, the survey comprised of 47 causes/factors of delay that was classified by responsibility into six groups: Causes related to contractor, Causes related to owner, Causes related to consultant, Causes related to services and utilities, Causes related to Government regulations, Causes related to Government regulations, Causes related to external

environment have been identified. The study concluded that even each category identified has a significant contribution for road project delay, but causes related to services and utilities are the most critical factors as indicated by the high values of their severity means. Lack of planning, shortage of manpower and materials from contractor side, suspension of work, budget availability and delay in decision making from owner side and lack of experience from consultant side are the significant causes identified from the other categories and recommendation made on it remarkably.

In Jordan, A.H. Al-Momani, (2000) has conducted a quantitative analysis on construction delay to determine the causes and the level of time extension of public projects. Using a random sample of 130 public projects, the study concluded that poor design and negligence of the owner, change orders, weather condition, site condition, late delivery, economic conditions, and increase in quantities are the main causes of delay.

In Saudi Arabia, Hussein Abdellatif and Adel Alshibani, (2019) assessed major factors causing delay in the delivery of manufacturing and building projects in Saudi Arabia. The survey comprised 22 causes/factors of delay and two categorizations were made: the first is based on the impact of the cause, and the second is based on the frequency of occurrence of the identified cause that has been found that the top five impacted causes of delay in the delivery of industrial projects in Saudi Arabia. These are: difficulties in financing project by contractor/manufacturer, late procurement of materials, late delivery of materials, delay in progress payments, and delay in approving design documents, respectively. In terms of frequency, the top five identified causes are: delay in progress payments, difficulties in financing project by contractor/manufacturer, slowness in decision making, late procurement of materials, and delay in approving design documents, respectively.

In Malaysia, Wa'el A., et al, (2007) has identified the major causes of delays in construction projects in Malaysia using a survey. The primary aim is to identify the perceptions of the different parties regarding the causes of delays, the allocation of responsibilities and the types of delays. Accordingly, the survey comprised the causes/factors of delay in to four categories by responsibility: Causes related to contractor, Causes related to owner, Causes related to consultant, Causes related to external factors and identified top ten factors. Financial difficulties and economic problems (owner) on the first rank, Financial problems (contractor) and Supervision too late and slowness in making decisions (consultants) on second and third ranks respectively. Slow to give instructions (consultants), Lack of materials on market (external), Poor site management (contractor),

Materials shortages on site (contractor), Construction mistakes and defective work (contractor), Delay in delivery of materials to site (contractor), Slowness in making decisions (owners), Lack of consultant's experience (consultants), Incomplete documents (consultants) are the factors identified from the fourth rank to last tenth.

2.7. Related Studies in Ethiopia

Werku Koshe, K. N. Jha, (2016) conducted a questioner survey in Ethiopia to investigate causes of construction delay designed to assess the opinion 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 under eight broad categories namely client related, consultant/supervisor related, contractor related, designer related, labor related, material related, equipment and external related categories have been identified throughout the literature review. And the study revealed that from overall results, it was found that five most significant factors that cause delay in Ethiopian public building construction have been identified. According to the study result, contractor's' financial difficulties, escalation of material price, ineffective planning and scheduling by contractors, delay in progress payments for completed works, lack of skilled professional in construction project management in contractor organization were the five key factors identified for delay of construction projects.

Wubishet J. M, et al (2017) has conducted a survey and case study on Causes of Cost Overrun in Federal Road Projects of Ethiopia in Case of Southern District. The study has identified six top rated factors for a project cost overrun and these were material price fluctuation, cost underestimation, delay in supply of raw materials, inadequate review of contract documents, lack of coordination at the design phase and lack of cost planning during pre- and post- contract stage have the highest impacts on the performance of project costs from the client's, consultants' and contractors' perspective.

Meaza Alemayehu, (2015) has identified weakness on the owner as the most important causes of delay in the power distribution construction projects with its study conducted on causes of project implementation delay in the Ethiopian Electric Utility Enterprise. The study has identified Mistakes and discrepancies in design documents, frequent design change and variation order during construction, unclear and inadequate details in drawings, slow response and supervision, poor contract management, inaccurate site investigation and change in material type during construction as owners' responsibility; delayed progress payment, slow management decision, unrealistic project construction time, change and variation of project costs and

prolonged procurement system are the most contributing factors on owner side. Contractor's financial problem on contractor side has been indicated as second factor in the study next to owners' related factors.

Shambel G., D., Patel (2018), with their study of Factors influencing Time and Cost Overruns in Road Construction Projects: Addis Ababa, Ethiopian Scenario identified Financial problems, improper planning, land acquisition and construction delay, design changes, less materials and equipment supply by contractors, incomplete design are the main sources of delay and cost overrun respectively. And the study also indicated once identified the main causes it is necessarily to give solutions to complete the projects on time and estimated cost.

2.8. Conceptual framework of the study

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 74 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. These are factors that have a direct impact on the performance of the projects or have it coming indirectly but the final results felt in the rate at which these projects are implemented. Effect of the road project is not the scope of this study but just to show the attention needed to overcome the delay factors, it will be survey as part of this study. The following delays factor categories have been identified for the purpose of this study from the previous studies that have been carried out on addressing the causes of delays in construction projects industry. The conceptual framework outlined the cause of delay in the implementation of project and the outcomes of delay discussed in the literature review shown as below.

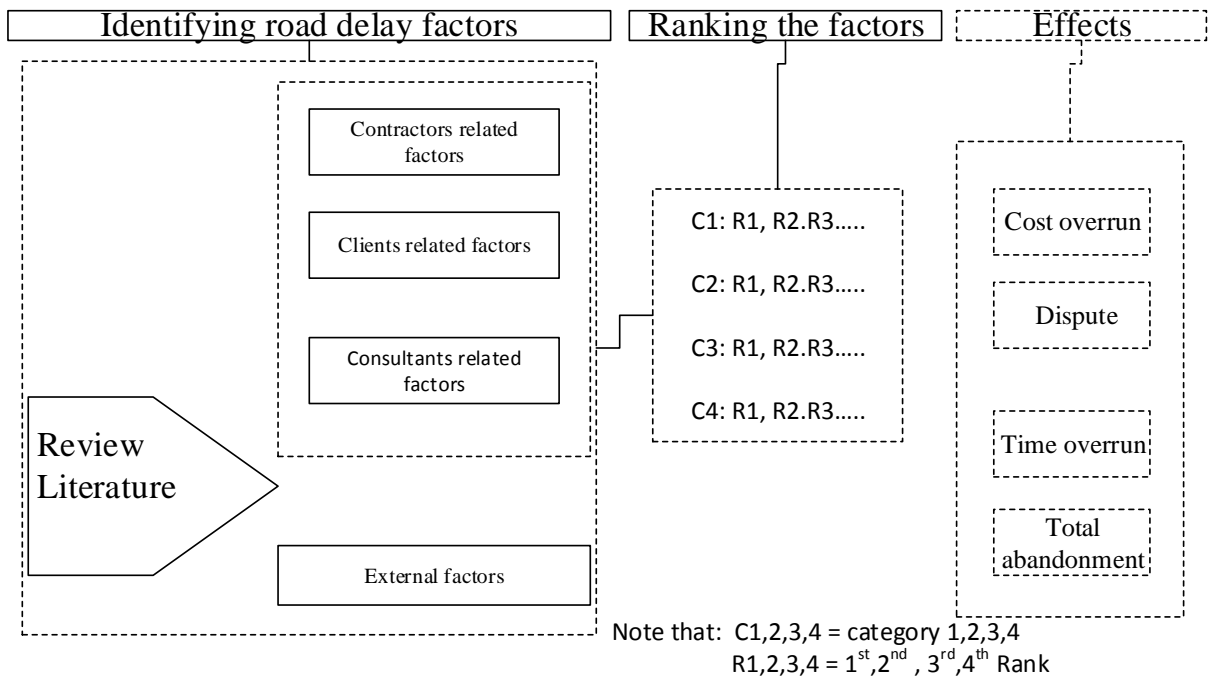


Figure 2: Conceptual framework of the study

Chapter Three

Research methodology

3.1. Introduction

This third chapter of the thesis deals with the methodology, comprising the research strategy, research design and data collection. The methodology used is aimed at realizing the objective of the study through collecting and analyzing an appropriate data that will enable identify the causes and factors of delay of roads construction projects in Addis Ababa under Addis Ababa road authority.

3.2. Research design and approach

Research design deals with a logical problem (logical structure of the inquiry) not a logistical problem (Vaus, 2001). According to Vaus, an appropriate research design selection enables to ensure that the evidence obtained enables to answer the initial question as unambiguously as possible. The study has aimed to identify the factors which are considered as grounds for road project delay in Addis Ababa. So in order to optimize the objective of the study, a descriptive nature research design which is used to provide quantitative or numerical description of attitude, or opinions of participants to evaluate the perception of parties involve in the construction process has been employed. This research type could enable the study to describe and validate the extent to that the identified factors by intensive literature review contribute to roads construction project delay for the case study (Addis Ababa road authority). Accordingly both quantitative (survey questions) and qualitative (case study) research approach have been employed for the study.

3.3. Research strategies

There could be different common research strategies that could be employed in a study. However, a choice of research strategy is guided by a research question(s) and objectives, the extent of existing knowledge, the amount of time and other resources available, as well as researcher own philosophical underpinnings (Saunders, et al, 2009) .Hence, with the objective and research question in mind, both survey has been considered as an appropriate strategies for the study. The survey strategy allows the researcher to collect quantitative data which can be analyzed quantitatively using descriptive as the nature of the study is descriptive. According to Saunders et al, Using a survey strategy give more control over the research process and sampling

to generate findings that are representative of the whole population at a lower cost than collecting the data for the whole population.

3.4. Source and type of data

In order to draw the true picture of road construction project delay in terms of the critical factors for it, the study has employed two sources of data: primary and secondary source of data. Primary source with the help of survey questionnaires and interview and secondary sources through review of different project progress report and other available documents in connection with. The data include both secondary and primary data. The secondary data used in this research are information's gathered through a literature review regarding delays in construction project. Literature reviews was carried out to enhance the understanding of theory regarding the research problem. The materials for literature reviews are such as books, articles, internet, journals, documents and other's research papers. By using the Five Point Likert's Scale questionnaire for different worker at sample project researcher would able obtained qualitative (ordinal) data. The information, which is relevant, was used as a benchmark against primary data collected to support the research. And additional qualitative part of data was obtained through interview.

3.5. Instruments for the data collection

The study employs a survey method as it enables the researcher to collect the opinion on the cause of project delay in Addis Ababa from all a stakeholder of road project construction. According to Creswell (2008), a survey research provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population. In addition, in order to identify the factors in detail, among the projects two road project with long delay time have been selected and the projects have been reviewed in detail as data collection for the study. As indicated on Slake (1 995) cited on Creswell 2008, case studies are a strategy of inquiry in which the researcher explores in depth a program, event, activity, and process. Accordingly researchers try to collect detailed information using a project document review and interview procedures with the counter team from clients as a periodical review undertaken by this team. The survey includes different personal information about the respondents (personal experience, his/her stay as worker in the road project, responsibility, and others) in addition to Five Point Likert's scale questionnaire (very little impact to least impact factor) about severity level of causes for project delay.

3.6. Target population

The target population of the study were client, contractors and consultants who are involved directly in the construction of the road projects irrespective of their experience in road construction projects as the number of ongoing road project is only 20 and the research didn't considered a closed projects in the authority.

3.7. Sample and sampling techniques

3.7.1. Sampling techniques:

There are 20 road projects undergoing live in 2018/2019 throughout Addis Ababa and the data obtained from the authority reveal that about 85% of the total road project are running out of their schedule. 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 (”Walliman (2006)). Saunders, etal (2009) also 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.

3.7.2. Sample size:

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 is a sub-group of a population, which is the totality of some category of component, human or otherwise. Sampling is used as a basis for statistical estimation, or illation from items, about the features of that population (Saunders, et al 2009). A total of 120 respondents were deliberated as adequate and sensible for this study. The sample was restricted to AA road construction project authority and the respondents were Addis Ababa road authority staff, contractors, consultants, subcontractors, engineers, who involve in road projects construction system and excluding a supportive staff for all the target population. Even Addis Ababa road authority has total of 1780 permanent staff but only three team i.e Contract

administrative, design and own force section have been considered for the questionnaires as the three team has direct interaction with ongoing projects. . However effective selection of the target respondents with high competence and experience proved to shield this gap. From the currently undergoing 20 projects under Addis Ababa road authority, 50% of the project were included on average 7 respondents (mainly from core staff) from each project which mean a total of 70 respondents were considered for the questionnaires' as the number staff of contractors and consultants varies from project to project. Though the sample size is relatively small, the quality of the responses was considered to be highly reliable for the analysis due to relevant industry experience, personal level interactions and clearly understanding the questionnaires among the respondents (Vaus, 2001).

3.8. Methods of Data Analysis

The data which was obtained from sample organization analyzed according to the objective of the study. The questionnaire was collected and analyzed by quantitative data collection method using Statistical Package for Social Science (SPSS 20). In order to ensure logical completeness and consistency of responses, data editing and coding have been carried out by the researcher. Once editing done, data have been analyzed qualitatively and quantitatively for the data which have been obtained through different data collection instruments. The quantitative (ordinal) data, which have been obtained from questionnaires, analyzed using different descriptive statistical techniques like frequency mainly for a relative importance of various factors that contribute to causes road construction delays. While inferential statistic Spearman correlation was used as method of quantitative data analysis. Analysis of data consists of calculating the Relative Importance Index (RII) and Ranking of factors in each category based on the Relative Importance Index (RII). According to many researchers (Assaf et al., 1995; Faridi and El-Sayegh, 2006; Iyer and Jha, 2005; Kumaraswamy and Chan, 1998) cited on H. Doloi et al. (2012) are of the opinion that mean and standard deviation of each individual attribute is not a suitable measure to assess overall rankings as they do not reflect any relationship between them and hence Relative Importance Index (RII) is best suitable for the study.

$$RII = \frac{\sum W}{A * N} \quad , \quad RII = \frac{1n_1 + 2n_2 + 3n_3 + 4n_4 + 5n_5}{A * N} \dots\dots\dots \text{Equation 3.1.}$$

Where, RII = Relative Importance Index, ORII= Overall relative importance index

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

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

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

N = total number of respondents.

And the overall Relative Importance Index which is part of RII was used to analyses the data

$$ORII = \sum_{i=1}^{i=3} \frac{i}{6} \times \left[\frac{\sum_{k=l}^{k=K} (k \times RII_k^i)}{\sum_{k=l}^{k=K} (k)} \right] \dots\dots\dots \text{Eq 3.2.}$$

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1. Introduction

This chapter presents the findings of the study made on the causes of road construction delay in Addis Ababa. This study conducted through survey and case study to generate raw data for analysis. Surveys were used to gather data from a relatively large number of respondents within a limited time frame. The survey through questionnaire conducted on projects that have been experienced time overrun. The aim of the questionnaire was to identify the common factors causes' time overrun and the questionnaires' were designed accordingly. Case studies were used to support the annalysis by an in-depth analysis of an archive of a particular project. This study primarily used two separate methods to analyse the collected data to identify the top rated factors among all three parties that affect the project time schedule. A descriptive approach to direct interpretation of the case study and survey results to identify the top rated influencing factors based on relative importance index and spearman ranking correlation to test the agreement among the grouped ranking.

4.2. Questionnaire survey

A number of one hundred twenty (120) questionnaires were distributed and were filled out by eighty five (85) experienced construction professionals including project manager/ manager, Contract administrators and own force engineers from Client side, Engineers and site supervisors from contractors and consultants of which two (2) were invalid and only eighty three (83) have been considered with a response rate of 69 %. Hence, based on the collection of the questionnaire it can be said that ample questionnaire were returned to analyse the data and infer in this study as according to Burgess, (2001) in a questionnaire survey research, a responses rate of 60% +/-20% is acceptable for data analysis. The collected data were analysed through Relative Importance Index (RII) method. The analysis revealed the most contributing factors and categories causing delays.

4.2.1. Respondent's profile

Respondents are selected from a wide range of professionals engaged in the road construction sector: contractors, clients and engineers were among the target population. The sample

consisted of Client representative (counter engineers or contract administrators from Addis Ababa road authority, structural engineers, project managers, consultants. Accordingly, the respondent's profile has been presented as below on table (4.1 and 4.2).

Table 4.1: Respondent Gender and organization type

Respondent Gender		Organisation type			Total
		Client/owner	contractor	Consultant	
Male		27	20	16	63
Female		9	9	2	20
Total		36	29	18	83
		Contractor level			Total
		Non-contractor	Level 1	Level 2	
Organisation type	Client/owner	36	0	0	36
	contractor	0	27	2	29
	Consultant	18	0	0	18
Total		54	27	2	83

Source: Survey result (2019)

As seen from the table (4.1), from the total of 83 respondents, 36 from owner/client organization, 29 from contractor organization and the remaining were from consultant organization. Regarding the respondents gender, about 63 were males and the remaining 20 were females. In regard to the gender, the study doesn't indicated that females numbers are low and males number are high as the sample is convenient sampling, and the intention of the study was not about gender composition in construction industry. And almost from the twenty nine contractors participated in in this study, 27 of them were level one contractors.

Table 4.2: Respondents' Role and relevant work experience

Role in the organisation * Relevant work experience * Organisation type							
Organisation type			Relevant work experience				Total
			1-5 Years	6-10 years	11-15 years	> 15 Years	
Client/ Owner	Role in the organisation	Client representative/ Contract administrator	7	7	0	4	18
		Site supervisor	0	2	0	0	2
		Engineers	8	6	2	0	16
	Total		15	15	2	4	36
contractor	Role in the organisation	Manager/Project manager	0	0	4		4
		Site supervisor	1	3	0		4
		Engineers	12	7	2		21
	Total		13	10	6		29
Consultant	Role in the organisation	Manager/Project manager	0	2	0	0	2
		Site supervisor	3	0	2	2	7
		Engineers	1	2	6	0	9
	Total		4	4	8	2	18
Total	Role in the organisation	Manager/Project manager	0	2	4	0	6
		Client representative/ Contract administrator	7	7	0	4	18
		Site supervisor	4	5	2	2	13
		Engineers	21	15	10	0	46
	Total		32	29	16	6	83

Source: Survey result (2019)

The respondents were asked to reply to their responsibility in the organization to know the relevance to the subject under investigation. Accordingly, 43.4% were from owner/clients, 34.9% of them were from contractors, and the remaining 21.7% of them were from consultant organisation. It can be said that fair relevant work type were represented.

Work experience of the respondents was thought to be very crucial in the target population. Accordingly, 38.6% of them worked for 1-5 years, 34.9% of them worked for 6-10 years, 19.3% of them worked for 11-15 years and the rest 7.2 % of them served for more than 15 years. It can

be said that, respondents have had good working experience in road construction area to distinguish and discuss the subject indicated in this research putting consideration of construction industry age of the country.

4.2.2. Ranking of delay causes

With a survey result, the impact of each factors in contributing to the delay of road construction project in Addis Ababa city have been ranked using the importance index factor and the result of the relative importance index was calculated as below.

$$RII = \sum W / A * N$$

$$RII = \frac{1n1 + 2n2 + 3n3 + 4n4 + 5n5 \dots \dots \dots}{A * N} \dots \dots \dots \text{Equation 4.1.}$$

Where RII is the Relative Importance Index of each factor for each group of respondents;
 W is the weighting given to each factor by the respondents (ranging from 1 to 5);
 A is the highest weight (i.e. 5 in this case); and
 N is the total number of respondents.

And the Overall Relative importance index is the ranking of each factor by all respondents representing the three groups as follows: “ Owners/Client group (i= 3)”; “Contractors group (i= 2)”, and “Consultants group (i= 1)”; considering all years of experiences of respondents together; which is calculated as a weighted average by RII from Eq (4.1). This formula have been used by many researchers of which R. F.Aziz.,et al (2016), R. F Aziz (2013), H. Doloi et al.(2012) are the few.

$$ORII = \sum_{i=1}^{i=3} \frac{i}{6} \times \left[\frac{\sum_{k=l}^{k=K} (k \times RII_k^i)}{\sum_{k=l}^{k=K} (k)} \right] \dots \dots \dots \text{Eq 4.2}$$

where ORII (%) is the Overall weighted average percentage of Relative Importance Index per factor, which is calculated based upon total years of experiences of all grouped respondents together; k is the number that represents’ years of experience of grouped respondents (from first year of experience k= 1 to last year of experience k =K); i is the type of grouped respondents; and RII is the yearly experience percentage of Relative Importance Index of each factor, which is calculated separately for corresponding year (k) of grouped respondents experience and calculated by Eq. (4.1)

The attributes are arranged in ascending order of ranks, attribute with highest RII or rank 1 indicates that it has the maximum impact on the delay while the attribute with lowest rank indicates that it has the least impact on delay duration. The highest RII score is usually the most critical and is assigned a rank of 1 and the RII with the less score indicate the next significant and is assigned accordingly in a descending order. However RII doesn't talk about the relationship between the various attributes.

4.2.2.1. Analysis of Overall Relative Importance Index (ORII).

From the 74 delay factors identified by literature review, the twenty most and the twenty least factors which cause time delay in road construction projects from respondents' points of view have been ranked with their relative importance index as below. Accordingly, Slow land expropriation due to resistance from occupants / Slow site clearance, Delays in contractors progress payment by owner and Shortage of materials/Equipment's on site were ranked the first three and the most contributing factors respectively to time delay in road construction project of Addis Ababa city with all respondent category. And lack of technical professional in the consulting organisation, unqualified/inadequate experienced labor and political situation/instability were the least three contributing factors respectively to time delay in road construction project of Addis Ababa city with all respondent category. As seen from the overall rating table (4.3) below almost 40% and 35% of the factors ranked in the top twenty factors which cause time delay in road construction project of the city generated from contractor and owner/client related factors respectively whereas the remaining 25% factors are rated as from both consultant and external related factors.

Table 4.3: Overall RII ranking of top 20 delay causes.

Delay cause description	Related Group	ΣW	ORII	Rank
Slow land expropriation due to resistance from occupants / Slow site clearance	Owner/Client	369	0.945	1
Delays in contractors progress payment by owner	Owner/Client	340	0.878	2
Shortage of materials/Equipment's on site	Contractor	340	0.840	3
Difficulties in financing the project by contractor	Contractor	333	0.813	4
Delay to deliver the site	Owner/Client	326	0.811	5
Wrong or improper (poor) design	Consultant	325	0.810	6
Shortage (availability) in construction materials	External	322	0.808	7
Ineffective resources management by contractor	Contractor	320	0.802	8
Type of project bidding and award (negotiation, lowest bidder)	Owner/Client	320	0.797	9
Late delivery of construction materials	Contractor	319	0.797	10
Poor coordination of the owner with other parties.	Owner/Client	318	0.790	11
Poor site management and supervision by contractor	Contractor	316	0.790	12
Design changes by owner during construction	Owner/Client	315	0.790	13
Lack of coordination with sub-contractors	Contractor	314	0.789	14
Material and labor wage escalations (inflation)	External	314	0.779	15
Lack of integration with utility providers (Electricity, water and telecom)	External	309	0.777	16
Exchange rate (Price) fluctuation/economies	Contractor	308	0.775	17
Delay in approving major changes in the scope of work	Consultant	307	0.775	18
Improper project feasibility study	Owner/Client	301	0.775	19
Coordination problems with other parties	Contractors	300	0.775	20

Source: Own survey result

Table 4.4: Overall RII and ranking of the least 20 delay causes.

Delay cause description	Related Group	ΣW	ORII	Rank
Lack of consultant's site staff	Consultant	259	0.629	55
Often change of subcontractors	Contractor	258	0.620	56
Seasonal labors availability	External	257	0.615	57
Poor scope definition/ client's requirements	Owner/Client	254	0.611	58
Changes in laws and regulations, transportation delays	External	249	0.608	59
Poor communication and coordination of the consultant with other parties	Consultant	239	0.608	60
Inadequate progress review	Owners	237	0.608	61
Motivation, Low productivity of labor	External	236	0.607	62
Shortage of labor	External	228	0.602	63
Social, religions and cultural factors	External	225	0.602	64
Change orders by owner during construction	Owners	221	0.601	65
Unclear contract conditions/terms	Owner	220	0.593	66
Conflict, war, revolution, riot, and public enemy	External	219	0.591	67
Poor contract management	Owner	217	0.591	68
External work due to public agencies (utilities and public services)	External	217	0.584	69
Poor weather conditions	External	198	0.578	70
Bribes (kickbacks) & personal interest- "corruption"	Owner	197	0.530	71
Political situation/instability	External	195	0.527	72
Unqualified/inadequate experienced labor	External	190	0.516	73
Lack of technical professional in the consulting organization	Consultant	184	0.480	74

Source: Own survey result

4.2.2.2. Analysis of project delay causes by Project Parties

In order to assess the delay causes by each party independently, the contractors', consultants', and owners' data were separated and analysed individually. This process also facilitated determining the degree of agreement between each party's responses. The importance index was calculated for each party for all delay causes and the delay causes were ranked accordingly and shown on below table (4.5.and 4.6).

Table 4.5: Each group ranking of the top 10 delay causes.

Rank	Owners view		Contractors View		Consultants View	
	Delay cause description	RII	Delay cause description	RII	Delay cause description	RII
1	Delays in contractors progress payment by owner	0.95	Slow land expropriation due to resistance from occupants	0.93	Delays in contractors progress payment by owner	0.95
2	Slow land expropriation due to resistance from occupants / Slow site clearance	0.95	Mistakes and delays in producing design documents	0.89	Slow land expropriation due to resistance from occupants	0.95
3	Lack of coordination with sub-contractors	0.89	Delay to deliver the site	0.86	Lack of coordination with sub-contractors	0.89
4	Design changes by owner during construction	0.87	Loss of time by traffic control and restriction at job site	0.85	Design changes by owner during construction	0.87
5	Shortage of materials/Equipment's on site	0.87	Lack of integration with utility providers (EEPC, water and telecom)	0.84	Shortage of materials/Equipment's on site	0.87
6	Wrong or improper (poor) design	0.86	Difficulties in financing the project by contractor	0.83	Ineffective resources management by contractor	0.86
7	Type of project bidding and award (negotiation, lowest bidder)	0.85	Shortage (availability) in construction materials	0.82	Type of project bidding and award (negotiation, lowest bidder)	0.85
8	Obtaining permits from municipality	0.84	Poor coordination of the owner with other parties.	0.81	Obtaining permits from municipality	0.84
9	Exchange rate Price fluctuation/economies	0.83	Delay in approving major changes in the scope of work	0.81	Delay to deliver the site	0.84

10	Material and labor wage escalations (inflation)	0.82	Coordination problems with other parties	0.79	Poor coordination of the owner with other parties.	0.83
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Table 4.6: Each group ranking of the least 10 delay cause

Rank	Owners view		Contractors View		Consultants View	
	Delay cause description	RII	Delay cause description	RII	Delay cause description	RII
1	Poor contract management	0.58	Lack of consultant's site staff	0.56	Poor contract management	0.58
2	Unclear contract conditions/terms	0.57	Lack of technical professional in the consulting organization	0.56	Unclear contract conditions/terms	0.57
3	External work due to public agencies (utilities and public services)	0.57	Often change of subcontractors	0.53	External work due to public agencies (utilities and public services)	0.57
4	Changes in laws and regulations, transportation delays	0.57	Delay in approval of completed work by owner/client	0.50	Changes in laws and regulations, transportation delays	0.57
5	Poor communication and coordination of the consultant with other parties	0.56	Bribes (kickbacks) & personal interest- "corruption"	0.49	Poor communication and coordination of the consultant with other parties	0.56
6	Poor weather conditions	0.55	Social, religions and cultural factors	0.48	Poor weather conditions	0.55
7	Bribes (kickbacks) & personal interest- "corruption"	0.55	Poor government judicial system for construction dispute settlement	0.47	Bribes (kickbacks) & personal interest- "corruption"	0.55
8	Unqualified/inadequate experienced labor	0.49	Seasonal labors availability	0.47	Unqualified/inadequate experienced labor	0.49
9	Political situation/instability	0.48	Conflict, war, revolution, riot, and public enemy	0.46	Political situation/instability	0.48
10	Lack of technical professional in the consulting organization	0.44	Shortage of labor	0.42	Lack of technical professional in the consulting organization	0.44

Source: Own survey result

As seen from the table (4.5) above, the most important ten causes ranked by parties have organized and presented. Accordingly, the three most important causes in the overall results are indicated in boldface for better illustration. “Slow land expropriation due to resistance from occupants / Slow site clearance” was identified as the top cause of delay by all parties. These results show how this cause can greatly affect a project delay and suggest the importance of timely facilitating a right of way problem and relocation of utility which mainly considered as the main factor for slow site clearance of owner/client. However, the second most important cause in the overall result was “Delays in contractors progress payment by owner” and this factor also ranked in the first both with owners’ and consultants’ point of view while the same factor has been was not ranked as top 10 by contractors. ‘Shortage of materials/Equipment’s on site’ which ranked on third with overall result, has been ranked on fifth both with owners’ and consultants’ point of view where as it was not ranked in the top 10 factors by contractors point of view.

In addition, ‘Coordination problem’ is the common causes between all the project parties found in top ten (10) contributing factors to road construction project as per the survey result.

Table 4.7: Self Ranking of the top 10 delay causes.

Rank	Owners view		Contractors View		Consultants View	
	Delay cause description	RII	Delay cause description	RII	Delay cause description	RII
1	Delays in contractors progress payment by owner	0.95	Difficulties in financing the project by contractor	0.83	Wrong or improper (poor) design	0.80
2	Slow land expropriation due to resistance from occupants / Slow site clearance	0.95	Coordination problems with other parties	0.79	Mistakes and discrepancies in design documents	0.77
3	Design changes by owner during construction	0.87	Delay in commencement	0.77	Delay in approving major changes in the scope of work	0.76
4	Type of project bidding and award (negotiation, lowest bidder)	0.85	Shortage of materials/Equipment's on site	0.77	Rework due to change of design or deviation order	0.71
5	Improper project feasibility study	0.81	Late delivery of construction materials	0.77	Delay of design submittal from consultant	0.69
6	In sufficient data collection and survey before design	0.78	Ineffective planning and scheduling of project by contractor	0.77	Unrealistic (unreasonable) contract time (duration)	0.67
7	Delay to deliver the site	0.77	Poor site management and supervision by contractor	0.75	Lack of consultant's site staff	0.66
8	Poor coordination of the owner with other parties.	0.76	Ineffective resources management by contractor	0.75	Lack of experience of consultant in construction projects	0.62
9	Slowness of the owner decision making process	0.76	Poor subcontractor performance/delays	0.72	Inspection delays (delay in performing inspection and testing)	0.61
10	Delay in approval of completed work by owner/client	0.76	Reworks due to defects/ in construction materials	0.64	Poor communication and coordination of the consultant with other parties	0.56

Source: Own survey result

4.2.3. Tests of agreement on causes of delay among project parties

The agreement between parties or survey respondents has been addressed with Spearman rank correlation coefficient among ranks. The value of Pearson's correlation coefficient ranges from +1 perfect correlation to 0 no correlation to -1 perfect negative correlation. Spearman rank correlation coefficient was calculated according to the following formula (Assaf and Al-Hejji 2006)

$$\text{Spearman rank correlation coefficient} = 1 - \frac{6\sum d^2}{n^3 - n}$$

Where d =difference between the ranks indicated by two parties, and
 n =number of records.

Accordingly the Spearman correlation coefficient of the survey has been conducted among the road construction parties (owner/client, Contractor and Consultant) and the result shown on below table (4.8).

Table 4.8: Spearman ranking correlation among the respondent group.

		Owners rating	Contractors rating	Consulting rating
Owners rating	Correlation Coefficient	1.000	.329	.961
	N	74	74	74
Contractors rating	Correlation Coefficient	.329	1.000	.337
	N	74	74	74
Consulting rating	Correlation Coefficient	.961	.337	1.000
	N	74	74	74

**, Correlation is significant at the 0.01 level.

Output of SPSS 20, August 2019

The results of the correlation between owner and contractor, owner and consultant, and contractor and consultant were 0.329, 0.961, and 0.337, respectively. The results obtained from Spearman rank correlation coefficient, the degree of agreement between owner and contractor is 0.329 which is low when it is evaluated with the agreement of owner and consultant. The Spearman rank correlation coefficient shows some sort of agreement between the parties was 0.961 with consultant and 0.329 with contractor.

Generally, these results show a low correlation between the owner and contractor, which resembles the conflicting views, and thus opposing views between these parties. However, there was a good agreement between the consultant and owner. Within the construction of projects, the position of the consultant might be seen as more favourable to the owner, because of the contractual relationship between them. But could be interpreted as impartial view of the consultant between the contractor and the owner as the correlation with owner is high and but low with construction. Though, the findings of the study may be a true representation of what is prevailing in the road construction projects in the city and may even be helpful to the concerned bodies, the researcher does not seek to generalize the results.

4.3. Case studies

4.3.1. Project I

Table 4.9: Summary of Project I case study.

Project start date: October 01, 2015			
Project Close out date: October 01, 2016			
Project Duration: One year project.			
Number of Extension of time (EOT): Three times – 439 days (117, 119, 203 days)			
Project time overrun: Almost two years (200%)			
Current Project status: 96% (As of July 2019)			
Time claim (EOT) Summary:			
Time Claim (EOT)	Number of days		Reason of the extension
Extension of Time 1:	117	117	Right of way problem (ROW)
Extension of Time 2:	119	43	Delay due to late site delivery
		76	Delay due to addition work order or Rework due to change of design or deviation order
Extension of Time 3:	203	61	Delay due to late renewal of Right of way problem
		4	Delay due to adverse weather condition
		24	Delay due to late decision
		16	Delay due to addition work order or Rework due to change of design or deviation order
		98	Delay due to special circumstances
Total Claim days	439 calendar days		

Source: - EOT request document review

As summarized on above table (4.9), the project contract reveals that October 01, 2015 was the start date of the project with 2 km length from and the project duration was for one year which mean the project was expected to be completed and closed out on October 01, 2016. However, the project was started almost at mid of 2016 with right of way problem (ROW), the problem of not timely diverting a water pipeline found on the road and late site delivery as stated on the summary above. In addition of contractor poor performance and design problem experienced during the implementation, addition work order or Rework due to change of design or deviation order, late decision, addition work order or deviation order were a compensable delay as the cause of the delay were owners and external factors related to site clearance.

4.3.2. Project II

Table 4.10: Summary of Project II case study.

Project Name: Lideta Tsebel – Bulgaria Mazoria -Meskel flower road project.		
Project commencement date: July 17, 2012		
Project Close out date: July, 2014		
Project Duration: Two year project.		
Number of Extension of time (EOT): Five times (EOT 1-365 calendar days , EOT 2-264 calendar days, EOT 3-457 calendar days, EOT 4-335 calendar days, , EOT 5-215		
Project time overrun: About 1,636 calendar days		
Current Project status: Almost accepted (July 15, 2019 was expected as completion date)		
Time claim (EOT) Summary:		
Time Claim (EOT)	No. of days	Reason of the extension
Extension of Time 1:	365	Delay due to late site delivery
		Right of way problem (ROW)
Extension of Time 2:	264	Delay due to addition work order or Rework due to change of design or deviation order
Extension of Time 3:	457	Unresolved Right of way problem
		Delay due to adverse weather condition
		Utility relocation
		Delay due to addition work order or Rework due to

			change of design or deviation order
			Delay due to special circumstances
Extension of Time 4:	335		Unresolved Right of way problem
			Delay due to adverse weather condition
Extension of Time 5:	215		Late approval of Utility Unit Rate
			Utility relocation
			Lately signing of supplementary agreements (Ethio telocom, and EEU civil works)
			Delay due to Right of Way problem Section II
<i>Total Claim days</i>	<i>1,636 calendar days</i>		

Source: - EOT request document review

As summarized on above table (10), the project contract reveals that July, 2012 was the start month of the project with 5.8 km length and the project duration was for two year which mean the project was expected to be completed and closed out on July 01, 2014. However, with various delay factors, five times Extension of time were given for the contractor. These delay factors varies from contractors related factor to external related factor given the owner related factors particularly a right of way (ROW) problem of the project had been the base for the delay of the project. As summarized above, in addition of contractor poor performance and design problem experienced during the implementation, addition work order or Rework due to change of design or deviation order, late decision, utility relocation, addition work order or deviation order and late approval were a compensable delay as the cause of the delay were owners and external factors related to site clearance and Delay due to adverse weather condition.

Summary of Key Implications of Case Studies: The two project cases imply that there is significant schedule delay problem. The first project had time schedule overrun for more than 200% of planned project duration as seen from the table (9) summary while the second project had more than 224% of the planned project duration as seen from the table (10) summary. As a main reason for the time delay of the projects;- Right of way problem (ROW), Delay due to late site delivery, Design problem experienced during the implementation, Addition work order or Rework due to change of design or deviation order, late decision, utility relocation, addition work order or deviation order and late approval were among the problems identified. A when it

is viewed with the survey result, this is in similarity with the finding from the survey result that has revealed popularity of significant delay problem in road construction projects as a result of Slow land expropriation due to resistance from occupants / Slow site clearance, Delays in contractors progress payment by owner (late decision), Delay due to late site delivery, and the like as summarised by their Overall relative importance and ranked. In projects of the case studies, problem of delayed payment and delayed designs are raised as issues for claiming additional project time. These two factors are also among the major delay factors identified by the research study even though their rank of importance is different in the research and in the case studies. In summary finding from the research study has implication of relevance when compared with the actual project case studies.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Following the deep literature review and the research data analyzed, the major factors that affect project time delay were identified and presented in the previous chapters. Then on this basis, this last chapter summarizes the main findings and draws a recommendation for the study. This is with a strong belief that delays could be minimized only when their causes are identified. Knowing the cause of any particular delay in a construction project would help avoiding the same. This project was therefore, aimed at identifying the major causes of delays in road construction projects in Addis Ababa through a survey and case study, and quantifies the perceptions of different parties relating to causes of the delay.

With a literature review, 74 factors related to project time delay have been identified. A combination of questionnaires survey and case study (project extension time document review and interview) has been used to provide helpful evidence on road construction project time delay. And with a descriptive analysis the factors have been ranked using an overall relative importance index. Spearman rank correlation coefficient has been employed to test the agreement of the grouped respondents (clients, consultants, and contractors).

Then based on the results of the questionnaire survey, information gathered from the case study undertaken and literature review, the following finding have been drawn. But even the findings of the paper may be a true representation of what is prevailing in the road construction projects in AA and may even be helpful to the concerned bodies, the researcher does not seek to generalize the findings.

With Overall Relative Importance Index (ORII), Slow land expropriation due to resistance from occupants / Slow site clearance which is termed as Right of way problem (ROW) in the industry, Delays in contractors progress payment by owner, Shortage of materials/Equipment's on site, Difficulties in financing the project by contractor, Delay to deliver the site, Wrong or improper (poor) design, Shortage (availability) in construction materials, Ineffective resources management by contractor, Type of project bidding and award (negotiation, lowest bidder), and

Late delivery of construction materials were the top ten (10) factors that contribute to road construction project time delay in the city according to the respondent's point of view.

Respondents have also forwarded the following delay causing factors with open-ended questionnaire, besides the ranking factors. These are: Design problems, ROW (Right of way) problem and Lack of material supply on time, design problem, machinery problem, change in design, Selection of insufficient contractor, delay in payment of executed work, delay in design approval, inadequate site investigation before the project started, Lack of integration with utility providers, lack of Proper planning (planning at procurement stage/both design and supervision, consultant selection, design stage and implementation stage).

With all the data collected through survey, case study and open ended questionnaire, Right of way problem, design related problem, lack of integration with utility providers, delay in payment of executed work, Shortage of materials/Equipment's on site, and Delay to deliver the site were the common factors that respondents have pointed out as the main cause of road construction project time delay.

With the results obtained from Spearman rank correlation coefficient, the degree of agreement of contractors with owners and consultant were low on ranking of the factors for project time delay which could be interpreted as either low common understanding on the degree of the factors affecting project time delay, poor communication among the parties or lack of frequent progress review of the projects with the parties. Whereas the degree of agreement of between owner and consultant was good even though within the construction of projects, the position of the consultant might be seen as more favorable to the owner, because of the contractual relationship between them. But could be interpreted as impartial view of the consultant between the contractor and the owner as the correlation with owner is high and but low with construction. Though, the findings of the study may be a true representation of what is prevailing in the road construction projects in the city and may even be helpful to the concerned bodies, the researcher does not seek to generalize the results.

With the ranking of factors by each group of respondent separately, 'Coordination problem' is the common causes between all the project parties found in top ten (10) contributing factors to road construction project ranking of respondent groups as per the survey result.

5.2. Recommendation

On the basis of the conclusion drawn from the finding of the data analysis, constructive recommendations forwarded as possible actions that can help manage the factors.

- A long term strategic integration and planning is required with utility providers to overcome the delay factors that arise as a result of utility relocation.
- In case of design change, Owner may demand some design changes during construction but such design change needs to be optimized to a limit having no adverse effect on the activities on the critical path.
- Since there are many parties involved in a project and dependency level of the projects could be high, communication and coordination with other parties are very crucial factors to achieve the project on time. Effective communication can alleviate most of delay factors. Proper communication and coordination channels between various parties should be established during each phase of construction. Any problem with communication may result in severe misunderstanding and delays in execution of the project.
- 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.
- Owner should be as fast as possible in decision making in order not to hinder the work to complete the project on time. In order to do this proper/effective communication channels and timely progress review of the project performance needs to be done. In addition, a structural responsibility needs to be considered in the organization.
- Detailed studies need to be carried out to estimate the probability of delay (which is very important on project success and should be carefully taken into account before bidding stage) in construction projects by developing and utilizing the findings of this study.

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