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Assessment of Time and Cost Performance Evaluation of Ethiopian Construction: A Case Study of Addis Ababa City Road Authority

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June, 2020
Addis Ababa, Ethiopia

ASSESSMENT OF TIME AND COST PERFORMANCE EVALUATION OF ETHIOPIAN CONSTRUCTION: A CASE STUDY OF ADDIS ABABA CITY ROAD AUTHORITY

BY
HENOK ASRAT

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APPROVED BY BOARD OF EXAMINERS

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DECLARATION

I hereby declare that this thesis entitled “Assessment of time and cost performance evaluation of Ethiopian construction: a case study of Addis Ababa city road authority” was composed by myself, with the guidance of my advisor, Dr. Abdurazak Mohamed, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has not been submitted, in whole or in part, for any other degree or processional qualification.

Henok Asrat Signature _____

St. Mary’s university, Addis Ababa June, 2020

ENDORSEMENT

This thesis has been submitted to St. Mary‘s university school of graduate studies for examination with my approval as a university advisor.

Abdurazak Mohamed (Dr.) _____

Advisor signature

St. Mary’s university, Addis Ababa June, 2020

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ABSTRACT

The road project is said to be success full, if it meets time, cost, and quality as per the need of the client and stakeholders. In order to achieve these targets, effective assessment of time and cost performance is should be present and given due attention. If not, risk may appear in many ways and could result in time and cost overrun, financial losses, loss of life, environmental damage, material expenditure and many more failures

The delivery of road construction projects in Ethiopia is affected by non-optimum performance. With this poor performance of the delivery of construction projects as the instigator, this study set major objectives of exploring the past and current practices of the performance of Addis Ababa road construction project.

The study design is descriptive research. Both primary and secondary data were collected by using questionnaire and review of previous documents. The primary data was collect through a well-structured questionnaire which is distributed to owner (AACRA), contractor and consultant and different professionals and experts who work in those sectors. Literature review about performance evaluation is review to identify the factors affecting the performance of road construction projects.

Accordingly, this study attempts to identify the major causes of poor time and cost performance of Addis Ababa road project, consequential impact in the Ethiopian road construction industry; which can use as the way forward for future work in coping with this performance problem. A thorough literature review and desk study was done, through which a number of time and cost performance factors were identified in international and national construction industry sector.

Therefore, this research try to assess the cause of poor time performance and budget overrun which mainly showed by contractor, consultant and contractor on Addis Ababa city road project of different area

The Maine purpose of the study is to assess the cause of time delay and cost overrun of Addis Ababa road projects. The major finding is include the road project of AACRA have time delay and cost overrun, identified client, consultant, contractor and external environment related factors that resulted on cost overrun the client is recommended to solve problems associated with delivery of the site (right of way problem), award to list bidder as soon as possible, revise the scope of the project before implementation, and improve weakness in payment and finance problem. Also consultant and contractor recommended improving their experience.

Key words: AACRA, project, client, consultant, contractor time delay, cost overrun

ABBREVIATION

AACRA	Addis Ababa City Road Authority
ADB	African Development Bank
BADEA	Bank of Arab for Economic Development Of Africa
BC	Building Contractor
CRDP	City Road Development Program
DBB	Design Bid Build
EB	European Bank
ERA	Ethiopian Road Authority
ETB	Ethiopian Birr (Ethiopian Currency)
EU	European Union
FID	Fund for International Development
GC	General Contractor
GDP	Gross Domestic Product
IHA	Imperial High Way Authority
KPI	Key Performance Indicator
NMT	None Motorized Transport
NRA	New Zealand Road Authority
OAU	Organization of African Union
RC	Road Contractor
UN	United Nation

CHAPTER ONE

INTRODUCTION

1.1.Introductions of the study

Construction industry which is the leading industry in local economy has also become one of the leading sectors in international economy. Approximately 8% of the global gross domestic product (GDP) depends on construction industry (MEGARON 2014). This indicates the degree of importance of the construction industry in international economy. Constructing infrastructure has been an aspect of life since the beginning of this world and existence of human being. Currently, the construction sector is leading and expected to spearhead development and industrialization in Ethiopia, besides to modernize the livelihood of the people in the sector. Construction industry, because require a lot of labor being the largest employer in the country, it is also an engine for technology, innovation and overall development

Road is an essential infrastructure constructed by own government, aid by foreign government or private sector to provide transport services of vehicles and pedestrian for passengers and goods movement safely from one place to other for people requirement.

The road project is said to be success full, if it meets time, cost, and quality as per the need of the client and stakeholders. In order to achieve these targets, effective assessment of time and cost performance is should be present and given due attention. If not, risk may appear in many ways and could result in time and cost overrun, financial losses, loss of life, environmental damage, material expenditure and many more failures.

Despite the current good performances, Ethiopia's infrastructure is among the least even it compared to Sub-Saharan Africa. In this regard, for comparison purpose, based on a 2010 data, the African Development Bank's Infrastructure Index puts Ethiopia at 52 out of the 53 African states (ADB, 2011). Therefore Ethiopia require infrastructure which is fit to the growing number of population as well as to bridge up with modernization.

Even if many local contractors are available in Ethiopia, most of the roads are constructed by foreign contractors, mainly Chinese contractor. This is due to most of the road project in Addis Ababa are budget is fully or partially supported by government of china itself. Local contractors are work with Chinese and other foreign contractors by taking works as sub-contracting from those prime contractors.

The construction sector is an important part of any economy country. Infrastructures delivered by the construction sector and its key allies impact economic growth. Construction, which has the responsibility of making, defining and maintaining the built economy within which most other social and economic activities carried out (Morton, 2002; Cain, 2003) is one of the most important ways in which societies create new values (Winch, 2002). The industry provides society with delivery mechanisms for many aspects of economic, social, political, environmental needs making its products essential to mankind's physical and daily works.

Furthermore, the industry gives significant amounts of fixed investment, contributes considerably to national outtake and is a amine source of employment, directly and indirectly through its multiplier impact (Walker and Flanagan, 1991). In this regard, in most countries, construction constitutes more than half of capital investment, contributes up to 10% of GDP and accounts for almost 28% of all industrial employment (Winch, 2002; CSIR, 2003). In addition, due to its multiplier effect, construction contributes towards employment in other industrial sectors. For example, according to the SECTUER Study quoted in COM (1997), in the European Country, one job created in the construction industry will be associated with two further jobs in other industry.

In quick developing countries, the use of construction to the economy is believed to be better than the global average (Winch, 2002). For such countries, mainly due to its multiplier effect and being interlinked with various other sector and disciplines, construction is claimed to be the Maine tool, mostly next to agriculture in most developing nations, to apply conventional Keynesian economic theory1 (Hillebrandt, 1974; Ball, 1998) in triggering/controlling economic growth.

The major malaise of construction works are associated both with the structure (including the temporary nature of projects) of the industry and the processes (as manifested by the inefficient execution of the various processes associated with the delivery). To remove these inefficiencies, construction is advised to look into and optimize both its structure and the processes (both the conversion and flow processes) it uses in delivering output. To this end, construction is advised to re-engineer its processes and change the way it does business (Koskella, 2000).

Different attempts have been performed to combat construction's inefficiencies and ineffectiveness. For example, different handover mechanisms like the design-build, construction management have been adopted as means of counteracting the problems of the sequential design-bid-build handover system; partnering form of supply chain relationships have been advised and implemented as a means of decrease the adversarial relations between the parties involved in construction delivery.

1.2.Back ground

In Ethiopia, construction works can be developed at the modern day of Axum town. Since then, in addition to people's house constructions, ranges of primarily palaces and monuments such as the Axum Obelisques, the Lalibela Rock Hewn Churches, the Gondar Palaces, the Harar Walls, axumtsion church, mosque had been build and erected in a widely spaced geographical locations and chronological times.

'Modern' construction, however, had started during the reign of Emperor Menelik II (1866- 1913). Though there had been various construction works before him (ERA, 2001), sustainable construction works, especially infrastructure works such as the Addis Ababa – Asmara road, Addis Ababa-Djibouti Railway, rail way station, palace of the emperor and government officials were implemented during his reign.

In 1951 imperial High way authority was established and initiate to improve Addis Ababa while Ethiopian road.The establishment of the Imperial Highway Authority, (IHA) in 1951 marked the institutional beginning of state-led road construction in Ethiopia. It was established by an imperial proclamation (No 115/1951) as an autonomous governmental agency under the Ministry of Public Works and Communication. Since the establishment of IHA, it initiated several Highway Programs to improve and modify the Ethiopian road network. From the year of establishment in 1951, the organization asses to undertake various physical and policy activities.

"Addis Ababa, the capital city of the Federal Democratic Republic of Ethiopia, is located in the middle of the country. Established in 1886, the city has practiced many planning changes that have influenced its physical and social growth.. It is where the African Union and its predecessor the OAU are based. Addis Ababa is therefore often referred to as the political capital of Africa, due to its historical, diplomatic and political significance for the continent which is the consequence of the foundation of African union in Addis Ababa. The city is gathering different people from different regions of the country and also neighbor countries like Eritrea.Addis belonging to severalvariety of religious communities. "Addis Ababa lies at an altitude of 7,546 feet (2,300 meters) and is a grassland biome, located at 9°1′48″N 38°44′24″E9.03°N 38.74°E9.03; 38.74Coordinates: 9°1′48″N 38°44′24″E9.03°N 38.74°E9.03; 38.74. The city lies at the foot of Mount Entoto. From its lowest point, around Bole International Airport, at 2,326 meters (7,631 ft) above sea level in the southern periphery, the city rises to over 3,000 meters (9,800 ft) in the Entoto Mountains to the north

The area of Addis Ababa is 530.14 square kilometers. Its current population is about 6.5 million (2019 estimate), about 6.01 percent of the population of Ethiopia. It also represents about 37 percent of the urban population of Ethiopia. Addis Ababa has an aggregate population density of 2784.3 persons per square kilometer

About 60% of the total vehicle of Ethiopia is found in Addis Ababa, The road network of Addis Ababa is limited in extent and right of way. Its capacity is low, on-street parking is prevalent due to lack of parking area, and the asphalt condition is poor in quality. Despite a large volume of pedestrians, there is no pedestrian way over a large length of the roadway network. Even if compared with other countries Addis Ababa has small amount of vehicle in the city, but due to there is no modernized road, high traffic jam is shown daily, as a result an average of 4hr is spent on the way of the city. Currently the administration of Addis Ababa city, by collaborate with Chinese government several road infrastructure are launched in different area of the city.

As a measurement to allow contractors to meet the eligibility criteria for pre-qualification. Specially to fulfill the expected criteria on the past experience, equipment availability and as well capable financial status (Anon, RSDP II, 2005).

In addition to that road sector development program in Ethiopia also shows that the performance of contractors is not that much on projects that are not committed to the contractual period, cost and quality and as well not to meet client standard. This in turn hinders the development of road construction in Ethiopia that limits the involvement of local contractors in construction while the foreign contractors win projects with much expensive contract price. Same, as indicated in Addis Ababa City Road Authority (AACRA) previous years‟ annual report most of local contractors are moving out of the road construction sector as they face challenge related to low performance (AACRA Annual report, 2014).

To alleviate this challenge, AACRA introduced risk guarantee system. This risk guarantee shall be submitted by all local contractors named as “Contractors all Risks”. This give contractors the chance to prolong their contracts rather than termination and encourage local contractors to stay in the sector (AACRA report, 2005). However, some of the contractors engaged the program never shown progress and evidenced behind contractual commitment. Therefore, this research will investigate the failure of this risk management system, in this case scenario.

Moreover, in ERA for RSDP the government awarded 14 rural road projects in 1995 with 20% advance payment to different local contractors in order to build their capacity. These contractors have been given the advance without submitting collaterals in terms of the aim for enhancing their capacity. Even government supported them

(as stated in the above), most of the contractors‟ performance was found low and some contractors have dropped out of the sector.

1.3.Statement of the problem

Effective performance of road infrastructure projects is important for countries growth and development. Successful construction industry plays essential role for a country's economic development. The construction industry plays important role in the economy of developing countries like Ethiopia. For example, in many developing countries, major construction activities account for about 80% of the total capital assets, 10 % of their GDP, and more than 50% of the wealth invested in fixed assets. In addition, the industry provides high employment opportunity, probably next after agriculture. E. Achuenu, (2013)

The construction sector is undoubtedly a national asset whose development ought to reflect the growth and transformation of a wider people. Also, a countries economic development is influenced by the physical infrastructure that is delivered by the construction sector and its main participants. Due to this, it is imperative that the construction industry needs to improve its capacity and delivery way to meet social and economic development. Besides, as large amounts of resources are required/or involved in infrastructure work.It is important to explore if the method put in place and the step adopted are valid in achieving the targeted objectives. In this sense, the Ethiopian construction industry is said to harbor many inefficiencies and ineffectiveness in its delivery system and processes (SMEC, 1999; MoWUD, 2001; ERA, 2009). This bad effectiveness affect the country's resources, as it means, with others, allocation of additional resources required to implement the projects, a necessity to maintain infrastructure before their due period and not delivering the intended purpose the projects are incepted for.

The objective of well-constructed road is to form the traffic activity and road transport safe, secure, fast ,good atmosphere, orderly and regular, comfort and efficient, integrated with other modes, accessible by all land region and support fair distribution, growth and stability to drive vehicles , to motor and to support national development and growth with nearby cost by society.

Addis Ababa city road authority (AACRA) Road Sector Development mentioned that a delay in work projects leads to budget increases and delay in benefit of the project to the country. Those projects which are handled by local and foreign contractors are exposed to cost and time overrun and there are various reasons for this.

Therefore, this research was assess the cause of poor time performance and budget overrun which mainly showed by client, consultant and contractor on Addis Ababa city road project of different area and indicates measurements for fill the gap of cost and time performance of Addis Ababa road projects

The researcher sought to fill in this gap, by studying those challenges, which are associated with AACRA project to be able to adopt the right approach in limitation of the problem. It is from this perspective that the study focused on assessing the challenges of low performance of the three stakeholders client, consultant and contractor.

1.4 Research questions

This study answered the following general questions:

- What is the cause of low performance of roads construction projects in Addis Ababa roads construction Enterprise?
- What are factors which is cause for cost overrun of roads construction projects in Addis Ababa roads construction Enterprise?
- What are factors which is cause for time delay of roads construction projects in Addis Ababa roads construction Enterprise?

1.5 Objective of the study

1.5.1 General objectives

The general objective of this study is assessing time and cost performance evaluation of Ethiopian construction, mainly the road project of Addis Ababa city

1.5.2 Specific objectives

The specific objective of this study include the following

- To assess performance of roads construction projects in Addis Ababa roads construction Enterprise;
- To identify factors causing cost overrun in roads construction projects in Addis Ababa roads construction Enterprise; and
- To identify factors causing time delay in roads construction projects in Addis Ababa roads construction Enterprise.

1.6 Significance of the study

A study on road project of time and cost performance will lead to a better understanding of the root causes of inefficiency in road construction projects. Once the most significant cost overrun and delay causing factors are identified, the stakeholders of the projects shall then be able to channel their energies and deploy resources to remove the specific limiting factors and thereby reduce delay to the projects. Therefore, the outcome of this study was expected first to present the extent of time delay and cost overrun problems of road construction projects in Addis Ababa city, and second to enable the concerned authorities to make informed interventions for improved implementation of road projects in Addis Ababa. This study is significance to asses and evaluates the performance of time and cost of Addis Ababa road project. Road construction is important because roads are the blood vessels which able to provide to economic growth and development.

1.7 Scope and limitation

1.7.1 Scope of the study

The Respondents of this study were restricted to the roads owner, consultant and road contractor who were involved in road construction projects in Addis Ababa city road authority (AACRA). The specific project survey targeted selected road projects constructed by the client of AACRA; the contractor may local contractor and also foreign contractor that had been completed within the past five years (during the years 2014-2019 G.C).of different area of Addis Ababa including the ongoing projects.

Table 1.1 location and size of different road project of AACRA

No	Name of the project	Size of the project	Contract amount(birr)	Contract period(day)
1	Arabsa condominium to Hayat condominium	3.3 km long and 30m width	178,235,214.32	455
2	CMC to Hayat	2.1 km long and 20m width	115,436,657.54	485
3	Gerji to ethio parent school	2.4 km long and 15m width	136,167,653.89	389
4	Djibouti embassy to sumit	1.9 km long and 18m width	98,654,321.43	240
5	Haile garment to jemmo3	4.5 km long and 12m width	573,896,365,74	365

6	Kalitigumruk to total	6.5 km long and 20m width	794,874213.21	605
7	Askoadissefer to birchiko condominium	3.7 km long and 15 m width	176,874,216.36	545
8	Medhanialem square to rufaelchurch	2.9 km long and 18 m width	135,673,984.21	605
9	Bole mickael ring road to bulbulacabe district	5.5 km long and 30m width	1,210,547,87.3	730
10	Autobistera to kolfe sub city	3.4 km long and 40mwidth	748,976,432,13	365
11	Tilahungesese square to gazebo square	1.1 km long and 10m width	242,876,145.54	365
12	Pushkin adababay to gotera	3.8 km long and 40 width	847,894.231.37	365

1.7.2 Limitation of the study

Because of the limited time and budget available for the research, lack of research studies and in accessibility of to get all relevant information from respective offices as a primary data, lack of secondary data which is done in the previous research are limitations compelled the study, at times, to rely on secondary data/ study. It also forced the study to concentrate on broader contexts such as presenting overall project life cycle in detail

1.8. Organization of the study

Chapter one provides an introduction of the study by highlighting the background of the study, statement of the problem, objectives, research question, scope of the study, limitation of the study and significance of the study. Chapter two reviews related literature on project closure in the construction project. Chapter three explains method / methodology:-This chapter gives an overall view of research methodology for the research and includes the method of data collection and questionnaire type, while chapter four presents the data analysis:-This chapter focuses on analyzing collected data and discussing the findings. It contains the analysis of the information gathered through the questionnaire, and document review survey, identifies the challenges of project performance in AACRA and analysis that support the recommendation and conclusion of the study. Chapter five concludes the study by summarizing the findings and providing recommendations thereof.

CHAPTER TWO

Literature review

2.1 History of Addis Ababa city road

Addis Ababa city was founded by Minellik II and Empress Taitu in 1886. The history of the city‘s road development also begins from the inception of the city.

Minellik II constructed the first ever two roads in the city as well as in the country that stretch from Addis Ababa to Addis Alem and from his palace to British embassy in 1902. In 1904 the first roller was imported by the Emperor and was pulled by many people for its operation. Emperor Minellik was also believed to be the first in importing cars in Addis Ababa and introduced the car technology in the city for the first time in 1907 E.C. The country’s modern road construction in general and Addis Ababa in particular is highly interlinked with Emperor Haile Sellase’s ruling period. During the regime of Haile Sellase a number of contractors were organized to carry out road construction.

The first agency to be established by the Government to construct roads was the Public Works Department. It was established to construct roads in Addis Ababa and in its surrounding. After a few years this Department was raised to a ministerial level and Addis Ababa also got the chance to establish its road development organizational structure.

When it was decided for Addis Ababa to have a mayor and a council in 1942, the city roads construction and maintenance was organized under the municipality. To fulfill the road construction activities together with building works, the “Road and Building Works” Department was established. This Department stayed till the replacement of the Haile Sellase regime by the Derge regime performing its duties. But no fundamental organizational change of the department was observed during the Derg regime.

In 1993 the existing government established regional governments and gave them power to administer their regions with autonomy. During this time Addis Ababa was also established as one of regions. The Addis Ababa administration during this period established the “Bureau of Works and Urban Development” and the bureau organized a department under it to carry out the road construction and maintenance works. The newly established road department constructed and maintained the City’s roads till the establishment of the Addis Ababa City Roads Authority in march 15,1998 by regulation no 7/1998 to be administrated by board of directors to construct,

maintain and administer the road works in Addis Ababa by the city administration. The total length of roads constructed in the city till the establishment of the authority in March 15, 1998 was 1300km of which 900 km was gravel road and the remaining 400 km was Asphalt surfaced road. The Addis Ababa City Roads Authority has done remarkable progress in the city roads expansion and upgrading in the last 11 years since its establishment.

A significant share of the urban growth is taking place in large cities like Addis Ababa. Especially, the number of conglomerates with more than 5 million inhabitants will grow. Middle and low income countries show the highest urban population increase, especially in Sub Saharan Africa. Despite some economic benefits, the rapid urban growth in developing countries is outstripping the capacity of most cities to provide adequate services for their citizens (Cohen, 2004). A high urbanization rate in combination with the intense desire for car ownership in developing countries causes a rapid growth of motorization .On the other hand, a lack of infrastructure and weak road network maintenance put extra stress on growing traffic flows with congestion, pollution and a low road safety level as a result.

Improved mobility in urban areas in developing countries is possible by building new infrastructure. However, this is a long term and expensive solution also transport is a key requirement for economic and social development to take place. The lack of it causes isolation, backwardness and poverty. So, this improvement of constructing new roads and urbanization must be evaluated frequently.

2.2 Theoretical literature reviews

2.2.1 The role of road for transport service

The transport sector is a key enabler of economic growth and transition in the region. By providing the physical networks and services upon which the economy and society depend for the movement of people and goods, transport increases the access of businesses and consumers to markets and services, promotes economic diversification and regional integration, supporting growth of the wider economy (European Bank, 2013)

From a social perspective, transport supports individual mobility so all people can benefit from access to essential public services such as health and education, and access to labor markets, which can also have important implications for economic inclusion and gender equality. It is also an enabler of international trade – in the modern global economy, no nation is self-sufficient, each relies on goods produced elsewhere – and transport provides the means for emerging markets to integrate into the global economy. This integration creates opportunities for businesses in the region to expand and develop, thereby supporting job creation. (European Bank, 2013)

Amare has mentioned that transport infrastructure is generally considered as an essential element for economic and social development as it provides the links required to make markets function. The development of economically vital sectors such as agriculture, industry, tourism, etc. is directly dependent on the existence of a working transport infrastructure system.

Transport is a key enabler of growth, providing the physical networks and services upon which the economy depends for the movement of people and goods. By connecting areas of economic activity within a country, transport increases access to markets and services. From a social perspective transport provides the individual mobility, that is critical for the people of the region, in terms of access to markets and essential services such as health and education. The provision of efficient, safe and sustainable transport is therefore fundamental for economic growth and the development of well-functioning markets.

Transport is also an enabler of international trade. In the modern global economy, where no nation is self-sufficient, transport is key to trade development, providing the means for emerging markets to integrate into the global economy. Export access is crucial for the companies in the Bank's region, increasing and maximizing opportunities for expansion and economic development.

The transport needs of the region have changed dramatically from the previous era when these countries were largely insulated from the global economy. Since then, new patterns of trade have developed, and the region now exports a significant proportion of its good and services (European Bank, 2013).

Nevertheless, despite large investment programs in many countries, the investment needs remain vast, as the existing transport networks are inadequate to support the economic aspirations of the region. Infrastructure which promotes national integration, linking suppliers with consumers and balancing national economies; and trade facilitation, integrating the countries of the region into the regional and global marketplace remains a priority. Much also remains to be done to advance sector reform, which often requires a deep and lengthy engagement with the public sector. (European Bank, 2013)

2.2.2 Current Trends in Road Provision

In recent decades, governments around the world have embraced mixed road provision strategies in which the role of private companies has been greatly enhanced. The rising cost of building and maintaining public road infrastructure has led governments in western nations such as New Zealand and developing economies like Singapore to consider public-private partnerships as a solution to road funding crisis. The shift toward the

treatment of roads as a private good has triggered opposition from some road users who have become accustomed to publicly funded roads and feel they are being charged to use infrastructure that has already been paid for through taxes. Governments argue that private roads that are built parallel to public roads serve to augment, rather than replace the existing road network.

The increasing ubiquity of toll roads and bridges raises the question of whether privatization will be limited to the provision of alternative routes and new infrastructure works that are prohibitively expensive for local, regional or national governments to provide on a public basis. The following review of articles and documents explores road policy and funding considerations at various institutional levels in North America and offers insight into the rationale for the shifting approach to roads. Due to the lack of explicit policy information in some jurisdictions, literature detailing the road financing regimes in place or under consideration is examined to provide an overview of current trends in the treatment of roads as a "public" or "private" good.

2.2.3 Time constrained of road project

Delays in construction projects are very common in most parts of the world even with the introduction of modern management techniques. Studies conducted on the causes of construction project delays in different countries of the world have been examined. A study carried out an investigation into factors causing construction project delays in MsafiriAtibuSeboru (2015) by Talukhaba (1999) in Kenya, and Assaf, et al. (1995) studied the causes of delay in large building construction projects in Saudi Arabia found out that the major causes of delay were: client's payment, architect's instructions, client's instructions, unexpected physical features (rock terrain, underground water, conflicts in work schedules of subcontractors, and slow decision making and executive bureaucracy in the owners' organizations. Al-Tabtabai (2002) shared the same added limited authority among supervision staff. MsafiriAtibuSeboru (2015) stated that El-Razek, et al. (2008) conducted a study on causes of delay in building construction projects in Egypt and found non- utilization of professional construction/contractual management as additional causes of delay in addition to Talukhaba (1999), Assaf, et al. (1995), Al-Tabtabai (2002). Mansfield, et al. (1994) studied the causes of delay and cost overruns in construction projects in Nigeria and the results showed that the most important factors were: financing and payment for completed works, poor contract management (lack of experiences on contractor administration), materials shortages, and improper planning. Memon, et al. (2012) conducted a study on time and cost performance in construction projects in Malaysia and Owolabi et al. (2014) in Nigeria revealed that the most important delay factors were: design and documentation issues, financial resource management, project management and contract administration, contractors' site management, and lack of information and communication technology and slow decision making

In Ghana, Frimpong et al. (2003) carried out a research on causes of delay and cost overruns in construction of groundwater projects in developing countries. According to the researchers indicated 75% of the projects in Ghana exceeded the original project schedule. The study revealed that the most important causes of delay were: monthly payment difficulties, poor contract management, material procurement, inflation, and contractor's financial difficulties. In Morocco, Challal and Tkiouat (2012) researched on the causes of deadline slippage in construction projects and found out five major causes of delay were: errors in initial budget assessment, multiple modifications in architectural and engineering designs, site hazards, and insufficiency or lack of prior study. Alinaitwe, et al. (2013) studied in Uganda's public sector construction projects on causes of delays and cost overruns and Kamanga et al. (2013) in Malawi in road construction projects carried out and showed that the major causes as: change of work scope and/or changes in material specifications, high inflation, insurance and interest rates, shortage of foreign currency (importation of materials and equipment), poor monitoring and control, incompetency and/or unreliability of supervisors, delayed payment to contractors-subcontractors and/or suppliers, insufficient equipment and fuel shortages. Memon (2014) conducted a study on contractor perspective on time overrun factors in Malaysian construction projects and the major factors causing delays were: frequent design changes, change in the scope of the project, financial difficulties of owner, delays in decisions making, and unforeseen ground conditions. In India, Desai and Bhatt (2013) studied the critical causes of delay in residential construction projects and found out that the most important delay factors were: original contract duration was too short, legal disputes between various parties, ineffective delay penalties, delay in progress payments by owner, and delay to deliver the site to the contractor by the owner. Sweis, et al. (2008) studied delays in construction projects in Jordan and the major causes of delay were: financial difficulties faced by the contractor, too many change orders from owner, poor planning and scheduling of the project by the contractor, presence of unskilled labor, and shortage of technical professionals in the contractor's organization. In India, Ravisankar, et al. (2014) conducted a study on the quantification of delay factors in the construction industry. The researchers indicated that time overrun vary between 50% and 80% for projects completed worldwide. The study revealed that the most important causes of delay were: Shortage of unskilled and skilled labor, design changes by owner or his agent during construction, fluctuation of prices, high waiting time for availability of work teams, and rework due to errors. Shanmugapriya et al. (2013)

investigated significant factors influencing time and cost overruns in Indian construction projects. The researchers indicated that 60% of projects in India suffered time overruns. The study found out that the following were the most significant factors causing time overruns: Material market rate, contract modification, rework of bad quality performance, unclear specification. Kholif, et al. (2013) analyzed time and cost overruns in educational building

projects in Egypt and found out that the major causes of time overruns were: political insecurity (instability), financial difficulties of contractor, escalation of material prices (inflation), high cost of skilled labor, and difficulties in getting work permits from government. Kagiri and Wainaina (2008) studied time and cost overruns in power projects in Kenya and revealed that the major causes of time overruns were: delayed payment to contractor, employer cash flow problems, delays in disbursement of funds by financiers, bureaucracy of government agencies, and delay of access to site. In Sri Lanka, Dolage et al. (2013) carried out a study causes of time overrun in construction phase of building projects and found out that the following were the major causes of time overrun: delay in progress payment by clients, inaccurate planning and scheduling of projects by contractors, rainy weather, non availability of experienced technical staff of contractor, and excessive work in hand of the contractors. Sweis (2013) investigated factors affecting time overruns in public construction projects in Jordan and Hoai et al. (2008) in Vietnam researched on delay and cost overruns in large construction projects revealed that the major causes of delay were: too many change orders from owner, poor planning and scheduling of the project by the contractor, ambiguities and mistakes in specifications and drawings, slow decision making from owner, and Poor qualification of consultants, engineers, staff assigned to the project, poor site management and supervision, poor project management assistance, financial difficulties of owner and financial difficulties of contractor.

2.3 Empirical review

2.3.1 Addis Ababa City Roads Development Program

The CDP has critically evaluated the road network of the city and proposed upgrading the existing ones and opening new sections so that the city has adequate road infrastructure. AACRA has embarked on road development program to upgrade, rehabilitate, and expand the road network as per the City Development Plan (2001-2010) in 2010-2015. The AACRA City Roads Development Program (CRDP) for 2010-2015 proposes to widen or construct 266 km of road. This includes improvement of junctions, squares, and interchanges. The estimated cost of these projects was estimated at about birr 8.6 billion (954 million Euro at exchange rate of 9 .0), although there are some inconsistencies in the list of project costs. This might be US$ 1.3 Billion today. Of the total cost, it was proposed that the City Administration would cover design, right of way clearance and part of construction amounting to approximately 15% of this cost, the rest to come from foreign grants or loans. Over the period 2012-2015 AACRA undertook maintenance of 187 km of asphalt roads and 123 km of gravel roads. Maintenance of 159 km of storm water drains and painting of 390 km of road were also undertaken. Assuming that the strategic plan for new and widened arterial, sub-arterial and collector streets is implemented, this will give rise to an additional 30% in maintenance needs. For both new construction and maintenance, there is likely to be a

capacity bottleneck, on the part of local contractors and management. The US$ 1.3 billion proposed for new construction over five years is about 20% of the total ERA construction budget for the same period for the entire road network in the rest of the country. (3)

Non-Motorized Transport

All the planning documents refer to the lack of and poor state of sidewalks, particularly at junctions. The Urban Transport Study points out that walking is the predominant mode of transport in AA, 60% of all trips. There is also an utter lack of respect for pedestrians on the part of drivers, and the issue or pedestrian crossings is critical. Over the period 2012 - 2015, AACRA designed and constructed about 50 km of pedestrian facilities, but many arterial, sub-arterial and collector roads remain without sidewalks or with sidewalks in poor condition. Planning of junctions and interchanges and new roads is said, however, to make provision for improved pedestrian facilities. The Urban Transport Study proposes that sidewalks be developed on both sides of the above- mentioned roads, and on one side of local roads. It recommends that pedestrian facilities should aim at reducing traffic speed through traffic calming and other measures. It proposes exclusive budgets for pedestrian facilities. In the process of widening or constructing new streets, pedestrian facilities are usually taken account of, although on the three categories of roads discussed above, traffic calming measure are likely to be limited and this topic may need to be revisited. (2)

Mobility characteristics of cities in Sub Saharan Africa

“Within the group of developing countries, the subgroup of Sub Saharan African countries distinguishes themselves on a number of characteristics. While other regions in developing countries are industrializing rapidly as a result of the new global economy, the African cities remain economically marginalized. However, the population in African cities is growing despite poor macroeconomic performance and without significant foreign direct investment. Even more, Sub Saharan Africa has globally the highest urban population growth in percentages as cited by J.W Zwarteveen. By 2025, African society is expected to become predominantly urban (United Nations, 2004). The institutional weaknesses of political instability, corruption and chronic mismanagement of economic resources put extra stress on the level of services in cities. It can be concluded that world’s challenges concerning urban mobility will be particularly significant in Sub Saharan Africa.” (4)

Mobility characteristics in Addis Ababa

By 2015, the Sub Sahara African region is expected to have five cities larger than 5 million inhabitants: Abidjan, Addis Ababa, Lagos, Luanda and Kinshasa (18). This thesis will focus on Addis Ababa, the capital city of Ethiopia, a city with numerous similarities with other Sub Saharan cities. The mobility problems in Addis Ababa are emergent, since the recent state of road traffic management is considerably poor (Kessides, 2007). Table 1 shows a benchmark of Addis Ababa with the average urban area in Africa, the developing world, Europe and the US. It can be seen that Addis Ababa has a relatively high population density and a high urban population growth; both facts combined with a low GDP per capita put high stress on the quality of mobility services. This stress is reflected by the very low supply of infrastructure: the current road density measured in kilometer of road per 1000 habitant in Addis Ababa is significantly lower than the average of developing countries; moreover, it is only one third of the African average. The public transport plays a dominant role in urban mobility in Ethiopia. The current average number of cars per 1000 habitants in whole Ethiopia is only one (The World Bank, 2011). In Addis Ababa, the car ownership has not gone up corresponding to the population growth. However, the number of trips per public transport is directly related to the urbanization.

2.3.2 Performance Indicators

Any effective performance measurement can be undertaken after developing an objective and consistent measurable criteria. Various studies have classified these measuring criteria into performance measures and indicators.

Literature review on performance measurement showed that the term performance indicator and performance measure are synonymous, their usage depending on the country. Where a distinction is made, performance measure generally has a broader meaning than performance indicator.

Performance measure indicates the direction for the performance (e.g. reduction, increase) while performance indicators are conceived more narrowly as data elements (OECD,2014)

A key performance indicator (KPI) is a measure of performance of an activity which is critical to the success of an organization (Constructing Excellence, 2009).

Saleh Samir &Abu Shabanstated that KPIs are very important in order to deliver value to stakeholders. So, companies must be sure they have the right processes and capabilities in place.

The KPIs also allows to trace which processes and capabilities must be competitively and distinctive, and which merely need to be improved or maintained. In order to define the KPIs throughout the lifetime of a project, five key stages have been identified as shown in Figure 2.1.

A. Commit to Invest: the point, at which the client decides in principle to invest in a project, sets out the requirements in business terms and authorizes the project team to proceed with the conceptual design.
B. Commit to construct: the point at which the client authorizes the project team to start the construction of the project.
C. C. Available for Use: the point at which the project is available for substantial occupancy or use. This may be in advance of the completion of the project.
D. D. End of Defect Liability Period: the point at which the period within the construction contract during which the contractor is obliged to rectify defects ends (often 12 months from point C).
E. E. End of Lifetime of Project: the point at which the period over which the project is employed in its original or near original purpose ends. As this is usually many years after the project's completion, this is a theoretical point over which concepts such as full life costs can be applied (Saleh Samir &Abu Shaban, 2008).

2.3.3 Project Time and Cost Performance Management

Construction project sites are generally complex because of the extensive use of sophisticated plant, equipment, modern methods of construction, multidisciplinary and multitasked aspects of its project workforce (Evelyn Ai Lin Teo, et.al, 2004). That is why management of construction project is needed to organize, arranges every function, actions and everyone involved. Management will help to settle everything in the right place (Cartin, 1993).

Project management defined as the application of knowledge, skills, tools and techniques to ensure the project is completed on time, within cost and fulfills the quality standard. George T.

Hendry in Degoff and Friedman, (1999), defines management in construction project as a group of management activities and engineering services related to a program, carried out during the pre-design, design and construction phase that contributes to the control of time and cost in a new facility .Generally, time and cost management of construction project is defined as centralized of time and cost planning, organizing and controlling in the fieldwork or in the construction sites to meet the goals of schedule, cost and quality estimation (Ritz, 1994).

2.4 Factor affecting project performance

2.4.1 Factor affecting project time performance

According to Abubeker (2015) project time has been defined as the duration that is needed to complete the work starting from site handover until finished.

Project time performance is the most important indicator of project success. Time overrun is a severe problem in the construction industry where only rare projects are completed on the estimated time.

Projects are considered as overrun in time, which are completed beyond the date of completion specified in a contract, or beyond the date that the parties agreed upon for delivery of a project.

2.4.2 Definition Time Overrun

Time overrun is any delay beyond the baseline construction schedule. Minimizing time and cost is the main goal in managing a construction project. However, time delay frequently occurs in all phases of a construction project and consequently increases the project total duration (Aftab, 2011).

Stumpf (2000) defined delay as an act or event that extends the time required to perform the tasks under a contract. The same way, Abubeker (2015) defines time overrun as the inability to complete a project either by the original planned time or budget, or both, ultimately results in project delay.

Time overrun is caused by various reasons such as poor site management and supervision, which can affect the productivity. Various researchers have highlighted several factors affecting time overrun. Aftab (2014)

2.4.3 Factor affecting project cost performance

The project cost is the amount of money that is required to complete all project activities. (Abubeker, 2015). Project cost has its proven importance as the prime factor for project success. In spite of its proven importance, it is not uncommon to see a construction project failing to achieve its goal within the specified cost. Cost overrun is a very frequent phenomenon and is almost associated with all projects of the construction industry (Turkey, 2011).

The lack of fulfillment of cost management functions often leads to project overruns producing an immediate impact on construction stakeholders.

2.4.4 Definition Cost Overrun

Cost overruns are defined as the excess of actual project costs over budgeted costs. The cost overburden is obtained by the estimated cost, final cost and the contract between a contractor and an owner. The difference between estimated and final cost is termed as the magnitude of the cost overrun of a project (Savita Sharma &Pradeep K. Goyal, 2014).According to Abubeker(2015) cost overrun is the amount by which actual costs exceed the baseline or approved costs.

For the purpose of this research cost overrun is defined as the positive difference between the final cost of a construction project at completion and the contract amount agreed by the client and the contractor during the signing of the contract.

Comprehensive review of the Canadian government's regulation of the transportation industry with recommendations on possible regulatory and policy amendments to be adopted by government. In its discussion of roads, the Review Panel acknowledges that only 15,000 kilometers of the 900,000-kilometer Canadian road network are federally owned and maintained. However, the intermodal nature of modern transport and the dire situation of Canada's roads necessitated a review of national road policy and the treatment of roads.

The CTA Review Panel's document presents a background on the importance of roads, and emerging trends in road use and funding in Canada. The ominous trend of increasing vehicle use and infrastructure demand, and decreasing federal road funding illustrates the need for a new approach to the treatment of roads. The federal government's policy of public road provision is criticized on the grounds that it has promoted an infrastructure deficit in Canada. Badly needed revenues are diverted away from roads, resulting in severe funding shortfalls that drive up local property taxes. According to the report, growing provincial and territorial opposition to the status quo treatment of roads is driving a change in road funding philosophy. Whether the solution involves the explicit allocation of fuel taxes, the implementation of real tolls, or the establishment of road management agencies, a consensus appears to be forming that the public treatment of all roads is no longer tenable in Canada. The Panel contends that many of the problems and inequities inherent in public road provision could be solved through greater privatization of the Canadian road network.

Resolution of the current road-funding crisis requires increased dedication of road revenues, improved co-operation among the various levels of government, and a greater onus on drivers to pay the real costs of road use. The Panel claims that these objectives could best be met through the establishment of a road agency, as recommended by the World Bank. The road agency would oversee funding, management and operation of the

country's road network and ensure system-wide responsibility and self-sufficiency. Three options were proposed for establishing road funding and management agencies, all of which entail the treatment of roads as a private good.

The solutions envisioned by the Panel imply significant technical and institutional changes, particularly at the federal level. It is recognized that, despite the economic necessity of these changes, there will likely be substantial entrenched opposition to their implementation. The Panel's view is that the existing system is dysfunctional and that radical reform will be needed eventually. The ongoing debate over the public/private treatment of roads in jurisdictions across Canada is a manifestation of the struggle over these issues. It is worthwhile to examine road policy developments at the municipal level to gage attitudes concerning the privatization of the road network in Canada.

The Case for Toll Roads was an article that appeared in the Ottawa Citizen that addressed the toll road issue being dealt with across the nation. The author highlights the experience of the Coquihalla toll highway, a 200-km four-lane highway that links the lower mainland of British Columbia with Kamloops and the rest of the country. Without the guarantee of toll revenue, it is argued, the quick, safe, and convenient Coquihalla

route could not have been built and motorists would still have to endure the longer, slower, more dangerous Trans-Canada route through Cache Creek. The author contends that the safety and convenience of toll roads such as the Coquihalla, combined with the central role of tolls in the financing and maintenance of new road infrastructure, may lead to greater support for the treatment of Canadian roads as a private good.

Road Pricing Takes its Toll is another Canadian article that examines the treatment of roads in Canada. Author Shannon Thompson, Co-Chair of the Ontario Better Transportation Coalition, presents an international synopsis of road pricing and explores options that may be appropriate for the city of Toronto and other Canadian jurisdictions. Thompson subscribes to the theory that the treatment of roads as a public good is flawed because it does not rely on a full, direct charging structure and is consequently plagued by over consumption and underpayment. The article notes that groups ranging from left- wing environmentalists to right-wing free marketers have supported measures that promote the treatment of roads as a private good. A variety of full-cost road pricing structures that have been implemented elsewhere are discussed as possible alternatives to the treatment of roads as a public good in Canada. Thompson argues that although Canada may not be prepared to fully embrace road pricing strategies, which charge motorists for the full cost of vehicle-use and infrastructure provision, public-private partnerships and toll roads are positive steps that signal key changes in Canada's road policy. Highway Tolls, an article written by

CBC New Brunswick, examines the political implications of imposing tolls on New Brunswick's portion of the Trans Canada Highway. Before the 1995 provincial election, Liberal Premier Frank McKenna denied that a decision had been made to proceed with the introduction of tolls in New Brunswick. A few months after his election victory, Mckenna announced that the province would, in fact, be bringing in tolls. Some observers noted that the decision to implement tolls was well on its way before voters went to the poles. The justification for going ahead with the toll project was reportedly based on economics and safety. Private companies were deemed able to build and operate the highway more quickly and cheaply than the government. Despite government claims that the savings accruing to the public would be put towards social needs, reaction to the toll roads was mixed. In subsequent by-elections in Fredericton and Moncton, Liberal candidates were pressured on the toll road issue. Their support for the treatment of the Trans Canada Highway as a private rather than a public good drew sharp criticism by those living along the toll route and was seen by many as a decisive factor in the Liberal losses in those ridings. The case of toll roads in New Brunswick illustrates the potential public resistance to the treatment of roads as a private good in some parts of Canada.

Ultimately, it appears that a fundamental shift is occurring in Canada with respect to the treatment of roads. In some jurisdictions, the emergence of toll roads has preceded the development of clear policy positions on user pay issues and the privatization of roads. New Brunswick's failure to gain broad public support for the treatment of roads as a private good was partly due to the perceived injustice in how in how the tolls wereapplied and set. Toronto's fully automated booth-free 407 Express Toll Route, on the other hand, has been well received by the public. But this is due in part to the availability of viable alternatives to that toll route. The growing role of the private sector and user fees in road provision suggests that Canada is at some point along a continuum between the public and private treatment of roads. Although the complete privatization of the entire Canadian road network is unlikely, fiscal constraints continue to drive a shift toward new highway management philosophies and the more widespread allocation of user revenues and the treatment of Canadian roads as a private good

The Treatment of Roads in the United States

Road policy in the United States is characterized by a mixed approach that favors the treatment of roads as a private good. Evidence supporting this can be found in explicit legislation that obliges the U.S. government to allocate the vast majority of revenues from federally imposed road charges to the road initiatives. According to the U.S. Federal Highway Administration's 2000 report, Addendum to the 1997 Federal Highway Cost Allocation Study, the 1997 U.S. Taxpayer Relief Act mandated that 16.3 cents of the 18.3 cents per gallon in U.S. federal fuel excise taxes go directly to the Highway Trust Fund and be made available for "highway-related purposes".14 This

legislation reversed an earlier decision implemented under the 1993 Omnibus Budget Reconciliation Act that had ordered 4.3 cents per gallon of federal motor fuel tax to be deposited into the General Fund for use towards U.S. deficit reduction.15 Such reversals of legislation reveal the ongoing debate over the ideal balance between the public/private treatment of roads in the United States.

One of the most important factors in the assessment of roads as public or private goods is consideration of excludability. When fuel excise taxes are allocated to roads, they are considered specific user fees that potentially exclude some from consuming a specific good (roads)16. Because an overwhelming proportion of federal fuel tax revenues accrue to the Highway Trust Fund17 and are used for road initiatives, roads in the United States can technically be considered a private good. The only Canadian jurisdiction to explicitly allocate a portion of its fuel taxes to roads is British Columbia. It funnels 2 cents per liter in fuel excise taxes to a Transportation Financing Authority18. This relatively small amount does not warrant consideration of B.C. roads as a private good. Such a comparison reveals the subjectivity involved in classifying roads as a public or private good and demonstrates that that the precise allocation of a large portion of U.S. fuel-tax revenues to American roads is a significant factor in their classification as a private good.

Another important consideration concerning the treatment of roads in the United States is the issue of public road subsidies. The use of non-road related public funds to subsidizeroads in the U.S. is a strategy which adds a public element to U.S. road provision and has resulted in U.S. roads receiving much higher levels of funding than Canadian roads. While the Canadian government is accused of diverting road revenues to non-road initiatives, the U.S. federal government allocates the majority of road taxes to roads, and allows for additional road funding from non-road related tax revenue. The disparate approaches to the treatment of roads in the United States and Canada may converge as public and political attitudes to Canadian road policy change.

In 1998 the U.S. Congress created a law known as TEA-21 (Transportation Equity Act for the 21st Century). TEA-21 provides substantial funding increases for core highways by ensuring that U.S. road revenues are spent on roads. With respect to the allocation of user fees, TEA-21 Chairman Bud Shuster heralded the law as a “victory for the American taxpayer” because gasoline taxes would no longer be shifted to other government spending priorities in the budget. This view, promoting user-fee allocation and the treatment of roads as a private good, is also tempered by the legislation’s provisions for deriving a portion of highway funding from the government’s General Fund.

One cannot assess the treatment of roads in the United States without accounting for the vast network of toll roads and the growing popularity of P3 project management strategies involving specific user fees. Approximately 7,500 kilometers of toll highways exist in the United States today, with the heaviest concentrations found in California and in the northeastern states. Even with the revenues from fuel taxes, these roads could not have been built and maintained without tolls. The gap between the states' financial resources, infrastructure needs, and the public's resistance to higher taxes, has made the private sector the only remaining source of capital for new highway capacity.

The increasing fuel efficiency of modern vehicles and the subsequent reduction in per- vehicle fuel tax contributions has made the American transportation system dependant on toll roads. While it is impossible to review the breadth of opinions regarding the treatment of roads in the United States, consideration of some representative examples provides insight into current and future trends in the treatment of roads.

Financing of the RSDP from the Government of Ethiopia and the Road Fund has been complemented and supported by additional contributions from various development partners including; The World Bank (WB), European Union (EU), African Development Bank (ADB), Nordic Development Fund (NDF), Bank of Arab for Economic Development in Africa (BADEA), OPEC Fund for International Development (OFID) and the Kuwait The Governments of Japan, Germany, U.K, Ireland, the Saudi Fund for Development, Fund and the Government of China have been involved in financing the Program. The recent donor which joined this effort is the Abu Dhabi Fund.

The involvement of financers is not limited to, financing matters, but they also involve in introducing best practices that enhance the capacity of the domestic construction industry as a way forward to ensuring sustainability of the projects they finance. The Road, Sector Development Plan is an ideal means of handling integrated plan in the road sector involving financing plans (ERA, 2014).

The seventeen years of RSDP performance have brought significant improvements in the restoration and expansion of Ethiopia's road network. Physical achievements have been matched by significant improvements in the condition of the network, strengthening of the management capacity of the road agencies and delivery on policy reform.

A total of 110,162 km of major physical road works were executed by local and foreign contractors, excluding routine maintenance was carried out, of which 29,155 km was on federal roads, 41,132 km was on regional roads construction and maintenance and 39,096 km was on URRAP roads. Overall physical accomplishment against the

plan was 86% as shown in the table below. Total disbursement was about ETB 180.9 billion and this disbursement was 113% of the plan.

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Selection of the Performance Indicators

A key component of the most successful road projects and programs is a well-defined set of goals and objectives. However, the use of performance indicators goes well beyond simply evaluating the degree to which goals and objectives have been achieved. The use of performance indicators by a road administration depends on the particular needs for development or improvement in performance. The main aspects that influence decisions on the use of performance indicators are: The main characteristics of the road transport vision in the country

concerned. The position of the road administration in the process of organizational reform. The management style of the organization. The specific functions that require development or learning. The 15 performance indicators selected for this project are not the "ideal", or even the most important, indicators. They were selected by the Expert Group to cover the previously developed taxonomy. (OECD, 2014).

Project Time and Cost Performance Management

Construction project sites are generally complex because of the extensive use of sophisticated plant, equipment, modern methods of construction, multidisciplinary and multitasked aspects of its project workforce (Evelyn Ai Lin Teo, et.al, 2004). That is why management of construction project is needed to organize, arranges every function, actions and everyone involved. Management will help to settle everything in the right place (Cartin, 1993).

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Hendry in Degoff and Friedman, (1999), defines management in construction project as a group of management activities and engineering services related to a program, carried out during the pre-design, design and construction phase that contributes to the control of time and cost in a new facility.

2.4.5 Factors Affect Project Performance

The construction industry is the tool through which a society achieves its goals of urban and rural development. It is one of the sectors that provide important ingredients for the development of an economy. The construction industry tends to fluctuate with the general economy, and it has a quick response to the changes in the economy (Abdullah, 2013). The construction industry is one of the most complex, fragmented industries referred as schedule and resource driven. In construction industry timely completion of project is a major criterion of project success (Aftab,2011)

The construction industry is an essential component for driving the economy of any country. Hence, worldwide huge amounts are spent on construction development works. However, this industry is suffering from a major issue of time overrun or delay continuously for many years. (Aftab, 2014)

In construction industry one of the basic goals of practitioners is to achieve timely completion of projects within stipulated budget and required quality as each day of time overrun in the completion of any project has a direct

impact on the cost of the project. In order to manage and control construction projects, there are various procurement strategies being adopted. Most popular strategies include traditional, management, integrated services and in-house teams (Aftab,2011)

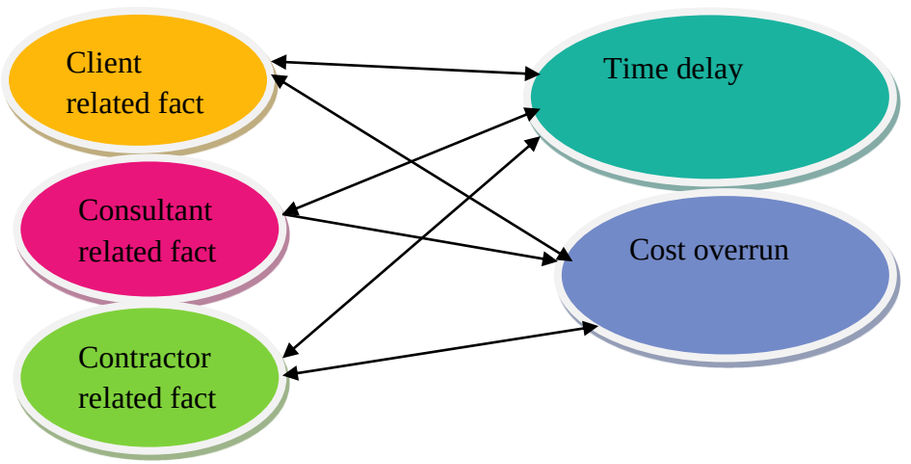
Savita Sharma (2014) stated construction industries play an important role in economic growth and development of any country. Recently it has witnessed that a large number of construction projects are facing the problem of cost overrun due to various factors.

The failure of any construction project is mainly related to the problems and failure in performance. Moreover, there are many reasons and factors which attribute to such problems. Ogunlana et al, (1996) stated that the construction industry performance problems in developing economies can be classified in three layers: problems of shortages

or inadequacies in industry infrastructure (mainly supply of resources), problems caused by clients and consultants and problems caused by contractor incompetence/inadequacies. Okuwoga (1998) identified that the performance problem is related to poor budgetary and time control. Long (2008) remarked that performance problems arise in large construction projects due to many reasons

2.5 Conceptual framework

Figure 2.1 conceptual frame works



This is also captured in the conceptual framework which is an organized relationship between the independent variables and dependent variable. The conceptual framework of the study was developed from different authors findings (kual, 2014; Meaza 2015; Markus and Tanis (2010); David (2016),Divya.R and S.Ramya (2015), and others). The study was guided by conceptual framework stated above

The figure shown in above indicates that, factors which are related to client, consultant and contractor are directly related to the cost and time of the project. If client, consultant and contractor shows low performance, then cost overrun and time delay will be occurs. Also, Al if cost overrun and time delay happens, then the performance of the three stakeholders is poor.

CHAPTER THREE

Research design and methodology

2.6 Research design

The strategy taking in carrying out the research was begin with problem identification which has been done through unorganized literature review, archival study and informal discussion with colleagues and professionals in the industry, then the research design was formulated.

The study design is descriptive research. It also uses mixed use approach, both qualitative and quantitative approaches. It attempt to describe the nature of road construction in Addis Ababa by considering its time and cost performance. It also explains or clarifies how road construction is directly related to the growth of economy and development.

By taking this data and source of information were determined based on the proposed research design. On the basis of the data and information sources the research instruments were conducted; and available source of information to the research were reviewed. The review includes books, journal and articles, internet sources and archival document search such as progress and completion reports within Addis Ababa city road authority− the implementing agency of the road sector development program in Addis Ababa

2.7 Research method

In the analysis the important index method is adopted to establish the relative importance of the causes and impacts of time and cost performance of Addis Ababa road construction project. Rating scale is one of the most common formats for questioning respondents on their views or opinions of an event or attribute

Both primary and secondary data will collect by using questioner and review of previous documents .the primary data will collect through a well-structured questionnaire which is distributed to construction stakeholder includes :owner (Addis Ababa city road authority),consultant representative ,prime contractor, sub-contractor(civil engineer, design engineer, project manager, general Forman).

2.8 Population/data sampling

The target population is defined as the whole group a researcher is interested in to study. According to Zikmund (2003) the definition of population was identifiable total set of elements of interest being investigated by a

researcher. Population contains those group or individuals who are in a position to answer the questions and to whom results of the survey apply. The populations of this research are professional employees of owners/client; consultant and contractor of Addis Ababa city road projects.

The projects under investigation were completed road projects and currently under construction by AACRA and financed by federal capital budget and aid by foreign government which include twelve different road construction in Addis Ababa city.

Therefore, in order to minimize biases that might occur, the researcher obliged to be undertaken considering purposive sampling, which may best represent roads in the city. 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 (2005).

The focus population consisted of different road construction of Addis Ababa which are completed and ongoing by different bodies, with respective supervision and consultancy firms. AACRA 2009 and contract documents helped the researcher to determine the number of sample sizes of roads. The research population ware take from the main three stakeholders which are participating in Addis Ababa road construction projects. Client/owner (AACRA)), contractors, and consulting firms. Professionals include those qualified experts work in the construction industry and were involved in road construction projects in the near past and are currently working out of the three agencies (owner, contractor and consultant).

A total of 72 questionnaires were distributed to purposively to the professional and experts who have a first degree holder and above, whom working for the road project of Addis Ababa. They are from client, consultant and contractor. For each stakeholder 24 questionnaires were distributed and a total of 68 are returned back, which is 24 from client, 22 from consultant and 22 from contractor.

2.9 Data collection

The data collection procedure for this research is including both in the office level and on the project too. Most of the professionals who are addressed by this research question paper are not easily available in one place. Some are found in office others are on the site. A repeated phone conversation and frequent attending on the project are needed to meet those professionals to give and return back the paper.

Multiple data sources (primary and secondary source of data) ware used for the purpose of investigating the different dimensions of the research objective. Therefore data used can be categorized as primary and secondary data. These different data were collected using different method at different stage. Most data collected from Addis Ababa city road authority and other related government and non-government offices.

For this research, most of the data are secondary data which is gathered in different techniques. Which includes observation, anal study (reviewing historical records), discussion (creating conversation in the concerned officials)

Questioner method was employed as the appropriate method to collect data in order to gather information about the concerned related project emphases on evaluation about performance evaluation by considering time and cost in Addis Ababa road project, its impact on the construction industry and the relation between the development of road and its impact on economic growth.

Furthermore, the questionnaires method added existing document review the construction industry which focuses on Addis Ababa road project. So questionnaires from stake holder of owner, contractor and consultant from top management to highly responsible professionals are conducted as a primary data collection and document review are conducted as a secondary data collection

2.10 Data analysis

The results of source of primary data which is questionnaires were analyzed using statistical techniques and the results used to form the basis for recommendations as well as areas for further research. The data analyzed by the method of importance index .followed by thorough discussions in order to draw a conclusion and to mansion recommendations based on the findings of the research. The statistical method is a technique of analysis which provides a general overview of the finding. Frequency distribution, which shows the frequency of observation of each response to each variable through process, is used to analyze the result of some questions.

Participants are conduct to indicate the importance of agreement of factors or research variables by rating them on a five point scale, (0-No Opinion, 1-Strongly Disagree, 2-Disagree, 3-Agree and 4-Strongly Agree) and it is used to calculate the importance index of the conducted opinions.

2.11 Validity of the study

The researchers try to conduct those stakeholders who working for client, consultant and contractor in different position by preparing appropriate question as a form of question paper. Those questions are prepared by collecting

expert opinion, previous experience and searching previous similar effective researches. Only selected and valid question are requested to fill those professionals in order to prepare effective research which is valid for further projects

2.12 Proposed time and cost performance

There are many indicators and measurements which evaluate the performance of time and cost of road project. Most of the time project contract budget and project actual executed cost are not equal due to different reason, one of the major reason is the relationship between time and cost performance. If the project time will enlarge the cost of the execute is also increase. The following table summarizes the relationship between time and cost performance

Table3.1 the relationship between time and cost performance

Time performance	Cost performance	
Project Complete before schedule		Execute cost is less than contract amount
Project Complete according to schedule		Execute cost is same as contract amount
Time overrun		Execute cost is greater than contract amount

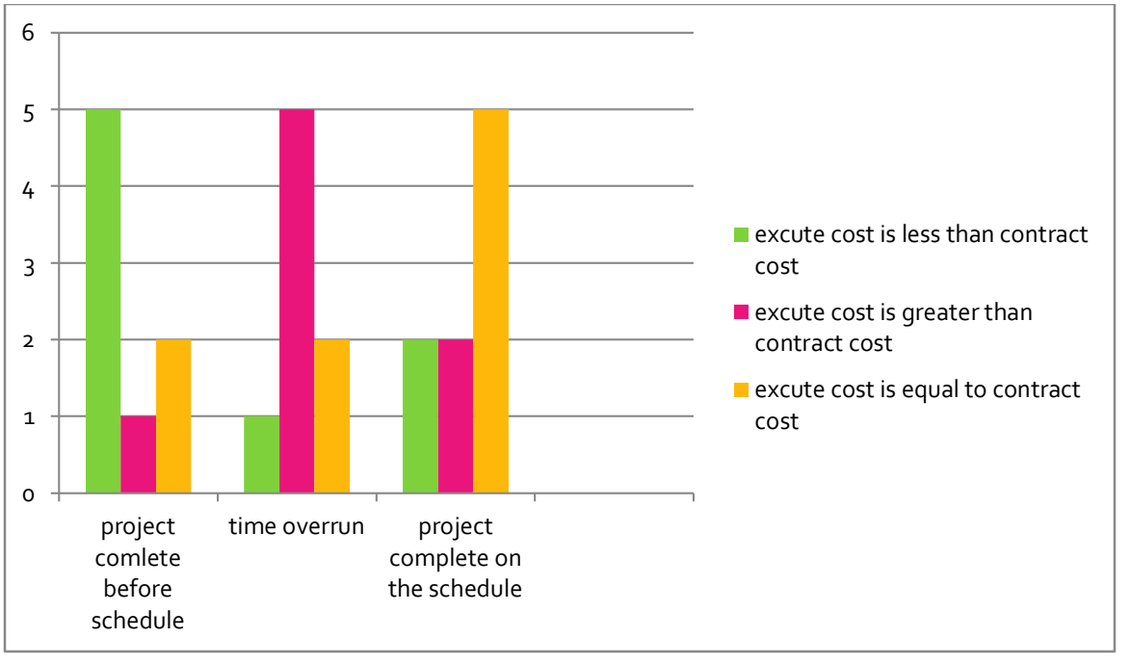


Figure3.1. the relationship between time and cost performance

2.13 Reliability Analysis

Table 3.2 reliability analysis

	Cronbach's Alpha	N of Items
Client related factors causing cost overrun	.847	10
Consultant related factors causing cost overrun	.927	10
Contractor related factors causing cost overrun	.975	15
External factors causing cost overrun	.894	10
Client related factors causing time delay	.836	10
Consultant related factors causing time delay	.922	10
Contractor related factors causing time delay	.971	15
External factors causing time delay	.892	10
Overall	.978	90

Source: Own Survey, 2020

3.9 Ethical issue

These research respondents were awarded of the confidentiality in the study so to make ensure respect for the dignity of respondents in the study. Their confidential information was only used by the researcher and the supervisor. The participants were not required to fill their names in the questionnaires or interview contact. Participants were not forced to respond except those who were voluntary willing to participate in the study. They will not be asked to deliver any identifying details and as such, transcripts and the final report will not reflect the subjects identifying information such as their names, in the case they are not happy with it. After the study has been finished and a final report written, the tools and methods used to collect information and data was destroyed .The study also tried to reach at conclusions based on objective inferences that are purely and blindly guided by the data collected. The analysis of data and interpretation of the results of data analysis were limited to what the data actually tell.

CHAPTER FOUR
RESULT AND DISCUSSION

4.1.Introduction

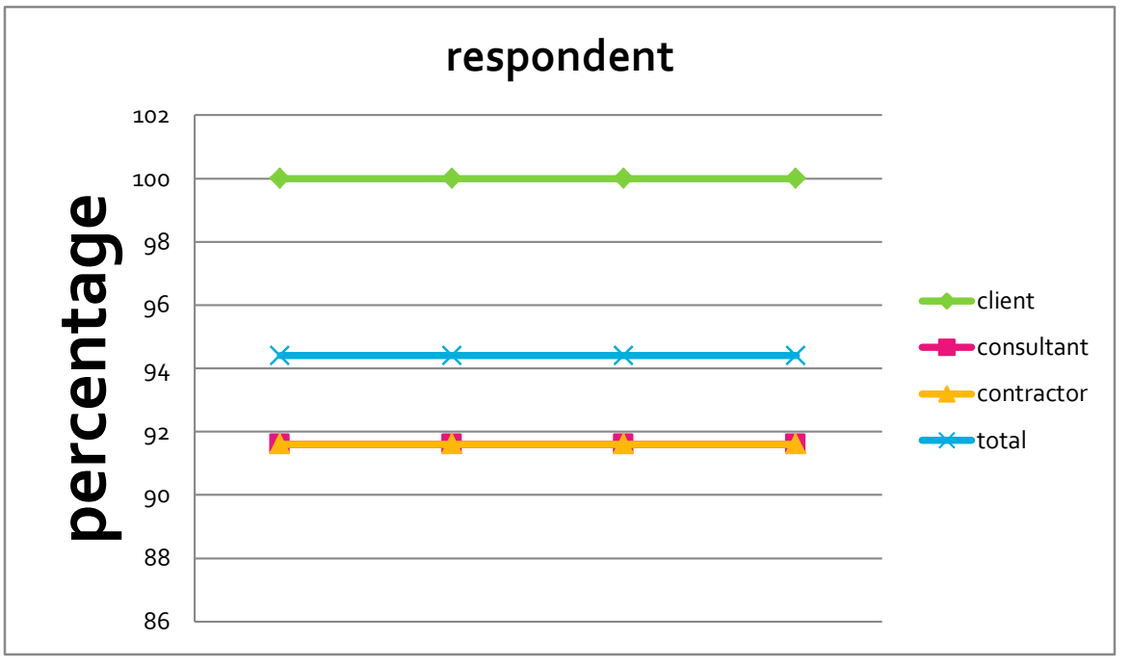
This study was mainly conducted to assess time and cost performance of road projects of AACRA. To meet this general objective the study has collected the study data from main stakeholders of the projects; client, consultant and contractor by using questionnaire. Based on the sampling strategy followed, the study has distributed total of 72 questionnaires; to clients, consultants and contractors; 24 each. But 68 (94.4%) of the questionnaires were returned 24 (100%) questionnaires from client, 22 (91.6%) questionnaires from consultants and 22 (91.6%) questionnaires from contractors. This chapter of the study presents result of the data analysis and discussion on the results. In the first section of the chapter the study presents general information about the respondents. The second section of the study is about factors causing lower performance of the projects through cost overrun. Finally, the third section is about factors causing time delay of the project.

Table 4.1 summary of overall response survey

Type	Distributed questionnaire	Returned questionnaire	Returned percentage
client	24	24	100
consultant	24	22	91.6
contractor	24	22	91.6
Total	72	68	94.4

Source: own survey, 2020

Figure 4.1 summary of overall response survey



Source: own survey, 2020

4.2.General Information

The study was conducted by using client, consultant, and contractors. The general description about the respondents is presented in Table 4.2 below by using descriptive statistics such as frequency and percentages. The general information assessed about the respondents includes gender, sex, education and working experience.

As presented in Table 4.2 below, majority of the respondents were at age level of '41 to 50 years' that include 38.4% of the respondents. This group of respondents is followed by age group f 'below 41 years' that includes 32.4% of the respondents. The smallest group of the respondents was at age level of 'above 50 years'. Another information collected is sex of the respondents. Majority of the respondents were male that include 73.5% of the respondents. But only 26.5% of the respondents were females. The study identified two levels of education of the respondents; bachelor's degree and master's degree that comprise 61.8% and 38.2% of the respondents respectively. Majority of the respondents have work experience in project management for '5 – 10 years' that includes the experience of 47.1% of the respondents. Following these group of respondents, 38.2% of the respondents have the experience for 'above 10 years'. But only 14.7% of the respondents have project

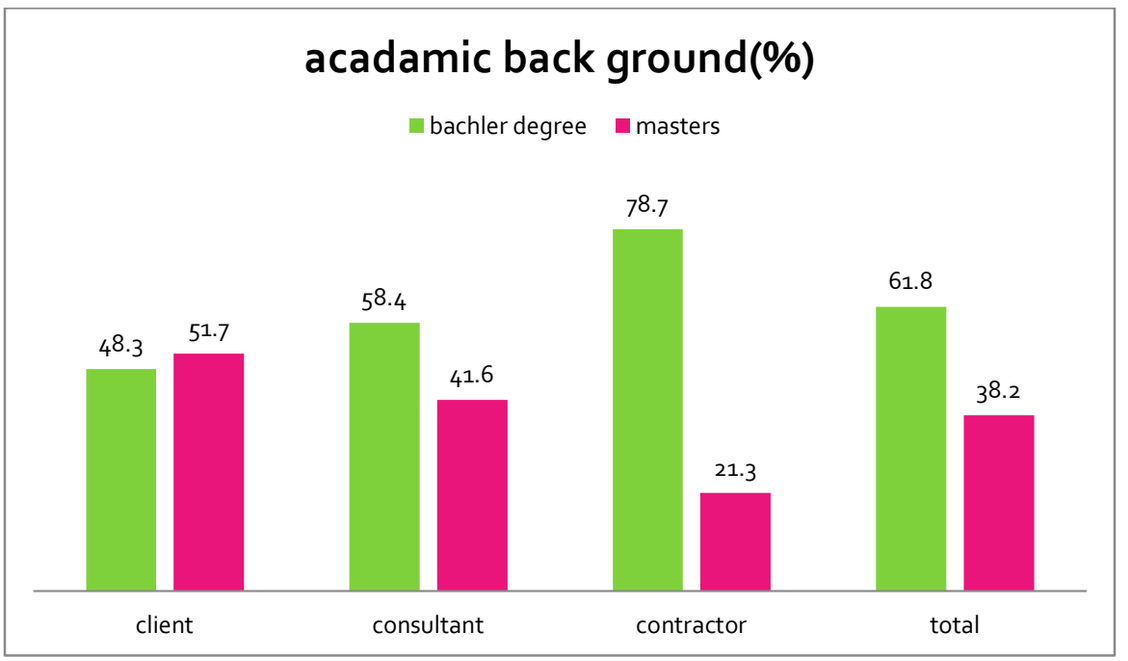
management experience for less than 5 years. The survey result about the background of the respondents suggests that projects of AACRA managed by educated and experienced stakeholders.

Table 4. 2General Information about Respondents

		Frequency	Percent
Age	Below 41 years	22	32.4
	41-50	26	38.2
	Above 50 years	20	29.4
Sex	Male	50	73.5
	Female	18	26.5
Education	Bachelor's Degree	42	61.8
	Master's Degree	26	38.2
Work experience	Below 5 years	10	14.7
	5-10 years	32	47.1
	Above 10 years	26	38.2

Source: Own Survey, 2020

Figure 4.2 academic back ground of respondent



Source: own survey, 2020

4.3.Performance of the Projects

This study has used cost overrun and time delay as main project performance indicators. Accordingly, cost overrun and time delay of the projects are assessed and the result of assessment is presented in Table 4.3 below. The time delay is measured in days and computed as variation from planned days. The cost overrun is measured by monetary unit of million Birr and computed as variation from pre-estimated cost.

Table 4. 3 Performances of the Projects

	N	Minimum	Maximum	Mean	Std. Deviation
Time delay	68	57.00	945.79	299.9956	177.10018
cost overrun	68	.33	77.01	10.3876	17.31689

Source: Own Survey, 2020

As depicted in Table 4.3 above, the projects have an average time delay of 300 days ranging from 57 days to 946 days. This indicates that projects of AACRA very poor performance in meeting pre-stated project period. In addition, very high value of standard deviation (177.1) is observed suggesting that time compliance performance of the projects varies from project to project.

The second performance indicator used by the study is cost overrun. As shown in Table 4.3 above, the minimum cost overrun run is 330,000 birr and maximum cost overrun is 77 million Birr. On average the projects have cost overrun of 10.39 million. In addition, high value of standard deviation for cost overrun indicates there is the cost performance variation from project to project in the Authority.

4.4. Factors Affecting the Project Performance

Based on the weaker performance of the projects regarding time and cost, this study has assessed causing factors for the weaker performance by classifying client, consultant, contractor, and external environment related factors for cost overrun and time delay. This section of the study presents result of the data analysis about factors caused weaker performance of the projects.

4.4.1. Cost Overrun

This section of the study presents causes of cost overrun in the projects. Based on previous studies, the study has assessed 45 causes of cost overrun by categorizing client related, consultant related, contractor related and external environment related factors. The effect of these factors is ranked based on mean score values and presented in respective tables below.

4.4.1.1.Client Related Problems

The causes of client related factors on cost overrun of the projects are summarized in Table 4.4 below by using mean score that represents importance of the factor for cost overrun in the projects. Based on the mean scores, the factors are ranked for responses of clients, consultants and contractors. This study has assessed 10 factors that might have caused cost overrun.

As depicted in Table 4.4 below, for some of the factors, there are variations of responses from the three categories of respondents; client, consultants and contractors. But for majority of the factors, responses have similar responses and then similar ranks. All the three stakeholders ranked 'right of way problem' as the main problem that has resulted on cost overrun. For this factor the highest mean score was observed for responses of consultant and followed by response of client. The response of the contractors also suggested that it is cause for cost overrun of the projects. The overall mean score is 3.71 and it is ranked the main problem that caused cost overrun in the projects. The right of problem is followed by 'Award to list bidder' with overall mean score of 3.65. It is ranked as second main reason for cost overrun of the projects by all stakeholders of the projects.

Table 4 4Client Related Causes for Cost Overrun

	client		consultant		Contractor		Total	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Delay to deliver the site (right of way problem)	3.5833	1	4.0000	1	3.5455	1	3.7059	1
Poor communication and management	2.8333	7	2.8182	6	2.5455	8	2.7353	7
Delay to payment and finance problem	3.3333	4	3.7273	4	3.3636	3	3.4706	4
Delay to decision making	3.2500	5	2.7273	7	2.7273	6	2.9118	6
Poor management of the contract	3.0833	6	3.2727	5	3.0000	5	3.1176	5
Change in scope of the project	3.5833	3	3.7273	3	3.2727	4	3.5294	3
Award to list bidder	3.5833	2	3.8182	2	3.5455	2	3.6471	2
Poor coordination	2.4167	10	2.1818	10	2.4545	9	2.3529	10
Design problem	2.6667	8	2.7273	8	2.4545	10	2.6176	8
Insufficient contract period	2.5000	9	2.5455	9	2.6364	7	2.5588	9

Source: Own Survey, 2020

The third reason for cost overrun is change in scope of the projects with mean score of 3.53. It is ranked 3rd based on responses of client and consultant and 4th based on responses from contractor. This finding suggests that making change on scope of the projects is resulting on cost overrun. The fourth reason for cost overrun in the

projects is delayed payment and finance problems. It is indicated by mean score of 3.47 suggesting that the respondents perceived that delayed payments and finance problems have resulted on cost overrun in the projects. It is ranked 4th based on responses from clients and consultants and ranked 3rd based on responses from contractor. Poor management is ranked 5th based on overall responses with mean score of 3.12; it is ranked 5th based on responses from consultants and contractors, and ranked 6th based on the responses from client. Although majority of the respondents observed that it is among the causes of cost overrun but according to Zikmund (2002) this response is indecisive. Although they are observed in some projects, delay to decision making, poor communication and management, design problem, insufficient contract period and poor coordination are not causes for cost overrun in the projects.

4.4.1.2.Consultant Related Problems

Another factors assessed by the study that might affect performance of the projects are consultant related factors. These factors include 10 problems due to inefficiencies of consultant of the projects. The summary of responses about problems related to consultant is presented in Table 4.5 below.

Table 4.5Consultant Related Factors that Causes Cost Overrun

	client		consultant		Contractor		Total	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Lack of experience	3.9167	1	4.2727	1	3.6364	2	3.9412	1
Absence of consultant in site	2.9167	7	3.0909	7	2.4545	7	2.8235	7
Delay in Preparation and approval of drawing	3.0000	6	3.1818	6	2.7273	6	2.9706	6
Lack of quality control	3.6667	3	3.9091	3	3.3636	4	3.6471	4
Contract management problem	2.5000	10	2.9091	9	2.4545	10	2.6176	10
Spent time for approval of test and inspection	3.5833	4	3.6364	5	4.0000	1	3.7353	2
Design error	2.9167	8	2.7273	10	2.4545	8	2.7059	8
Frequent design change	2.5833	9	2.9091	8	2.4545	9	2.6471	9
Incomplete design at the time of tender	3.6667	2	3.9091	2	3.4545	3	3.6765	3
Complicated specification	3.5000	5	3.8182	4	3.0909	5	3.4706	5

Source: Own Survey, 2020

As shown in Table 4.5 above, five important factors that related to performance of consultant were identified that caused cost overrun in the projects. Among the consultant related factors, lack of experienced is ranked 1st based on responses of all stakeholders suggesting that the main consultant related problem resulting on cost overrun is lack of experience of consultants. It has an overall mean score of 3.94 indicating that all stakeholder perceive that

consultants lack experience on management of the projects. The highest mean score (4.27) is computed for responses of consultants themselves. The second main consultant related problem is 'spent time for approval of test and inspection' with mean score of 3.74. It is ranked 4th by client and 5th by consultant with mean scores of 3.58 and 3.64 respectively. But the problem is mainly observed by the contractor as indicated by mean score of 4.00 and it is ranked 1st based on responses of contractors. This indicates that the consultants are taking longer time for test approval and inspection. Delayed approval and inspection results on wastage of construction materials that increases cost of the projects. Incomplete design at the time of the tender the 3rd ranked client related factor that results on cost overrun in the projects with mean score of 3.68. It is ranked 2nd based on responses of client and consultant, and ranked 3rd by contractor. This finding suggests that incomplete designs are submitted at the time of the tender that increase cost through design modifications. The 4th ranked and important factor for cost overrun is lack of quality control. It is ranked 4th by contractors and 3rd by consultant and client. This suggests weaker performance of consultant on quality control is increasing cost of the projects through wastage and disposals. Among the important factors, the 5th ranked consultant related factor is complication in specification. It is indicated by mean score of 3.47. It is ranked 5th by client and contractor and 4th by client.

4.4.1.3.Contractor Related Factors Causing Cost Overrun

Based on previous studies, 15 contractor related factors were assessed and ranked based on their importance for cost overrun. The summary statistics is presented in Table 4.6 below.

As shown in table 4.6 below, based on the standard recommended by Zikmund (2002), among the factors related to contractor, 4 important factors were identified that caused cost overrun that have mean score of value above 3.41. Regarding the responses of stakeholders, based on the responses of clients and consultants, 5 factors were identified but responses of contractors indicated only 2 factors. Among the important factors based on overall responses, lack of experience of contractor in the construction is ranked 1st on overall. It is ranked 1st based on the responses of all stakeholders. This indicates that among the characteristics of the contractor in the projects, lack of experience in construction is main problem for cost overrun that lack of experience has resulted on cost management inefficiency and project controlling. The second main problem related contractor performance is following poor construction methodologies followed by the contractors. It is ranked 2nd based on responses of all stakeholders. It is due to poor methodology of the construction has exposed the projects for wastages and time delay that wastage has resulted additional purchase and time delay resulted purchase of inflated inputs. The 3rd rated factor is poor site management. This indicates that poor site management is among contractor related reasons

that increased cost of projects. This finding implies the projects are not properly managing their sites that indicate improper storage and distance from the project.

Table 4.6 Contractor Related Problems for Cost Overrun

	client		consultant		Contractor		Total	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Project inspection problem	2.7500	8	3.0000	8	2.5455	8	2.7647	8
Inadequate subcontractor	2.5833	12	2.7273	13	2.4545	12	2.5882	12
Project management problem	2.5000	13	2.7273	14	2.4545	13	2.5588	13
Poor construction methodologies	3.6667	2	4.0909	2	3.5455	2	3.7647	2
Lack of experience	3.9167	1	4.0909	1	3.6364	1	3.8824	1
Low quality materials	3.5833	4	3.8182	4	3.0000	4	3.4706	4
Shortage of material	2.7500	7	3.0909	7	2.5455	7	2.7941	7
Equipment unavailability	2.7500	9	2.9091	9	2.5455	9	2.7353	9
Labor supply problem	2.4167	14	2.8182	12	2.4545	14	2.5588	14
Financial problem	2.7500	6	3.0909	6	2.7273	6	2.8529	6
Poor site management	3.5833	3	3.9091	3	3.3636	3	3.6176	3
Variation of material price	2.6667	10	2.9091	10	2.5455	10	2.7059	10
Poor workmanship	3.4167	5	3.4545	5	2.8182	5	3.2353	5
Poor defect liability method	2.6667	11	2.8182	11	2.5455	11	2.6765	11
Lack of training	2.4167	15	2.7273	15	2.3636	15	2.5000	15

Source: Own Survey, 2020

The fourth contractor related factor for cost overrun in the projects is low quality material that is summarized by mean score of 3.47. This finding suggests practice of the contractors to use low quality material has resulted on additional expense in the projects. Although it is not important factor for cost overrun due to response of the contractors, client and consultants indicated that poor workmanship is also important cause for cost overrun.

As depicted in Table 4.6 above, other 11 factors are not important causes for cost overrun in the projects. Although project inspection problem, inadequate subcontractor, project management problem, shortage of material, equipment unavailability, financial problem, labor supply problem, variation of material price, poor defect liability method, and lack of training existed to some extent, they are not resulting on cost overrun.

4.4.1.4.External Factors Causing Cost Overrun

In addition to performance of the stakeholders, the study has identified the importance of external factors for cost overrun in the projects. Summary of responses about observation of the main stakeholders of project management on external factors causing cost overrun is presented in Table 4.7 below.

Table 4.7 Summary of External Factors Causing Cost Overrun

	client		consultant		Contractor		Total	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Major disputes and negotiations	3.4167	3	4.0909	1	3.9091	1	3.7941	1
Weather condition	2.5000	9	2.9091	9	2.0909	10	2.5000	10
Regulatory problems	2.7500	7	3.0000	5	2.2727	9	2.6765	8
Utility problems (electricity, water, telephone)	3.4167	4	4.0909	2	3.7273	2	3.7353	2
Material price variations (inflation/escalation)	3.6667	1	3.7273	4	3.5455	3	3.6471	3
Exchange rate fluctuation	3.6667	2	3.8182	3	3.2727	4	3.5882	4
Unforeseen ground condition	2.6667	8	3.0000	6	2.4545	7	2.7059	7
Equipment unavailability	2.8333	6	3.0000	7	2.4545	8	2.7647	6
Material problem	2.5000	10	2.4545	10	2.7273	5	2.5588	9
Delay and difficulties of supplier	2.9167	5	3.0000	8	2.5455	6	2.8235	5

Source: Own Survey, 2020

As shown in Table 4.7 above, the overall mean indicated that there 4 important external factors that cause cost overrun of the projects. Regarding the groups of the respondents, responses of client and consultant indicated 4 important factors and consultants indicated 3 important factors. External factors that caused cost overrun in the projects are major disputes and negotiations, utility problems, material price variation and exchange rate fluctuations. External factors such as weather condition, regulatory problems, unforeseen ground condition, equipment unavailability, material problem and delay and difficulties of supplier are not important to causes for cost overrun.

Among the important factors, disputes and negotiations is ranked 1st with mean score of 3.79. Based on the responses of client it is ranked 3rd and based on the responses of clients and contractors it is ranked 1st. This indicates from the external environment, mainly disputes and negotiations are causing cost overrun in the projects. The second important cause for cost overrun in the projects in utility problem. Although it is ranked 4th by client it is ranked 2nd by clients and contractors. Variation of price of the construction materials is ranked 3rd with mean score of 3.65; it is ranked 1st based on response of client, 4th based on response of consultants and 3rd based on responses of contractor. This suggests that general price rise of materials in increasing overall cost of the projects. Among the important external factors, exchange rate fluctuation is ranked4th with mean score of 3.59.

4.4.2. Factors Causing Time Delay

This study has used two important indicators of project performance; cost overrun and time delay. In the previous section factors that causing cost overrun were presented. similarly, in this section of the study factors causing time

delay of the projects are presented based on the responses of the main stakeholders of the project management; client, consultant and contractors. The factors assessed were client related, consultant related, contractor related and external environment related.

4.4.2.1.Client Related Factors Causing Time Delay

The study has assessed 10 client related factors that might cause time delay. The survey result on client related factors that might cause time delay are summarized by using mean score and rank and presented in Table 4.7 below.

Table 4.8 Summaries about Client Related Factors that Cause Time Delay

	Client		Consultant		Contractor		Total	
	Mean	**Rank**	**Mean**	**Rank**	**Mean**	**Rank**	**Mean**	**Rank**
Delay to deliver the site (right of way problem)	3.5833	1	3.9091	1	3.5455	1	3.6765	1
Poor communication and management	2.8333	7	2.8182	6	2.4545	8	2.7059	7
Delay to payment and finance problem	3.2500	4	3.7273	3	3.3636	3	3.4412	4
Delay to decision making	3.1667	5	2.7273	7	2.7273	6	2.8824	6
Poor management of the contract	3.0833	6	3.1818	5	3.0000	5	3.0882	5
Change in scope of the project	3.5833	2	3.6364	4	3.2727	4	3.5000	3
Award to list bidder	3.5000	3	3.8182	2	3.5455	2	3.6176	2
Poor coordination	2.4167	10	2.0909	10	2.4545	9	2.3235	10
Design problem	2.6667	8	2.6364	8	2.4545	10	2.5882	8
Insufficient contract period	2.5000	9	2.4545	9	2.6364	7	2.5294	9

Source: Own Survey, 2020

As shown in Table 4.8 above, mean scores are above 3.40 for four client related factors. These factors include delay to deliver the site, delay to payment and finance problem, change in scope of the project and award to list bidder. But other six factors were not causing time delay.

Among the important factors that results on time delay, delay to deliver the site (right of way problem) is the main problem. It is ranked 1st based on overall response with mean score of 3.68 and it is ranked 1st by all stakeholders of the project performance. This indicates the projects are delayed due to right of way problems in the project area. Following the right of way problem, award to least bidder is ranked 2nd with mean score of 3.62. According to the response of client it is third reason for project delay but it is ranked as 2nd important reason by consultant and contractors. This shows the project is providing delayed award to list bidder that delays the project period. Change

in the project scope is ranked 3rd based on overall response with mean score of 3.5. This problem is the second main problem based on the observation of client but it is 4th problem that caused time delay. This indicates change in project scope is causing delay of the project completion. Delay to payment and finance problem is ranked 4th on overall with mean score of 3.44; based on the responses of client it is 4th problem and based on the responses of consultant and contractor. This finding suggests delayed payment is causing the project delay as activities of the projects are suspended due to lack of finance.

4.4.2.2.Consultant Related Factors Causing Time Delay

The second group of factors causing delay of the completion of the projects is consultant performance related. The survey result about consultant related factors is summarized and presented in table 4.9 below.

As shown in the Table 4.9 below, there are 5 important factors related to consultant that caused project completion delay with mean scores above 3.40. These factors include lack of the experience of the consultant, delay in Preparation and approval of drawing, lack of quality control, incomplete design at the time of tender, and complicated specifications.

Among the consultant related factors, lack of experience of consultant is ranked 1st with mean score of 3.91. It is ranked 1st based on responses of clients and consultant and ranked 2nd based on the responses of contractors. This finding shows the project period is delayed due to lack of experience of the consultant.

Table 4.9 Summary of Consultant Related Factors that Cause Time Delay

	Client		consultant		Contractor		Total	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
lack of experience	3.9167	1	4.1818	1	3.6364	2	3.9118	1
absence of consultant in site	3.0000	6	3.0909	6	2.7273	6	2.9412	6
Delay in Preparation and approval of drawing	3.5000	5	3.7273	4	3.0909	5	3.4412	5
lack of quality control	3.6667	2	3.8182	3	3.3636	4	3.6176	4
contract management problem	2.5833	9	2.8182	8	2.4545	7	2.6176	9
spent time for approval of test and inspection	2.5000	10	2.8182	9	2.4545	8	2.5882	10
Design error	2.9167	7	3.0000	7	2.4545	9	2.7941	7
frequent design change	2.9167	8	2.6364	10	2.4545	10	2.6765	8
incomplete design at the time of tender	3.5833	3	3.5455	5	4.0000	1	3.7059	2
Complicated specification	3.5833	4	3.9091	2	3.4545	3	3.6471	3

Source: Own Survey, 2020

The second most important consultant related factor for time delay is incomplete design at the time of tender. It is ranked 2nd with mean score of 3.71. This problem is mainly indicated by contractors who ranked it 1st consultant related problem with mean score of 4.00. This suggests the incomplete design submitted by the consultant during the time of tender is lagging the project activities. Complicated specification is ranked 3rd based on overall results. It is ranked 2nd by consultants, ranked 3rd by contractor and ranked 4th by client. The overall result suggests the complicated specification made by consultants is causing project delay. Lack of quality control is among the important factors that caused time delay of the projects. It is ranked 4th with overall mean score of 3.62. It is ranked 2nd by client, 3rd by consultant and 4th by contractor with mean scores of 3.67, 3.82 and 3.36 respectively. This suggests weaker practice of quality control is increasing time delay of the projects. Finally, delay in preparation and approval of drawing is ranked 5th with mean score of 3.44 indicating that delay in preparation and approval of drawing is resulting on project delay.

4.4.2.3.Contractor Related Factors Causing Time Delay

Performance of contractor is another important cause for time delay of projects. Performance of the contractor is assessed by using 15 factors. The summary of contractor related factors that cause time delay in the projects is presented in Table 4.10 below.

Table 4.10 Contractor related factors causing time delay of projects

	client		consultant		Contractor		Total	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
project inspection problem	2.7500	6	3.0000	7	2.5455	7	2.7647	7
inadequate subcontractor	2.5000	12	2.7273	13	2.4545	12	2.5588	12
project management problem	2.4167	13	2.7273	14	2.4545	13	2.5294	13
poor construction methodologies	3.6667	2	4.0000	1	3.5455	2	3.7353	2
lack of construction ability/experience	3.9167	1	4.0000	2	3.6364	1	3.8529	1
low quality materials	3.5833	3	3.7273	4	3.0000	4	3.4412	4
shortage of material	2.7500	7	3.0000	8	2.5455	8	2.7647	8
construction equipment unavailability	2.7500	8	2.8182	10	2.5455	9	2.7059	9
Labor supply problem	2.4167	14	2.8182	11	2.3636	14	2.5294	14
Financial problem	2.7500	9	3.0909	6	2.7273	6	2.8529	6
Poor site management	3.5833	4	3.9091	3	3.1818	3	3.5588	3
Variation of material price	2.5833	10	2.9091	9	2.5455	10	2.6765	10
poor workmanship	3.3333	5	3.4545	5	2.8182	5	3.2059	5
poor defect liability method	2.5833	11	2.8182	12	2.5455	11	2.6471	11
lack of training	2.3333	15	2.7273	15	2.3636	15	2.4706	15

Source: own Survey, 2020

As shown in Table 4.10 above, there are five contractor related factors that caused time delay of the projects. These factors have mean score values above 3.40. They include lack of construction ability/experience, poor construction methodologies, poor site management and using low quality materials. Among these factors, lack of experience of the contractor is the main problem for time delay of the projects. It is ranked 1st with mean score of 3.85. Client and contractors indicated it as main problem for the delay and consultants indicated it as second important cause for time delay. This suggests limited experience of the contractors is delay the period of project completion. The second important problem is poor construction methodology followed by the contractors. On overall, it is ranked 2nd with mean score of 3.74; it is ranked 2nd by client and contractor. According to consultants it is a main contractor related problem for time delay. This indicates that contractors have poor construction methodology that resulted on time delay on the projects. The third problem related to contractor is poor site management. It is ranked 3rd with mean score of 3.55. It is ranked 4th based on responses of client and 3rd based on responses of consultants. But this problem is not indicated as cause for time delay by contractors. The overall result suggests poor site management is causing time delay of projects. As indicated by responses of client and consultant, the contractors are using low quality materials that caused time delay of project completion. It is ranked 4th with mean score of 3.44; it is ranked 3rd by client and 4th by consultant with mean scores of 3.58 and 3.73 respectively. This finding suggests the contractors have practice of using poor site management that caused time delay of projects.

4.4.2.4.External Factors Causing Time Delay

This study has used external factors as possible causes for delay of project completion. Based on previous studies 10 factors related to external environment were assessed. The survey result about the external factors is summarized in Table 4.10 below.

As depicted in Table 4.11 below, four factors were identified that are important to identify the effect on time delay. These factors include major disputes and negotiations, weather conditions, utility problems, and material price fluctuations that have the mean value above 3.40.

Among the important factors, factor, major disputes and negotiations, is ranked 1stwith mean score of 3.76. This factor is ranked 1st based on observation of consultants and contractor but it is ranked 4th by clients. This indicates that the projects are delayed due to disputes and negotiations among the stakeholders of the projects. Another important external factor for delay of projects is challenge from weather conditions. It is ranked 2nd with mean score of 3.71. It is ranked 3rd by client and 2nd by consultant and contractor. This indicates the projects are delayed

due to variation of weather. Utility problems are the 3rd ranked problems that caused project delay. It is indicated by mean score of 3.62 indicated that weaker performance of utility in the project area is resulting on project delay. It is ranked 2ndby the client and 3rd by consultant and contractor. The material price variation is the 4th ranked external factor that results on time delay of projects .It is ranked 1st by client and 4th by consultant and contractor. This finding suggests variation in price of material is resulting on delay in project period.

Table 4.11External Factors Related to Time Delay

	client		Consultant		Contractor		Total	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Major disputes and negotiations	3.3333	4	4.0909	1	3.9091	1	3.7647	1
Weather condition	3.4167	3	4.0909	2	3.6364	2	3.7059	2
Regulatory problems	2.5000	9	2.3636	10	2.7273	5	2.5294	9
Utility problems (electricity, water, telephone)	3.5833	2	3.7273	3	3.5455	3	3.6176	3
Material price variations (inflation/escalation)	3.6667	1	3.7273	4	3.2727	4	3.5588	4
Exchange rate fluctuation	2.9167	5	2.9091	8	2.5455	6	2.7941	5
Unforeseen ground condition	2.7500	6	3.0000	5	2.1818	9	2.6471	8
Equipment unavailability	2.6667	8	3.0000	6	2.3636	8	2.6765	7
Material problem	2.5000	10	2.9091	9	2.0000	10	2.4706	10
Delay and difficulties of supplier	2.7500	7	3.0000	7	2.4545	7	2.7353	6

Source: Own Survey, 2020

Finding about the factors causing project time delay shows that project delay in AACRA is caused by client related, consultant related, contractor related and external factors. The highest mean score is observed in consultant related suggesting that the mainly project delay is due to weaker performance of the consultant and it is indicated by lack of experience of the consultant. The second highest mean score is observed in factors related to contractor. This indicates the second main party for project delay is performance of the contractor which is indicated by lack of experience. Therefore, this finding suggests lack of experience in main factor for time delay of projects.

Further these findings indicate project performance indicators such as cost overrun and time delay are affected by similar factors. Although the project performance is affected by client related factors, consultant related factors, contractor related factors and external environment factors, it is mainly affected by performance of consultant and contractors.

4.5 Discussion

The project has weak performance when compared to project plan. Regarding the time performance, the projects have an average time delay of 300 days. On the other hand, the cost of the project is overrunning. On average the projects have cost overrun of 10.39 million. This weak performance of the project is caused due to different factors. In this study, factors related to client, consultant, contractor and external environment are identified.

Cost overrun in the projects is due to different factors. Among these factors the most important factors includes; delay to deliver the site, delay to payment and finance problem, change in scope of the project, award to list bidder, lack of experience of contractor and consultant, lack of quality control, spent time for approval of test and inspection, incomplete design at the time of tender, low quality materials, poor site management, poor workmanship, disputes and negotiations, utility problems, material price variations, exchange rate fluctuation.

Another performance indicator is timely completion of projects. The delayed project completion is caused by different factors. It is affected by contractor related, consultant related, client related and external environment related factors. Specifically, time delay of the projects is caused by award to list bidder, change in scope of the project, delay to payment and finance problem,, delay to deliver the site, disputes and negotiations, exchange rate fluctuation, incomplete design at the time of tender, lack of experience of contractor and consultant, lack of quality control, low quality materials, material price variations, poor site management, poor workmanship, spent time for approval of test and inspection and utility problems.

CHAPTER FIVE
CONCLUSION AND RECOMMENDATION

5.1.Summary of Major Finding

This study was mainly conducted to assess time and cost performance evaluation of road projects of AACRA. To meet this general objective the study has collected the study data from main stakeholders of the projects; client, consultant and contractor by using questionnaire. The data collected through questionnaire is analyzed by using descriptive methods such as mean and ranking. The mean is used for identification of relative importance of the factor. The study has developed three specific objectives based on the main objective of the study. The major findings of the study are summarized as follows;

- Road construction projects in AACRA have an average time delay of 300 days ranging from 57 days to 946 days. The minimum cost overrun run is 330,000 birr and maximum cost overrun is 77 million Birr. On average the projects have cost overrun of 10.39 million.
- The study has identified client, consultant, contractor and external environment related factors that that resulted on cost overrun. The important factors related to performance of the client include delay to deliver the site (right of way problem), award to list bidder, change in scope of the project, and delay to payment and finance problem.The consultant related factors that increased cost of the projects include lack of experience, spent time for approval of test and inspection, incomplete design at the time of tender, Lack of quality control, and Complicated specification. The third group of factors that caused cost overrun were Lack of experience, Poor construction methodologies, Poor site management and Low quality materials. Finally, the environmental factors that caused cost overrun in the projects were major disputes and negotiations, utility problems (electricity, water and telephone), material price variations (inflation/escalation) and exchange rate fluctuation.
- The second indicator of the performance of the projects is timely completion of the projects. In the projects time delay was observed and factors caused time delay were identified.The study has identified 4 groups of factors; client related, consultant related, contractor related and external environment related. The client related factors that caused the time delay in the projects include (right of way problem), award to list bidder, change in scope of the project, and delay to payment and finance problem. In addition to client related factors, consultant related factors were causes for time delay of the projects that include lack of experience, spent time for approval of test and inspection, incomplete design at the time of tender, lack of quality control, and complicated specification .Lack of experience, Poor construction methodologies, Poor

site management and Low quality materials were contractor related factors that delayed the project completion period. The environmental factors that caused project delay were major disputes and negotiations, weather conditions, utility problems, and inflation/escalation.

5.2.Conclusions

Based on the major findings the study reached on following conclusions.

- Most of the participant surveyed in the study has agreed that Addis Ababa road projects have poor performance rate with respect to time and cost.
- Road construction projects in Addis Ababa Construction Authority are at lower performance especially regarding time delay and cost delay. The enterprise and stakeholders of the project management has weaker performance. On average the projects are delayed for 300 days and costs of the projects increased by 10.39 million Birr.
- Weaker performance of the projects is due to weaker performance of the client, consultant, and contractors. The cost of the project has increased due to right of way problem, delayed award to list bidder, frequent change in scopes, delay to payment, limited experience of consultant, delayed approval of test and inspection, incomplete design, lack of quality control, complicated specification, lack of experience of contractor, poor construction methodologies followed by the contractor, poor site management practices and using low quality materials. In addition, external factors were also responsible for weaker performance of the projects. These factors include major disputes and negotiations, utility problems, material price variations (inflation/escalation) and exchange rate fluctuation.
- Time delay of the projects is affected by similar factors that increased cost of the projects. right of way problem, delayed award to list bidder, frequent change in scopes, delay to payment, limited experience of consultant, delayed approval of test and inspection,
- It is found that road construction performance have a great impact on the construction sector in such a way that their low performance will discourage investment on road construction projects by government, fund Aid, eroding mutual trust and respect between the parties, and it make negative attitude towards public authority.
- Incomplete design, lack of quality control, complicated specification, lack of experience of contractor, poor construction methodologies followed by the contractor, poor site management practices and using low quality materials were causes of time delay in road construction projects in AACRA. The project is

delayed due to external factors such as disputes and negotiations, weather conditions, utility problems, and inflation/escalation.

- It is revealed from the study that there are a variation orders and quick decision problem from the client and consultant side and contractors poor planning and management experience in most of the projects considered for the research. As a result, the Contractor's time and cost performance have been affected.

5.3.Recommendations

Based on the conclusions the study provides following recommendations for stakeholders of the management of the projects.

- To improve performance of the projects the stakeholders were recommended to improve their performance.
- Specifically, the client is recommended to solve problems associated with delivery of the site (right of way problem), award to list bidder as soon as possible, revise the scope of the project before implementation, and improve weakness in payment and finance problem.
- The government of Ethiopia also Addis Ababa should develop better policy and proper strategy to enhance client, consultant and contractor performance in order to build up the road construction sector of Addis Ababa. This can be real by developing policy for better access to financial and pay attention to the construction industry and by providing higher margin of preference for the performance of road construction
- The consultants are recommended to improve their performance through employing experienced employees, reduce time for approval of test and inspection, submit complete design, strong quality control, and develop rational and implementable specifications.
- Supervision consultants are suggested to hire a qualified technical staff to supervise the projects correctly, so that they will be able to overcome and control any poor project performance and supervision. It is also advised that supervision consultants need to have high qualification and attend site to give appropriate instruction at the right time and to be able to supervise and manage the construction project in efficient and correct way.
- Further, contractors are recommended to employee experienced sub-contractors, improve the construction methodologies they follow, develop strong site management and use quality materials.
- The contractor has also advised to deploy and use the resources such as; manpower, equipment, time and finance in efficient and effective way in order to meet project objectives.

5.4. Policy Recommendations

Road construction projects in Addis Ababa in particular and road construction projects in Ethiopia in general are facing rise in cost of the projects and delayed completion. Therefore, the government of Ethiopia recommended controlling economic shocks such as inflation and exchange rate fluctuations. The government of Addis Ababa city administration is recommended to improve supply of utilities such as electricity and water.

5.5.Recommendation for further research

This study gives attention to assessing performance of Addis Ababa road project challenges only in different AACRA project experience, for the future, it could be better to include other projects and study to get a general understanding of the construction industry. Also for future studies, another researcher can include external challenges like inflation factor and technology adaptation as a challenge and consider identifying their implication in the construction and road project.

A few more points that could be studied in greater depth are

1. This study mainly identified the challenges of Addis Ababa road project; therefore, for future study, the researcher recommended that research should focus on the impacts of road construction project challenge from the perspectives of the client, consultant, and contractor.

2. Do a guideline schedule that would help them plan independently for the construction sector? Do they think it will be a valuable resource to help them achieve timely completion?

3. If firms are not spending sufficient time planning for road construction during the early stages of projects, are they focusing more on that phase as it comes closer? At what point do they realize that the construction is something they need to tackle immediately.

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Appendix A
QUESTIONNNAIRE

QUESTIONNNAIRE FOR CLIENT (AACRA) AND CONSULTANT

Date: _____

Dear Sir/ Madam

This is a questionnaire designed for a research purpose in St. marry university, MSc Program in project management. The questions are prepared for the assessment of time and cost performance evaluation of Ethiopian

construction, in the case of Addis Ababa city road authority. The main objective of this study is to assess the Cause of cost overrun and time delay in Addis Ababa city Road Authority projects related with owner (AACRA), consultant and contractor. Thus, your responses to these questions would be kept confidential and be used only as academic purpose.

Therefore, please be helpful and give your precise and correct answers to these questions. your responses are used for only study purposes and also for further recommendations to improve similar works in the future. I would like to thank you in advance for giving your precious time.

Henok Asrat

St. marry university

Msc program in project management

Dear respondents,

The objective of this questionnaire is assessment of time and cost performance evaluation of Ethiopian construction, in the case of Addis Ababa city road authority

This questionnaire is prepared for data collection of a research on time and cost performance evaluation of Ethiopian construction, in the case of Addis Ababa city road authority

Part one: **General information**

1. Type of organization

   Client ☐ consultant ☐ contractor ☐

2. Age of the respondent_____

3. Sex of the respondent

   Male ☐ Female ☐

4. Education

   Diploma ☐ first degree ☐ Master's degree, PHD and above ☐

5. working experience in road construction (year)

   Below 5 years ☐ 5-10 ☐ above 10 ☐

Part two: Project Performances

6. Delay in the time? _____
7. Amount overrun the cost?_____

Part Three: factors causing low performance with respect to cost and time

Please use the following key words to answer and make ticking mark ( ) on the provided space

(5) =strongly agree, (4) = agree, (3) = no opinion, (2) = disagree, (1) strongly disagree

NO	Cause	Degree of Agreement /Disagreement									
		Cost Overrun					Time Overrun				
		0	1	2	3	4	0	1	2	3	4
	A. client related										
1	Delay to deliver the site(right of way problem)										
2	Poor communication and management										
3	Delay to payment and finance problem										
4	Delay to decision making										

5	Poor management of the contract										
6	Change in scope of the project										
7	Award to list bidder										
8	Poor coordination										
9	Design problem										
10	Insufficient contract period										
B. consultant related											
1	lack of experience										
2	absence of consultant in site										
3	Delay in Preparation and approval of drawing										
4	lack of quality control										
5	contract management problem										
6	spent time for approval of test and inspection										
7	Design error										
8	frequent design change										
9	incomplete design at the time of tender										
10	Complicated specification										
	c. contractor related										
1	project inspection problem										
2	inadequate subcontractor										
3	project management problem										
4	poor construction methodologies										
5	lack of construction ability/experience										
6	low quality materials										
7	shortage of material										
8	construction equipment unavailability										
9	Labor supply problem										
10	Financial problem										
11	Poor site management										
12	Variation of material price										
13	poor workmanship										
14	poor defect liability method										
15	lack of training										
D external factors											
1	Major disputes and negotiations										
2	weather condition										
3	regulatory problems										
4	utility problems (electricity, water, telephone)										
5	material price variations (inflation/escalation)										
6	Exchange rate fluctuation										
7	Unforeseen ground condition										
8	equipment unavailability										
9	material problem										
10	delay and difficulties of supplier										

2.2 please write extra contributing factor for cost overrun (if any)

_____
_____
_____

2.3 please write extra contribution factor for time overrun (if any)

_____
_____
_____
_____
_____
_____
_____

Part four: open ended questions

A. Method your organization uses for managing time delay
   _____
   _____
   _____
B. Method used to managing cost overrun?
   _____
   _____
   _____

QUESTIONNNAIRE FOR CONTRSCTOR

Date: _____

Dear Sir/ Madam

This is a questionnaire designed for a research purpose in St. marry university, MSc Program in project management. The questions are prepared for the assessment of time and cost performance evaluation of Ethiopian construction, in the case of Addis Ababa city road authority. The main objective of this study is to assess the

Cause of cost overrun and time delay in Addis Ababa city Road Authority projects related with owner (AACRA), consultant and contractor. Thus, your responses to these questions would be kept confidential and be used only as academic purpose.

Therefore, please be helpful and give your precise and correct answers to these questions. your responses are used for only study purposes and also for further recommendations to improve similar works in the future. I would like to thank you in advance for giving your precious time.

HenokAsrat

St. marry university

Msc program in project management

Dear respondents,

The objective of this questionnaire is assessment of time and cost performance evaluation of Ethiopian construction, in the case of Addis Ababa city road authority

This questionnaire is prepared for data collection of a research on time and cost performance evaluation of Ethiopian construction, in the case of Addis Ababa city road authority

Part one: **General information**

8. Type of organization

   Client ☐ consultant ☐ contractor ☐

9. Age of the respondent_____

10. Sex of the respondent

    Male ☐ Female ☐

11. Education

    Diploma ☐ first degree ☐ Master's degree, PHD and above ☐

12. working experience in road construction (year)

    Below 5 years ☐ 5-10 ☐ above 10 ☐

Part two: Project Performances

13. Delay in the time? _____

14. Amount overrun the cost?_____

Part Three: factors causing low performance with respect to cost and time

Please use the following key words to answer and make ticking mark ( ) on the provided space

(5) =strongly agree, (4) = agree, (3) = no opinion, (2) = disagree, (1) strongly disagree

NO	Cause	Degree of Agreement /Disagreement									
		Cost Overrun					Time Overrun				
		0	1	2	3	4	0	1	2	3	4
	A. client related										
1	Delay to deliver the site(right of way problem)										
2	Poor communication and management										
3	Delay to payment and finance problem										
4	Delay to decision making										
5	Poor management of the contract										
6	Change in scope of the project										

7	Award to list bidder										
8	Poor coordination										
9	Design problem										
10	Insufficient contract period										
B. consultant related											
1	lack of experience										
2	absence of consultant in site										
3	Delay in Preparation and approval of drawing										
4	lack of quality control										
5	contract management problem										
6	spent time for approval of test and inspection										
7	Design error										
8	frequent design change										
9	incomplete design at the time of tender										
10	Complicated specification										
	c. contractor related										
1	project inspection problem										
2	inadequate subcontractor										
3	project management problem										
4	poor construction methodologies										
5	lack of construction ability/experience										
6	low quality materials										
7	shortage of material										
8	construction equipment unavailability										
9	Labor supply problem										
10	Financial problem										
11	Poor site management										
12	Variation of material price										
13	poor workmanship										
14	poor defect liability method										
15	lack of training										
D external factors											
1	Major disputes and negotiations										
2	weather condition										
3	regulatory problems										
4	utility problems (electricity, water, telephone)										
5	material price variations (inflation/escalation)										
6	Exchange rate fluctuation										
7	Unforeseen ground condition										
8	equipment unavailability										
9	material problem										
10	delay and difficulties of supplier										

2.2 please write extra contributing factor for cost overrun (if any)

_____
_____
_____

2.3 please write extra contribution factor for time overrun (if any)

_____
_____
_____
_____
_____
_____
_____

Part four: open ended questions

C. Method your organization uses for managing time delay

_____
_____
_____

D. Method used to managing cost overrun?

_____
_____
_____

Appendix B

SPSS Outputs

Delay to deliver the site(right of way problem)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	2	5.9	5.9	8.8
	Neutral	5	14.7	14.7	23.5
	Agree	24	70.6	70.6	94.1

	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

Poor communication and management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	13	38.2	38.2	41.2
	Neutral	14	41.2	41.2	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

Delay to payment and finance problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	4	11.8	11.8	14.7
	Neutral	7	20.6	20.6	35.3
	Agree	22	64.7	64.7	100.0
	Total	34	100.0	100.0	

Delay to decision making

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	11.8	11.8	11.8
	Disagree	8	23.5	23.5	35.3
	Neutral	11	32.4	32.4	67.6
	Agree	9	26.5	26.5	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

Poor management of the contract

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	5.9	5.9	5.9
	Disagree	7	20.6	20.6	26.5
	Neutral	11	32.4	32.4	58.8
	Agree	13	38.2	38.2	97.1
	Strongly Agree	1	2.9	2.9	100.0
	Total	34	100.0	100.0	

Change in scope of the project

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	2	5.9	5.9	8.8
	Neutral	9	26.5	26.5	35.3
	Agree	22	64.7	64.7	100.0
	Total	34	100.0	100.0	

Award to list bidder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	2	5.9	5.9	8.8
	Neutral	6	17.6	17.6	26.5
	Agree	24	70.6	70.6	97.1
	Strongly Agree	1	2.9	2.9	100.0
	Total	34	100.0	100.0	

Poor coordination

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	5.9	5.9	5.9
	Disagree	21	61.8	61.8	67.6
	Neutral	8	23.5	23.5	91.2
	Agree	3	8.8	8.8	100.0
	Total	34	100.0	100.0	

Design problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	16	47.1	47.1	50.0
	Neutral	12	35.3	35.3	85.3
	Agree	5	14.7	14.7	100.0
	Total	34	100.0	100.0	

Insufficient contract period

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	16	47.1	47.1	50.0
	Neutral	14	41.2	41.2	91.2
	Agree	3	8.8	8.8	100.0
	Total	34	100.0	100.0	

lack of experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9

	Disagree	1	2.9	2.9	5.9
	Neutral	3	8.8	8.8	14.7
	Agree	23	67.6	67.6	82.4
	Strongly Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

absence of consultant in site

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	11	32.4	32.4	32.4
	Neutral	13	38.2	38.2	70.6
	Agree	10	29.4	29.4	100.0
	Total	34	100.0	100.0	

Delay in Preparation and approval of drawing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	20.6	20.6	20.6
	Neutral	4	11.8	11.8	32.4
	Agree	23	67.6	67.6	100.0
	Total	34	100.0	100.0	

lack of quality control

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	14.7	14.7	14.7
	Neutral	4	11.8	11.8	26.5
	Agree	23	67.6	67.6	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

contract management problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	20	58.8	58.8	58.8
	Neutral	6	17.6	17.6	76.5
	Agree	8	23.5	23.5	100.0
	Total	34	100.0	100.0	

spent time for approval of test and inspection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	21	61.8	61.8	61.8
	Neutral	5	14.7	14.7	76.5
	Agree	8	23.5	23.5	100.0
	Total	34	100.0	100.0	

Design error

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	18	52.9	52.9	52.9
	Neutral	4	11.8	11.8	64.7
	Agree	12	35.3	35.3	100.0
	Total	34	100.0	100.0	

frequent design change

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	20	58.8	58.8	58.8
	Neutral	4	11.8	11.8	70.6
	Agree	10	29.4	29.4	100.0
	Total	34	100.0	100.0	

incomplete design at the time of tender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.9	5.9	5.9
	Neutral	9	26.5	26.5	32.4
	Agree	19	55.9	55.9	88.2
	Strongly Agree	4	11.8	11.8	100.0
	Total	34	100.0	100.0	

Complicated specification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	8.8	8.8	8.8
	Neutral	7	20.6	20.6	29.4
	Agree	22	64.7	64.7	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

project inspection problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	14	41.2	41.2	41.2
	Neutral	14	41.2	41.2	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

inadequate subcontractor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	19	55.9	55.9	55.9

	Neutral	10	29.4	29.4	85.3
	Agree	5	14.7	14.7	100.0
	Total	34	100.0	100.0	

project management problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	20	58.8	58.8	58.8
	Neutral	9	26.5	26.5	85.3
	Agree	5	14.7	14.7	100.0
	Total	34	100.0	100.0	

poor construction methodologies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	3	8.8	8.8	11.8
	Neutral	1	2.9	2.9	14.7
	Agree	27	79.4	79.4	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

lack of construction ability/experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	1	2.9	2.9	5.9
	Neutral	3	8.8	8.8	14.7
	Agree	25	73.5	73.5	88.2
	Strongly Agree	4	11.8	11.8	100.0
	Total	34	100.0	100.0	

low quality materials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	6	17.6	17.6	20.6
	Neutral	3	8.8	8.8	29.4
	Agree	24	70.6	70.6	100.0
	Total	34	100.0	100.0	

shortage of material

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	13	38.2	38.2	38.2
	Neutral	15	44.1	44.1	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

construction equipment unavailability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	15	44.1	44.1	44.1
	Neutral	13	38.2	38.2	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

Labor supply problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	21	61.8	61.8	61.8
	Neutral	7	20.6	20.6	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

Financial problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	11	32.4	32.4	32.4
	Neutral	17	50.0	50.0	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

Poor site management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	3	8.8	8.8	11.8
	Neutral	6	17.6	17.6	29.4
	Agree	22	64.7	64.7	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

Variation of material price

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	16	47.1	47.1	47.1
	Neutral	12	35.3	35.3	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

poor workmanship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9

	Disagree	8	23.5	23.5	26.5
	Neutral	7	20.6	20.6	47.1
	Agree	18	52.9	52.9	100.0
	Total	34	100.0	100.0	

poor defect liability method

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	17	50.0	50.0	50.0
	Neutral	11	32.4	32.4	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

lack of training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	23	67.6	67.6	67.6
	Neutral	5	14.7	14.7	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

Major disputes and negotiations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	3	8.8	8.8	11.8
	Agree	28	82.4	82.4	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

weather condition

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	3	8.8	8.8	11.8
	Neutral	2	5.9	5.9	17.6
	Agree	26	76.5	76.5	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

regulatory problems

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	14.7	14.7	14.7
	Disagree	16	47.1	47.1	61.8
	Neutral	2	5.9	5.9	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	

utility problems (electricity, water, telephone)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	3	8.8	8.8	11.8
	Neutral	5	14.7	14.7	26.5
	Agree	23	67.6	67.6	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

material price variations (inflation/escalation)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	14.7	14.7	14.7
	Neutral	4	11.8	11.8	26.5

	Agree	25	73.5	73.5	100.0
	Total	34	100.0	100.0	

Exchange rate fluctuation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	17	50.0	50.0	50.0
	Neutral	6	17.6	17.6	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	

Unforeseen ground condition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	8.8	8.8	8.8
	Disagree	16	47.1	47.1	55.9
	Neutral	4	11.8	11.8	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	

equipment unavailability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	21	61.8	61.8	61.8
	Neutral	2	5.9	5.9	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	

material problem

		Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Strongly Disagree	5	14.7	14.7	14.7
	Disagree	18	52.9	52.9	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	

delay and difficulties of supplier

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	19	55.9	55.9	55.9
	Neutral	4	11.8	11.8	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	

Delay to deliver the site(right of way problem)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	2	5.9	5.9	8.8
	Neutral	6	17.6	17.6	26.5
	Agree	23	67.6	67.6	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

Poor communication and management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	14	41.2	41.2	44.1
	Neutral	13	38.2	38.2	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

Delay to payment and finance problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	4	11.8	11.8	14.7
	Neutral	8	23.5	23.5	38.2
	Agree	21	61.8	61.8	100.0
	Total	34	100.0	100.0	

Delay to decision making

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	11.8	11.8	11.8
	Disagree	8	23.5	23.5	35.3
	Neutral	12	35.3	35.3	70.6
	Agree	8	23.5	23.5	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

Poor management of the contract

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	5.9	5.9	5.9
	Disagree	7	20.6	20.6	26.5
	Neutral	11	32.4	32.4	58.8
	Agree	14	41.2	41.2	100.0
	Total	34	100.0	100.0	

Change in scope of the project

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	2	5.9	5.9	8.8
	Neutral	10	29.4	29.4	38.2
	Agree	21	61.8	61.8	100.0
	Total	34	100.0	100.0	

Award to list bidder

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	2	5.9	5.9	8.8
	Neutral	7	20.6	20.6	29.4
	Agree	23	67.6	67.6	97.1
	Strongly Agree	1	2.9	2.9	100.0
	Total	34	100.0	100.0	

Poor coordination

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	5.9	5.9	5.9
	Disagree	21	61.8	61.8	67.6
	Neutral	9	26.5	26.5	94.1
	Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

Design problem

		Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	16	47.1	47.1	50.0
	Neutral	13	38.2	38.2	88.2
	Agree	4	11.8	11.8	100.0
	Total	34	100.0	100.0	

Insufficient contract period

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	16	47.1	47.1	50.0
	Neutral	15	44.1	44.1	94.1
	Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

lack of experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	1	2.9	2.9	5.9
	Neutral	4	11.8	11.8	17.6
	Agree	22	64.7	64.7	82.4
	Strongly Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

absence of consultant in site

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	11	32.4	32.4	32.4
	Neutral	14	41.2	41.2	73.5
	Agree	9	26.5	26.5	100.0

	Total	34	100.0	100.0	

Delay in Preparation and approval of drawing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	20.6	20.6	20.6
	Neutral	5	14.7	14.7	35.3
	Agree	22	64.7	64.7	100.0
	Total	34	100.0	100.0	

lack of quality control

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	14.7	14.7	14.7
	Neutral	5	14.7	14.7	29.4
	Agree	22	64.7	64.7	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

contract management problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	20	58.8	58.8	58.8
	Neutral	7	20.6	20.6	79.4
	Agree	7	20.6	20.6	100.0
	Total	34	100.0	100.0	

spent time for approval of test and inspection

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	21	61.8	61.8	61.8
	Neutral	6	17.6	17.6	79.4

	Agree	7	20.6	20.6	100.0
	Total	34	100.0	100.0	

Design error

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	18	52.9	52.9	52.9
	Neutral	5	14.7	14.7	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	

frequent design change

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	20	58.8	58.8	58.8
	Neutral	5	14.7	14.7	73.5
	Agree	9	26.5	26.5	100.0
	Total	34	100.0	100.0	

incomplete design at the time of tender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	5.9	5.9	5.9
	Neutral	10	29.4	29.4	35.3
	Agree	18	52.9	52.9	88.2
	Strongly Agree	4	11.8	11.8	100.0
	Total	34	100.0	100.0	

Complicated specification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	8.8	8.8	8.8

	Neutral	8	23.5	23.5	32.4
	Agree	21	61.8	61.8	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

project inspection problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	14	41.2	41.2	41.2
	Neutral	14	41.2	41.2	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

inadequate subcontractor

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	20	58.8	58.8	58.8
	Neutral	9	26.5	26.5	85.3
	Agree	5	14.7	14.7	100.0
	Total	34	100.0	100.0	

project management problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	21	61.8	61.8	61.8
	Neutral	8	23.5	23.5	85.3
	Agree	5	14.7	14.7	100.0
	Total	34	100.0	100.0	

poor construction methodologies

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	3	8.8	8.8	11.8
	Neutral	2	5.9	5.9	17.6
	Agree	26	76.5	76.5	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

lack of construction ability/experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	1	2.9	2.9	5.9
	Neutral	4	11.8	11.8	17.6
	Agree	24	70.6	70.6	88.2
	Strongly Agree	4	11.8	11.8	100.0
	Total	34	100.0	100.0	

low quality materials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	6	17.6	17.6	20.6
	Neutral	4	11.8	11.8	32.4
	Agree	23	67.6	67.6	100.0
	Total	34	100.0	100.0	

shortage of material

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	14	41.2	41.2	41.2
	Neutral	14	41.2	41.2	82.4

	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

construction equipment unavailability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	16	47.1	47.1	47.1
	Neutral	12	35.3	35.3	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

Labor supply problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	22	64.7	64.7	64.7
	Neutral	6	17.6	17.6	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

Financial problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	11	32.4	32.4	32.4
	Neutral	17	50.0	50.0	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

Poor site management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	4	11.8	11.8	14.7

	Neutral	6	17.6	17.6	32.4
	Agree	21	61.8	61.8	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

Variation of material price

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	17	50.0	50.0	50.0
	Neutral	11	32.4	32.4	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

poor workmanship

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	8	23.5	23.5	26.5
	Neutral	8	23.5	23.5	50.0
	Agree	17	50.0	50.0	100.0
	Total	34	100.0	100.0	

poor defect liability method

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	18	52.9	52.9	52.9
	Neutral	10	29.4	29.4	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

lack of training

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	22	64.7	64.7	67.6
	Neutral	5	14.7	14.7	82.4
	Agree	6	17.6	17.6	100.0
	Total	34	100.0	100.0	

Major disputes and negotiations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	3	8.8	8.8	11.8
	Neutral	1	2.9	2.9	14.7
	Agree	27	79.4	79.4	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

weather condition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	3	8.8	8.8	11.8
	Neutral	3	8.8	8.8	20.6
	Agree	25	73.5	73.5	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

regulatory problems

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Strongly Disagree	6	17.6	17.6	17.6
	Disagree	15	44.1	44.1	61.8
	Neutral	2	5.9	5.9	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	

utility problems (electricity, water, telephone)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	3	8.8	8.8	11.8
	Neutral	6	17.6	17.6	29.4
	Agree	22	64.7	64.7	94.1
	Strongly Agree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	

material price variations (inflation/escalation)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	14.7	14.7	14.7
	Neutral	5	14.7	14.7	29.4
	Agree	24	70.6	70.6	100.0
	Total	34	100.0	100.0	

Exchange rate fluctuation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	16	47.1	47.1	50.0
	Neutral	6	17.6	17.6	67.6
	Agree	11	32.4	32.4	100.0

	Total	34	100.0	100.0	

Unforeseen ground condition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	11.8	11.8	11.8
	Disagree	15	44.1	44.1	55.9
	Neutral	4	11.8	11.8	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	

equipment unavailability

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	20	58.8	58.8	61.8
	Neutral	2	5.9	5.9	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	

material problem

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	6	17.6	17.6	17.6
	Disagree	17	50.0	50.0	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	

delay and difficulties of supplier

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	2.9	2.9	2.9
	Disagree	18	52.9	52.9	55.9
	Neutral	4	11.8	11.8	67.6
	Agree	11	32.4	32.4	100.0
	Total	34	100.0	100.0	