ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

MA IN PROJECT MANAGEMENT

Factors Affecting Success of Projects in Addis Ababa City Roads Authority

A thesis paper submitted to graduate program in partial fulfillment of the requirements for the degree of Masters in Project Management

By: Tigist Tena

Advisor: Mengistu Bogale (PhD)

June, 2017
Addis Ababa, Ethiopia

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Approved by Board of Examiners:

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DECLARATION

I, the undersigned, declare that this thesis entitled 'Factors Affecting Success of Projects in Addis Ababa City Roads Authority' is my original work, prepared under the guidance of Dr. Mengistu Bogale. All sources of materials used for the thesis have been duly acknowledged.

Name

Tigist Tena _____

Signature

Addis Ababa University, Addis Ababa June, 2017

CERTIFICATE

This is to certify that this project work, "Factors Affecting Success of Projects in Addis Ababa City Roads Authority" undertaken by Tigist Tena for the Partial fulfillment of the award of Master's degree in Project Management at Addis Ababa University, School of Commerce, is an original work and not submitted earlier for any degree either at this University or any other University and the thesis has been submitted for examination with my approval as a university advisor.

Mengistu Bogale (Ph.D.) ----------

Advisor **Signature**

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Table of Contents

Page

ACRONYMS

AACRA	Addis Ababa City Roads Authority
AAWSA	Addis Ababa Water and Sewerage Authority
CM	Construction Management
EEPCO	Ethiopian Electric Power Corporation
ETC	Ethiopian Tele Communication
FCY	Foreign Currency
WBS	Work Break Down Structure

List of Tables and Figures

Tables

Page

Figures

Abstract

The objective of this study is to identify the causes behind the observed project delays, project cost overruns and quality problems of the project deliverables of Addis Ababa City Roads Authority. Moreover, providing a framework that will be used to improve the future performance of projects at the authority was also intended. The study has utilized primary and secondary data sources. Primary data has been collected through questionnaire and interviews while secondary data was collected through a documentation review of progress and completion reports of the authority. Descriptive analysis was used to analyze the data collected. The factors affecting the three success dimensions were identified through the questionnaires and interviews. Accordingly, the major factors identified as affecting project delays were found to be poor coordination with other stakeholders (including EEPCO, ETC and AAWSA), Delays in administration of right of way obstruction removal, delay in provision of resources and machineries and design and scope changes. On the other hand, Project cost overruns of the authority has been found to be mostly influenced by penalty, claims and overhead costs in relation to project delays, poor coordination between stakeholders resulting Reworks and misalignment and inadequate planning and scope changes. Quality problems of AACRA's project deliverables of projects are basically caused by lack of complete and updated quality policy and quality assurance manuals, Poor quality of construction materials, Poor coordination with other stakeholders and Lack of skilled and committed manpower to quality. Besides, the study has revealed that though projects undertaken by AACRA are mostly subjected to scope and design changes, the authority has no strategy towards change management and this is resulting costly way of incorporating changes. Lessons learned from past projects and documentation practice of AACRA were as well found to be poor resulting in difficulty to trace progress of ongoing projects and rising the probability that mistakes will be repeated in future projects. Finally, based on the other factors identified to be affecting the success of projects in the authority, recommendations were forwarded and a framework which can be utilized to improve AACRA's project performance was developed.

Chapter One: Introduction

1.1 Background of the Study

From the early days of project management, the direct project objectives of time, cost, and performance (as generally agreed to by the client and the organization actually doing the project) have been accepted as the primary determinants of project success or failure. (Jack R. Merd. and Samuel J. Mantel, Jr. 2009).Thus, 'Project implementation and management focuses on three basic parameters: Quality, cost and time. A successfully managed project is one that is completed at the specified level of quality, on or before the deadline, and within the planned budget' (UNCRD, 2000).

Yet, large construction projects have been known for their cost overruns and late completion times (Pickrell 1990; Flyvberg H. & Buhl, 2003). A considerable number of international literatures opine that the inability to complete projects on time and within budget continues to be a chronic problem worldwide and a far worsening case (Ahmed, Azher, Castillo, and Kappagantula, 2002; Azhar and Farouqui, 2008). However, as the trend of construction projects cost overrun becomes severe, a number of adverse consequences such as project failure, reduction of profit margin, loss of belief of citizen in government funded projects, would certainly take place.

Our country is not an exception. According to Fayissa (2014), even though projects are tools through which development policies and programs are translated into practice, many public sector development projects implemented usually take more time; require additional budget and customers complained about quality of project outputs. And Fetene (2008) stated that most construction projects in this country (Ethiopia) suffer time and cost overrun, (Fetene, AAU, 2008).

Studies have even revealed that our status is worse; "From the view point of cost, completion time and quality of the projects, the construction Industry of Ethiopia is not at required level compared to the rest of the world" (Bereket, 2015).

Many factors might be responsible for cost overruns and late completion times and quality problems. Cost overruns are mostly caused by 'Underestimation of costs to make the projects

more viable, addition of scope during later stages of project planning and even during construction, changed conditions, etc.'. One of the most important contributing factors to the magnitude of cost overrun in large transportation projects are project delays. Furthermore, the length of project development phase from planning to construction seems to be a major factor in the extent of cost overrun (Flyvbjerg, H. & Buhl, 2004).

On the other hand, studies have revealed that schedule slippages can be caused by, 'inaccurate time estimation' M. Haseeb, et al., (2011), 'financial status of the contractor' Mahamid (2013), slow site clearance, inflation, progress payments delay by owner, inaccurate cost estimation, and delay in commencement Siraw (2011).

Thus, the studies have indicated that the factors affecting the success of projects might vary in different situations. This study is planned to identify the factors affecting the success of projects in the context of Addis Ababa City Roads Authority.

The study of this paper will focus on the previously mentioned three dimensions of project success. As the organization under the study is involved in infrastructure projects that are not executed for commercial purpose, the success dimensions that are linked with business functions will not be addressed in this study.

Addis Ababa City Roads Authority is responsible for administration and construction of Asphalt surfaced and gravels surfaced Roads at the capital of Ethiopia. The authority has been responsible for undertaking and administering road construction projects since 1998 E.C. The Authority has done remarkable progress in the city roads expansion and upgrading in the last 11 years since its establishment.

Yet, the organization has been challenged to deliver its projects efficiently and confirming to the expected level of standard. Planned schedules and budgets are frequently missed and technical specifications of the deliverables fail to meet the standards.

As scholars argue, in order to improve projects' performance, the factors for project success are essentially important to be identified. The primary objective of this study is to identify the major factors resulting in cost overrun, schedule slippage and quality problems in the construction projects of Addis Ababa City Roads Authority so that it will be possible to recommend on the ways to mitigate the occurrence of inefficiency of projects in the authority and the technical specification problems of the deliverables.

1.2 Statement of the Problem

The driving force to study the selected area came from personal observation of the considerable delays in completion of road projects undertaken in Addis Ababa and the reworks and performance problems on the roads constructed.

Being the capital city of our country, political city of Africa and center of International organizations, Addis Ababa demands a highly growing infrastructural development. Among the developments desired at all corners of the city is construction of standard asphalt roads.

Yet, as residents of Addis Ababa, we have been witnessing the significant delays in completion of road construction projects held or administered by Addis Ababa City Roads Authority. We have also heard the complaints of the society and several institutions for the inconveniences resulted by the delays of the projects for completion and the quality problems of the deliverables through various media. Besides, a study 'Analysis of factors to time over run on Addis Ababa City Roads Authority' conducted by Siraw Yenesew revealed that Addis Ababa City Roads Authority was short of achieving what was planned in all Ethiopian calendar years between 2000 and 2005 and 80 percent of the projects suffered time overrun.

Moreover, number of asphalt roads are constructed without the necessary drainage system and incorporating other utility lines. Thus, when a need for installing these lines arises, the roads shall be dug out and maintained resulting in spending of additional resources and time besides creating inconvenience on the users. Consequently, these projects will also be subjected to cost overrun as schedule over run and reworks are among other the factors resulting in cost overrun.

Considering the failure of the authority to succeed in the three success dimensions of projects and the definition of project success given by several scholars, it can be implied that most of the projects executed by the authority have not been successful so far.

''Time, cost and quality have their proven importance as a prime measures for project success'' Mohamed, (2013). Project requirements are commonly assumed to be time, quality and cost of a project. Success and failure of any project will be measured by these three requirements.'' (Siraw, 2016) Timely and with budget completion of a construction project is frequently seen as a major criterion of project success by clients, contractors, consultants and related stakeholders (Luka and Muhammad, 2014; Ibrahim and Nabil, 2013; Abadir, 2011; Chabota et al., 2008).

According to the studies of several researchers, there will be many variables having an impact upon specification problems and construction time and cost overruns. Considering the failures of AACRA to complete projects within the planned schedule, budget and to the acceptable level of quality, this paper aimed at exploring the significant factors resulting in these failures so that it will be possible to overcome them revealing an insight towards improving the project management practice of the organization by developing a framework.

1.3 Research Questions

1. What are the major factors resulting in cost overrun on the projects of Addis Ababa City Roads Authority?

2. What factors are influencing the schedules and performance of projects undertaken in Addis Ababa City Roads Authority?

3. How would it be possible to improve the performance of projects in Addis Ababa City Roads Authority?

1.4 Research Objectives

General Objective

The general objective of the study is to identify the major factors influencing project success in Addis Ababa City Roads Authority.

Specific Objectives

- To identify the factors resulting in schedule slippages in construction projects in Addis Ababa City Roads Authority.
- To identify factors responsible for cost overrun and quality problems in construction projects of AACRA.
- To provide a framework that can be used to improve the future performance of projects at Addis Ababa City Roads Authority

1.5 Significance of the Study

Identifying factors affecting success of projects will help in dealing with the issues since the inception stage of upcoming projects and to control them for projects under implementation. Accordingly, the findings from this research and the developed success framework will serve as an input to AACRA to manage its projects successfully.

On top of that, providing an insight towards progress in infrastructural development particularly the road sector of Ethiopia's largest metropolis, Addis Ababa, home to 25% of the country's urban population, an official diplomatic capital of Africa, and the fourth largest diplomatic center in the world is believed to have a considerable impact on the economic and social sectors of the country as physical infrastructure has influences in facilitating and enhancing economic activities.

On the other hand, the findings from this study can provide inputs for further research works such as an impact assessment of project delays and quality problems and mitigation techniques against delays and cost overruns.

The study also contributes to the Project Management discipline by adding literature and findings to improvement of other similar projects.

1.6 Scope of the Study

This study is limited to assessing the cost, quality and time dimensions of project success of AACRA. Moreover, the study has been undertaken by considering 5 projects executed or administered by Addis Ababa City Roads Authority in the recent 3 Calendar years (2006-2008) to demonstrate project cost overruns and project delays.

1.7 Limitation of the Study

The authority under the study, Addis Ababa City Roads Authority, undertakes projects either by its own force or by subcontracting certain or entire activities for completing a project; yet, though contract administrators of the authority has been approached to identify the factors affecting the three success dimensions, the study has failed to question contractors so that

responses of contractors has not been included due to time constraints. Moreover inaccuracies in estimating project costs could not be measured due to the poor documentation practice of the authority.

1.8 Organization of the Study

The paper is organized in to five chapters. The first chapter is an introduction of the overall study, consisting of background of the study, statement of the problem, objectives of the study basic research questions, significance and scope of the study.

The second chapter focuses on review of related literature in which earlier studies on the area are highlighted and presented. Theoretical Review of the Literature and empirical evidences of factors affecting project success of construction projects are discussed in detail. The third chapter presents the design of the research and the methodologies used. In this chapter source of data, sampling technique, instrument of data collection, methods of data analysis and ethical research considerations are offered.

The fourth chapter is devoted to data presentation, analysis and interpretation in which the collected primary and secondary data are analyzed and organized in a manner that meets the objectives of the study.

The last chapter deals with summary of the research findings, the conclusion as well as recommendations of the research based on the findings.

Chapter Two: Review of related Literature

Introduction

This section is designed to review relevant literatures on the area of successful project management. Thus, both theoretical and practical findings of various researchers related to projects, project management, project success and factors affecting project success will be reviewed. The literatures are gathered from different secondary sources such as published books, articles and related websites. Efforts were exerted to include significantly related literatures by reviewing available documents helping to support the research.

2.1 Theoretical Review

2.1.1 Project and Project Management

Project

A project can be defined in various ways. The PMI has defined a project as a temporary endeavor undertaken to create a unique product or service. (Project Manegement Institute, 2004)

According to Tonnquest, a project is a task that is performed by a temporary organization in order to achieve a predetermined result. Projects are not limited in size or in persons involved but are always temporal and have a clear start and end. Projects can be used for different kinds of purpose, but most commonly they are used for realizing organizational goals. (Tonnquest B., (2008) cited by Lund, 2011).

Projects are desirable to be completed within the time frame and budgeted cost. But unfortunately, many projects take longer to complete and cost more than necessary because of lack of professional skills in the area and other various factors directly and/or indirectly related with it. In most developing countries this problem is more aggravated than those developed ones; as a result many project-sponsoring organizations are discouraged to sponsor projects in these poor countries. (Abraham, 2004)

Project Management

The 2008 edition of the *PMBOK GUIDE* defines project management as "application of knowledge, skills, tools and techniques to project activities to meet project requirements. Project management is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing". Yet, some authors argue that these processes do not fully capture the essence of project management 'Much of project management consists of dealing with political issues, trying to get team members to perform at the required level, and negotiating for scarce resources'. (James P., 2005)

According to Kerzner, Project management is the planning, organizing, directing, and controlling of company resources for a relatively short-term objective that has been established to complete specific goals and objectives (Kerzner H., 2003).

2.1.2 Project Success

Defining Project Success

According to the PMBOK Guide, since projects are temporary in nature, the success of the project should be measured in terms of completing the project within the constraints of scope, time, cost, quality, resources, and risk as approved between the project managers and senior management (PMBOK, 2013). For a project to be successful, it is essential to understand the project requirements right from the start and go for project planning which provides the right direction to project managers and their teams and execute the project accordingly (Nader Sh. Kandelousi, Ooi. J., Abdollahi, 2011). A successful project is one that is delivered on time and managed within the budget.

The traditional view of project success is to accomplish all of the schedule, budget, and technical objectives as planned (Harvey A. Lev, 2002). Ideally a project will be considered totally successful if it gets completed on time, within budget and performs exactly to the designer's specifications (Harvey A. Lev, 2002). These three variables define the overall goals of a project; therefore, any project that is "on time, on budget, high quality" is declared a success. The difficulty, however, exists in their relationship to one another (Erik Versuh, 2003). The term *equilibrium* sums up the challenge: The quality of the product we create depends on the time and

money we are willing to spend. After a balance between these variables is struck, a change to one will affect the other two. Achieving the proper balance of cost, schedule, and quality is beyond the control of the project manager alone. All stakeholders, particularly those involved in project selection, influence the choices and trade-offs that make up the triple constraint (Erik Versuh, 2003). Tradeoffs have to be accepted between various performance parameters for effective management of a project (Harvey A. Lev, 2002).

How to measure success of Projects

Ibrahim M., (2013), indicated that time, cost and quality have their proven importance as a prime measures for project success. Project requirements are commonly assumed to be time, quality and cost of a project. Success and failure of any project will be measured by these three requirements.

Construction projects are not exceptions. According to Majid (2006), a construction project is commonly acknowledged as successful when it is completed on time, within budget, in accordance with specifications. Moreover, 'Success is determined by how well it performed against the defined objectives and conformed to the management processes outlined in the planning phase' (Jason W., 2006).

2.2 Empirical Review

2.2.1 Factors affecting Success of Projects

Various researchers have studied different types of projects and identified different factors affecting successfulness of projects. The Factors that affect the projects' performance vary with the various project success dimensions we have discussed so far. Thus, it is planned to put the factors to the respective dimensions of success. Hence, the sections below will present various factors contributing for cost overrun, project delays and quality problems as identified by number of studies made in various countries. Effort is exerted to give special attention to studies made on construction projects.

2.2.1.1 Factors contributing to Cost over Runs

Cost Overrun is the expression which is used to represent the variance between the original sanctioned cost and the final cost incurred, would then provide no indication of managerial performance. Anything done to a project, including time overrun would be reflected in the cost. If a project is not managed well, its cost will go up; conversely, if a project is managed well, its cost should come down. Therefore, cost can be used as an indicator for project management performance (Tarun Soota, 2005).

Different studies have revealed that there are various factors responsible for cost overrun of Construction projects. Kaming, Olomolaiye, Holt, and Harris (1997), who studied 31 construction projects in Indonesia, found that from a contractor's point of view, cost overruns were mainly caused by inaccuracy of material take-off, increase in material costs and cost increase due to environmental restrictions. Le-Hoai et al. (2008) ranked the three top causes of cost overruns in Vietnam as material cost increase due to inflation, inaccurate quantity take - off, and labor cost increase due to environment restriction. Kaliba, et al. (2009) concluded that cost escalation of construction projects in Zambia are caused by factors such as inclement weather, scope changes, environment protection and mitigation costs, schedule delay, strikes, technical challenges and inflation. Bubshait and Al-Juwait (2002) listed the following as factors that cause cost overrun on construction projects in Saudi Arabia; effects of weather, number of projects going on at the same time, social and cultural impacts, project location, lack of productivity standards in Saudi Arabia, level of competitors, supplier manipulation, economic stability, inadequate production of raw materials by the country, absence of construction cost data. In another study on construction projects in Nigeria, conducted by Okpala and Aniekwu (1988), it was found that architects, consultants and clients agreed that shortage of materials, finance and payment of completed works and poor contract management were the most important causes of cost overruns. Mansfield, Ugwu and Doran (1994) studied the performance of transportation infrastructure projects in Nigeria and concluded that material price fluctuations, inaccurate estimates, project delays and additional work contributed most to cost overruns. During a review of public sector construction projects in Nigeria, Dlakwa and Culpin (1990) found that the three main reasons for cost overruns are "fluctuations in material, labor and plant costs, construction delays and inadequate pre-planning. Kaming et al, (1997) and Mansfield et al,1994 also

identified design change, inadequate planning, unpredictable weather condition, and fluctuation in construction materials as factors influencing cost overruns. Another critical causes for time cost overrun were identified: incomplete design at the time of tender; additional work at owner's request; changes in owner brief; lack of cost planning/monitoring during pre and- post contract stages; site/poor soil conditions; adjustment of prime cost and provisional sums; re-measurement of provisional works; logistics due to site location.

All the cited researches have helped to trace several causes. On the other hand, 'Understanding and Monitoring the Cost-Determining Factors of Infrastructure Projects, A User's guide- online' has provided the below elaborated factors resulting in cost overrun.

Factors which change costs overtime

Once implementation begins, a project's costs rarely remain static. As further information becomes available the costs may be further defined. Yet, even when a cost has become firmly fixed, there are numerous factors that can lead to the cost increasing. Delays are a major factor. Whatever the reason, delays almost invariably increase budget costs. Many events may have contributed to the delay – some which could have been foreseen and others which could not. (Understanding and Monitoring the Cost-Determining Factors of Infrastructure Projects, A User's guide- online)

Design Changes

A change in a project's design can arise for a number of reasons. It may be that the project sponsor wants additional elements to be included in the project or changes to existing ones. Usually, these design changes require additional time inputs from architects and engineers as well as the additional time and cost inputs from the contractor and for additional materials.

Inflation

As noted earlier in this section inflation can act to increase the original estimates of construction costs. Inflation may have been taken into account in the original estimates, but if the rate of inflation increases above the predicted level during the construction period, then the original cost

estimate will be exceeded. Obviously any other factor that delays a project will expose the project to the risk of further inflationary cost increases.
Inflation may not be the only cause of price rises. Political or technological factors may affect one or more element of costs.

Shortages of Material and Plant

During periods where the level of development activity is unusually high in a particular region, there may be shortage of some construction materials, construction plant (machines and equipment used during construction) and service plant (equipment used in the operation of the infrastructure project). If this was not anticipated in the original cost estimate, delays may occur and/or the prices of these elements increase.

Exchange Rates

The exchange rate is particularly relevant if contracting services or other elements of the project are being purchased from foreign countries. If exchange rates change beyond the level predicted by the project sponsor (and the companies providing the services) then the cost of the project can increase. It can of course operate in the opposite way where the project sponsor takes advantage of a strengthening of his own currency.

Inappropriate Contractors

Contractors are selected on the basis of price, experience in undertaking particular types of project and their track record in producing high quality work within budget and on time. Problems may arise where there is a high level of development activity being undertaken in a particular region and the better contractors are not available to bid for the work at that time. Alternatively, the tender review process may not have been undertaken by the personnel with the best understanding of the services required. As a consequence, firms which are not the most experienced in that field of activity are chosen, often with implications for the quality and cost of a project. Delays in project implementation and increases in costs can arise through the use of

ineffective or inappropriate labor, or errors in calculating how productive the labor will be. This can happen especially when sub-contractors are used whose quality is not controlled in the main project contract. In most cases there is a trade-off between price, experience and track record but the desire to accept the lowest tender does not always lead to a project that is completed within time and budget. There are cases of contractors and sub-contractors who go into liquidation during the construction period. This can lead to significant delays and extra costs arising as the project sponsor has to re-tender the remaining work. Identifying a new contractor to complete another contractor's work is difficult because of the possible liabilities that the new contractor would have to accept for another company's work.

Funding Problems

The overall lack of finance to complete a project, or delays in the payment for services by the project sponsor can lead to significant problems arising. If the costs of a project have increased significantly beyond the original estimate, then work on the project may have to stop or be delayed until additional funds can be found. Funding problems can also arise if funds allocated to one project have been diverted to other projects within a programme of development. If the payment of invoices by a project sponsor is low, the contractor may begin to commit less resource to a project, and may even cease work if cash flow becomes a problem. In some cases, even when a project is expected to be entirely profitable, project sponsors may understate the availability of local funding simply in order to maximize the level of grant. This can happen with revenue-generating projects particularly. Such practices can reduce the availability of funding for other projects.

Other Factors

In addition to all the categories listed above, experience shows that problems also arise from premeditated under-estimation of initial costs simply in order to obtain initial approval for a project. This can lead to major projects being approved, and started, in the knowledge that actual costs will be very much higher than the "agreed" estimate. Once started, a high profile infrastructure project is often politically difficult to stop. So, when the true costs do become

apparent, it is difficult for authorities to refuse the additional funding required to complete the project. (Understanding and Monitoring the Cost-Determining Factors of Infrastructure Projects, A User's guide- online)

2.2.1.2 Factors contributing for Schedule Slippage

Researches in developing countries especially Africa have made progress in determining the causes behind project delays. (ABJ Journal of advanced research,2016) Kaliba, Muya, and Mumba (2009) explained in their study that, the major causes of delay in road construction projects in Zambia were delayed payments, financial deficiencies on the part of the client or contractor, contract modification, economic problems, material procurement, changes in design drawings, staffing problems, equipment unavailability, poor supervision, construction mistakes, poor coordination on site, changes in specifications, labor disputes, and strikes. In Uganda, Agaba (2009) attributes delays in construction projects to poor designs and specifications, and problems associated with management and supervision. In their study, El-Razek, Bassioni, Mobarak, (2008) found that delayed payments, coordination difficulty, and poor communication were important causes of delay in Egypt. Studies outside the African continent seem to also have identified almost similar causes. Sambasivan and Soon (2007), and Alinaitwe (2008) established that poor planning, poor site management, inadequate supervisory skills of the contractor, delayed payments, material shortage, labor supply, equipment availability and failure, poor communication and rework were the most important causes of delays in the Malaysian Construction Industry. Kouskili and Kartan (2004) identified the main factors affecting cost and time overrun as inadequate/inefficient equipment, tools and plant, unreliable sources of materials on the local market, and site accidents. Hence, the list of causes confirm above agree with the findings of AbdMajid and McCaffer (1998) who concluded that if such causes are effectively dealt with, then time overrun can effectively be mitigated.

2.2.1.3 Factors affecting the Quality of Projects

Quality is one of the important key performance indicators of a construction project which may cause cost overrun and time delays (Construction *Management & Economics* vol. 18(4), 2000) . Quality can be defined as the level of conformance of the final deliverable to the customer's requirements. One cause of usual project failure is that quality is overlooked or scarified so that a tight deadline can be met. It is very helpful to complete a project on time, only to discover that the thing delivered will not work properly (PMBOK/PMI 2008).

Researchers have explored various factors affecting quality of projects fundamentals of which are discussed below. Special attention is once more given for identifying the factors influencing construction projects.

The quality is a key function in all infrastructure development environments like cost and time. It becomes one of the vital factors in any construction project (P. E. Love, and Heng Li, Construction *Management & Economics* vol. 18(4), 2000).

Quality is affected by shortage of materials, equipment, design changes, error in cost estimation and lack of budget (R. R. a. L. Tan, Y.G.,) 1995. The other factors affecting quality are deficiencies in scheduling, inappropriate planning and unclear evaluation standards (D. I. OT Ibironke, 2011). The significance of these factors depends on type of projects, working environment and local culture.

In construction projects, lack of quality results in delays, cost overrun, and unsafe structure (FIDIC Quality of Construction - Online). There are three types of costs associated with quality. First one is appraisal cost: the cost of testing and inspection, second one is failure cost: the cost of rework and third one is prevention cost: the cost of maintenance and better design (J. L. Ashford, Management of Quality in Construction - Online). Many researches have been carried out both in developed and developing countries to investigate the factors that have a substantial effect on the quality of construction projects. Below is presented a highlight of the factors affecting quality of construction projects.

Factors that cause quality problems in Pakistan are material prices escalation, inflation, procurement, selection of material, lack of communication, and poor on site supervision (S. M. A. Rizwan U. Farooqui, and Sarosh H. Lodi, 2008). K. N. J. K. C. IYER, 2006 as sited by (M. Abas1, S.B. Khattak, 2015) have identified adverse factors on quality of Indian construction

projects, which are bad weather condition, communication problem, lack of project management skills, and low bids due to excessive competition. Construction project quality in Gaza strip is significantly affected by availability of construction materials, political environment, site staff experience and proper documentation (M. I. A. Rifat N. Rustom, 2006).

M. I. A. Rifat N. Rustom, (2006) studied the factors affecting the quality performance of building projects in Hong Kong. The major factors are effective project management, building effective construction team, and environment in which project is conducted. The findings of C. M. T. Albert P.C. Chan, (2006) show that continuous improvement, training of employees, effective communication, and building an effective project team are the factors affecting quality. The quality problems are due to management, improper planning, and carelessness, lack of training and improper use of materials (P. S. B. A. Bezelga, 2002).

A. R. A. Ilias Said studied the major problems with quality performance in the Malaysian construction Industry. These problems are lack of technical person availability, lack of awareness about quality management system, and lack of training workers. R. H. Abdel -Razek, El - Dosouky, A.I. and Solaiman,A.M discussed the factors that can improve the quality of construction projects. These factors are correct estimation of cost, implementation of ISO 9000, effective utilization of resources, implementing new technologies, proper planning and improving quality control system.

2.2.2 Factors Affecting Success of Road construction Projects in Ethiopia

According to Abraham (2004), Finance is one of the big problems that domestic construction firms are facing in our country. In addition to the *scarcity of finance*, they lack financial management skills that hinder their capacity to complete projects on time and within the estimated budget. It was also found that most of them lack the *experience* and the *capacity* to undertake major road projects, which requires big sum of money and high technology. Lack of *skilled manpower and professionals in the field* is another common feature of the domestic construction companies.

According to Siraw (2016), the most important causes of time overrun on road projects were found to be slow site clearance, contractors' financial problems, Inflation, contractors financial

problems, inaccurate cost estimation, poor resource management, progress payments delay by owner, exchange rate fluctuation and delay in commencement.

Few studies are made on success factors of road construction projects in Ethiopia. Yet, the identified gaps by the studies are still prevalent. Besides, most of them are not recent and are designed to address only one dimension of project success. Siraw 2016 for instance, has analyzed the factors contributing to project delays of Addis Ababa City roads Authority. The purpose of this study is to consider all the three dimensions of success and to provide a framework that is believed to improve the performance of these projects in all the three aspects time, cost and quality.

2.2.3 Mitigation Measures against Project delays, cost overrun and quality problems

Different researchers have cited number of measures that can be applied to mitigate project performance problems. Some of the measures are applicable to mitigate two or three of the problems while some only serve to mitigate a single performance problem.

2.2.3.1 Mitigation Measures against Project delays

Under their study entitled 'Major Mitigation Measures for Delays in Construction Projects', Mohamad SyazliFathi and Mohammad Abedi have identified 30 Methods of avoiding or minimizing delays in construction projects. The basic methods identified are presented in this section. These are Accurate initial cost estimates and initial time estimates, Performing a preconstruction planning of project tasks and resource needs, Adopting a new approach to contract award procedure by giving less weight to prices and more weight to the capabilities and past performance of contractors, Selection of a competent consultant and a reliable contractor to carry out the work, Allocation of sufficient time and money at the design phase, Availability of resources, Commitment to projects, Competent project manager , Comprehensive contract documentation, Ensure adequate and available source of finance until project completion, Frequent progress meeting, Enforcing liquidated damage clauses, Systematic control

mechanism, Contingency allowance, Use up to date technology utilization, Effective strategic planning, Multidisciplinary/competent project team. (Mohamad S. and Mohammad A., 2011)

2.2.3.2 Mitigation Measures against Project Cost Overrun

Under his study of Avoiding Cost Overruns in Construction Projects in India, 2015, Abdussalam Shiban has consulted literatures and categorized the mitigation methods against cost overrun in to proactive, reactive measures and organizational strategies; the proactive measures are those which should be adopted in the planning stage of projects which include efficient planning of strategies, and management of site and supervision of the project; appropriate planning and arrangement of project; organized regulatory mechanism; and using proper methods for construction (Azis et al., 2012). The organizational strategies include: appropriate prominence on previous experience; regular coordination between the associated parties; increasing human resources in the industry; and complete administration of contracts (Ahsan & Gunawan, 2010). Regular meetings on development, employing proficient subcontractors and suppliers, attributing less weight to prices, and more weight to abilities and earlier performance of contractors to improve the contracts and their procedures are some reactive and organizational strategies (Azis et al., 2012). Using channels for perfect information and communication is a proactive and organizational strategy. Utilization of latest technology is a proactive and reactive strategy. Undertaking a preconstruction planning regarding the procedures and resources of project is a proactive, reactive, and organizational strategy (Azis et al., 2012).

On the other hand, Nadzirah 2015 has identified numerous mitigation measures related to time control and cost overrun issues by consulting a Comprehensive literature consisting of 21 published articles. According to him keeping construction projects within estimated costs and schedules requires sound strategies, good practices, and careful judgment. There are, however, steps that can be taken to minimize their causes and effects of time and cost overrun, the major one is using efficient project management tools and practices. (Nadzirah B. 2015)

Among the identified mitigating methods are Accurate cost estimation, Allocation of adequate contingency allowances, Adopting clear information and communication channel, Adopting effective and efficient material procurement systems, Allocating sufficient time and money, Application of professional construction management (CM), Appointing competent site

managers, Appropriate scope definition, Choosing experienced subcontractors with good reputation, Close monitoring, Conducting a process mapping exercise, Controlling design changes. (Nadzirah B. 2015)

2.2.3.3 Mitigation Measures against Project Quality Problems

Mitigating quality problems demand quality management implementation in projects. According to PMI 2000, Quality management processes involve identification of quality standards, evaluation of overall project performance and quality control and monitoring of projects.

Several tools and techniques were identified as part of the implementation process, like benefit-cost analysis, benchmarking, flow-charting, design of experiments, cost of quality, quality audits, inspection, control charts, Pareto diagrams, statistical sampling, and trend analysis.

As defined in the PMBOK, Project quality management processes flow provides an overview of the processes which include: Plan Quality Management, Perform Quality Assurance, and Control Quality.

Harris and McCaffer, (2001) defined quality planning as a set of activities whose purpose is to define quality system policies, objectives, and requirements, and to explain how these policies will be applied, how these objectives will be achieved, and how these requirements will be met.

The role of quality policies in quality management was found to be significant. Tennant & Robert (2000) have recommended organizational level quality policy as an approach over the conventional planning so that it would be possible to increase quality goal consensus

Quality assurance on the other hand "is oriented towards prevention of quality deficiencies. It aims at minimizing the risk of making mistakes in the first place, thereby avoiding the necessity for rework, repair or reject." (Chang, 2014: page 7)

Quality control is the use of techniques and activities that compare actual quality performance with goals and define appropriate action in response to a shortfall. Control Quality is the process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes. The key benefits of this process include: identifying the causes of poor process or product quality and recommending and/or taking action to eliminate them;

and; validating that project deliverables and work meet the requirements specified by key stakeholders' necessary for final acceptance (PMBOK, 2013).

According to Juran, quality control relies on five basics: a clear definition of quality; a target, a clear goal; a sensor, a way to measure actual performance; a way to interpret the measurement and compare with the target; and a way to take action, to adjust the process if necessary (Juran, 1999).

Chapter Three: Research Design and Methodology

Introduction

This chapter presents the methodology used in the study. The tools and processes that are found relevant to gather data for the research work and the method of data analysis is explained. The chapter is composed of the research design, sampling techniques used and target population, data sources, data collection tools used, and ethical considerations.

3.1 Description of the Study Area

The study area is limited to Addis Ababa City Roads Authority**.** The area was chosen as it is entirely involved in managing projects and project deliverables yet having significant gaps in doing so. The authority is responsible for administering and constructing road construction projects in Addis Ababa.

3.2 Research Design and Approach

As the study is planned to identify the factors affecting the three dimensions of project success, a qualitative approach was used. Secondary data has been collected from the reports and other relevant documents of the authority to obtain quantitative data regarding the original budget and schedule of the projects addressed and the actual spending of the same. Moreover primary data has been collected to identify the factors resulting in the deviations. Questionnaires were distributed to site and office Engineers, contract administrators and project team leaders in the authority. And semi structured interview has been conducted to a project manager and director of the Quality Assurance and Road Safety Inspection Directorate of the Authority. The responses from these parties and the literature review helped to identify the factors affecting the performance of the projects in the authority.

Descriptive methods were needed to describe the link between the identified factors with each success dimensions and dependence of cost overrun upon project delays. And the approach utilized for the study was qualitative approach.

3.3 Sources and Instruments of Data Collection

The study utilized both primary and secondary data sources. Primary data was collected by using open ended questionnaires and semi structured interviews, while secondary data has been collected from the organization's project plans, progress and completion reports.

For primary data collection purpose, questionnaires were distributed to the site and office Engineers involved in road construction, project managers, super visors and team leaders, contract administrators and other technical team members; and, semi structured interviews had been conducted to a project manager and director of the Quality Assurance and Road Safety Inspection Directorate of AACRA.

3.4 Methods of Data Analysis

For analyzing data intended for the purpose, descriptive analysis was used. Descriptive analysis has been considered to describe the link between the factors resulting in project delays, cost overruns and quality problems and the resulted performance. While describing the collected data, visual aids such as graphs were used so as to make the reader better understand the information.

Moreover, the relationship between the two success factors cost overrun and the level of schedule slippage has been analyzed.

3.5 Target Population and Sampling Techniques

Target populations of the study were all engineers involved in road construction projects of Addis Ababa City Roads Authority, contract administrators, technical team members of projects and laboratory technicians. The engineers involved in construction projects include project

managers, supervisors, team members and team leaders. The target population is consisted of all the employees engaged in the mentioned posts.

There are 10 Engineers involved in Contract administration, 116 civil Engineers for road construction and maintenance and 19 Laboratory technicians in the authority.

Among these targeted parties, 3 project managers, 5 contract administrators, 2 project team leaders, 1 Project supervisor, 8 laboratory technicians and 21 site and office engineers, totally 40 respondents have been selected for the sample.

The sampling method the researcher chosen for the study is purposive or judgmental sampling. The interviewees and the respondents of the questionnaires have been selected based on purposive sampling of the researcher's subjective judgment which considers that the selectee will give required level of information. Purposive sampling was chosen as it will be possible to deliberately determine who to include in the study based on their ability to provide necessary and reliable data. Accordingly, the highest proportion of the sample was from the site and office Engineers of the authority and questions regarding quality problems of the deliverables of the projects in the authority have been provided for experts working in the authority's laboratory as they are believed to provide first-hand information.

3.6 Ethical Considerations

The respondents have been approached after submission of a letter written by the University to the authority. Purpose of the study has been explained to the respondents so that they will be contented to reply. All participants are asked to voluntarily participate in the data collection by collaborating in filling the questionnaire and responding to the interview. By doing so, the respondents are free of any harm and more importantly their views will be very confidential and anonymous. Moreover, the questionnaire and the interview do not have any connection with the respondents since it is done for academic purpose.

Chapter Four: Data Presentation, Analysis and Interpretation

4.1 Introduction

This chapter presents the collected data from primary and secondary sources, the analysis of the same to answer the research questions derived from objectives of the study, and the findings from the analysis.

First, the data collected from the progress and completion reports of the selected 5 projects would be presented. The data from the secondary sources are needed to demonstrate the variances between the actual and the planned time and cost spent on the projects.

The descriptive analysis was used to interpret the raw data concerning the factors influencing success of projects in Addis Ababa City Roads Authority in to useful information. Frequencies and percentages of responses are considered in the descriptive analysis. Moreover, tables and charts have been used to present the findings.

The responses from the questionnaires address the identified success factors of the authority's projects in all the respective aspects and the responses from interviews revealed the authority's practice to overcome them.

4.2 The Performance of selected Projects in AACRA regarding cost and Schedule

Five projects completed in the last three years were considered to demonstrate the performance level of the organization's projects regarding cost and schedule. The information was gathered from the progressive and completion reports of the projects. The tables below present these projects and the observed variances from the plan. Moreover, bar charts are used to illustrate the variation of the actual performance from the planned.

4.2.1 Schedule Variance of Projects

The planned time for completion of the five projects considered are compared against their actual completion time. The table below presents the comparison.

Table 4.1: Schedule Variance of projects in AACRA

Project Name	Planned time for completion	Actual time of completion	Variance from the schedule
Gora IT Park Asphalt Road Construction Pr.	31/12/2013	2/1/2016	2.08 years
TuliDimtu Condominium Asphalt Road Construction Pr.	12/10/2014	30/05/2015	7.6 Months
TekleHaimanot RA- TewodrosSq-Nigid Printing-Grand Palace Road Project	14/02/2015	20/02/2017	2 Years
Legetafo Waste Disposal Land Fill Urban Road Construction Project	26/07/2014	3/6/2017	2.85 Years
Megenagna Tor Hailoch Road Project	24/05/2016	27/05/2017	1 Year

Source: AARCA Project Progress and completion Reports

This shows that all the examined projects suffered from delays and 60% of the projects have slippages of more than 2 years. Below a graph elaborates the schedule variance of each project.

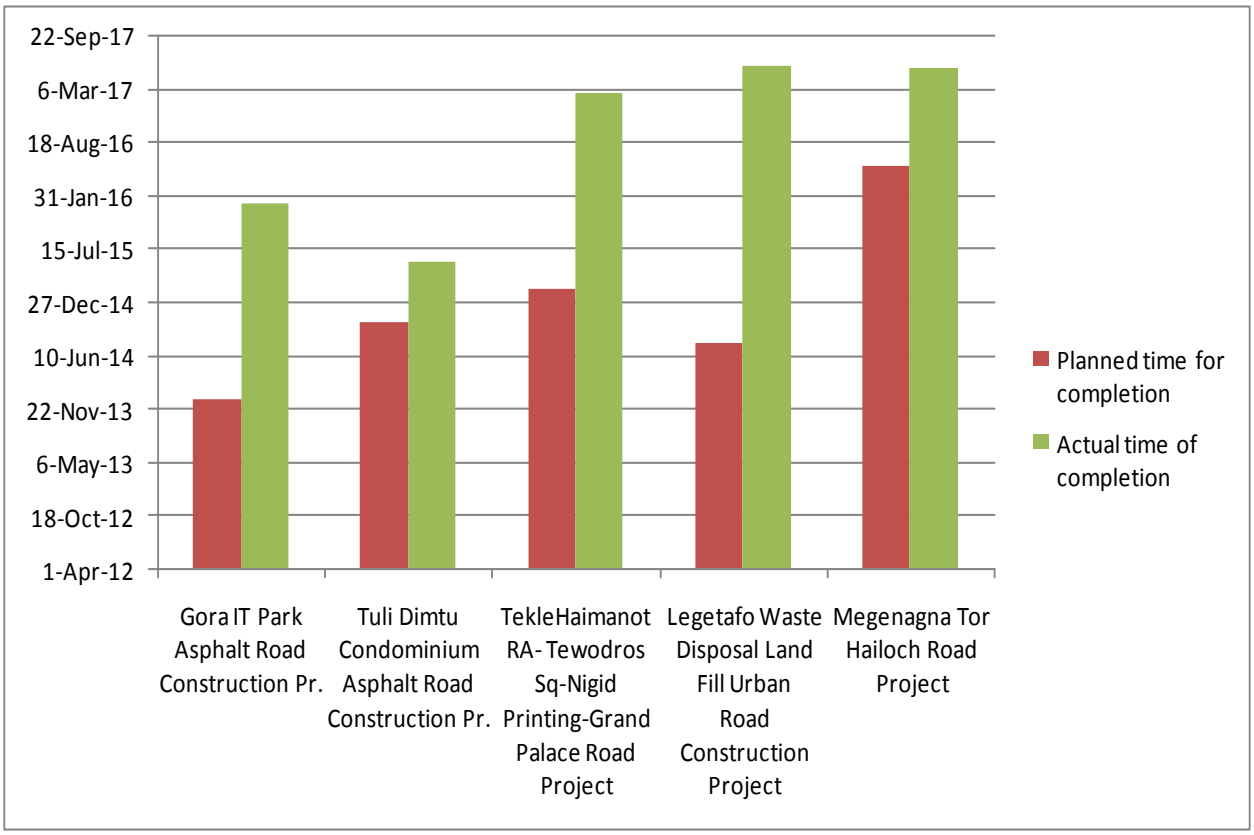

Figure 4.1: Schedule Variance of projects in AACRA

4.2.2 Cost Variance of Projects

The variance of cost of projects from the budgeted or contracted amount will be presented in the table below.

Table 4.2: Cost Variance of projects in AACRA

Project Name	Budgeted or Contracted Cost	Actual Cost	Variance from the budget
Gora IT Park Asphalt Road Construction Pr.	179,359,082.06	197,823,898.30	18,464,816.24
Tuli Dimtu Condominium Asphalt Road Construction Pr.	90,800,138.61	117,621,509.49	26,821,370.88
TekleHaimanot RA- Tewodros Sq-Nigid Printing-Grand Palace Road Project	189,216,770.05	138,135,243.24	(51,081,526.81)
Legetafo Waste Disposal Land Fill Urban Road Construction Project	292,226,831.42	218,291,262.94	(73,935,568.48)
Megenagna Tor Hailoch Road Project	468,599,730.51	336,771,855.66	(131,827,874.85)

Source: AARCA Project Progress and completion Reports

This shows that only 40% of the projects under the study have suffered from cost overrun. Yet, the prevalence of low cost overrun alone cannot be a confirmation to good project cost management of the authority. As the works of scholars suggest Project cost management involves defining the cost of the project and then making sure that it is delivered within the approved budget including three principal components: cost estimation, budgeting, and control. The cost estimation component involves estimating the costs of all of the resources that will be charged to the project including: labor, equipment, materials, services, and any contingency costs. It is the process of developing an approximation of the monetary resources needed to complete project activities. If inaccuracy of these estimates is significant, they would result poor project cost management. Significant underestimation of costs would result unreasonable budgeting for the work planned to be executed rising the probability of quality compromises and delays for completion while overestimation of costs would be a reason for wastage of resources and spending of unreasonable costs.

Though the study has demanded a measure of inaccuracy of cost estimates of the projects addressed, it was not possible to find the data due to the authority's poor practice of measuring inaccuracies and its poor documentation. Yet, interviews conducted to project managers and the responses on the questionnaires have indicated that the authority's project cost estimates are significantly overstated. Furthermore, according to a documentation review in planning and budget office of AACRA, huge variances are observed between budgeted amount for project packages and actual spending. The budgeted amount is often far greater than the actual outlay. Thus, a further enquiry was found desirable on the project cost management of the authority.

Below a graph elaborates the cost variance of each project under consideration.

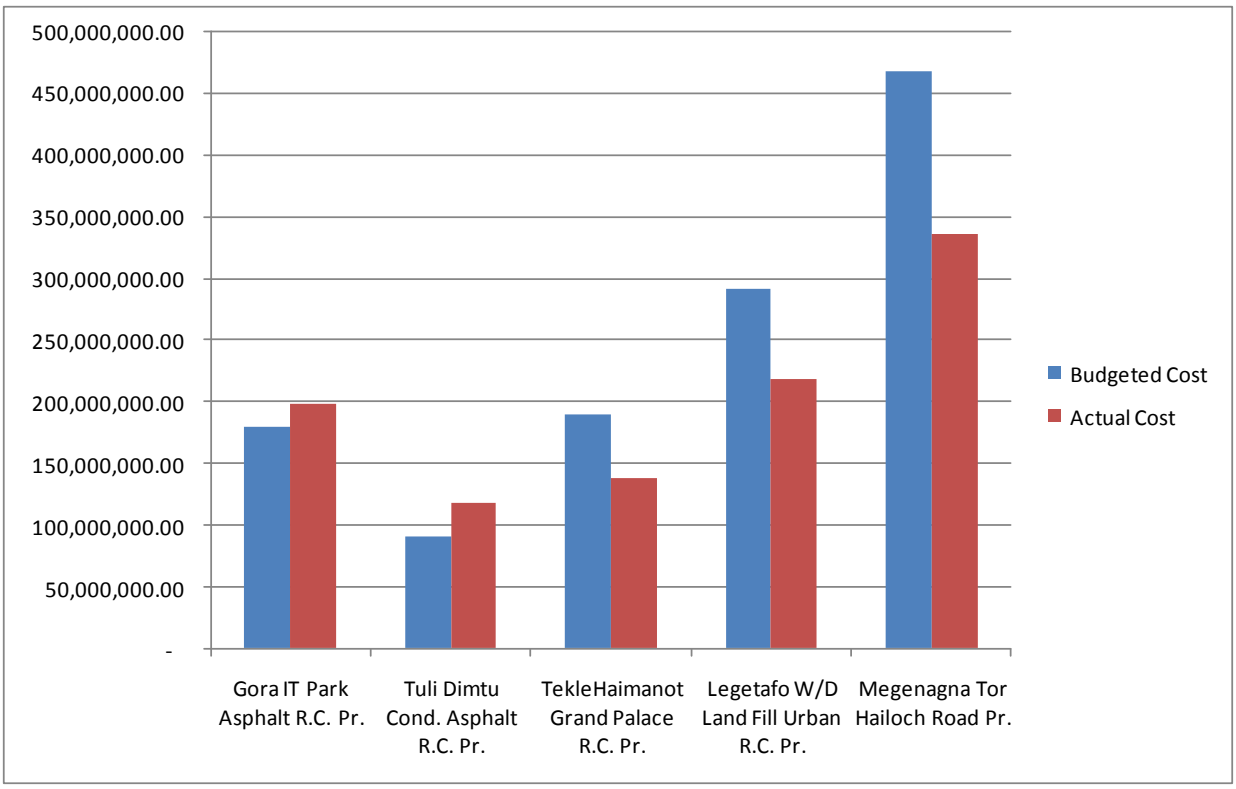

Figure 4.2: Cost Variance of projects in AACRA

Presentation and discussion of Data collected from Primary Sources

Primary data was found desirable to identify the real challenges that the project team face and the practices adapted impacting success of AACRA's projects. Forty open-ended questionnaires were distributed to project managers, site and office Engineers, project supervisors, technical team members and project team leaders so that they can be able to identify the causes for project delays, cost overruns and quality problems of the deliverables. While semi-structured interview was conducted to a project manager and a director of quality Assurance and Road Safety Directorate so that it would be possible to trace the authority's practice of planning, cost estimation, scheduling and quality control. Moreover, the interview has helped to recognize the techniques that AACRA has planned and implemented to mitigate the delays, overruns and quality problems. First, the responses from the questionnaires will be discussed and then follows that of the interviews.

4.3 Response Rate

From the total forty questionnaires that were distributed to the engineers involved in construction projects, contract administrators, project team leaders, project managers and technical team members, twenty six has been returned. This shows that the response rate was 65% and twenty six questionnaires were used for the analysis.

4.4 Major causes of project delays in AACRA

The study revealed that all the selected implemented projects in the authority have delayed. The respondents have identified number of causes of delays for these and other projects in AACRA. The factors identified by the respondents and their respective frequency are presented in the table below.

Table 4.3: Reasons for project Delays in AACRA

S. No.	Factor for schedule slippage	No. of times the factor has been identified
1	Delays in administration of right of way obstruction removal	15
2	Delays in preparation of supplementary agreements with EEPCO, ETC and AAWSA for utility works (Poor coordination among stakeholders)	5
3	Inadequate planning and Poor Designs	6
4	Delay in provision of resources and machineries	11
5	Lack of prefeasibility study for contracted projects	1
6	Design and scope changes during implementation	13
7	Delay in commencement of projects	10
8	Technical incompetency and lack of skilled manpower	11
9	Weather conditions	10
10	Poor project Monitoring and Evaluation	3
11	Undertaking Several Projects at a time	8
12	Poor capacity of contractors	3

Source: Survey Result, 2017

In addition to identifying the factors, the respondents have explained their views towards the magnitude of the impact of the major factors. According to most of the respondents (57% of them), delays in administration of right of way obstruction removal and delays in preparation of supplementary agreements with other stakeholders for utility works are the most important issues resulting in delays in completion of the projects.

Significant Delay in commencement of the projects, design and scope changes during implementation, delay in provision of resources and inadequate planning were also considered as basic factors. Yet, as per the explanation of the respondents, most of the factors depend on each other. The design problems are for instance reflected on the delays for commencement and several projects being undertaken at a time results in delay of provision of machineries.

However, most respondents believe that the Schedules are realistic. The challenge is implementing the plan according to the schedule and this is mostly caused by the previously mentioned factors.

4.5 Major causes of project Cost Overrun in AACRA

Though only 40% of the sampled projects have suffered from cost overrun, the researcher aimed at exploring the reasons behind overruns of costs in the projects undertaken by the authority. As indicated earlier, interviews conducted to project managers of AACRA disclosed that there are significant overestimates in the initial cost estimates of projects. Thus, it is reasonable to plan to further examine the cost control practice of the authority.

The respondents have identified number of factors affecting success of projects in AACRA regarding cost management. The factors identified and their respective frequency will be presented in the table below.

Table 4.4: Factors resulting in Cost overrun in AACRA

S. No.	Factor for Cost overrun	No. of times the factor has been identified
1	Inflation, FCY exchange rate fluctuation and instability of the market	4
2	Penalty, Claims and overhead costs in relation to project delays	16
3	Right of way Obstruction Removal	3
4	Incomplete contract document	1
5	Corruption and abuse of resources	11
6	Reworks and misalignment	12
7	Design and scope changes during implementation	10
8	Inadequate planning	12
9	Problem in optimal utilization of resources	1
10	Estimation inaccuracies	7
11	Poor implementation of the plan	2

Source: Survey Result, 2017

As it was for project delays, lack of coordination with other stakeholder institutions like EEPCO, ETC and Sewer lines in addition to costs in relation with right of way obstruction were identified as major causes for cost overruns in the authority's projects. The respondents explained that the poor coordination between the authority and the mentioned institutions results in delay of the utility works till the roads get constructed which results in reworks and additional costs.

The instability of the market was also considered as a factor contributing significantly for cost overrun; some respondents have declared that price fluctuation of materials in our country have been resulting the variance of the projects' cost from the plan.

On the other hand, several respondents have admitted that the projects in the authority suffer from inadequate planning and abuse of resources, and that there are costs not considered during estimation.

Moreover, though the respondents stated that some scope and design changes are inherent to the nature of road construction projects due to underground conditions of the project area, design changes are also among the factors resulting in cost overruns.

Finally, the respondents agreed that delay in completion of projects contributes for cost overrun significantly. As per their explanation, project delays are subject to increase in overheads, claims and other related costs. Thus, cost overrun will be prevalent.

4.6 Major causes of Quality Problems in the project deliverables of AACRA

As one of the objectives of this study is to identify the major factors affecting the quality of project deliverables of the authority, requests helping to identify the factors were presented to the sampled respondents involved in construction projects and in examining standardization of materials in the authority's laboratory. The respondents have identified number of factors that are presented in the table below with their respective frequency.

Table 4.5: Factors resulting in Quality Problems on project deliverables of AACRA

S. No.	Factor for Quality Problems	No. of times the factor has been identified
1	Lack of skilled and committed manpower to quality	20
2	Abuses of resources	4
3	Poor quality of construction materials	16
4	Poor coordination with other stakeholders such as EEPCO, ETC and AAWSA	20
5	Problems with the master plan of the city	1
6	Poor design	7
7	Poor attitude towards quality	4
8	Political issues	3
9	Poor performance of contractors	1

Source: Survey Result, 2017

Lack of skilled and committed manpower, poor management system, abuses of resources, and poor design were among the major internal factors identified to be the causes for the quality problems observed in the roads constructed by the authority. Most (70%) respondents have complained about the quality problems subjected to shortage of skilled and committed manpower in the authority.

On the other hand, the respondents claimed that there are external factors as well contributing for the failures of the constructed roads to meet the desired level of standard and these factors are poor quality of materials supplied in the market, problems with the master plan of the City and political issues.

Among these external factors, Poor coordination with other stakeholders such as EEPCO, ETC and Sewer lines is again considered to be a major factor influencing the quality of the project deliverables of the authority, about 70% of respondents declared that poor coordination of AACRA with the other stakeholders is the basic reason for quality problems.

By the requests provided to the respondents in the objective of examining the level of tradeoff between the three success factor dimensions of projects, it could be identified that the authority do not compromise quality by rushing to meet deadlines and budgets are allocated sufficiently to construct the desired standard of road.

Other Factors Affecting Project Success at AACRA as identified by observation and Interviews

Personal observation of the researcher revealed that the documentation practice of the authority is so poor that required information regarding completed and ongoing projects cannot be traced easily. The observation is also supported by response of the interviewees. The poor documentation practice has contributed for poor 'lessons learnt' practice from completed projects.

Moreover, it has been observed that most of the persons assigned to manage and supervise AACRA's projects lack project management skills though they have the technical expertise. Hence, project planning; scheduling, feasibility studies, monitoring and control are only managed with inadequate knowledge.

As per the project manager interviewed, the cost estimation practice in the authority is inadequate. First, estimates are not based on complete definition of the project and the scope of work involved. Second, the authority lacks an accounting system and coding scheme that are well aligned with the work breakdown structure. Thus, costs are only estimated per physical length of the road planned to be constructed without considering the detailed work packages; and, according to the project manager, these estimates are extremely exaggerated. And since one of the keys to successful project completion is an accurate cost estimate, it can be inferred that the estimation practice of AACRA is one of the drawbacks that resulted poor project cost management.

What is more, AACRA has only planned but not yet begun to use cost accounting system that will accumulate costs and allocate them to their relevant cost accounts as and when they are incurred.

The authority also lacks a change management strategy which would help to steer out essential changes before incorporation and to incorporate the same in a way that would not affect the performance of the projects significantly.

Unforeseen events were also considered as the other reasons for the failure of the authority not to execute its projects as planned. As per the interviewees, since AACRA is under the supremacy of the government, accidental orders from the government shall be immediately executed and this also creates deviations from the plan of the authority.

On the other hand, according to an interview conducted to the director of AACRA's quality assurance and road safety directorate, though the authority has given emphasis for quality assurance for prevention of quality problems by establishing its own laboratory to test the materials to be used in the construction process, the process is influenced by lack of updated and complete quality assurance manual. AACRA has been using Ethiopian Road Authority's (ERA's) manuals with some modifications.

On top of that, the authority's quality planning is so poor that it lacks a quality policy which shall be used for constructing urban roads and even these outdated and incomplete guidelines and procedures are not being followed in the authority cautiously.

The Director has also admitted that the authority's contract management procedure is outdated resulting in some quality problems on subcontracted projects.

4.7 Relationship between cost overrun and Project Delays

Examining the relationship between project cost overrun and project delays in the organization in concern is one of the objectives of this study. The responses of many respondents have indicated that delays are among the major causes to project cost overrun. And among the other identified factors contributing for cost overrun, exchange rate and inflation, would have exaggerated impact on actual costs when projects are delayed. Thus, mitigating project delays would help the authority from incurring unplanned costs thus improving its overall projects' performance.

4.8 Major mitigation techniques used against delays, Cost Overruns and Quality problems

Interviews have been conducted to a project manager and the director of the authority's quality assurance and road safety inspection directorate of the authority so that it would be possible to recognize the techniques the authority adapted to mitigate the described project failures.

4.8.1 Mitigation Techniques used against delays

Interviews have been conducted to a project manager of the authority regarding the techniques the authority adapted to mitigate project delays and the below discussed responses were found.

According to the project manager, the previous practice of scheduling projects in AACRA has been scheduling for the entire work totally. Activity based scheduling was not practiced in the authority. Yet, recently, the organization has adapted activity based scheduling and this is believed to help the control significantly.

Moreover, AACRA has reformed its organizational structure so that it would be possible to segregate duties and follow up timely completion of activities easily. Regular follow up and supervision of activities are also considered as major mitigation techniques against delays. The progress reports on ongoing projects are also designed to measure progress and performance so that the supervisor can be able to compare actual performance against plan.

Yet, the authority has not yet begun considering the tools that are often used to monitor project performance; Gantt charts, control charts, and milestones are not taken in to account.

4.8.2 Mitigation Techniques used against Cost Overruns

As per the project manager, the previous practice of the authority in estimating costs involved roughly estimating costs based on physical plan which is estimating costs per unit length of the road to be constructed without defining the cost per work packages. And this has been resulting in significantly overestimated budgets.

Yet, recently, financial plans are being prepared for work packages (categorized activities required to complete a project) and this is believed to make the control effective. This implies that the authority has adapted Bottom-up estimating which Involves estimating the cost of individual activities or work packages, then summarizing or rolling-up the individual estimates to get a project total. Besides, though it is not yet implemented, the interviews revealed that AACRA is planning to use cost accounting techniques in order to strengthen its control over project costs.

Since lack of coordination with other stakeholder organizations including EEPCO and ETC was identified as one of the major factors affecting all the three success dimensions of the projects undertaken by the authority, the project manager and the quality assurance and road safety directorate director were requested what the authority is planning to overcome the problem. In response, they have declared that AACRA has been presenting its complaints to the concerned government organs frequently, but, no solution has been reached at yet.

4.8.3 Mitigation Techniques used against Quality Problems

As per the interview conducted to a project manager and the director of the authority's quality assurance and road safety inspection directorate, the basic method the organization adapts to overcome quality problems is quality assurance through laboratory testing of materials. The authority has established its own laboratory for testing the materials to be used in the construction process and this has been a good tool to reject substandard materials that deteriorates the qualities of the roads constructed. Moreover a recently established department, Quality assurance and Road Safety Inspection have been engaged in quality audits and inspection as methods to control quality conformance to the desired goal.

On the other hand, AACRA has recently begun assessing all the concerned departments in order to identify the gaps resulting quality problems on its projects.

As per the interviews, AACRA has also planned for updating its outdated quality manuals so that applicable procedures and guidelines can be adapted. What is more, the authority has planned to narrow the awareness and skill gaps observed in the staff through trainings and experience sharing.

Chapter Five: Summary, Conclusion and Recommendation

Introduction

This last chapter of the thesis work will have four main sections. First, summary of the major findings will be presented. Then the conclusion derived from the findings will be offered followed by recommendations made based on the conclusions. The framework developed to assist the project successes of the authority will then be provided. And finally, areas for further studies will be provided.

5.1 Summary of the Major Findings

- The projects undertaken by AACRA are mostly subjected to scope and design changes and most of the changes are inherent since certain underground conditions of the project area are not known before the beginning of project execution; yet the authority has no strategy towards change management.
- The authority is in short of skilled man power and most of the projects are managed by supervisors and project managers having minimal project management skills. And this is reflected in the inadequate planning, defective cost estimating and control and poor project monitoring techniques.
- Lessons learned from past projects and documentation practice of AACRA was found to be poor rising the probability that mistakes will be repeated in future projects.
- Project delays are the most apparent failures of AACRA's projects and the major causes for the delays were found to be delays in administration of right of way obstruction removal, Poor coordination among stakeholders, delay in provision of resources and machineries and design and scope changes.
- Project cost management of the authority was as well found to be lacking as costs are mostly overestimated and not based on activity packages and cost overruns are observed on some projects. The major reasons behind the cost overruns were identified to be

penalty, Claims and overhead costs in relation to project delays, reworks and misalignment, Design and scope changes during implementation and Inadequate planning.

- Quality of project deliverables in AACRA is also found to be influenced by Lack of skilled and committed manpower to quality, lack of complete and updated quality policy and quality assurance manuals and Poor coordination with other stakeholders. Furthermore, Poor quality of construction materials was identified as one of the major factors affecting quality of the authority's projects.
- The mitigation techniques adopted by the authority to overcome delays, cost overrun and quality problems are not adequate. Project management tools and desirable practices of the discipline are not being utilized for the mitigation. Activity based cost estimation, earned value analysis; schedule controlling tools such as Gant charts and project management software are farfetched considerations for the authority.
- Poor coordination between AACRA and other stakeholder institutions including Ethiopian Electric Power Corporation, Ethiopian Tele Communication and Addis Ababa Water and Sewerage Authority was found to be a major problem resulting significant project delays, cost escalations and quality compromises. But, the problem has not yet got a solution.

5.2 Conclusion

Effective project management has been frequently defined as completing projects within time, cost and quality constraints. And project performance can be improved by studying and improving the factors that affect these three success dimensions. Accordingly, this research has strived to identify the factors responsible to project delays, cost overrun and quality problems in Addis Ababa City Roads Authority.

The major factors identified as affecting all the three performance indicators are poor coordination with other stakeholders, difficulty to administer right of way Obstruction removals, inadequate planning and lack of skilled manpower.

Besides, delays were mostly found to be caused by delay in provision of resources and machineries, poor Designs and design and scope changes. While cost overruns are often resulted by project delays, reworks and misalignment and Design and scope changes during

implementation. Quality problems were traced back on Poor quality of construction materials, abuse of resources, lack of skilled and committed manpower and lack of complete and updated quality policy and quality assurance manuals.

5.3 Recommendations

- AACRA shall have clear, complete, and unambiguous definition of projects and the scope of work involved before executing projects; moreover, planning projects shall include prioritized and detailed work schedule, drawn from the work breakdown structure. Poor scoping and planning is costing the authority regarding time, resource and quality.
- The authority shall plan for efficient time management through proper resource planning and duration estimation so that it would be possible to minimize the delays. Moreover, AACRA shall strive to commence projects as planned for delays in commencement results delays in completion.
- As reasonable and accurate system for estimating costs is one of the factors that influence success of projects, the authority shall develop well-defined project work structures and adapt an accounting system and coding scheme that are well aligned with the work breakdown structure.
- AACRA shall develop a concrete change management strategy so that essential changes can be incorporated without significantly affecting the performance of projects**.**
- The authority shall engage competent and skilled project managers capable of leading effective project planning, execution, monitoring and control. By doing so, it would be possible to plan all activities before hand, develop reasonable cost estimates and monitor and control each step of the execution.
- Documentation practice of AACRA shall get improved so that it would be possible to easily trace progress of ongoing projects and to learn lessons from completed projects with the intentions that mistakes would not be repeated.
- The authority should develop its own complete quality policy and update its quality assurance manual so that it would be possible to have consistent and inclusive quality guidelines.

- Since the quality problems are traced back to poor quality of construction materials as well, and the delays are also influenced by late provision of the materials, the procurement unit needs to develop good relations with key suppliers to take advantage of good quality and on time supply of materials.
- AACRA shall urge for the attention of the concerned government organ to coordinate all stakeholders in the intention that they can harmonize their respective strategic plans. By doing so, it would be possible to avoid the delays in relation with right of way of utility lines and houses, the costs incurred by the delays and reworks resulting from not incorporating of the utility lines before the road gets constructed and the quality problems in relation.

5.4 Project Success Framework for Addis Ababa City Roads Authority

Based on the major findings of the study and the reviewed literatures in the earlier chapters, the researcher has developed a framework which can be utilized by the authority under the study to improve its project performance.

As it was mentioned frequently, the authority is suffering from lack of coordination of stakeholders and lack of skilled manpower to manage the planning, execution and monitoring of projects which resulted unclear and incomplete scoping, inadequate planning and insufficient monitoring of activities. Moreover, the poor practice of the authority's documentation and the resulting undeveloped culture for 'lessons learnt' from past projects were also part of the reasons behind the failures of the authority's projects to get completed within the predefined budget, schedule and to the acceptable level of quality. On the other hand, lack of updated and complete quality policy and quality assurance manuals has as well been found to be a factor influencing the quality of project deliverables of AACRA. Thus, the researcher has considered relevance of development of a framework incorporating the ways to overcome all these problems.

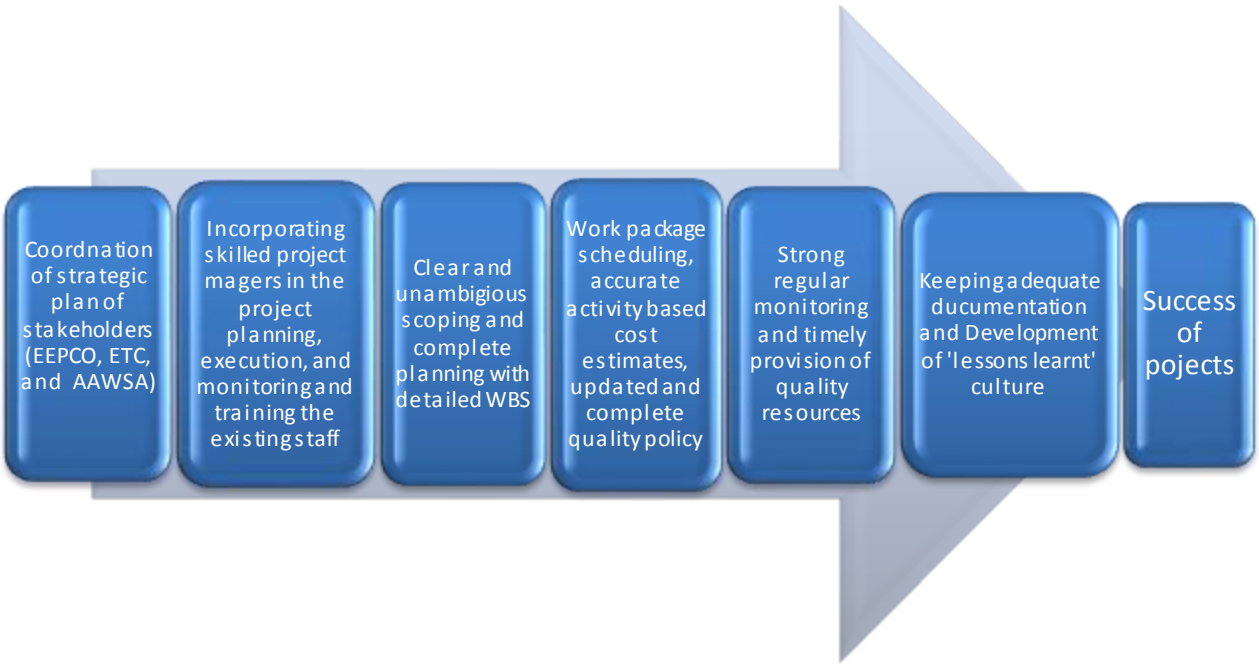

Fig 5.1 Project Success frame work for Addis Ababa City Roads Authority

5.5 Future Studies

Project management practice is at the infant stage in our country. Even organizations that are totally involved in undertaking projects such as AACRA fail to manage projects based on project management skills but only utilize technical expertise. Furthermore, only few researches have been conducted in the area. Further researches would help to develop the practice and to fill the gaps observed in project undertaking organizations.

On the other hand, the authority under the study, Addis Ababa City Roads Authority, has still gaps unidentified and problems unresolved. The researcher recommends for the analysis of dependence of cost overrun of projects on delays; Analysis of contract management in the projects administered by AACRA; and environmental impact assessment of the delays and quality problems of projects undertaken by AACRA.

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