



ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF MANAGEMENT

MBA program

Analysis of Factors Contributing To time overruns on Road
Construction Projects under Addis Ababa City Administration

A thesis paper submitted to graduate program of AAU in partial fulfillment of the
requirements for the degree of Masters of Business Administration [MBA]

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Advisor: Matiwos Ensermu (PhD)

June, 2014

Addis Ababa, Ethiopia

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LETTER OF CERTIFICATION

This is to certify that Siraw Yenesew has carried out his thesis work on the topic of “Analysis of Factors Contributing to time overruns on Road Construction Projects under Addis Ababa City Administration” under my supervision. This work is original in its nature and it is suitable for Submission in partial fulfillment of the requirement for the award of Master’s Degree in Business Administration (MBA).

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Date

DECLARATION

I, Siraw Y enesew, declare that this work entitled **“Analysis of Factors Contributing to time overruns on Road Construction Projects under Addis Ababa City Administration”** is the outcome of my own effort and study and that all sources of materials used for the study have been duly acknowledged.

I have produced it independently except for the guidance and suggestion of the Research Advisor. This study has not been submitted for any degree in this University or any other University. It is offered for the partial fulfillment of the degree of Masters in Business Administration [MBA]

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Anex

Anex A: Questionnaires

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Anex C: Implementation performance of AACRA

LIST OF ACRONYM

AACRA *Addis Ababa City Road Authority*

ACA *Addis Ababa City Administration*

PM *Project management*

PMBK *Project management body of knowledge*

EPRDF *Ethiopian people revolutionary democratic front*

UNDP *United Nations Development Program*

SPSS *Statistical Package for Social science*

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Abstract

It is well known that most road construction projects in Ethiopia and Addis Ababa city are exposed to time and cost overrun or both. It becomes difficult to complete road projects in the allocated cost and time. Therefore, this research was carried out to dig-out information on the factors that cause time overrun on Asphalt road construction projects in Addis Ababa City administration. The aim of this research is to assess factors contributing for time overruns on road construction projects in Addis Ababa city Administration in the views of road construction stakeholders. Questionnaire survey was used to collect data on causes of time overrun. A total of 47 questionnaires from owner (AACRA), contractors and consultants were collected on the common factors to contribute for time overrun on asphalt road construction projects completed from 2000-2005E.c in Addis Ababa city administration by using a purposive sampling technique and analyzed using both descriptive and inferential statistics. Secondary data (asphalt road construction projects completion report) was used to know the real extent of time overrun on the projects understudied. From the result, it was found that 80% of the projects suffered time overrun. The most important causes of time overrun were found to be slow site clearance, contractors' financial problems, Inflation, progress payments delay by owner, inaccurate cost estimation, and delay in commencement. Spearman rank order correlation analysis was used to evaluate whether consensus of views exists between groups of respondents (owner versus contractor, owner versus consultant and contractor versus consultant). From the analysis of the results, it was found that there is no consensus of opinion between owner versus contractor and owner versus consultant respondents on the factors that cause time overrun but there is consensus between contractor and consultant respondents. Lack of adequate literatures' on my case study was the limitation of this study.

Key words: time overrun, causes, factors, asphalt road construction projects, Road construction project stake holders.

Chapter One: Introduction

1.1. Background of the Study

Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements (*PMBK 2000 Ed.*). *Ibrahim Mohamed, Hail University, (2013)*, indicated that time, cost and quality have their proven importance as a prime measures for project success. As it is prevailed above 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.

Road project management is not something special to be treated differently rather, like any other projects. The focus of this research will be on the success of road projects in Addis Ababa city administration in terms of completion period (time requirement).

The construction sector particularly road construction is a very important sector for the development and economic growth of any developing country (*M.Haseeb, 2011*). Ethiopia and/or Addis Ababa city is under development and the development of road construction is vital like any other developing country if not more vital.

In Ethiopia, particularly in Addis Ababa, there are many road projects constructed, under construction and planned to be constructed. But, a very common problem which is affecting almost all road construction projects in the city is the failure to meet the stated/planned completion period (delay).

According to Ahmed et al., 2002, the inability to complete projects on time and within budget continues to be a chronic problem worldwide and is worsening. The failure to

meet time requirements of road projects will certainly end up with various side effects related with budget and other economic circulations of the country or city.

And therefore, this chronic problem is repeatedly happening in almost all road projects of Addis Ababa city administration and we can assume list of factors to affect the on time accomplishment of projects.

History of the Addis Ababa City Roads Development

Addis Ababa city was founded by Minellik II and Empress Taitu in 1887. 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 England Embassy in 1902. In 1904 the first roller was imported by the emperor and was being pulled by many people for its operation.

Emperor Minellik was also believed to be the first in importing two cars in Addis Ababa and introduced the car technology in the city for the first time in 1907. The country's modern road construction is highly interlinked with Emperor Haile Sellase's ruling period. During the regime of Haile Sellase I, a number of contractors were organized to carry out road construction.

The first one to be established by the Government to construct roads was 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 minister 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 Selassie regime by the Derg regime performing its duties. But no fundamental organizational change of the department was observed in the Derg regime.

In 1993 the existing Government (EPRDF) has established regional governments and gave them power to administer their regions with autonomy. During this time Addis Ababa was also established as one of the 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 roads till the establishment of the Addis Ababa City Roads Authority in March 15, 1998 by regulation No. 7/1998 to be administered by board of directors to construct maintain and administer the road works in Addis Ababa by the city Administration. The total length of road constructed in the city till the establishment of the authority in March 1998 was 1300 km 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. To date the City Roads length reached 2814 km of which 1534 km is gravel surfaced and 1280 km is Asphalt surfaced and the road network coverage has reached 10.34% compared with the developed area of the city.

This research aims at identifying the most common and frequent factors which contribute for this problem (time overrun)

1.2. Statement of the Problem

This section of the research states about the motivations (deriving force) to study the selected area.

The initiation for the study of this research is largely due to personal observation and low performance of asphalt road construction projects in Addis Ababa city administration in terms of time (delay).

The construction sector is one of the key economic sectors and is the main force in motivating the economic development of nations (*mehamid, 2013*).

According to Majid (2006), a construction project is commonly acknowledged as successful when it is completed on time, within budget, in accordance with specifications, and to stakeholders' satisfaction.

Sadi A. et al., (2006), Completing projects on time is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors, which result from many sources. These sources include the performance of parties, resources availability, environmental conditions, involvement of other parties, and contractual relations. However, it is difficult to see a project is completed within the specified time.

The delay in completion of construction projects is a worldwide *problem (M. Haseeb, Xinhai, 2011)*. This statement again implies how delay in construction projects is common even globally.

According to *Faridi et.al* (2006), delays have a n a diverse impact (effect) on project success in terms of time, cost, quality and safety.

Most c onstruction p rojects in t his country (Ethiopia) s uffer t ime a nd cost overrun, (*Fetene Nega, AAU, 2008*). As it is obviously known, Addis Ababa is the capital city of both Ethiopia and Africa and this fact makes the necessity of standardized roads in the city even more critical and vital. Despite the fact that Efforts of the city administration are visible, construction delay remains the main problem and there are various factors which affect the a ccomplishment o f projects a s planned in o ur case in terms o f t ime requirement.

The factors could be various in numbers and types in different situations, countries and circumstances. V arious s tudies have been co nducted to identify the most c ritical, common and frequent factors as a cause o f t ime o verrun in d ifferent c ountries and situations.

According to *M.Haseeb, et al., (2011)*, the most imp ortant and h ighly r anked delay causes in construction industry of Pakistan is inaccurate time estimation. But in another study, *Mahamid (2013)*, t he most important a nd hi ghly frequent Couse of delay is financial status of the contractor.

Important cau ses ar e financial p roblems, changes in t he d esign a nd s cope, delay in making de cisions a nd approvals by o wner, difficulties in o btaining work permit, a nd coordination and communication problems (*Sadi A. et al., (2006)*).

Apolot, et al., (2002), stated, The f ive m ost i mportant c auses o f d elays a nd c ost overrun a re c hanges in s cope, d elayed p ayment t o c ontractor, po or m onitoring a nd control and high inflation and interest rates.

Therefore, from the above fact, we can ascertain that important and frequent factors for project delay could be different in different situations.

Besides to that, there are some factors which have never been mentioned in most studies which are related with clearing the environment of the project (site clearance). Nevertheless, clearing the environment of the project is assumed (hypothesized) to be the most critical factors of delay among other factors in my research case in the views of both owner, contractors and consultants.

Generally, this study tried to identify the most common and frequent factors of delay for road construction projects in Addis Ababa city administration.

1.3. Research Questions

This section encompasses the questions the researcher wants to ask to shape the study. Based on the above model, and to test the hypothesis, the researcher wants to ask the following research questions:

1. How is the achievement of Addis Ababa city road authority (AACRA) in terms of time requirement?
2. How do the road construction project participants rate the different delay factors (their views)?
3. What are the most frequently happening delay factors in different asphalt road construction projects in the city?
4. What are the possible corrective measures to be taken to enhance/foster asphalt road construction project success in terms of time requirement in Addis Ababa city administration?

1.4. Objectives of the Research

General objective

The general objective of this study was to identify the most common and frequent factors of delay (time overrun) in road construction projects of Addis Ababa city administration.

Specific objectives

This study has been undertaken with the following specific objectives

1. To identify factors contributing for time overrun on asphalt road construction projects under AACRA and evaluate their relative importance and frequency of happening
2. Investigate the views of different construction parties (owner, contractor and consultant) to rank the identified factors based on their commonness and frequency.
3. To evaluate the degree of agreement /disagreement regarding the ranking of these factors between the construction parties.
4. Identifying the extent of time overrun for various road construction projects under Addis Ababa city administration
5. Forwarding recommendations to minimize or to avoid time overrun and frequency of its occurrence; and hence to reduce its consequential effects on road construction projects in Addis Ababa city administration.

1.5. Hypothesis

This section states about the prediction of the outcome. It states the directions of the study.

A researcher wanted to examine the relationship of different delay factors (independent variable) and time overrun (dependent variable) in asphalt road construction projects in Addis Ababa city administration.

The purpose of a hypothesis test is to avoid being deceived by chance of occurrences. The tests also helped to evaluate whether consensus of views exist among respondents. To test the agreement of paired respondents on ranking of factors contributing for time overrun on road construction projects, the researcher tested the following hypothesis.

H₀ is there is no agreement in the ranking of factors contributing for time overrun between two groups of respondents (owner versus contractor, owner versus consultant and contractor versus consultant).

H_A is there is agreement in the ranking of factors contributing for time overrun between two groups of respondents' (owner versus contractor, owner versus consultant and contractor versus consultant).

1.6. Significance of the Study

This research is significant in various dimensions; like:

- ❖ Helps us to understand the real extent of delay in Addis Ababa's road construction projects.

- ❖ Helps us to know who are responsible for road project delay in Addis Ababa city administration.
- ❖ Helps us to identify the most frequently happening factors of delay in Addis Ababa's road construction project.
- ❖ Helps the management of the AACRA to take corrective actions to foster project management success in the capital in terms of time requirement.

1.7. Scope and Limitations of the Study

The study was conducted on Addis Ababa city road authority from the perspectives of owner, contractors and consultants that was approached for questionnaires to identify the most common and frequently happening factors of delay in road construction projects.

The major limitation of this study is lack of relevant and up to date literatures which was conducted in this area of study (AA city).

1.8. Organization of the Study

This study is organized in five consequential chapters. The first chapter deals with the introduction part of the paper comprising statement of the problem, objectives of the study and other relevant introductory issues. The second chapter focuses on literature review. An eye bird view on all of the relevant literatures in relation to the topic under discussion was made. The third chapter deals with the research design, approaches used throughout the data collection and analysis process.

The fourth chapter presents the overall finding of the study which prevails about the extent of delay in asphalt road construction of Addis Ababa city administration, who are the responsible parties for delay among the project participants (stake holders) and

the most common and frequently happening factors of delay and presents the comparative analysis of the views of the respondents from the three groups (owner, contractors and consultants). The last chapter, chapter five encompasses the conclusion and recommendation part of the study. Conclusions are made from the previous chapter so that we can make some recommendations.

Chapter Two: Literature Review

2.1. Chapter review

This chapter deals about different literatures' which was conducted on the area of both project management and road project management. Most of the literatures' discussed here under are conducted on different countries and situations to ascertain the fact that delay factors could be different in different countries and situations. The purpose of this chapter is to refer it and integrate with the finding of this study.

2.2. Definition.

A project is a temporary endeavor undertaken to create a unique product, service, or result (*PMBOK, 2008, 4th Ed.*). The temporary nature of projects indicates a definite beginning and end. According to *PMBOK*, The end is reached when the projects objectives have been achieved or when the project is terminated because its objective will not or cannot be met, or when the need for the project is no longer exists. Temporary does not necessarily mean short in duration. *PMBOK* implies the fact that, temporary does not generally apply to the product, service or result created by the project; most projects are undertaken to create a lasting outcome.

Project management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements (*PMBOK, 2008, 4th Ed.*). The *PMBOK* guide divides project management processes into initiating, planning, execution, controlling and closing process. A central idea is that these processes form a closed loop: the planning process provides a plan that is realized by the executing process, and variances from the base line or requests for change lead to corrections in execution or changes in further plans (Howell 2002).

According to *Mohamed, (2013)*, Project success is measured by the planned time, cost and quality as they have their proven importance as a prime measures for project success. As it is prevailed above 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.

Therefore, a proper practices of project managerial functions; proper planning of every element of a project, proper execution/implementations including controlling and proper close-up of the project fosters/ enhances project success in terms of the above three principal requirement which is what we call golden triangles of project success. The golden triangle (time, cost and quality) is used to measure the project performance and success (*Mahamed, 2013*).

Any deviation in terms of the planned time, quality and cost will lead to argue that the project is not successful or failed to meet its requirement.

2.3. Project Delay

In construction, delay could be defined as the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project (*Sadi. A. et al 2006*). It is a project sleeping over its planned schedule and is considered as common problem in construction projects.

In construction, the word “delay” refers to something happening at a later time than planned, expected, specified in a contract or beyond the date that the parties agreed upon for the delivery of a project (*Pickavance, 2005*). *Lo, Fung and Tung (2006)* define delay as the slowing down of work without stopping construction entirely and that can lead to time overrun either beyond the contract date or beyond the

date that the parties have agreed upon for the delivery of the project. Syed, Azhar, et al., (2002) classify delays into non-excusable delays, excusable non-compensable delays, excusable compensable delays and concurrent delays. Non-excusable delays are delays, which the contractor either causes or assumes the risk for. Excusable non-compensable delays are delays caused by factors that are not foreseeable, beyond the contractor's reasonable control and not attributable to the contractor's fault or negligence. Compensable excusable delays are excusable delays, suspensions, or interruptions to all or part of the work caused by an act or failure to act by the owner resulting from owner's breach of an obligation, stated or implied, in the contract. Concurrent delays occur when both owner and the contractor are responsible for the delay.

Fetene Nega (2008) concluded that, it is common to see construction projects failing to achieve their mission of creating facilities within the specified cost and time. This implies again the extent of projects failure to meet their plan or requirement. Hardly few projects get completed on time and within budget since construction projects are exposed to uncertain environments because of such factors as complex nature of construction projects; presence of various interest groups such as the project owners, end users, consultants, contractors, financiers, materials, equipment, project funding, climatic environment, the economic and political environment and legal regulations.

The delay in completion of construction projects is a worldwide problem (*M. Haseeb, 2011*). This statement again states how delay in construction projects is common even globally.

For the client, construction delay refers to the loss of revenue, lack of productivity, dependency of existing facilities, lack of rentable facilities et c. for the contractor,

construction delay refers to the higher costs, longer work duration, increased labor cost, higher material and equipment costs etc. completion construction projects on specified time or time agreed within parties indicates the work and construction efficiency.

According to Abbas (2006), let completion of works as compared to the planned schedule or contract schedule is what is known as delay. Delay occurs when the progress of a contract falls behind its scheduled program. It may be caused by any party to the contract and may be a direct result of one or more circumstances. A contract delay has adverse effects on both the owner and contractor (either in the form of lost revenues or extra expense) and it often raises the contentious issue of delay responsibility, which may result in conflicts that frequently reach the courts (*Apolot, et al, 2009*).

According to Majid (2006), a construction project is commonly acknowledged as successful when it is completed on time, within budget, in accordance with specifications, and to stakeholders' satisfaction. In construction industry, contractors tend to maximize profit to increase market share. To achieve this aim, it is crucial for contractors to carefully identify the factors that affect the success of a project and estimate their impacts before the bidding stage.

A major criticism facing the Nigerian construction industry is the growing rate of delays in project delivery (*Aibinu, & .Jagboro, 2002*). Delay is a situation when the contractor or the project owners jointly or severally contribute to the non-completion of the project within the original or stipulated or agreed contract period. When projects are delayed, they are either accelerated or have their duration extended beyond the scheduled completion date. These are not without some cost consequences.

According to *Faridi et.al* (2006), delays have an adverse impact on project success in terms of time, cost, quality and safety. The effect of construction delays are not confined with construction industry only, but influence the overall economy of the country.

100% of road construction projects implemented in the west bank suffering from time overrun (Mahamid & Bruland, 2012).

The delays in construction projects happen because of various causes or reasons. These causes lead to the delay in construction completion, and these delay leads to some negative effects on the construction projects.

In Ethiopia and Addis Ababa, it is very rare case that road construction projects are completed on the time specified or agreed upon. There are many road projects in Addis Ababa which suffered delay or in some cases suffered suspension or even abandonment. And a number of studies have been conducted to identify important causes of delay in road construction which is common globally.

2.4. Causes of Delay in Road Construction Projects

Many articles and studies conducted on causes of delay in construction project to be reviewed below for the purpose of this research.

According to *Sadi.A, and et al, (2006)*, the causes can be grouped in to nine classes. Ranking of these groups associated with frequency of occurrence, degree of severity and importance by owners, contractors and consultants are presented below. According to this study, owners and consultants specify that labor, contractor and project related causes as source of delay. From owners' point of view, the most frequent causes of delay are related to both contractors and labor. The study shows that owners are

realizing that awarding of projects to the lowest bidders is one of the highest frequent factors of delay. The idea here is the lowest bidders are unqualified contractors with shortage in resources and low capabilities, which leads to low performance and which causes delay in completion of the work. While contractors indicate that source of delay in construction projects are owners and consultants. The combined results presented on this study prevails that delay in construction projects is mostly originated by the owner, followed by contractors. Design, labor and consultant related factors are less important.

In another study, *M. Haseeb & Xinhai, (2011)*, finance and payments, in accurate time estimation, quality of material, delay to payments to supplier and contractors and poor site management are the five most important causes of delay for construction projects. *M. Haseeb & Xinhai*, identified a round 16 causes of delay for construction projects ranked in terms of frequency and importance to affect successful construction project accomplishments. As per this study, the financial power of contractors and progress payments made by owners to contractors are ranked most important factors followed by quality of materials used to accomplish construction projects. And change in drawings, improper equipment, inaccurate cost estimation, change orders, organizational changes and regulatory changes are taken as the five least important and less frequently happening factors of delay. And the rest six; i.e., old technology, natural disasters, unforeseen site conditions, shortage of material, and delay caused by contractors are proved to be important and frequent in both the two classifications mentioned above as most and less important factors for delay. But on the previous study, most of these averagely taken factors have been proved most important and frequently happening factors for project delay.

The top three ranked factors of delay for construction projects from contractors view in Palestine are, Labors, materials and equipment's, and owner related factors (*Mahamid, 2013*). According to Ibrahim, the three least important and less frequent factors in the same country are consultant, design and project related factors. The study discussed why the above three important and frequently happening factors are taken as important factors of delay for construction projects in Palestine. Labor related factor is important because of the fact that segmentation of the west bank limits the movement of labors, goods and services b/n the areas (cities and villages). The check points b/n the Palestinian areas which are controlled by Israel may prevent or delay labors, materials and equipment to arrive the project site on time. The political situation in the west bank is described as unstable because of the conflict between the Palestinian and Israel. This situation leads to shortage in materials, shortage in equipment, limitations on material import, and limitation on movement which lead to time overrun. Progress payments are of high importance to contractors in order to fulfill the high daily expense. Due to the delay of payments by the owner, work progress can be delayed because there is inadequate cash flow to support construction expense especially for those contractors who are not financially sound.

As the researcher stated above, factors for delay can be different in different countries and situations. According to *Chan & Kumar W, (1997)*, the main causes of delay for construction projects in Hong Kong are poor supervision and management, unpredictable site conditions, slow decisions, variations by clients and variations of work. Whereas according to *Masfield, (2002)*, the main causes of delay for construction projects in Nigeria are finance and payments, poor handling of contract, shortage of materials and equipment, inaccurate estimations and fluctuations in price.

Summary of causes of delay according to these two researchers in two different countries

| S.No | Main Causes of Delay in Construction Industry | |
|------|---|---|
| 1 | Poor supervision and management | According to Chan & Kumar W (1997), in Hong Kong |
| 2 | Unpredictable site conditions | |
| 3 | Slow decisions | |
| 4 | Variations by client | |
| 5 | Variations of work | |
| 1 | Finance and payments | According to Mansfield (1994), in Nigeria |
| 2 | Poor handling of contract | |
| 3 | Shortages of materials and equipment | |
| 4 | Inaccurate estimations | |
| 5 | Fluctuations in prices | |

Table 2.1; Comparison of common factors in different countries

Agaba (2009) attributes delays in construction projects to poor designs and specifications, and problems associated with management and supervision. In their study, El-Razek et al., (2008) found that delayed payments, coordination difficulty, and poor communication were important causes of delay in Egypt. Sambasivan and Soon (2007) established 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.

As we can see on the above paragraph, all the researchers found and outlined their own factors of delay on construction industries in the respective countries. The idea here is, it is difficult to expect common causes of delay in construction projects due to its special nature and characteristics and level of complexity. The parties and stakeholders

to participate in the construction process are different in different countries and this fact can contribute to the heterogeneity of causes of delay factors in different countries.

As the process of construction project development is very complicated and combines various parties' agendas, comprise many stages of work, and entail a long period until completion (Puspasari 2006) , many factors contribute to delays in construction projects.

Baldwin and Manthei (1971) investigated the reasons for delays in building projects in the United States. They indicated 17 delay factors. Their study concluded that weather, labor supply, and sub- contractors are the three major causes of construction delays.

Mezher and Tawil (1998) carried out a survey about the causes of delays in the construction industry in Lebanon. The survey included 64 causes of delay, which were grouped into 10 major categories. According to their findings, financial issues, the way in which contractors regarded the contractual relationship, and project management issues were the most important causes of delays.

Odeh and Battaineh (2002) found that contractors and consultants agreed that owner interference, inadequate contractor experience, financing and payments, labor productivity, slow decision making, improper planning, and subcontractors are among the top ten most important factors of construction delay in Jordan.

Al-Momani (2000) investigated causes of delay in 130 public building projects constructed in Jordan during the period of 1990-1997. He presented regression models of the relationship between actual and planned project duration for different types of building facilities. He concluded that the main causes of delay are related to designer,

user changes, weather, site conditions, late deliveries, economic conditions and increase in quantity.

Asnaashari et al. (2009) presented the result of an investigation into the main factors which cause construction delay in Iran. The results reveal that most of construction projects in Iran are subject to delay. Cash constraints, shortage of resources, high inflation rate, delay in payments, and disputes in the supply chain are the top causes of delay in the Iranian construction industry.

All the above studies were focusing to identify the most common and highly frequently happened causes of delay for construction projects in different countries and situations. Unfortunately there are not enough studies conducted in Addis Ababa city administration to outline the causes of delay for road construction projects. But, the above articles are dictating the fact that all the causes of delay are related with either the owners or contractors or consultants and slightly with external or natural environments. Nevertheless all the delay factors could be categorized in to these three parties or stakeholders of construction industry, the particular causes of delay are different in different countries and circumstances. Here as a researcher who reviewed the above articles, we can infer that the causes of delay in road construction projects in Addis Ababa city will be related with either owners or consultants or contractors or natural environments or both which will be proved after this research. As we have seen the above articles, even if the causes can be categorized under the three parties, different construction projects could have different causes of delay. Therefore the most common and frequently happening factors to affect the effective and efficient completion of road projects in Addis Ababa city administration is different from what

we have reviewed above as it is common that the factors are different in different countries and situations.

To summarize, delay in construction projects is very common wherever the project is undergoing. And the causes of delay are related with and can be categorized under the different participants of a construction project (project stakeholders). But the particular causes of delay are different in different countries and situations. This research also identified the real causes of delay for road construction projects in Addis Ababa city administration.

2.5. Discussion on the Major Causes Contributing to Time Overrun on the Views of Three Project Participants.

The consequences of construction time overrun when undertaking a public sector road project affects all project parties, with issues such as extra cost. Although various methods for mitigating the problem have been developed in the previous studies, the limitation of using these methods raises the concern that probably the causes contributing to the time variance has not been adequately addressed. To investigate the causes, three interview workshops were arranged with relevant personnel in the public sectors. These discussions led to the identification of the following major categories of causes of time overruns (Wang et al 2003).

2.5.1. Owner-Related Causes

A public sector project generally involves more changes, thus inducing delays in the process of implementing the project. The public sector owner in general, is less active in pushing project progress when compared with a private sector owner. There is a lack of skill in controlling construction programming.

The bureaucracy exists in all procedures that a public sector project has to go through, which further induces progress delay. A public sector owner has to work with many governmental departments when changes to a project occur. He has to spend a substantial amount of time communicating with many other governmental departments, which again induces project delays (Wang et al 2003).

2.5.2. Contractor-Related Causes

There are many ways in which a contractor's performance can delay a construction project. For typical examples, main contractors often have various disputes with subcontractors and materials suppliers, which can cause major delays. In fact, such disputes are considered a major cause for project delay. Other factors, such as the contractor's insufficient financial resources, mistakes in making decisions on progress control and the overall inability when performing management functions, are also possible reasons for causing project delays.

It is interesting to note that, a main contractor will sometimes deliberately demand an unreasonably short contract period although the contractor understands that the completion on contract time is impossible. In this situation, the contractors only want to secure a contract and thus agree with an unrealistic contract period imposed by a project owner. Consequently, project delay cannot be avoided (Takim et al 2004).

2.5.3. Consultant-Related Causes

The consultant engaged in a road construction project can affect the progress of construction programming through various monitoring measures such as issuing certificates, and endorsing the satisfaction of certain activities in the construction process. Progress delay can happen if these monitoring measures are not implemented properly. This appears a typical problem in the mainland of China

where a professional called the ‘supervision engineer’ is adopted for supervising construction performance, particularly in committing public sector projects. Supervision engineers are given the authority to endorse the satisfaction of certain procedures such as piling, steel fixing, the quality of key materials, before the construction programming can proceed forward. It has been found that supervision engineers often cannot endorse these procedures in time, thus construction delays are caused (Wang et al 2003).

2.6. Effects of Delay

A study by Aibinu and Jagboro, (2002) reveals six effects of delay on project delivery in Nigerian construction industry which are: time overrun, cost overrun, dispute, arbitration, total abandonment and litigation. Sambasivan and Soon (2007) disclose the same effects of delay in Malaysian construction industry. Haseeb et al (2011) identifies effects of delays in Pakistan construction industry as clash, claims, total desertion and slowing down the growth of the construction sector. Ramabodu and Verster (2010) identify critical factors that cause cost overruns in construction projects as changes in scope of work on site, incomplete design at the time of tender, contractual claims (extension of time with cost), lack of cost planning and monitoring of funds, delays in costing variations and additional works. These critical factors in turn are the delay factors. Chileshe and Berko (2010) indicate that causes cost overrun in Ghanaian road construction sector are delay in monthly payments to contractors; variations; inflation, and schedule slippage. Again, these explain the causes of delays and the effect of cost overrun.

According to A. A. Aibinu*, G. O. Jagboro (2002), it was observed that the most frequent effects of delay on project delivery in Nigeria were time overrun.

Therefore, based on the above articles, we can argue that delay in road construction projects affect everything negatively. Especially in developing countries, it might be worse than that as road and other infrastructures are needed badly to enhance the economic development of the country or the town in the case of this research. And again, developing countries didn't afford any compensation (additional cost) for a late completion of road construction projects. These fact among other things tells us about the very high extent of negative effects caused by road project delays in a given developing country or region. The effect of delay on road construction projects in the case of both Ethiopia and Addis Ababa could be worse than what we have tried to disclose above as the need for development and transformation is highly necessary.

Chapter Three: The Research Design and Methodology

3.1 Research Approach

Kumar, (1999), considers research as a process of collecting, analyzing and interpreting information to provide solutions to questions or problems. For the purpose of this study, research is defined as a practical investigation or exploration to find out new facts or assemble old facts by scientific ways for the purpose of developing existing theory or its application for real problems. Research can either be a theory based (deductive), or a problem initiated for theory contribution (inductive), or a mixed approach. This research has an inductive approach as it was initiated from the observation of existing problems of delay on road construction projects in Addis Ababa city administration.

3.2. Research design/Type

This research is a practical problem developed from the observation of asphalt road construction projects and the research questions are oriented to investigate the cause of time overrun in road construction projects of Addis Ababa city administration.

This research can be categorized as applied and descriptive type. It is applied because the research is initiated from practical problems and finds whether there exists time overrun or not. It is also descriptive because it tried to describe the actual rate of time overrun and the variables or factors of time overrun in Addis Ababa city administration.

3.3. Sampling design

3.3.1. Target population

The population of the study comprises the stake holders of road construction projects such as owners (city road authority administration), contractors and consultants who were involved in the construction process of road construction projects taken (considered) for the study (completed from 2000 -2005E.c) under Addis Ababa city road authority to get possible reasons for time overrun. The questionnaire was distributed for engineers who are working under the construct management departments of the above mentioned stakeholders.

3.3.2. Sampling method

Purposive sampling technique was used to select the respondents under owners, consultants and contractors. According to Walliman (2005), 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.

3.3.3. Sample size

In the case of this research population, it does not mean that all members (employees) of road construction stakeholders are possible respondents for the questionnaire. Rather the questionnaire was distributed to engineers who are located under contract administration departments of each construction stakeholders (contractors, consultants and owner) who is working in the department at least for the last three years. There are 9 engineers' under the contract administration department of the owner, 20 engineers under the contract administration department of contractors involved in the construction process of the selected

roads for this study and 18 engineers under contract administration department of consultants. The researcher believed that these are the only respondents who know about delay factors for the road construction projects as they were involved in the construction process of the understudied projects and decided to distribute the questionnaire to all of these engineers. Therefore, the questionnaire was distributed for a total of 47 respondents who know the area or subject matter very well. The response rate of the questionnaire was so far so good. 100% of the owner respondents returned the questionnaire by disclosing their view about the causes of time overrun for the road construction projects understudied. 100% of respondents' from the contractors' side returned the questionnaire. And 100% of the respondents from the consultants' side returned the questionnaire with their view.

3.3.4. Unit of analysis

The unit of analysis is the major entity that is being analyzed in a study. It is the 'what' or 'who' that is being studied.

In terms of unit of analysis, this research focuses only on Asphalt road construction projects under Addis Ababa city administration which was completed within the last six years (from 2000-2005 E.C).

3.4. Source of Data

Both primary and secondary data were used in relation to the topic under discussion.

3.5. Data collection method

The data were gathered in two ways:

1. **Document review:** Completion reports of asphalt road construction projects in the city administration were reviewed to disclose the extent of road project delay in the city.
2. **Questionnaire:** Closed ended questionnaires were prepared and distributed for all road project participant respondents (Questionnaires were distributed to contractors, owner and consultants of the asphalt road construction projects).

The researcher hoped that, these sources are enough and relevant to investigate the most common and frequent factors of delay for asphalt road construction projects under Addis Ababa city administration.

3.6. Research instrument

To gather concrete data, all relevant and available data/documents were assessed and analyzed. These are project completion reports to disclose the fact that whether asphalt road constructions are completed as per the agreement/plan or not.

Contractors, owners and consultants have been approached for their view on causes of delay for road construction projects by using closed ended questionnaires (*in the form of likert scale*).

3.7. Analysis and Finding Methods

The analysis part combined (is based on) all groups of respondents (contractors, consultants and owners) in order to obtain significant results. The data is analyzed by calculating the relative important index model to rank the hypothesized factors based on their importance and frequency which is derived from the views of the respondents of the three groups. The spearman rank correlation coefficient is used to test the hypothesis of this research (whether there is significant agreement between the views of respondents from different groups to rank the delay factors).

. al. (1994) and Sambasivan and Soon (2007) used the RII method to determine the relative importance of the various causes of delays for construction projects. The same method is adopted in this study. RIIs for each factor is calculated as shown below:

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

Where:

RII = relative importance index

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

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

N = total number of respondents.

The RII values have a range of 0 to 1 (0 not inclusive); the higher the RII, the more important the cause of delay is. The RIIs is ranked, and the results are shown by using tables and/or graphs.

The Spearman's Correlation is used to compare the views of all respondents regarding about how they did rank the hypothesized factors to contribute for time overrun in the understudied road construction projects (to make a comparative analysis between owners and contractors, owners and consultants, contractors and consultants). Correlation is a relationship measure among different parties or factors and the strength and direction of the relationship. In this research it is used to show the degree of agreement between the different parties' of road construction projects under AACRA to rank the different factors contributing for time overrun on asphalt road construction projects in the city. The correlation coefficient varies between +1 and -1, where +1 implies a perfect positive relationship (significant agreement), while -1 result from a perfect negative relationship (disagreement).

In order to decide whether to accept or reject the null hypothesis, the level of significance 95% ($P = 0.05$) is used. This allows to state whether or not there is "agreement" between respondents response.

If the calculated value of p is less than the critical value, H_0 is failed to be rejected, i.e. there is no evidence of a statistically significant agreement between the groups. If the calculated value of p is greater than the critical value, H_0 is rejected, i.e. there is evidence of a statistically significant agreement between the two groups.

Spearman rank correlation coefficient is used to determine whether there is evidence of a linear relationship between two ordinal variables. The sample spearman correlation coefficient is denoted by r_s and is given by the formula below: (Saleh; 2001)

$$r_s = 1 - \frac{6\sum d^2}{n(n^2-1)}$$

Where:

r_s = Spearman's rank correlation coefficient

d = the difference in ranking between the usage and effectiveness of factors

n = the number of factors used to correlate

3.8. Ethical issues

Ethics is one of the major considerations in research. The researcher of this study is also subject to the following ethical considerations.

The research work was started after getting the willingness of the stated organizations.

Respondents were clearly communicated about the objective of the research before they are asked to give their answer.

There was no any physical or psychological damage to them because of the research.

Respondents were not asked about their name, race, religion, etc.

Chapter Four: Results and Discussion

4.1. Introduction

This chapter deals with the presentation of the data collected through questionnaire and document review. An attempt was made to collect relevant data from contract administration departments of owners, consultants and contractors of road construction projects which was completed within 2000-2005e.c, under Addis Ababa city road authority (AACRA). All engineers' under each contract administration department were contacted to fill the questionnaire to understand their view and experience about the importance and frequency of the hypothesized factors of delay for the pre-stated road projects.

Documents of the company essentially the completion reports of the road projects which are considered for this study was reviewed and presented here in this chapter.

The presentation part is structured as: Company background, the performance of asphalt road construction projects completed within 2000-2005e.c in terms of time requirement, analysis of factors contributing for time overrun in road construction projects in owners, contractors and consultants point of view and comparative analysis of the finding.

4.2. Population Characteristics

This part is mainly designed to provide general information about the respondents in terms of major type of work involved, and experiences of respondents.

4.3.1. Type of Respondents' Organization

In this study, 42.6 % (20) contractors, 19.1% (9) owners, 38.3 % (18) consultants are participated in the questionnaire as shown at Fig (4.1). The general response rate for contractors, owners and consultants was 100% and the total number of respondents for the

study was 47.

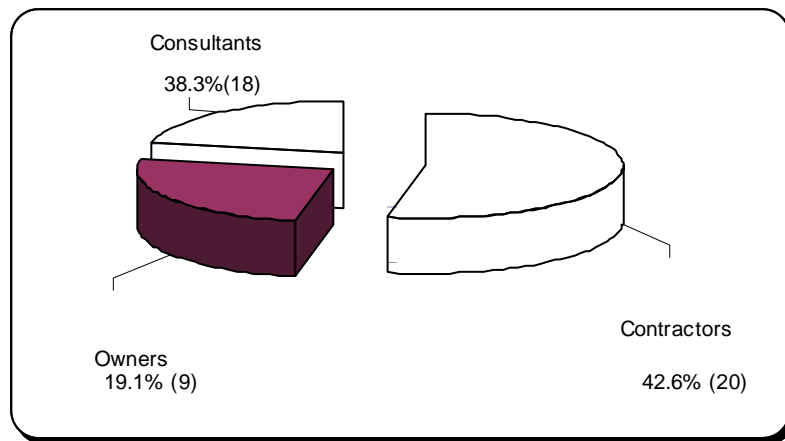


Figure 4.1: Type of respondents' organization

Figure 4.1 prevails about organizations where the respondents taken from for this study to provide the necessary information about the factors contributing for time overrun in Asphalt road construction projects under Addis Ababa city administration. There is only one owner for all the road projects understudied which is the city authority (AACRA). The researcher contacted 9 engineers who are working under the contract administration department of the authority who knows the delay factors very well which counts 19.1% of the total respondents. The study contacted 20 respondents who is working under the contract administration department of different contractors who was participating in the construction of the projects understudied. The respondents' from contractors take the 42.6% of the total share. The third road construction projects stakeholders who were considered for this study are consultants again who were participating on the implementation the understudied projects. 18 respondents were contacted to feel the questionnaire prepared by the researcher to know their view regarding about the common

and frequent factors contribution for time overrun on the road projects selected for this study. Those respondents cover 38.3% of the total respondents.

4.3.2. Experience of Respondents

Table 4.1 shows that 44.8 % (22) of the respondents have experience between 5 to 10 years at road construction works and the rest percentage of respondents, 55.2%(25) have experience of more than 10 years.

| | | Contractor | Owner | Consultant | Average |
|----------------------|-----------------------|-------------------|--------------|-------------------|----------------|
| Experience of | 1-3 Yrs | 0% (0) | 0% (0) | 0% (0) | 0 % (0) |
| | 3-5 Yrs | 0% (0) | 0% (0) | 0% (0) | 0 % (0) |
| | 5-10 Yrs | 40% (8) | 33.30 % (3) | 61.1 % (11) | 44.8% (22) |
| | More than 10 Years | 60 % (12) | 66.7 % (6) | 38.90 % (7) | 55.2 % (25) |
| Total | 100 % (47) | 100 % (20) | 100 % (9) | 100 % (18) | 100 % (47) |

Table 4.1: Experience of respondents (years)

As it is highlighted on table 4.1, the total numbers of respondents taken for this study are 47. The researcher used a purposive sampling technique which helps to select respondents who knows the case very well. The researcher selected Asphalt road projects which were completed between 2000-2005Ec, under AACRA and the researcher believed that the respondents must be members of contract administration department of all projects take holders who were part of the implementation of those projects. Meaning, all the respondents must have above 5 years of experience. Due to this fact, as the above table presents, 44.8% of the respondents have 5 -

10 years of experience and the rest 55.2% of the respondents have more than 10 years of experience.

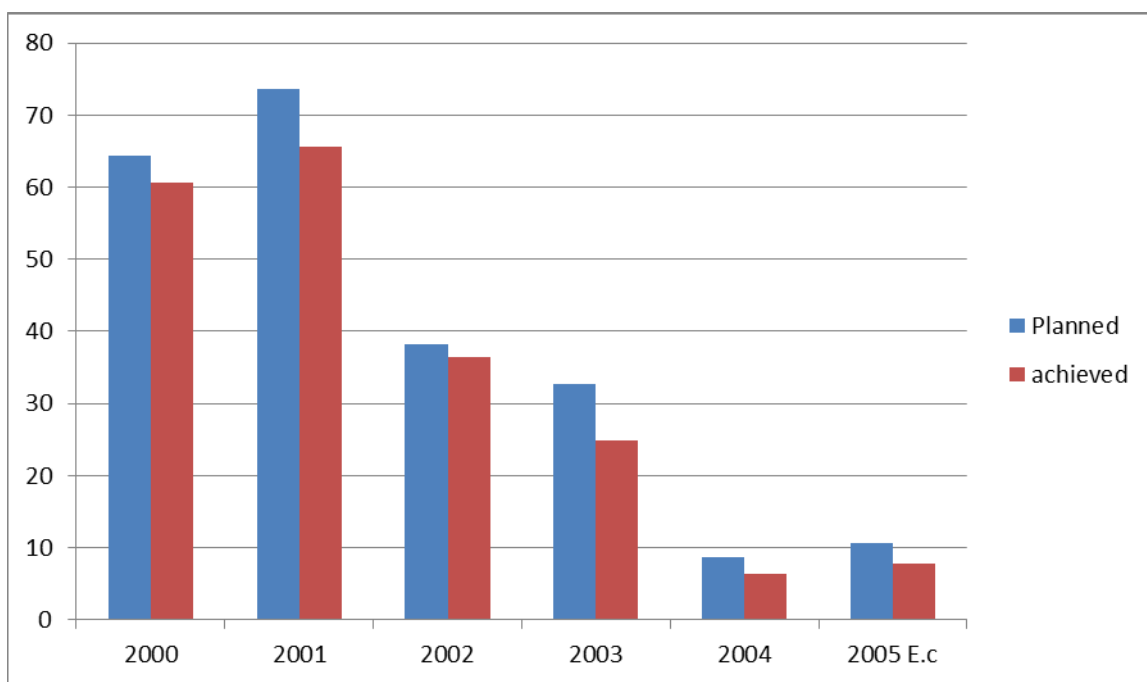
4.3.3. Response Rate of the Questionnaire

The response rate of the questionnaire was so far so good. 100% of the owner respondents returned the questionnaire by disclosing their view about the causes of time overrun for the road construction projects understudied. 100% of respondents' from the contractors' side returned the questionnaire. And 100% of the respondents' from the consultants' side returned the questionnaire with their view.

4.4. Yearly Accomplishment of Asphalt Road Construction Projects

As it is clearly presented before, this researcher focuses on asphalt road construction projects completed in 2000-2005 E.C under Addis Ababa city road authority. This section presents the yearly performances of the office in terms of comparing what was planned and achieved. The office prepared its yearly plan to accomplish a given kilometer of asphalt road projects which helped to compare it with the actual performance (comparison of planned and achieved performance). The real difference between the planned and achieved performance of Addis Ababa city road authority for those years is presented below in the form of chart.

Figure 4.2: Yearly accomplishment of asphalt road construction projects from 2000 to 2005E.c in Kilo meters by Addis Ababa city road authority.



| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|----------|------|------|------|------|------|------|
| Planned | 64.4 | 73.6 | 38.2 | 32.7 | 8.7 | 10.6 |
| Achieved | 60.6 | 65.6 | 36.4 | 24.9 | 6.3 | 7.8 |

Source: AACRA information desk

As we can understand from the above chart, Addis Ababa city road authority was short of achieving what was planned in all calendar years stated above. The numbers are representing kilometers of roads planned and accomplished in each year. There is a big difference between what was planned and accomplished during those years. This fact prevails about how road project delay (time overrun) is a common and obvious problem for Addis Ababa city road

authority. Given the extremely ambitious plans the authority has as it is presented above in the form of vision, mission, values and objectives, this problem (delay) deserves to be taken seriously. The first measure to be taken to deal with this problem is to identify causes of delay so that the office can take corrective actions to reduce delay or even to avoid if it is possible. These causes of delay will be identified and underscored on this study by using questionnaires to collect the views of contractors, consultants and owner about the most common and frequently happening delay factors.

4.5. Performance of Asphalt Road Construction Projects

2000-2005 was the period when many road projects were completed which was commenced following the plan developed by the city administration to boom the road construction projects of Addis Ababa city administration.

Table 4.2: AACRA, completion report for road construction projects completed in 2000-2005e.c.

| No | Name of the project | Date of commencement | Planned completion period | Actual completion period | Contractor | Consultant | Planned cost | Actual cost |
|----|---|----------------------|---------------------------|--------------------------|---------------------------|-----------------|--------------|--------------|
| 1 | Winget square- Asko bridge | Dec-210G.c | Jul-2012G.c | Mar-2013G.c | Tidhar constr. | Yuniken | 207,498,019 | 306,751,511 |
| 2 | Ayat square-Bole Ayat village | Ap-2012 | Ap-2013 | Mar-2013 | C.R,B.C Addis engineering | Best consulting | 150,032,280 | 173,934,076 |
| 3 | Winget square –Gojam ber | May-2006 | Jun-2008 | Dec-2012 | C.R,B.C Addis engineering | Yuniken | 326,506,025 | 728,864,968 |
| 4 | Yerer ber- Fisash mataria | Mar-2006 | Mar-2007 | Ap-2012 | Medroc constr. | Zewde Eskindir | 77,537,233 | 90,820,184 |
| 5 | Alem bank-yeshi debele road | Jul-2008 | Sep-2009 | Mar-2012 | Enyi constr. | Hek amakari | 177,785,402 | 198,698,122 |
| 6 | Lideta reconstruction road constr. | Oct-2011 | Mar-2012 | Aug-2012 | Enyi constr. | Beza consulting | 52,077,583 | 52,077,583 |
| 7 | Yerer ber ambesa garage –Lem hotel, Shola gebeya | Jul-2007 | Aug-2009 | May-2011 | Enyi constr. | Best consulting | 109,512,768 | 132,262,895 |
| 8 | Mekanisa-Jemo-Sebeta | Jul-2007 | Ap-2009 | Jan-2011 | Hek Amakari | Hek Amakari | 115,539,588 | 139,395,415 |
| 9 | Gofa camp- Mekanisa ring road | May-2006 | Jun-2009 | Oct-2010 | Enyi constr. | Hek Amakari | 43,576,867 | 61,385,047 |
| 10 | Megenagna- English embassy-qebena 4kilo | May-2006 | Dec-2008 | App-2010 | C.R,BC Addis engineering | Beza consulting | 146,890,588 | 235,8880,038 |
| 11 | Coca cola mazoria –through abnet tekleymanot square | Jul-2007 | May-2010 | May-2010 | C.R,BC Addis engineering | Zewde Eskindir | 93,257,398 | 113,076,890 |
| 12 | Yeshi debele- Ambo menged | Mar-2006 | May-2007 | Jun-2009 | Medroc constr. | Zewde Eskindir | 87,384,461 | 103,841783 |
| 13 | Meri radio -Beken | Mar-2006 | Mar-2007 | July-2009 | Medroc constr. | Zewde Eskindir | 50,365,079 | 74,225,454 |
| 14 | Mexico square-pushkin square-Mekanisa ring road | Jul-2007 | Nov-2009 | Nov-2009 | C.R,BC Addis engineering | Zewde Eskindir | 147,678,225 | 170,696594 |
| 15 | Yekatit 12 square-afincho ber-semen hotel | Jul-2006 | Dec-2009 | Dec-2009 | C.R,BC Addis engineering | Highway Amakari | 36,213,579 | 63,093783 |
| 16 | Dama hotel-hana Mariam bridge | May-2006 | May-2007 | Jun-2009 | Enyi constr. | Zewde Eskindir | 62,346,103 | 75,361,614 |

Source: AACRA, planning and budget office.

As we can understand from the above table, almost 80% of the projects were completed beyond their planned completion period. The adverse effect of time overrun on the projects stated on the table is directly reflected on the respective costs of projects. Almost 95% of the

above projects have consumed more than the planned cost. As it is clearly presented on the table, there is a significant difference between the plan and the actual performance of projects in terms of time and cost requirements. As the researcher reviewed above, Project efficiency is measured by its actual performance compared with what was planned in terms of time, cost and quality requirements (golden triangles). If any project failed to meet its planned requirement in terms of time, cost and quality, that project will be assumed as inefficient. As most of the road projects the researcher focused on for this study are completed beyond their plan in terms of time and cost, we can argue that all those projects are inefficient in terms of time and cost.

It is possible to assume different causes/factors for the inefficiency of the above projects in terms of their time and cost requirement. The researcher assumed/hypothesized different factors which can contribute essentially for time overrun on road construction projects as it is presented above and prepared it with a likert scale questionnaire format to distribute to the respondents. The respondents were engineers who were directly involving for the accomplishment of the road projects understudied. The engineers (respondents) were selected by using a purposive sampling technique which enables to meet respondents who knows the area under studied very well. The aim was to understand factors/causes for delay (time overrun) on the views of contractors, consultants and owner under Addis Ababa city road authority.

The results of this study are presented and discussed in three different categories in a way which enables to understand the views of contractors, consultants and owner about the causes of time overrun on road construction projects in Addis Ababa city administration.

4.6. Factors Contributing for Time Overrun on Asphalt Road Construction Projects in AACRA

This part of the paper consists of results and discussion of factors that contribute for time overrun (delay) in asphalt road construction projects. The factors are discussed into three groups, as Ten common and frequent factors from the views of owners, Ten common and frequent factors from the views of contractors' and Ten common and frequent factors from the views of consultants. The ranking of factors is done based on the importance and frequency of factors to happen and affect the timely delivery of road construction projects understudied.

4.6.1. Ten Common Factors Contributing for Time Overrun from Owners View.

Table 4.3: Factors contributing for time overrun on road construction projects in AACRA

| Hypothesized factors | Significance/frequency | | | | | Total value | RII | Rank |
|-----------------------------------|------------------------|---|---|---|---|-------------|-------|------|
| | 1 | 2 | 3 | 4 | 5 | | | |
| slow cite clearance | 0 | 0 | 0 | 2 | 7 | 43 | 0.955 | 1 |
| contractors financial problems | 0 | 0 | 0 | 4 | 5 | 41 | 0.911 | 2 |
| Inflation | 0 | 0 | 0 | 4 | 5 | 41 | 0.911 | 3 |
| exchange rate fluctuation | 0 | 0 | 0 | 5 | 4 | 40 | 0.888 | 4 |
| supply of material | 0 | 0 | 3 | 6 | 0 | 33 | 0.733 | 5 |
| inadequate contractors experience | 0 | 0 | 4 | 5 | 0 | 32 | 0.711 | 6 |
| low productivity of labor | 0 | 0 | 5 | 3 | 1 | 32 | 0.711 | 7 |
| inaccurate cost estimation | 0 | 0 | 5 | 4 | 0 | 31 | 0.688 | 8 |
| poor resource management | 0 | 0 | 7 | 1 | 1 | 30 | 0.666 | 9 |
| improper planning | 0 | 0 | 7 | 2 | 0 | 29 | 0.644 | 10 |

Sources: field survey, 2014.

Table 4.3, shows that the respondents' from the owners group ranked "slow cite clearance" in the first position with the relative importance index value of (RII=0.955), which indicates the

high importance of clearing the project site early to commence and finish the road projects on time. The suspension of clearing the project site will certainly disturb the overall plans of the project and will result with delay in commencement and delivering road projects as per the agreement. This result is not consistent with Asnaashari et al. (2009) as his study revealed that, the first common and frequent factor of delay for road construction projects in Iran is cash constraint.

The second common and frequent factor ranked by respondents of owners (AACRA) is “contractors’ financial problems” with the relative importance index value of (RII=0.911). This may be traced to the youngness of construction projects in our country. As the researcher tried to indicate above, all road construction projects selected for this study were not financially strong. As most of these contractors are inexperienced in the construction industry, it is normal to think that they may not be strong financially to complete projects on time with the agreed standard. This is a strong indication that financial power of contractors in construction industry is so far so important to deliver projects with the required and agreed requirement. This finding is consistent with *Mahamid*, (2013), as he ranked “difficulties in financing projects by contractors” first with frequency index of 0.676.

“Inflation” ranked third by respondents from owner with the relative importance index value of (RII=0.911), valued equal with financial problems of contractors which is ranked second. It tells us about, according to owner (AACRA) respondents, inflation is as important as financial problems of contractors to contribute for delay in road construction projects under Addis Ababa city administration. Especially in our case, inflation was a major issue in Ethiopia during the time selected for this study (2000-2005 E.C) and it is reasonable to say road construction projects which were completed during the period of high inflation throughout the country were

affected by the level of inflation to be delayed. This finding is not consistent with *Ibrahim Mahamid*, (2013), as he concluded inflation as unimportant and infrequently happening factor to affect road construction projects to be delayed in Palestine. The difference could be because of the time when the understated projects were undertaken and the place/country where road construction projects were done.

The fourth common and frequently happening factor to contribute for time overrun in road construction projects under AACRA according to owner respondents' is "exchange rate fluctuation" with the relative important index value of (RII=0.888). The value of birr in terms of foreign currencies is continuously changing through time in our country. Industrialization in Ethiopia is still imminent and in effect most construction materials are to be imported from abroad to affect the financial powers of construction parties given the fact that the value of birr in terms of U.S dollar and other currencies is decreasing now and then. The more the value of birr in terms of U.S dollar and other foreign currencies is decreasing or fluctuating, the longer time the road construction projects will take to be completed. If currency fluctuation affects financial power of construction parties which is indispensable, the road construction projects are certainly to be delayed beyond the agreed time requirement to deliver.

"Supply of materials" is ranked fifth with the relative importance index value of (RII=0.733), according to the views of owner respondents. As we know Ethiopia is a land locked country and I have indicated above that most construction materials are to be imported from abroad. Supply of road construction materials should not be efficient because of the above two reasons. To mean Ethiopia is a land locked country, the movement of commodities from inside to outside and from outside to inside of the country should not be smooth and fast. When road construction parties are importing construction materials from abroad, the materials are expected to be

waiting at the border to fulfill the necessary importing requirements. Besides that, when a country is a landlocked country, the price of importing materials is relatively high to cover costs for seaports. Like any other project or organization, road construction projects under Addis Ababa city administration must be affected negatively due to these unfavorable scenarios if not more. One more thing which makes supply of materials for road construction projects is inefficient and to be taken as an important factor to contribute for time overrun in asphalt road construction projects of Addis Ababa city administration is the transportation technology and system of the country. In terms of transportation technology, Ethiopia is believed to be the least due to different measurements like; the country is using cars to transport commodities to make international trades than using modern transportation technologies and it makes the delivery of construction materials for projects inefficient.

According to the views of respondents from the owners side, “inadequate contractors experience” is ranked as the sixth most important and frequently happen factor to contribute for time overrun in asphalt road construction projects under AACRA with the relative importance index value of (RII=0.711). As I have indicated above under “contractors financial problems”, construction industry in Ethiopia is young and imminent, the same thing for contractors experience as well. We as a society (country) are leaning through trial and error in different aspects as many things are being started very lately. The age of asphalt road construction industry in Ethiopia is traced back to 50 or 60 years. But it was not common to participate for local contractors for many years. Projects were done by foreign contractors. It is very recently that we are building asphalt road construction projects by local contractors in effect our local contractors are inexperienced and it can be taken as an important factor contributing for delay/time overrun in asphalt road construction projects under AACRA.

“Low productivity of labor” is ranked seventh with the relative importance index value of (RII=0.711) equally as important and frequent as “inadequate contractors experience” which is ranked sixth in the views of owner respondents. Ethiopia is the second populated country in Africa with more than 85,000,000 people. Especially recently, the majority share of this figure is to be taken by young with productive age group of the population. But still, the labor group of the country is regarded as unproductive due to many reasons like the inadequacy of higher education in the country, civilization of the people and many other reasons. Therefore labor in Ethiopia is good in terms of number but not good in terms of quality. Due to this and other reasons “low productivity of labor” can be taken as an important and frequently happening factor to affect the timely delivery of asphalt road construction projects under AACRA.

The eighth most important and frequently happening delay factor for asphalt road construction projects under AACRA is “inaccurate cost estimation of projects” with the relative importance index value of (RII=0.688). It can be considered as important and frequently happening factor of delay basically because of fluctuation in price of raw materials which will happen due to exchange rate fluctuation that I have indicated above. If exchange rate fluctuation is common as it is indicated above as a fourth most important factor for delay, mismatch between the estimated and the actual construction cost must be common. If the estimated cost is below the actual cost necessary to complete the road projects, it will be a difficult mountain to climb for contractors and certainly there will be a disagreement with other construction parties which will result with delay in the delivery of the project.

“Poor resource management” and “improper planning” are ranked ninth and tenth with the relative importance index value of (RII=0.666 and 0.644) respectively. According to owner respondents, these two factors are contributing for delay in asphalt road construction projects

under AACRA. Scientific management theories and skills are yet to be developed in our country regardless of the type and sizes of organizations. Especially in construction industries generally and road construction projects particularly, managing the scarce resources which is necessary to complete the projects is inimitable. If the scarce resources are not managed properly, it is to mean that there will be wastage and in effect delay will be indispensable or unavoidable. And everything must be planned properly before starting the actual work. Unless all the activities and the necessary resources are not planned properly, it will be impossible to forecast anything which will happen to affect the success of the project.

Therefore as we can understand from the views of owners, delay is a major problem which is commonly happening in the case of AACRA. According to these respondents, there are different factors to contribute for delay (time overrun) in the above case study and the factors are different in terms of their importance and frequency to happen. As it is indicated above, the researcher tried to identify, rank and select the ten most important and frequently happening delay factors based on the views of owner respondents which is assumed to represent the views of owners of the road construction projects understudied (AACRA).

4.6.2. Ten Common Factors Contributing for Time Overrun from Contractors View.

Table 4.4: factors contributing for time overrun on road construction projects in AACRA

| Hypothesized factors | Significance/frequency | | | | | Total value | RII | Rank |
|----------------------------------|------------------------|---|---|----|---|-------------|------|------|
| | 1 | 2 | 3 | 4 | 5 | | | |
| progress payments delay by owner | 1 | 2 | 3 | 4 | | 94 | 0.94 | 1 |
| inaccurate cost estimation | 0 | 1 | 1 | 1 | | 94 | 0.94 | 2 |
| supply of material | 0 | 0 | 1 | 4 | | 94 | 0.94 | 3 |
| slow cite clearance | 0 | 0 | 1 | 4 | | 91 | 0.91 | 4 |
| Inflation | 0 | 0 | 1 | 5 | | 88 | 0.88 | 5 |
| slow equipment movement | 0 | 0 | 2 | 8 | | 88 | 0.88 | 6 |
| exchange rate fluctuation | 0 | 0 | 2 | 8 | | 86 | 0.86 | 7 |
| interference of owners | 0 | 0 | 2 | 10 | | 86 | 0.86 | 8 |
| unforeseen cite conditions | 0 | 0 | 4 | 6 | | 84 | 0.84 | 9 |
| quality of material | 0 | 1 | 4 | 5 | | 83 | 0.83 | 10 |

Sources: field survey, 2014.

Table 4.4, reveals about the views of respondents from the contractors group who were involved on the road construction projects under studied to rank the ten most important and frequently happening factors to contribute for time overrun in road construction projects under AACRA.

According to respondents from the contractors group, “progress payments delay by owner”, “inaccurate cost estimation” and “supply of material” factors are ranked first, second and third respectively with the same relative importance index value of (RII= 0.94). It implies that the above three mentioned factors are equally important and happening with high frequency to affect timely delivery of road construction projects. As we can understand from the respondents’ view, if owners can’t pay the required money as per the agreement when the project progresses, it will

be to add a fuel on the financial problems of contractors which was ranked as the second most important and frequently happening factor by the views of owner respondents. If contractors don't have the required financial adequacy, it will be a very difficult job to make payments for the necessary construction materials, salaries and for anything which will be critically necessary. This finding is supported by M. Haseeb et al., (2011 Vol, 1), ranked first under client related delay factors as finance and payments.

The second import factor for delay is, "in accurate cost estimation" which is valued as important as the first factors in terms of relative importance index value. In accurate cost estimation was ranked eighth on the views of owner respondents and we can assume the difference between the views of contractors and owners on this particular factor or cause of delay. The contractors' respondents ranked it second but the owner respondents ranked it eighth. M. Haseeb, et al., (2011 Vol, 1), ranked eight which supports the views of owner respondents than contractor respondents.

Another factor which is given the same relative importance index value by contractors respondents with the above two factors is "supply of materials". According to their view, the necessary materials are not supplied conveniently and it can delay on the delivery projects as per the agreed period. Supply of materials was ranked as the fifth most important factor for time overrun on the views of owner respondents and the possible reasons why materials cannot be supplied conveniently were presented above under the views of owner respondents. M. Haseeb, et al., (2011 Vol,1), ranked this factor as the third most important factor under material related delay causes and it perfectly supports my finding.

"Slow cite clearance" ranked as the most important and highly frequent factor to contribute for delay with the relative importance index value of (RII=0.91) as the views of contractor

respondents. This factor was ranked as the first most important factor to contribute for time overrun on the views of owner respondents. It is uncommon to clear construction sites early not only for road construction projects but also for other construction projects in Ethiopia in general and Addis Ababa city in particular.

M. Haseeb, et al., (2011 Vol,1), ranked this factor seventh under external delay causes.

“Inflation” and “slow equipment movement” are ranked fifth and sixth respectively with the same relative importance index value of (RII= 0.88) according to the views of contractor respondents. Inflation was a common country wide problem during a year before increasing with double digit and the road construction projects can't escape from the negative impact of high inflation. Unfortunately, the road construction projects being studied for this particular study were built during the time when inflation marked its maximum to move down according to information's from the Ethiopian government. Therefore, inflation was a major problem to contribute for time overrun on road construction projects under AACRA. Inflation was ranked third by owner respondents. M. Haseeb, et al., (2011), ranked inflation as the six important factor and we can say that it supported this research's finding. Slow equipment movement is also regarded as important as inflation with the RII value. This factor is out of the ten most important factors to contribute for delay in road construction projects by the views of owner respondents but ranked six on the views of contractor respondents. The problem of slow equipment movement could be related with the inefficient transportation systems of the country and the type of technologies that is used in the construction process to move equipment's.

“Exchange rate fluctuation” and “interference of owners” are ranked seventh and eighth respectively with the same relative importance index value of (RII= 0.86) according to the views of contractor respondents. Exchange rate fluctuation was ranked the fourth most important factor

to contribute for time overrun on the views of owner respondents. This means, there is a disagreement between the views of contractors and owners on how exchange rate fluctuation must be weighted to contribute for time overrun.

Interference of owners is also a factor to contribute for time overrun in road construction projects under AACRA according to the views of contractor respondents. It was out of the top ten important factors ranked based on the views of owner respondents.

According to the views of contractor respondents, “unforeseen site conditions” is ranked ninth with the relative importance index value of (RII=0.84). When the road construction parties are agreed on different terms, there are various requirements and specifications to be taken into consideration. But, it is difficult to think like everything will remain exactly as planned and as calculated. Uncalculated or unforeseen conditions could happen once the project is undergoing and the most common which could happen is site conditions which is different from the site condition that was assumed and believed to be when the agreement was signed. According to contractor respondents, unforeseen site conditions are important factors to contribute for time overrun.

“Quality of material” is the last important factor among the ten most important delay factors to contribute for time overrun from the views of contractor respondents with the relative importance index value of (RII=0.83). Quality of materials is critically important for the success of a project in general and road construction projects in particular. Because, the less the quality of materials the more frequently rework will happen which will result with delay and time overrun of projects or road construction projects. Therefore contractors believe that, quality of material is a determinant factor for the success or failure of road construction projects to achieve its time requirement (on time delivery). And even M. Haseeb, et al., (2011) ranked this factor as

the first most important factor to contribute for time overrun under material related causes of delay.

Therefore, like the views of owners we have summarized above, contractors argued that time overrun or delivering projects beyond the agreed time is a common and very serious problem which is affecting the performances of the owner (AACRA), contractors and consultants as it is difficult to accomplish tasks as planned. Again here, contractors believe that contributing factors for time overrun are different in number and type. The researcher tried to identify the possible time overrun contributing factors and distribute a likert scale questionnaire for the respondents of different contractors. And finally as we can observe on table 4.3, the researcher identified the ten most important time overrun contributing factors according to the views of contractors based on their importance and frequency to happen.

4.6.3. Ten Common Factors Contributing for Time Overrun from Consultants View.

Table 4.5: Factors contributing for time overrun on road construction projects in AACRA

| Hypothesized factors | Significance/frequency | | | | | Total value | RII | Rank |
|-----------------------------------|------------------------|---|---|----|---|-------------|-------|------|
| | 1 | 2 | 3 | 4 | 5 | | | |
| progress payments delay by owner | 0 | 0 | 0 | 9 | 9 | 81 | 0.900 | 1 |
| Inflation | 0 | 0 | 0 | 15 | 3 | 75 | 0.833 | 2 |
| delay in commencement | 0 | 0 | 3 | 12 | 3 | 72 | 0.800 | 3 |
| contractors financial problems | 0 | 0 | 3 | 12 | 3 | 72 | 0.800 | 4 |
| unforeseen cite conditions | 0 | 0 | 2 | 15 | 1 | 71 | 0.788 | 5 |
| inadequate contractors experience | 0 | 1 | 2 | 13 | 2 | 70 | 0.777 | 6 |
| inaccurate cost estimation | 0 | 0 | 3 | 14 | 1 | 70 | 0.777 | 7 |
| slow equipment movement | 0 | 0 | 3 | 15 | 0 | 69 | 0.766 | 8 |
| incomplete drawings | 0 | 0 | 6 | 10 | 2 | 68 | 0.755 | 9 |
| quality of material | 0 | 0 | 5 | 12 | 1 | 68 | 0.755 | 10 |

Sources: field survey, 2014.

Factors which are presented on the above table (table 4.5) denotes the ten common and frequently happening factors to contribute for time overrun on asphalt road construction projects under AACRA from the consultants view which is slightly different from the views of both owner and contractors.

Like the views of contractors, “progress payment delay by owner” is ranked first with the relative importance index value of (RII=0.900) according to the views of consultants. The why it could happen and its possible negative effect are explained above under the views of contractors. This finding is supported by M. Haseeb, et al., (2011 Vol,1), ranked first under client related delay factors as finance and payments.

“Inflation” is ranked second with the relative importance index value of (RII= 0.833) according

to the views of consultant respondents. Inflation was a common country wide problem during a year before increasing with double digit and the road construction projects can't escape from the negative impact of high inflation. Unfortunately, the road construction projects being studied for this particular study were built during the time when inflation marked its maximum to move down according to information's from the Ethiopian government. Therefore, inflation was a major problem to contribute for time overrun on road construction projects under AACRA. Inflation was ranked third by owner respondents while fifth in contractor respondents. M. Haseeb, et al., (2011), ranked inflation as the six important factor and we can say that it didn't support my finding as it is somewhat devalued on the study I am referring.

According to the views of consultant respondents, "delay in commencement" and "contractors' financial problem" are ranked as the third and fourth most important and frequently happening factor to contribute for time overrun on asphalt road construction projects respectively with the same relative importance index value of (RII=0.800). Delay in commencement was out of the ten most important factors according to the views of both owner and contractors respondents but consultant respondents ranked it third. The idea is it is common that asphalt road construction projects in Addis Ababa city are delayed to be commenced or never started as per the agreement. If projects or road projects particularly didn't commenced on the agreed time, certainly it will be difficult to deliver it on the agreed time without project crushing. If road construction project participants didn't commenced the project early and decided to crush it to deliver on time, there will be a mismatch between the planned and the actual cost of the project. The actual project cost will be higher than the budgeted cost which will result with conflict between the road construction parties. Contractors' financial problem is the fourth most important factor and it may be because of the youngness of construction projects in our country.

As the researcher tried to indicate above, all road construction projects selected for this study was taken by domestic contractors. As the domestic contractors are inexperienced in the construction industry, it is normal to think that they may not be strong financially to complete projects on time with the agreed standard. This is a strong indication that financial power of contractors in construction industry is so far so important to deliver projects with the required and agreed requirement. This finding is consistent with *Mahamid, (2013)*, a sh e r a n k e d “difficulties in financing projects by contractors” first with frequency index of 0.676.

“unforeseen site conditions” is the fifth important and frequently happening factor to contribute for time overrun in asphalt road construction projects under Addis Ababa city road construction projects according to the views of consultant respondents.

It was ranked ninth with the relative importance index value of (RII=0.84) from the views of contractor respondents. When the road construction parties are agreed on different terms, there are various requirements and specifications to be taken in to consideration. But, it is difficult to think like everything will remain exactly as planned and as calculated. Unplanned or unforeseen conditions could happen once the project is undergoing and the most common which could happen is site conditions which is different from the site condition that was assumed and believed to be when the agreement was signed. According to consultant respondents, unforeseen site conditions are important factors to contribute for time overrun and it is the consultant respondents who value this factor (unforeseen site conditions) compared with the rest two road construction parties.

The six and seventh important factors are “inadequate contractors experience” and “inaccurate cost estimation” respectively with the same relative importance index value of (RII=0.777) according to the views of consultant respondents.

Owner respondents ranked inadequate experiences of contractors sixth exactly the same to that of the views of consultant respondents. Construction industry in Ethiopia is young and imminent, the same thing for contractors experience as well. We as a society (country) are leaning through trial and error in different aspects as many things are being started very lately. The age of asphalt road construction industry in Ethiopia is traced back to 50 or 60 years. But it was not common to participate for local contractors for many years. Projects were done by foreign contractors. It is very recently that we are building asphalt road construction projects by local contractors in effect our local contractors are inexperienced and it can be taken as an important factor contributing for delay/time overrun in asphalt road construction projects under AACRA.

In accurate cost estimation was ranked eighth on the views of owner respondents and second from the views of contractors.

We can assume the difference between the views of contractors, consultants and owners on this particular factor or cause of delay. The contractors' respondents ranked it second but the owner respondents ranked it eighth and consultant respondents ranked it seventh. M. Haseeb, et al., (2011 Vol, 1), ranked eight which supports the views of owner respondents than contractor respondents.

The respondents from the consultants side ranked "slow equipment movement" as the eighth most important and most frequently happening factor to contribute for time overrun in asphalt road construction projects under AACRA with the relative importance index value of (RII=0.766). Contractor respondents were ranked this factor as the sixth most important factor to contribute for time overrun on road construction projects understudied. This factor is out of the ten most important factors to contribute for delay in road construction projects by the views of owner respondents but ranked six on the views of contractor respondents and eighth from

consultant respondents. The problem of slow equipment movement could be related with the inefficient transportation systems of the country and the type of technologies that is used in the construction process to move the necessary equipment's.

The last two factors (ranked ninth and tenth) are "incomplete drawing" and "quality of material" respectively with the same relative importance index value of (RII=0.755) according to the views of consultant respondents. Incomplete drawing was out of contention on the views of contractor and owner respondents as far as we are concerned about the top ten most important factors ranked by those respondents. But consultant respondents ranked it ninth and it makes sense as it is the consultants who controls the progress of the project whether it is in line with the design or drawing.

Quality of material was ranked tenth by contractor respondents which is exactly the same with how consultant respondents ranked it. Quality of materials is critically important for the success of a project in general and road construction projects in particular. Because, the less the quality of materials the more frequently rework will happen which will result with delay and time overrun of projects or road construction projects. Therefore both contractor and consultant respondents believe that, quality of material is a determinant factor for the success or failure of road construction projects to achieve its time requirement (on time delivery). And even M. Haseeb, et al., (2011 Vol, 1), ranked this factor as the first most important factor to contribute for time overrun under material related causes of delay.

Therefore, consultants are keen on the commonness and recurrence of time overrun on asphalt road construction projects they are being involved and they are serious about the fact that what are the possible factors to contribute for the indispensability of this problem. They believe that it is possible to list factors which can be ranked hierarchically on the bases of their importance,

commonness and severity to negatively influence on time delivery of road projects. The consultant respondents gave a hierarchy for the different factors which was listed by the researcher as the hypothesized factors for the purpose of a questionnaire to the respondents. From that list, consultant respondents have selected the above ten most important and frequently happening factor to contribute for time overrun on asphalt road construction projects which was considered for this study.

4.7. Comparative Analysis

This section of the study aims to see the level of agreement (significant relationship) between the three road construction parties; owner versus contractor, owner versus consultant and contractor versus consultant in terms of their view to rank the hypothesized factors which can contribute for time overrun on the understudied road construction projects.

In this research the Spearman's correlation is used. Correlation is a relationship measure among different parties or factors and the strength and direction of the relationship. For this research it is used to show the degree of agreement between the different parties.

The Null Hypothesis (H_0) is:

There is no agreement in the ranking of factors contributing for time overrun between two groups of respondents.

The Alternative Hypothesis (H_A) is:

There is agreement in the ranking of factors contributing for time overrun between two groups of respondents.

In order to decide whether to accept or reject the null hypothesis, the level of significance

95% ($P = 0.05$) is used. This allows to state whether or not there is "agreement" between respondents response.

If the calculated value of ρ (correlation coefficient) is less than the critical value of P , H_0 is failed to be rejected, i.e. there is no evidence of a statistically significant agreement between the groups. If the calculated value of ρ is greater than the critical value, H_0 is rejected, i.e. there is evidence of a statistically significant agreement between the two groups.

Table 4.6: Correlation test of the most important factors of time overrun among contractor, consultant and owner

| Respondents | Correlation coefficient (Calculated value of P) | Critical value of P | Significance for $P < 0.05$ | Reject/don't reject the Null Hypothesis |
|---------------------------|---|-----------------------|-----------------------------|---|
| Owner and Contractor | 0.247 | 0.441 | Insignificant | Fail to reject |
| Owner and consultant | 0.414 | 0.441 | Insignificant | Fail to reject |
| Contractor and consultant | 0.649 | 0.441 | Significant | Reject |

In this case, with a significance level of 95% ($P = 0.05$), the calculated value of ρ for the first two group cases are less than the critical values of ρ , so the hypothesis that there is no significant agreement between the respondents is failed to be rejected i.e. the null hypothesis is failed to be rejected. Meaning, there is no significant agreement between owner versus contractors and owner versus consultant in ranking factors contributing for time overrun in asphalt road construction projects in Addis Ababa city.

But for the last (third) group, the calculated value of ρ is greater than the critical value of ρ , so, the hypothesis that there is no significant agreement between the respondents is rejected. That means, there is a significant agreement between contractors and consultants in ranking factors

contributing for time overrun on asphalt road construction projects in Addis Ababa city.

From Table 4.6, above, it can be concluded that there is no strong correlation between the attitudes of the owner respondents versus contractor respondents and owner respondents versus consultant respondents and hence the null hypothesis should be accepted and the alternative hypothesis shall be rejected. This means that most of the respondents from owners have a different view about factors contributing for time overrun compared with contractor and consultant respondents. And we can also conclude that, there is a strong correlation between the attitudes of contractor and consultant respondents in terms of their views in ranking factors of time overrun. Hence the null hypothesis is rejected. Meaning, most of the respondents from contractor and consultant groups have the same view in ranking factors of time overrun.

Chapter Five: Conclusions and Recommendations

5.1. Introduction

This chapter includes the conclusions and recommendations that would help in solving the problem of delay (time overrun) on asphalt road construction projects under Addis Ababa city administration.

The first objective of this study was to identify factors contributing for time overrun on asphalt road construction projects administered by AACRA and evaluate their relative importance and frequency of happening. The second objective was to investigate the views of different construction parties (owner, contractor and consultant) to rank the identified factors based on their importance. To evaluate the degree of agreement /disagreement regarding the ranking of these factors between the construction parties was the third objective. Identifying the extent of time overrun in asphalt road construction projects under Addis Ababa city administration and forwarding recommendations to minimize or to avoid time overrun and frequency of its occurrence; and hence to reduce its consequential effects on road construction projects in Addis Ababa city administration were the fourth and fifth objectives of this study.

5.2. Conclusions

Road construction projects are vital for developing countries like Ethiopia in general and Addis Ababa city in particular as infrastructure development is key for economic development of those countries, hence, untimely delivery of road projects in that country will directly affect the country's economic development program. Therefore, carrying out a research in this area will have a paramount importance to reduce the frequency of untimely delivery (time overrun) of road projects and to avoid it if it is possible.

Identification of causes of time overrun is a prerequisite to minimize or to avoid time overrun in asphalt road construction industry. The main objective of this research is, therefore, to identify and investigate the critical causes of time overrun on asphalt road construction projects in Addis Ababa city administration. Secondary data (project completion report) was used to identify the existence and extent of time overrun asphalt road construction projects completed from 2000 to 2005Ec under Addis Ababa city administration. Questionnaire survey was also used to identify the causes of time overrun in the form of likert scale questions. Owner, contractors and consultants were asked to identify the factors that contribute for time overrun in asphalt road construction projects in Addis Ababa city administration. The SPSS software was used to summarize and categorize the respondents view and R II method was used to rank the hypothesized factors for their importance and frequency of happening based on the views of the three construction parties. Agreements of the respondents on the causes of time overrun, i.e. between owner and contractor, between owner and consultant, and between consultant and contractor were also tested. The ranked data was correlated by using Spearman correlation coefficient (r_s).

From the results of the analysis of secondary data and respondents' responses the following conclusions are drawn.

1. Presentation of the existence and real extent of time overrun problem (untimely delivery of asphalt road projects in Addis Ababa city administration in the years under studied) is important before identifying the factors contributing for time overrun. Almost 80% of the projects were completed beyond their planned completion period out of the asphalt road construction projects which was completed from 2000-2005Ec, and in effect, almost 95% of those road projects have consumed more than the planned cost. Therefore the researcher

concluded that, time overrun for a asphalt road construction project in Addis Ababa city administration is common.

2. Addis Ababa city road authority (AACRA) was short of achieving what was planned in all calendar years selected for the study in terms of building asphalt roads. The plan was to build 228.2Km asphalt roads within the years selected for the study (2000-2005Ec). But the authority achieved far below the plan which is 201.6Km of asphalt road projects.

The researcher concluded that there is improper management system in the office which helps to achieve what was planned; that is why time and cost overrun is being common in the city administration.

3. From the research it was found that all contractors, owner and consultants are responsible for the problems of time overrun in road construction projects in Addis Ababa city administration. The conclusion is, causes of delay are related with either the owners or contractors or consultants and slightly with external factors.
4. From this research, owner (AACRA) is the one who is severely affected by time overrun, since the authority is forced to look for additional money (budget) to complete the road construction projects. It is common that contractors claim for the revision of the agreement if it was not possible to complete the project on time. However, it should be noted that owner, contractors, consultants and even the economy of the city and the country are all affected by the problem of untimely delivery of these projects.
5. Time overrun will have many unfavorable effects for stakeholders in the road construction industry like, cost overrun, revision of the agreed contract, budget short fall of the owner, adversarial relationship among stakeholders and loss of reputation for professionals on the road construction industry especially to consultants which is related with design issues and

unforeseen site conditions.

6. For this study, 48 hypothesized factors were identified and distributed for respondents which can contribute to time overrun in asphalt road construction projects. The respondents from all groups or construction parties (owner, contractor and consultant) have disclosed their view for the importance and frequency of the hypothesized factors. Based on their view the researcher identified the most common factors through the ranking of importance and rate of occurrence
7. There is no strong correlation on the responses of owner, contractor and consultant respondents, i.e. between owner versus contractors and owner versus consultants; but there is a strong correlation on the responses of contractor and consultant respondents.

5.3. Recommendations

Based on the findings of the research, the following recommendations are forwarded which is expected from key stakeholders of asphalt road construction projects in Addis Ababa city administration.

5.3.1 Expected from Owner

Owner (AACRA) is one of the most important parties who invest the money for the realization of asphalt road construction projects, and the office plays a key role starting from conception through construction up to utilization of the road projects. The following recommendations are forwarded which is expected from the owner.

1. Fulfill contractual obligations, especially as regards to progress payment of road construction projects as it impairs the contractors' ability to finance the work. The owner should ensure that adequate funds are available before projects are started, so that contractors can be paid in accordance with the contract agreement which will

enhance the timely delivery of road projects.

2. Owner should allow sufficient time to prepare project briefs and other feasibility studies as it will reduce the contribution of inaccurate cost estimation, unforeseen site conditions and slow site clearances for the untimely delivery (time overrun) of asphalt road construction projects.
3. Select suitable contractors not only on the basis of least cost but also on experience, financial standing, and overall capacity as inadequate experience of contractors is mentioned as a common factor to contribute for time overrun.
4. Avoid or reduce unnecessary interferences as it could disrupt the momentum of the work. Controlling timing and follow upping mechanisms must be as planned.
5. Implement cost reduction incentive proposals as it will reduce the impact of contractors' financial problems for time overrun on asphalt road construction projects.

5.3.2 Expected from Contractors

Contractors are one of the stakeholders who participate directly on the construction projects; accordingly the following recommendations are forwarded which are expected from them.

1. Implementing adequate funding alternatives ahead of time to have sufficient finance to complete the project as per the agreement. It is unacceptable that to bid for a project wins it and can't continue because of financial problems.
2. Ensure efficient time management through proper resource planning, duration estimation, and schedule development and control; to avoid delay.
3. Commence projects on time according to the agreement. If it is commenced on time, it will be reflected on the outcome of the project if it is not crashed which probably end

up with cost overrun and finally the project will struggle to fulfill the time requirement of project success.

4. Acquire construction materials and other items ahead of time with the agreed quality and specification as it can reduce the impact of supply and quality of material on the timely delivery of road projects. It is also better for them to have time schedule for material delivery process to the site in order to avoid shortage or lack of materials.
5. Contractors are advised to set up stores for the necessary construction materials, and especially for scarce or that are in limited quantity in the markets to avoid time overrun.
6. Contractors are recommended to give adequate training for their labor power at different levels to improve labor quality and then to enhance timely delivery of road projects.
7. Contractors are recommended to correctly forecast the possible exchange rate fluctuation and the overall economic trends of the country.

5.3.3 Expected from Consultants

The consultants are among the key role players in construction projects that translate the owner needs and ideas into plans and drawings and supervise the translation of these plans and drawings into visible physical structures. The following recommendations are expected from consultants.

1. Avoid complex designs and incomplete drawings as it contributes for time overrun through creating confusion on the rest stakeholders of the road project and asks extra time to complete the drawing respectively. All the specifications, criteria's and requirements must be clear and easily communicable for contractors and other participants.

2. They are recommended to make a very detail analysis in the design and drawing stage to reduce or even to avoid all the uncertainties which the construction participants would face once the construction work is commenced. If everything is not precisely analyzed and stated, it will end up with disagreement between owner and contractors as unsought site conditions will be found and asks additional time and cost to end up a gain with time overrun.
3. Consultants are recommended to be flexible during their supervision of the projects when it is necessary to avoid disagreements with other construction parties. Rigidity will lead to unnecessary disputes and affects the timely delivery of road construction projects.
4. They are recommended to develop a flexible design to respond more proactively to necessary changes in owner needs and requirements; after completion of designs and plans, cross-check designs and details to eliminate errors and reduce rework.
5. The researcher recommends consultants to develop a clear and complete project scope to avoid frequent changes.

5.3.4 Expected from the Government

1. The government should try to stabilize the variations in inflation and foreign currency related issues as it can reduce uncertainties in terms of the required cost and consequently time of delivering projects through changing the monetary policies of the country to stabilize all these things.
2. The researcher also would like to mention one thing which is expected from the government; installing active transportation system to reduce the impacts of poor supply of materials. The transportation system of our country is arguably poor and slow compared with many African countries even. There must be a greatly enhanced

transportation system to support the highly rated economic development of the country and the transportation sector correspondingly.

5.4. **Future area of research**

Future research can be carried out to determine the effect of time overrun on asphalt road construction project which are not identified in the present study.

Any interested researcher can include road construction projects in country level to identify the most common and frequent factors contributing for time.

Other researchers can focus to identify factors contributing for cost overrun on asphalt road construction projects.

Annex A:

Addis Ababa University
College of Business and Economics
Department of Management
MBA Program

Questionnaire for Contractors, Consultants and Owners of AACRA

This questionnaire is prepared to conduct a study in the partial fulfillment of a Master’s Degree in Business Administration (MBA) program entitled with “ Analysis of Factors Contributing for Time Overrun in Road Construction Projects under Addis Ababa City Administration’’. Hence, you are kindly requested to give the necessary information for the research questions.

There is no need to write your name and address and the information that you provide will be kept confidential. The accuracy, honesty, and fairness of your response will have a great impact on the outcome of the research.

Aim of the questionnaire: This questionnaire is developed to assess the views of owners, consultants, and contractors to identify important factors contributing for delay in the road construction projects under Addis Ababa city administration

General guidelines:

Please read each question (hypothesized factor) carefully and make a tick or a circle under each value and you can write your opinion on the remark section.

SECTION A: General organization information

1. Name of organization : -----

2. Respondents designation:

- Owner Consultant Contractor

3. Relevant work experience:

1-3yrs 3-5yrs 5-10yrs > 10yrs

SECTION B: Factors contributing for time overrun in road construction projects under Addis Ababa city administration

1. Did you experienced delay on asphalt road construction projects that your organization was involved under Addis Ababa city administration completed within 2000-2005 E.C?

A. Yes

B. No

If your answer is yes, Please indicate the **significance/frequency of occurrence** of each factor (causes of delay) by ticking the appropriate boxes. Add any remarks relating to each factor on the last column.

N.B:

1= very low

3= Moderate

2. = Low

4 = High

5= Very high

| <i>Hypothesized factors</i> | | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> | <i>5</i> | <i>Remark</i> |
|------------------------------------|--|-----------------|-----------------|-----------------|-----------------|-----------------|----------------------|
| 1 | Award project to lowest bid price | | | | | | |
| 2 | Slow site clearance | | | | | | |
| 3 | delay in commencement | | | | | | |
| 4 | poor resource management | | | | | | |
| 5 | rework due to errors during construction | | | | | | |
| 6 | Poor soil quality | | | | | | |
| 7 | Poor ground condition | | | | | | |
| 8 | undefined scope of working | | | | | | |
| 9 | Contractor's financial problems | | | | | | |
| 10 | poor site supervision by contractor | | | | | | |
| 11 | progress payments delay by owner | | | | | | |
| 12 | Inflation | | | | | | |
| 13 | exchange rate fluctuation | | | | | | |
| 14 | bankers policy for loans | | | | | | |
| 15 | weather condition | | | | | | |
| 16 | High interest rate | | | | | | |
| 17 | Interference of owners | | | | | | |
| 18 | Unrealistic contract duration and requirements | | | | | | |
| 19 | Non-capable owners representative | | | | | | |
| 20 | Change in specifications | | | | | | |
| 21 | Poor site management | | | | | | |
| 22 | delay in performing inspection by consultants | | | | | | |
| 23 | incapable inspectors | | | | | | |
| 24 | Improper planning | | | | | | |
| 25 | Inadequate contractor's experience | | | | | | |
| 26 | Inaccurate cost estimation | | | | | | |
| 27 | Incompetent project team | | | | | | |
| 28 | inappropriate design | | | | | | |
| 29 | Contract management | | | | | | |
| 30 | Incomplete drawings | | | | | | |
| 31 | Changes in drawings | | | | | | |
| 32 | Quality assurance | | | | | | |
| 33 | Inadequate consultant experience | | | | | | |
| 34 | Quality of material | | | | | | |
| 35 | Supply of material | | | | | | |
| 36 | Labor supply (insufficient labors) | | | | | | |
| 37 | low productivity of labors | | | | | | |

| | | | | | | | |
|----|--|--|--|--|--|--|--|
| 38 | personal conflict between labors and management team | | | | | | |
| 39 | Labor injuries | | | | | | |
| 40 | Non-attendance of labors | | | | | | |
| 41 | Slow equipment movement | | | | | | |
| 42 | Natural disasters | | | | | | |
| 43 | Regulatory changes | | | | | | |
| 44 | Problem with surroundings of the city (boundary) | | | | | | |
| 45 | Unforeseen site conditions | | | | | | |
| 46 | Organizational changes | | | | | | |
| 47 | Conflicts between construction parties | | | | | | |
| 48 | Geological and geographical conditions | | | | | | |

Annex B:**Ranking of important factors contributing for time overrun in asphalt road construction projects in AACRA (owners view)**

| Hypothesized factors | Significance/frequency | | | | | Total value | RII | Rank |
|--|------------------------|---|---|---|---|-------------|-------|------|
| | 1 | 2 | 3 | 4 | 5 | | | |
| slow cite clearance | 0 | 0 | 0 | 2 | 7 | 43 | 0.955 | 1 |
| contractors financial problems | 0 | 0 | 0 | 4 | 5 | 41 | 0.911 | 2 |
| Inflation | 0 | 0 | 0 | 4 | 5 | 41 | 0.911 | 3 |
| exchange rate fluctuation | 0 | 0 | 0 | 5 | 4 | 40 | 0.888 | 4 |
| supply of material | 0 | 0 | 3 | 6 | 0 | 33 | 0.733 | 5 |
| inadequate contractors experience | 0 | 0 | 4 | 5 | 0 | 32 | 0.711 | 6 |
| low productivity of labor | 0 | 0 | 5 | 3 | 1 | 32 | 0.711 | 7 |
| inaccurate cost estimation | 0 | 0 | 5 | 4 | 0 | 31 | 0.688 | 8 |
| poor resource management | 0 | 0 | 7 | 1 | 1 | 30 | 0.666 | 9 |
| improper planning | 0 | 0 | 7 | 2 | 0 | 29 | 0.644 | 10 |
| inadequate consultant experience | 0 | 1 | 5 | 3 | 0 | 29 | 0.644 | 11 |
| quality of material | 0 | 0 | 7 | 2 | 0 | 29 | 0.644 | 12 |
| Award project to lowest bid price | 0 | | 8 | 1 | 0 | 28 | 0.622 | 13 |
| delay in commencement | 0 | 2 | 4 | 3 | 0 | 28 | 0.622 | 14 |
| quality assurance | 0 | 1 | 6 | 2 | 0 | 28 | 0.622 | 15 |
| unforeseen cite conditions | 0 | 0 | 8 | 1 | 0 | 28 | 0.622 | 16 |
| slow equipment movement | 0 | 2 | 5 | 2 | 0 | 27 | 0.6 | 17 |
| inappropriate design | 0 | 1 | 8 | 0 | 0 | 26 | 0.577 | 18 |
| regulatory changes | 0 | 1 | 8 | 0 | 0 | 26 | 0.577 | 19 |
| poor cite supervision by contractors | 0 | 3 | 5 | 1 | 0 | 25 | 0.555 | 20 |
| changes in drawings | 0 | 3 | 5 | 1 | 0 | 25 | 0.555 | 21 |
| progress payments delay by owner | 0 | 3 | 6 | 0 | 0 | 24 | 0.533 | 22 |
| poor cite management | 0 | 0 | 8 | 1 | 0 | 24 | 0.533 | 23 |
| geological and geographical conditions | 0 | 5 | 3 | 0 | 1 | 24 | 0.533 | 24 |
| contract management | 0 | 5 | 3 | 1 | 0 | 23 | 0.511 | 25 |
| organizational changes | 0 | 5 | 3 | 1 | 0 | 23 | 0.511 | 26 |
| unrealistic contract duration and requirements | 0 | 5 | 4 | 0 | 0 | 22 | 0.488 | 27 |
| incompetent project team | 0 | 5 | 4 | 0 | 0 | 22 | 0.488 | 28 |
| rework due to errors during construction | 1 | 4 | 4 | 0 | 0 | 21 | 0.466 | 29 |
| weather condition | 1 | 4 | 4 | 0 | 0 | 21 | 0.466 | 30 |
| change in specification | 1 | 4 | 4 | 0 | 0 | 21 | 0.466 | 31 |
| problems with surroundings of the city | 0 | 6 | 3 | 0 | 0 | 21 | 0.466 | 32 |
| poor soil quality | 0 | 7 | 2 | 0 | 0 | 20 | 0.444 | 33 |
| poor ground condition | 0 | 7 | 2 | 0 | 0 | 20 | 0.444 | 34 |

| | | | | | | | | |
|--|---|---|---|---|---|----|-------|----|
| delay in performing inspections by consultants | 1 | 6 | 2 | 0 | 0 | 19 | 0.422 | 35 |
| incapable inspectors | 0 | 8 | 1 | 0 | 0 | 19 | 0.422 | 36 |
| conflicts between construction parties | 0 | 8 | 1 | 0 | 0 | 19 | 0.422 | 37 |
| high interest rate | 1 | 7 | 1 | 0 | 0 | 18 | 0.4 | 38 |
| interference of owners | 1 | 7 | 1 | 0 | 0 | 18 | 0.4 | 39 |
| incomplete drawings | 1 | 7 | 1 | 0 | 0 | 18 | 0.4 | 40 |
| labor injuries | 1 | 7 | 1 | 0 | 0 | 18 | 0.4 | 41 |
| undefined scope of working | 2 | 6 | 1 | 0 | 0 | 17 | 0.377 | 42 |
| labor supply | 1 | 8 | 0 | 0 | 0 | 17 | 0.377 | 43 |
| personal conflict between labors and management team | 2 | 6 | 1 | 0 | 0 | 17 | 0.377 | 44 |
| natural disasters | 1 | 8 | 0 | 0 | 0 | 17 | 0.377 | 45 |
| Non capable owners representatives | 3 | 5 | 1 | 0 | 0 | 16 | 0.355 | 46 |
| nonattendance of labor | 0 | 8 | 1 | 0 | 0 | 13 | 0.288 | 47 |
| bankers policy for loans | 6 | 3 | 0 | 0 | 0 | 12 | 0.266 | 48 |

Ranking of important factors contributing for time overrun in asphalt road construction projects in AACRA (contractors view)

| Hypothesized factors | Significance/frequency | | | | | Total value | RII | Rank |
|--|------------------------|---|---|----|---|-------------|------|------|
| | 1 | 2 | 3 | 4 | 5 | | | |
| progress payments delay by owner | 1 | 2 | 3 | 4 | | 94 | 0.94 | 1 |
| inaccurate cost estimation | 0 | 1 | 1 | 1 | | 94 | 0.94 | 2 |
| supply of material | 0 | 0 | 1 | 4 | | 94 | 0.94 | 3 |
| slow cite clearance | 0 | 0 | 1 | 4 | | 91 | 0.91 | 4 |
| Inflation | 0 | 0 | 1 | 5 | | 88 | 0.88 | 5 |
| slow equipment movement | 0 | 0 | 2 | 8 | | 88 | 0.88 | 6 |
| exchange rate fluctuation | 0 | 0 | 2 | 8 | | 86 | 0.86 | 7 |
| interference of owners | 0 | 0 | 2 | 10 | | 86 | 0.86 | 8 |
| unforeseen cite conditions | 0 | 0 | 4 | 6 | | 84 | 0.84 | 9 |
| quality of material | 0 | 1 | 4 | 5 | | 83 | 0.83 | 10 |
| poor ground condition | 0 | 0 | 2 | 13 | | 82 | 0.82 | 11 |
| regulatory changes | 0 | 0 | 3 | 12 | | 79 | 0.79 | 12 |
| unrealistic contract duration and requirements | 0 | 1 | 4 | 10 | | 77 | 0.77 | 13 |
| low productivity of labor | 0 | 1 | 5 | 10 | | 77 | 0.77 | 14 |
| change in specification | 0 | 0 | 6 | 11 | | 76 | 0.76 | 15 |
| incomplete drawings | 0 | 1 | 7 | 10 | | 76 | 0.76 | 16 |
| no capable owners representatives | 0 | 0 | 5 | 14 | | 75 | 0.75 | 17 |
| organizational changes | 0 | 0 | 6 | 11 | | 75 | 0.75 | 18 |
| changes in drawings | 0 | 1 | 5 | 12 | | 74 | 0.74 | 19 |

| | | | | | | | | |
|--|---|----|----|----|--|----|------|----|
| weather condition | 0 | 1 | 4 | 15 | | 72 | 0.72 | 20 |
| undefined scope of working | 0 | 0 | 9 | 10 | | 71 | 0.71 | 21 |
| inappropriate design | 0 | 0 | 10 | 9 | | 71 | 0.71 | 22 |
| inadequate consultant experience | 0 | 1 | 9 | 8 | | 69 | 0.69 | 23 |
| conflicts between construction parties | 0 | 0 | 13 | 5 | | 68 | 0.68 | 24 |
| delay in performing inspections by consultants | 0 | 3 | 7 | 9 | | 67 | 0.67 | 25 |
| poor soil quality | 0 | 2 | 12 | 5 | | 66 | 0.66 | 26 |
| improper planning | 0 | 0 | 15 | 4 | | 66 | 0.66 | 27 |
| incapable inspectors | 0 | 2 | 11 | 6 | | 65 | 0.65 | 28 |
| geological and geographical conditions | 0 | 0 | 15 | 5 | | 62 | 0.62 | 29 |
| inadequate contractors experience | 0 | 5 | 9 | 5 | | 59 | 0.59 | 30 |
| contract management | 0 | 2 | 17 | 1 | | 59 | 0.59 | 31 |
| contractors financial problems | 0 | 2 | 17 | 1 | | 58 | 0.58 | 32 |
| bankers policy for loans | 0 | 7 | 9 | 3 | | 58 | 0.58 | 33 |
| quality assurance | 0 | 5 | 12 | 3 | | 58 | 0.58 | 34 |
| delay in commencement | 0 | 3 | 16 | 1 | | 57 | 0.57 | 35 |
| poor cite management | 0 | 5 | 13 | 2 | | 57 | 0.57 | 36 |
| incompetent project team | 1 | 5 | 10 | 4 | | 57 | 0.57 | 37 |
| poor resource management | 0 | 5 | 13 | 2 | | 55 | 0.55 | 38 |
| Award project to lowest bid price | 0 | 5 | 15 | 0 | | 54 | 0.54 | 39 |
| labor supply | 1 | 4 | 15 | 0 | | 51 | 0.51 | 40 |
| nonattendance of labors | 2 | 5 | 13 | 0 | | 50 | 0.5 | 41 |
| personal conflict between labors and management team | 1 | 10 | 7 | 2 | | 49 | 0.49 | 42 |
| problems with surroundings of the city | 1 | 10 | 8 | 1 | | 49 | 0.49 | 43 |
| rework due to errors during construction | 5 | 3 | 10 | 2 | | 48 | 0.48 | 44 |
| high interest rate | 0 | 10 | 9 | 1 | | 48 | 0.48 | 45 |
| poor cite supervision by contractors | 2 | 9 | 8 | 1 | | 44 | 0.44 | 46 |
| labor injuries | 2 | 13 | 4 | 1 | | 33 | 0.33 | 47 |
| natural disasters | 8 | 11 | 1 | 0 | | 32 | 0.32 | 48 |

Ranking of important factors contributing for time overrun in asphalt road construction projects in AACRA (Consultants view)

| Hypothesized factors | Significance/frequency | | | | | Total value | RII | Rank |
|--|------------------------|---|----|----|---|-------------|-------|------|
| | 1 | 2 | 3 | 4 | 5 | | | |
| progress payments delay by owner | 0 | 0 | 0 | 9 | 9 | 81 | 0.9 | 1 |
| Inflation | 0 | 0 | 0 | 15 | 3 | 75 | 0.833 | 2 |
| delay in commencement | 0 | 0 | 3 | 12 | 3 | 72 | 0.8 | 3 |
| contractors financial problems | 0 | 0 | 3 | 12 | 3 | 72 | 0.8 | 4 |
| unforeseen cite conditions | 0 | 0 | 2 | 15 | 1 | 71 | 0.788 | 5 |
| inadequate contractors experience | 0 | 1 | 2 | 13 | 2 | 70 | 0.777 | 6 |
| inaccurate cost estimation | 0 | 0 | 3 | 14 | 1 | 70 | 0.777 | 7 |
| slow equipment movement | 0 | 0 | 3 | 15 | 0 | 69 | 0.766 | 8 |
| incomplete drawings | 0 | 0 | 6 | 10 | 2 | 68 | 0.755 | 9 |
| quality of material | 0 | 0 | 5 | 12 | 1 | 68 | 0.755 | 10 |
| unrealistic contract duration and requirements | 0 | 1 | 5 | 10 | 2 | 67 | 0.744 | 11 |
| changes in drawings | 0 | 1 | 5 | 10 | 2 | 67 | 0.744 | 12 |
| supply of material | 0 | 0 | 5 | 13 | 0 | 67 | 0.744 | 13 |
| exchange rate fluctuation | 0 | 0 | 8 | 8 | 2 | 66 | 0.733 | 14 |
| improper planning | 0 | 1 | 5 | 12 | 0 | 65 | 0.722 | 15 |
| quality assurance | 1 | 2 | 14 | 1 | 0 | 65 | 0.722 | 16 |
| slow cite clearance | 1 | 0 | 9 | 8 | 0 | 64 | 0.711 | 17 |
| problems with surroundings of the city | 0 | 0 | 9 | 8 | 1 | 64 | 0.711 | 18 |
| low productivity of labor | 0 | 0 | 9 | 9 | 0 | 63 | 0.7 | 19 |
| poor ground condition | 0 | 4 | 10 | 4 | 0 | 62 | 0.688 | 20 |
| Award project to lowest bid price | 1 | 2 | 6 | 7 | 2 | 61 | 0.677 | 21 |
| inappropriate design | 0 | 3 | 6 | 9 | 0 | 60 | 0.666 | 22 |
| incompetent project team | 0 | 1 | 11 | 6 | 0 | 59 | 0.655 | 23 |
| poor resource management | 0 | 2 | 11 | 4 | 1 | 58 | 0.644 | 24 |
| change in specification | 0 | 1 | 12 | 5 | 0 | 58 | 0.644 | 25 |
| contract management | 0 | 0 | 14 | 4 | 0 | 58 | 0.644 | 26 |
| poor cite supervision by contractors | 0 | 1 | 13 | 4 | 0 | 57 | 0.633 | 27 |
| interference of owners | 0 | 1 | 13 | 4 | 0 | 57 | 0.633 | 28 |
| rework due to errors during construction | 1 | 1 | 11 | 5 | 0 | 56 | 0.622 | 29 |
| conflicts between construction parties | 0 | 1 | 14 | 3 | 0 | 56 | 0.622 | 30 |
| undefined scope of working | 1 | 1 | 12 | 4 | 0 | 55 | 0.611 | 31 |
| poor cite management | 0 | 2 | 13 | 3 | 0 | 55 | 0.611 | 32 |
| no capable owners representatives | 1 | 2 | 15 | 0 | 0 | 50 | 0.555 | 33 |
| labor injuries | 1 | 2 | 15 | 0 | 0 | 50 | 0.555 | 34 |
| regulatory changes | 1 | 2 | 15 | 0 | 0 | 50 | 0.555 | 35 |

| | | | | | | | | |
|--|---|----|----|---|---|----|-------|----|
| organizational changes | 1 | 2 | 15 | 0 | 0 | 50 | 0.555 | 36 |
| conflicts between construction parties | 1 | 2 | 3 | 4 | 5 | 50 | 0.555 | 37 |
| weather condition | 1 | 5 | 12 | 0 | 0 | 47 | 0.522 | 38 |
| incapable inspectors | 1 | 6 | 11 | 0 | 0 | 46 | 0.511 | 39 |
| inadequate consultant experience | 1 | 8 | 7 | 2 | 0 | 45 | 0.5 | 40 |
| geological and geographical conditions | 3 | 7 | 7 | 1 | 0 | 42 | 0.466 | 41 |
| bankers policy for loans | 3 | 8 | 7 | 0 | 0 | 40 | 0.444 | 42 |
| poor soil quality | 1 | 14 | 3 | 0 | 0 | 38 | 0.422 | 43 |
| personal conflict between labors and management team | 2 | 13 | 3 | 0 | 0 | 37 | 0.411 | 44 |
| delay in performing inspections by consultants | 4 | 10 | 4 | 0 | 0 | 36 | 0.4 | 45 |
| labor supply | 5 | 8 | 5 | 0 | 0 | 36 | 0.4 | 46 |
| nonattendance of labors | 6 | 9 | 3 | 0 | 0 | 33 | 0.366 | 47 |
| high interest rate | 9 | 7 | 2 | 0 | 0 | 29 | 0.322 | 48 |

Annex C: Implementation performance of the city from 2000-2005Ec

| No | Name of the project | Date of commencement | Planned completion period | Actual completion period | Contractor | Consultant | Planned cost | Actual cost |
|----|--|----------------------|---------------------------|--------------------------|---------------------------------|--------------------|--------------|------------------|
| 1 | Winget square- Asko bridge | Dec-210G.c | Jul-2012G.c | Mar-2013G.c | Tidhar constr. | Yuniken | 207,498,019 | 306,751,511 |
| 2 | Ayat square-Bole Ayat village | Ap-2012 | Ap-2013 | Mar-2013 | C.R,B.C Addis engineering | Best consulting | 150,032,280 | 173,934,076 |
| 3 | Winget square –Gojam ber | May-2006 | Jun-2008 | Dec-2012 | C.R,B.C Addis engineering | Yuniken | 326,506,025 | 728,864,968 |
| 4 | Yerer ber- Fisash mataria | Mar-2006 | Mar-2007 | Ap-2012 | Medroc constr. | Zewde Eskindir | 77,537,233 | 90,820,184 |
| 5 | Alem bank-yeshi debele road | Jul-2008 | Sep-2009 | Mar-2012 | Enyi constr. | Hek amakari | 177,785,402 | 198,698,122 |
| 6 | Lideta reconstruction road constr. | Oct-2011 | Mar-2012 | Aug-2012 | Enyi constr. | Beza consulting | 52,077,583 | 52,077,583 |
| 7 | Yerer ber ambesa garage –Lem hotel, Shola gebeya | Jul-2007 | Aug-2009 | May-2011 | Enyi constr. | Best consulting | 109,512,768 | 132,262,895 |
| 8 | Mekanisa-Jemo-Sebeta | Jul-2007 | Ap-2009 | Jan-2011 | Hek Amakari | Hek Amakari | 115,539,588 | 139,395,415 |
| 9 | Gofa camp- Mekanisa ring road | May-2006 | Jun-2009 | Oct-2010 | Enyi constr. | Hek Amakari | 43,576,867 | 61,385,047 |
| 10 | Megenagna- English embassy- qebena 4kilo | May-2006 | Dec-2008 | App-2010 | C.R,BC Addis engineering | Beza consulting | 146,890,588 | 235,8880,03 8 |
| 11 | Coca cola mazoria –through abnet teklehmanot square | Jul-2007 | May-2010 | May-2010 | C.R,BC Addis engineering | Zewde Eskindir | 93,257,398 | 113,076,890 |
| 12 | Yeshi debele- Ambo menged | Mar-2006 | May-2007 | Jun-2009 | Medroc constr. | Zewde Eskindir | 87,384,461 | 103,841783 |
| 13 | Meri radio -Beken | Mar-2006 | Mar-2007 | July-2009 | Medroc constr. | Zewde Eskindir | 50,365,079 | 74,225,454 |
| 14 | Mexico square-pushkin square- Mekanisa ring road | Jul-2007 | Nov-2009 | Nov-2009 | C.R,BC Addis engineering | Zewde Eskindir | 147,678,225 | 170,696594 |
| 15 | Yekatit 12 square-afincho ber- semen hotel | Jul-2006 | Dec-2009 | Dec-2009 | C.R,BC Addis engineering | Highway Amakari | 36,213,579 | 63,093783 |
| 16 | Dama hotel-hana Mariam bridge | May-2006 | May-2007 | Jun-2009 | Enyi constr. | Zewde Eskindir | 62,346,103 | 75,361,614 |

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