



## **Analysis Of Cost Over-Run Factors In Road Projects: The Case Of Ethiopian Road Administration**

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**Project work, MAPM607-3**

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A Project Work Submitted To Addis Ababa University, College Of Business And Economics, School Of Commerce, For The Partial Fulfilment Of Master Of Arts In Project Management

**August, 2024  
Addis Ababa**

## **Declaration**

I, Atsedemariam Bekele, hereby declared that this research project entitled “Analysis of cost over-run in road projects: the case of Ethiopian road administration” is a work done by me and that it has not been submitted anywhere by anyone for any sort of approval. I understand that any false declaration will be subject to disciplinary action, up to and including expulsion from the Master's programs in Projects Management at Addis Ababa’s University, Schools of Commerce.

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## Acknowledgment

I would like to express my sincere gratitude to God Almighty for His guidance and support throughout the completion of this research project and in all my life paths. I would also like to thank all of the respondents (ERA staffs and administrators) who took the time to respond to my request. Their insights and feedback were invaluable to the development of this project. I would also like to thank my Mom Kassaye Lulu, my family for their encouragement and support. Their love and understanding helped me to stay motivated throughout this process. I would like to thank my person Mikiyas Beyene for his incredible support throughout my graduate studies and on this research. Finally, I would like to thank my advisor, Dr.Wubeshet for his guidance and mentorship. His expertise and insights were invaluable to the development of this project.

## ***Abstract***

*This research assessed the relationship between the Dependent variable which is cost overrun and Independent variables named Economic factor, Managerial factor, Political factor, Financial and timelines of factor and Road construction techniques and design with each of them having sub factors under them on case of Ethiopian Road Administration. A questionnaire survey with 60 respondents was employed for the data, using a Likert scale questionnaire. The study used descriptive research design and quantitative research approach and the primary sources of data were collected from the questionnaire done on staff and management members from Ethiopian road administration. After conducting inferential statistics it is found that there is a strong positive correlation between the dependent and independent variables. The finding suggests that organizations can avoid or minimize cost overrun by prioritizing those factors highly correlated with the dependent variable. Recommendations include creating a comprehensive management plan, predicting future economy fluctuations such as exchange rate and inflation, and the concerned body should facilitate payment to contractors in order to overcome delay in progress payment and avoid the occurrences of cost overrun. Based on the results and recommendations likelihood of successful project implementing in the road project of Ethiopian Road Administrations can be increased and improved.*

*Keywords: Economic factors, Managerial factors, Road construction technique and design, Political factors, financial factors, ERA, Ethiopia*

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## List of Abbreviations

BOK..... Project Management Body of Knowledge

ERA..... Ethiopian Road Administration

WBS..... Work Breakdown Structure

AC..... Actual Cost

PC..... Planned Cost

GDP..... Gross Domestic Growth

RII..... Relative Importance Index

PM..... Project Management

PP..... Probability Plot

VIF..... Variance Inflation Factor

TL..... Tolerance

COR..... Cost over run

EF..... Economic factor

MF..... Managerial factor

PF..... Political factor

RCTDF..... Road construction techniques and designs factor

FF..... Financial factor



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## **Chapter One**

### **1. Introduction**

This section of the study aims to provide an overview of the overall goal of the research or the issue that motivated the investigation. Cost overrun in construction sector is a global issue and Ethiopia's road construction sector is not an exception. Finding the primary causes of cost overruns in road construction projects in Ethiopia, reviewing the problems history and the solutions that have been proposed, and stating the importance and goal of this specific research for the Ethiopian roads administration and other interested parties were the main goals of the study that was presented in this paper.

Therefore the study of this research is aiming to reach the goals of the studies by examining in to the elements as the behind reasons of the cost overrun and practices of the administration office. Furthermore, the assessment will aim to evaluate the obstacles in the project cost overrun procedures. Then suggestion for enhancement will be offered based on the results of the gaps.

#### **1.1. Background of the Study**

As of applying procedures, techniques, abilities, experience and knowledge all of the in to a specified project goals in accordance to the criteria of the project acceptance as well as its standards and within predetermined project boundaries constitutes project management. As it is known there are five main stage of project management as each of them having sub stages but the major stages are project initiation, planning, execution, performance and monitoring and closing. A key sector of any economy in the world is the construction sector; economic growth is highly impacted by the infrastructure and service provided by the building sector mainly named construction sector and its principal partners. The majority of other social and economic activities in most country occur within the built environment which is created, defined and maintained by the road building industry (Morton, 2002). The road construction building sector as whole offers society delivery methods as transportation for numerous types of economic, social, political and environmental needs of the citizens, making its goods indispensable to humankind's daily social and physical activities making life easier compared to life prior of it.

Additionally, it stands on the top from the major sector generates a sizeable quantity of fixed investment with a fixed return and profit, makes a considerable contribution to the country's production, economic development and GDP which in return creates a large number of jobs both directly and indirectly through the positive multiplier effect it have on the economy development (Walker and Flangan,1991). Accordingly, based on different studies construction and road building accounts for over 28% of all types of industrial employment, more than half of capital investment and up to 10% of GDP in the majority of countries (Winch and Bonke 2002). Furthermore, construction and road building creates jobs in other industrial because of its positive multiplier effect on employment. For instance, in the European community one job produced in the construction business will be linked to two additional jobs in other sectors, per the SECTUER study, which was cited in COM (1997).

In general Cost overrun also known as budget overrun, cost escalation, or cost rise is the excess of actual costs over the allocated amount, budget or cost. The simplest explanation of cost overrun is when project expenses end up being more than the anticipated cost on the projects budget plan. It is often described as the discrepancy or the difference between the projects initial cost estimate when the projects starts and the actual construction costs once the project job is finished. The difference between those which means the contract amount and the initial contract award amount is another way to define cost overrun. To make comparisons easier and to grasp the effect more in realistic way, this calculation can be transformed to a percentage.

The number of road construction projects in Ethiopia is progressively rising. But it gets harder and harder to finish project tasks strictly with in the budget allotted by finance. Therefore, one of the main issues with road projects in Ethiopia is cost overrun. Consequently, the purpose of this study is to gather data regarding the primary causes of cost overruns in Ethiopian road construction projects which has been done in Ethiopian road authority. The aim of this research is to evaluate the degree of cost overruns in Ethiopian road authority projects. According to Ethiopian roads administration management system (ERAMS) – Status Summary Report the assessment period contract progress as of November 2023 out of 190 projects reported 62 projects which are already got done by the administration office have faced increased cost overrun with different level of severity. The remaining projects are not yet to be done or show alarming progress that shows future cost overrun.

## **History of Ethiopian Roads Administration**

Historical texts explain that former kings such as Emperor Fasil, Emperor Tewodros, Emperor Yohannes and Emperor Minilk built paved roads and river crossing bridges mostly with human labor.

At that time, although the condition of the roads was not as we know it now, they were providing great service at that time. It is known that most of them were in the form of a road with a foot step loop. Until Italy invaded Ethiopia in 1935, although the roads were not graded, the total length of the country's roads was 400 km. After that, Italy stayed in Ethiopia from 1935 to 1939. During the 5 years, not for development, but to strengthen Italian's control in the country, it imported 6000 citizens from Italy and forced many Ethiopians to build 6000 km long roads.

### **The First Highway Program (1951-1957)**

The first highway program was to improve and repair the roads that had been built in Fascist Italy and were badly damaged due to lack of maintenance. Among the highways covered by this program, Addis Ababa - Asab 860 km, Addis Ababa - Jimma 355 km, Addis Ababa - Nekmet 351 km. In addition, by extending the program, Addis Ababa-Adigrat, Addis Ababa-Abai River and Addis Ababa-Shashemene roads were repaired. A total of 1523 kilometers of improvement and 2686 kilometers of maintenance works were carried out, and 77 million Ethiopian Birr was used for the implementation of the program.

### **The Second Highway Program (1949-1958)**

In the second highway program, a total of 6300 km of highways are planned to be repaired, improved and to construct new roads, and then 4500 km/m of maintenance and improvement work, 800 km/m of existing roads have been rerouted and improved.

Among the new roads included in the program, the new roads were built by foreign contractors, among them are the Jimma Agaro, Awash-Kulbi, Bahardar-Addis Mesma, Gohatsion-Dejen, Dredawa-Harar and Koka alternative roads.

Before the completion of the second highway program and the start of the third, the work of Jimma-Bonga, Debre Berhan-Jhur, Tarmaber-Molale, Nazareth-Awash and other roads were done. A capital budget of 110 million birr was allocated for this program.

### **The Third Highway Program (1966 - 1969)**

The program followed the objectives of the first and second highway programs. Under the program, new road construction, asphalt work, bridge construction, surveying and design work were carried out. 60 million Birr was allocated for the implementation of the program, and 700 kilometers of primary and secondary asphalt roads, 1000 kilometers of feeder roads and 1040 kilometers of primary asphalt leveling work were done.

At the same time, among the roads started by foreign contractors, Addis Ababa - Feche, Feche Megenteya/junction - Gohatsion, Nekmet - Gimbi, Agaro - Bedele, Addis Ababa - Debre Berhan and Awash - Sodere roads are included.

With the weak labor force of the highway authority, the works of Kebre Mengist-Ngele, Adaba-Gobana, Robi-Goro-Ginir roads, and the Welawekite-Hosaina, Gode-Kabridehar, Bitata-Meslo roads were started with public cooperation.

### **The Fourth Highway Program (1961 - 1966)**

In the fourth highway program, 820 kilometers of new primary and secondary road work and 170 kilometers of asphalt improvement work were carried out. Among the roads started by foreign contractors are Jimma-Agaro, Nazareth-Awash, Bedele-Metu, Awash-Mile and Dila-Yabelo-Moyale roads.

Among the roads that the authority's office has begun to work with own force; Debreberhan - Robit Asphalt, Dejen - Mota, Gondar - Humera, Gimbi - Kurmuk, Areza - Barentu, Azezo - Metema, Jimma - Santu, Goba - Meslon and Jijga - Ferfer are included.

For most of the new projects planned by the Highway Authority until 1974, the necessary economic studies were carried out by external consulting firms, but since that time, they have been involved in planning and research.

According to the mentioned focus, the authority was able to conduct all the road economic studies by its own experts. The studies carried out contributed to the coordination and preparation of programs and projects, and its ability to prepare project design played an important role in expanding road networks.

### **Fifth Highway Program (1967 - 1969)**

A major focus of this program was the work of feeder roads that would help agricultural development and industrial development. Among the 539 kilometers of feeder roads and 322

kilometers of asphalt paving projects included in the program are Asela-Dodola, Hosaena-Sodo, Gelemso-Mechara, Zwai-Butajera, Agaro-Gera and Awash-Mieso road projects.

Regarding the asphalt improvement work, Waliso-Jima and Addis Ababa-Nazareth roads have been started, and equipment used for maintenance has been purchased for 14 million birr.

There was a time when foreign contractors who were previously operating in our country were prevented from engaging in road work due to the state policy.

Therefore, all the roads included in the fifth program were carried out by local contractors and highway own forces. In the same process, the office of the authority has been moved to effectively fulfill the assigned responsibility.

### **The Sixth Highway Program (1969 - 1973)**

Due to the increase in the own force construction capacity of the program, the work of new projects was started on a large scale.

Accordingly, 284 km of primary asphalt maintenance 280 kilometers of secondary gravel road maintenance, 809 km of new gravel road construction, 657 kilometers of lower transport service roads and 1660 km rural road works have been included.

### **Management method and change**

The authority played a wide role in empowering experts who can take over the responsibilities of the leadership and the organization of the authority with work management methods. In 1968, the Public Administration Service called "PAS" as a management method and technical expertise was hired by a loan consultant obtained from the World Bank. It was possible to replace it completely. The Ethiopian Roads Authority was re-established under the Ministry of Transport and Communications under Proclamation No. 189/1988 under the name Ethiopian Transport Construction Authority. Two years later, when the Ministry of Construction was established in accordance with Decree No. 216/1989, the Ethiopian Transport Construction Authority was placed under the Ministry.

Regarding the change of organizational position and purpose, by being established as the Ethiopian Transport Construction Authority, it took over the responsibility of building not only

main and rural roads, but also urban roads, ports and railways. In 1987, the authority's control functions were given by the government to be transferred to the newly established Ethiopian Transport Construction Design Company.

The authority's contract construction department was also brought under the same organization, so the road construction, which was being carried out through contractors, was stopped for some years. Regarding the development program, the authority's office started sector development programs by changing the road programs that it had been carrying out in the past.

## **1.2. Statement of the Problem**

The motivation behind the chosen field of study is mostly driven by first-hand knowledge of Ethiopian road building project cost overruns caused by a failure to satisfy project deadlines and targets. The first hand knowledge has developed from the information and news from main streaming media and the different conferences held in the authority office. It is stated that there are three main indicators of projects success, which are usually its cost, time and quality. This is specifically crucial in developing nations like Ethiopia because public construction projects must meet strict financial requirements and be carried out with limited funds as the developing countries like Ethiopia are yet to be developed there is no so much more resources to spend on extra cost incurred in projects that have already estimated costs. Nevertheless, there are many examples in the history of the Ethiopian road construction and building sector of projects that were finished even though they were significantly behind schedule and cost (Nega, 2008).

According to Talukhaba (1999), Project delays raised from cost overrun and inappropriate time schedule always hinder overall the economic development since they have unquantifiable negative effects on society and cause all parties and stakeholders participating in the projects to lose their reputation. Without doubt, the building sector is a national asset and its growth should be mirrored in the changes and evolution of society as a whole. Furthermore, the physical infrastructure provided by the construction sector and its major player influences a country's economic development. Thus in order to achieve social economic goal, the building sector must drastically enhance its capacity and delivery system.

Furthermore, as the provision of infrastructure involves the use of substantial resources, it is crucial to look in to the efficacy of the procedures and system implemented in reaching the goals. As previously mentioned, there are a number of alleged inefficiencies and ineffectiveness in the Ethiopian road construction administration delivery system and procedures (SMEC,1999; MoWUD, 2001; ERA,2009.) The allocation of additional resources required to implement the projects, the need to maintain infrastructure before it is due, and the failure to achieve the intended purpose of the projects are just a few of the ways that these inefficiencies have a substantial negative influences on the nations already limited resources. In general this study attempted to analyse and rank the elements that contribute to cost overruns in order of significance. It also looked in to the reasons behind delays on recently finished sampling road projects that were managed by the Ethiopian road Administration.

### **1.3. Research Questions**

This paper analysis the research questions below:

- What are the main causes and extent of cost overruns in Ethiopian road construction projects?
- What steps are recommended to control the risk of cost overruns in road construction projects in the ERA?

### **1.4. Research objectives**

#### **1.4.1. General Objective of the study**

- ❖ The research aims to evaluate and pinpoint the important variables that lead to Ethiopian road building project cost overruns.
- ❖ To assess the variables that lead to cost overruns in Ethiopian road construction projects at every stage, as exemplified by the ERA instance.
- ❖ To determine how much the Ethiopian road Administration has overspent on costs.
- ❖ To determine the correlation between the dependent variable and the stated independent variable, taking in to account the degree of significance.

#### **1.4.2. Specific Objectives of the study**

1. To determine and look into the causes of cost overruns in Ethiopian road administration projects those have been previously finished.
2. To order the factors according to their level of importance and severity.
3. To evaluate the difficulties faced by Ethiopian road administration stakeholders, including Project managers, Accountants, Economists, and Engineers.
4. Making recommendations in light of the survey and literature review results.

#### **1.5. Research Hypothesis**

Numerous prior publications, such as the PMBOK, and different academic studies or researches have been demonstrating the positive and substantial effects of various aspects of cost overruns and overall performance of projects management. For instance, the following two alternate theories were put forth in this study based on the previous findings from works done by scholars and other graduate study students:

H0: Economic factors, Managerial factors, Road construction technique and design, Political factors and Financial factors have positive and statistically significant relationship with cost overrun in Ethiopian road authority.

H1: Economic factors, Managerial factors, Road construction technique and design, Political factors and Financial factors have no positive and statistically significant relationship with cost overrun in Ethiopian road authority.

#### **1.6 Significance of the study**

With the country shifting towards greater economic growth, this research could provide valuable information on the feasibility and benefits of smoother interconnectivity from timeous road construction projects in all parts of the country. This has the ability to increase economic growth, reduce dependency on out-dated and slow means of transport, and contribute to the gross domestic product rise. Following the identification of the most important causes of cost overruns, the projects stakeholders will be able to focus their efforts and allocate resources to eliminate the particular constraints ultimately. After the their efforts and allocate resources to eliminate the particular constraints, resulting in a

reduction of project delay and expense. Based on the suggestions made here, the Ethiopian road administration may be able to identify the elements influencing the accuracy of their projected cost prediction in comparison to actual costs, gain knowledge and develop remedial measures for the weak point.

### **1.7 Scope of the Study**

The study's main objective is to assess the variables that lead to road project cost overruns, using Ethiopia's road administration as a case study. Owing to the nature of the research, the primary data source will primarily come from management members of the Ethiopian road administration who are actively involved in road construction. These individuals participated in an interview with the researcher and completed questionnaires with members of the budgeting, monitoring and evaluation; planning and strategy departments of the Ethiopian road administration office all of whom were expected to have extensive knowledge of the subject.

### **1.8 Limitation of the Study**

The Ethiopian road Administrations road projects are the exclusive focus of this study. And the respondents are employee of this publicly owned administrative body. Consequently, it would seem that this papers result, description, inferential statics, conclusion and advice is more suited for road projects that are managed by the public. Furthermore, ERA's monitoring and evaluation department is controlling (monitoring) the cost performance of the several on-going road projects. Therefore, it is recommended to use caution when applying the study's factor and cost overrun numbers to on-going projects (which has not been not done yet). Completed projects cost cannot be compared to those still going on project cost. Also the study was hampered due to time, financial constraints, by a lack of research studies and inability to obtain all pertinent secondary data from the relevant offices. Obtaining secondary data from other office departments would have improved the study's analysis and results for further implication. It also made the study focus on more general circumstances, such as providing a detailed overview of the administration office sampled projects life cycle.

### **1.9 Organization of the Study**

This section describes the arrangement of the research sections based on their concepts included in the chapters; there are five primary chapters in this research. The study's background is

covered in Chapter 1, along with the administration offices background information and basic history of the office from emerging it till now. There are various topics covered in this second chapter, the chapter includes the research questions, objectives and hypothesis, as well as the significances, limitations, scope and organization of the study, the foundation of the problem. this problem statement in the chapter explains the basic beginning of the problem which leads to studying the specific topic and after that points out the areas that can be covered more by other graduate students or a body whoever is capable and willing of doing it. Chapter 2, includes a theoretical analysis of the idea of cost overrun as well as summary of the literature on the subject of project cost overruns on the construction sector and under the Ethiopian road administration, both of which are backed by evidence and actual cost overruns in the administration office which the researcher took as a sample from the given monthly, quarterly and annual report of ERA. The population, data collection techniques and research instruments are all covered in detail in Chapter 3's research methodology. In Chapter 4, the data gathered in chapter 3 it will be analysed and interpreted in a way that fits the topic in this chapter. Chapter 5 which is the last chapter ends with summary from the whole chapters issues and data, conclusions based on the studies, forwarding suggestions for the administration office and advice with implications for additional research and recommendations.

## Chapter Two

### 2 Literature Review

#### 2.7 Theoretical Review

Road infrastructure projects have grown significantly in the last few decades, with a major impact on Ethiopia's economy, competitiveness, health and education among other areas. Despite their significance, road construction projects are frequently and unfavorably linked to cost overruns.

One of the biggest issues facing almost every project in the construction sector is cost overruns, particularly in road development. Construction projects have a tendency to go over budget due to the risk and uncertainty they entail. This issue is particularly serious in poor nations because some initiatives end up costing twice as much as expected in terms of time and money. One of the biggest issues facing almost every project in the construction sector is cost overruns and delays. Cost overrun is the term that refers to failure to stick to the budget allocated to cover the cost of overall project or parts of it. It is a situation in which the actual cost incurred becomes more than the estimated one, resulting in projects getting delayed or even terminated permanently.. (Ashok Gupta and Shubham Sharma 2021).

It requires a lot of planning and strategic decision making in order to make a project process remain within the budgeted resources. As the operation proceeds further and more resources get involved, complex situations arise, giving rise to the requirement of better planning, allocation and continuous monitoring of situations so that any deviation resulting in cost overrun in construction projects can be easily identified and handled in the best way possible. (Ashok Gupta and Shubham Sharma 2021).

Stakeholders and funders are becoming increasingly concerned about cost overruns and finding solutions to this problem will require careful consideration and in-depth investigation. Therefore, the purpose of this study was to evaluate important aspects that contribute to the problem of cost overruns in Ethiopian building projects, namely Ethiopian Road Authority.

Other terms for cost overrun include “budget overrun,” “cost escalation” and “cost increase” (Zhu & Lin, 2004). However, most professionals in Ethiopian construction use the two terms differently. Cost escalation, as defined by experts, is the rise in a materials or equipment’s cost as a result of ongoing price adjustments over time. Therefore, the definitions of cost overrun that follow have been chosen for this project since they are both expressive and appropriate is:

- ✓ Increasing of the actual original cost above the estimated project budgeted cost. (Azhar et al., 2008).
- ✓ Cost overrun can be taken as the excess amount of costs incurred during projects compared to the actual cost that have expected to happen. It can be calculated as the change in contract amount compared to the original contracted in the first place this also can be set in percept to see the difference well.. (Naveenkumar et.al, 2016, p2).

$$\text{Over run costs} = \frac{\text{Completion Cost} - \text{Original Contract Cost}}{\text{Original Contract Cost}} * 100\%$$

To make comparisons easier, this computation can assist in turning the outcome to a percentage.

Building projects for infrastructure frequently incur cost overruns. Studies conducted on building projects in some developing nations show that by the time a project is finished, the real cost will have risen by roughly 30% over the original contract price. (Alla- Momanii 1996).

### **Warning signs of an ongoing or upcoming Cost overrun**

- Unexpected resource cost increase
- Delay in projects milestone
- Regular budget adjustments to account for unforeseen expenses
- Unseen needs after the budget is set
- Stress and burnout among team members
- Frequent updates or less responsiveness from the team

### 2.7.1 Types of cost over run

There are 4 primary types of cost overrun

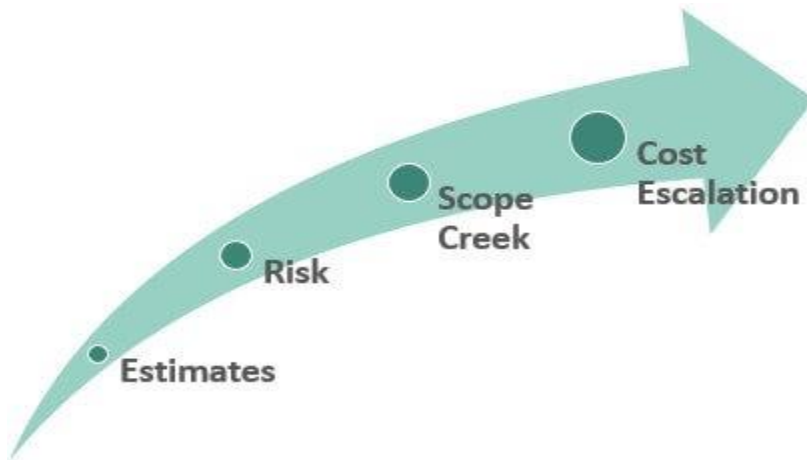


Figure 2.1

#### **Estimates**

Project costs have been overestimated because of issues as individuals personal prejudice and the intricate processes needed to do the work. Cost estimated that excessively low because of things like optimism bias or lack of knowledge about the nature of the project being estimated. The accuracy of the estimates maybe increased by employing strategies like reference forecasting. (instagantt.com)

#### **Risk**

Any situation for which a probability cannot be determined is considered risky, it is impossible to anticipate in advance and occasionally outside the projects control, which could cause delays in project completion or vendor performance and ultimately harm the company, a risk associated with cost overruns. Although a well-crafted risk management plan can assist the company in reducing risk to some degree, risk remains the main obstacle that any project or organization must overcome. For instance, exceptionally severe weather can raise project costs. Cost overruns can be avoided by risk management, which is the act of recognizing and managing risk. (instagantt.com)

### **Scope Creep**

When unaccounted for activities emerge in a project that were not factored in to the budget or the actual cost, it is known as scope creep. It may occur when project management continues to add features as needed or as the project evolves or when the project team becomes overly imaginative and starts incorporating activities that aren't recorded. The primary purpose of project management controls is to avert such situations by ongoing budget review. (instagantt.com)

### **Cost Escalation**

Refers to additional economic elements, such as inflation, which could include an items price rising over time that wasn't factored in during the original budget. For instance, the cost of resources like steel can increase quickly in a brief of amount of time. (instagantt.com)

## **2.8 Project cost overrun**

The amount that actual costs surpass approved or baseliner prices is known as a project cost overrun (Wideman,2002). It is the discrepancy between the projects final cost and its initial cost (Avots,193). A Project cost overrun sometimes referred to as a cost rise or budget overrun, is the result of underestimating actual costs during budgeting leading to unforeseen expenses that exceed planned amounts. It is important to distinguish between cost overrun and cost escalation, which refers to the expected increase in as planned cost as result of variables like inflation. The difference between the contract amount and the ultimate cost of a construction project at completion is referred to as cost overrun in this paper.

There are many different reasons why road projects go over budget, and some of them are challenging to both foresee and control (Morris and Hough, 1991). According to a 1985 study conducted in turkey by Arditi et al., factors that contributed to road construction cost overruns included inflationary pressures, rising labor and material costs, challenges obtaining construction materials, delays in construction, inadequacies in the consultants cost estimates and unforeseen subsurface conditions. Mansfield, Ugwu and Doran (1994) discovered that cost overruns were ascribed to issues with financing and payment arrangements, subpar contract management procedures, shortages of materials, modifications to the site's conditions, changes in the design,

errors and inconsistencies in the contract documents, errors made during construction, fluctuations in price, imprecise estimating, delays, and extra more work, shortened construction schedules and dishonest business methods and bribes. Project owners identified five reasons for project cost overruns, according to Robert F. Cox (2007). These included inadequate pre planning procedures, unfinished designs, rising material costs a delaying making decisions and an excessive<sup>4</sup> number of change orders. The users guide 2005 lists the following additional elements as causes of project cost overruns; inadequate project management, design modifications, unforeseen ground conditions, inflation, material shortages, currency rate changes, unsuitable contractors, financial issues and force. Majeure Frimpong et al.(2003) also discovered that, in Ghana issuers with agency fee collection are contributing factor to building cost overruns in addition to all previously listed concerns.

### **2.8.1 Factors Leading to Cost Overrun in Road Construction Projects**

There are numerous factors that contributes to project cost deviations or variations between the projects estimated or planned cost (PC) and actual cost (AC) which will be covered in more detail later. Therefore, the researcher attempted to evaluate a large number of publications that addressed the elements that lead to cost overruns in road construction projects. Ninety percent of construction projects undervalue their costs, according to numerous studies, and this figure rises in under developed nations due to a lack of project management experience. Therefore, a variety of factors that vary depending on the project and location might lead to cost overruns. There will be an identification of cost overrun an explanation of why it occurred and an analysis of numerous earlier researches. (M. Ammar et al., 2009).

#### **➤ Political factors**

Bureaucrats work for the government to carry out the policies that politicians are elected by the people to decide on, including the implementation of public projects like road construction. Politicians may be motivated to enhance the caliber of public initiatives that have the potential to garner votes when they are confronted with intense political competition within their districts. As a result, they might try to get over obstacles like the corruption, inertia, or impoliteness of officials. Research to date indicates that political rivalry might enhance public project delivery.

➤ **Economic Factors**

The degree of overall economic activity and the resources available to carry out building are referred to as economic and environmental considerations. Chism and Armstrong (2010) attest to the reality that a project's construction is impacted by the political climate. Political stability was one of the twenty-seven key success criteria highlighted by Fortune and White (2014) in their evaluation of sets of important success elements in sixty-three articles. According to Wideman (1986), one significant external risk factor working against the success of programs is changes in government actions. The degree of overall economic activity and the resources available to carry out building are referred to as economic and environmental considerations.

➤ **Financial Factors and Timeliness of Payment**

Completing large-scale road building projects on schedule and within the initial budget is a regular problem that arises worldwide. Timely project completion is frequently a crucial component and indicator of project success. Any project's success is largely determined by how long it takes to complete and how much it costs to produce the desired results. This directly affects management choices on standards, targets, and budgets (Seddon, 2008).

Al-Tabtabai (2002) conducted a study on causes of delays in construction projects in Kuwait and found out that the major causes of delay were: Slow financial and payment procedures; Slow decision-making process; Limited authority among supervision staff; Risk allocation mainly on the contractor; and Lack of design drawings coordination. Memon, Rahman and Azis (2012) conducted a study on time and cost performance in construction projects in Malaysia and revealed that only 21% of public sector projects and 33% of private sector projects were completed within time.

➤ **Road Construction techniques and design**

In construction and design ongoing process of managing cost, business expenses such as a materials, labor, overhead and change orders associated with a project to improve profitability in every aspect of the process. Those factors that would contribute to cost overrun are assumed to

be Frequent Design changes, Design errors and mistakes, Deficient design and delays in design process, Incomplete design at time of tender and No feasibility study.

## **2.9 Empirical Review**

A project is collection of small tasks which each of them have its own milestone to achieve the works as the works have defined time frame to achieve the goals set when the project is planned by a specific party. Projects with defined time periods have identifiable beginnings and ends. According to Harvey Levine (2002), a project comes to an end when its goals are completed, when it is canceled because its goals will not be met, or when the need for it is no longer there.

As is widely accepted, the time, quality, and cost of a project are its three main needs. Any project's success or failure will be determined by these three factors. When a project is finished on time, under budget, and in accordance with the required standards of quality, it is considered to develop been successfully executed. Hence, in terms of the aforementioned three primary requirements—the so-called "golden triangles of project success"—proper project management practices, including proper planning of every project element, proper execution/implementations, including controlling, and proper project close-up, foster or enhance project success. Any departure from the budget, schedule, or quality standards will give rise to claims that the project is unsuccessful or does not accomplish its objectives (James P. Lewis, 1995).

### **2.9.1 Studies of cost overrun in road projects**

Various studies have been done on the factors that lead to cost overruns worldwide, and this section attempts to examine their by narrowing the researches that has been done in developing countries. In 2020, Negalign Nigatu Oynaka, a lecturer at Wolaita Sodo University, used a total sample size of 82 individuals to assess to his study using a descriptive study design altogether with quantitative research methodologies and questionnaires structured for the sole purpose of the study. He looked at a number of factors before concluding that the the most important factors contributing to cost overruns in public construction projects in Gamo Zone Arba Minch town. These factors are insignificant regressed against the dependent variable construction project cost overruns in Arba Minch town except one factor namely construction technique and design which

has been found significant and positively correlated to the dependent variable construction project cost overruns in Arba Minch town.

Kodwo and Seth (2014) evaluated the factors that contribute to cost overruns in Gahanna, Accra, construction projects. The three main factors that contribute to cost overruns—additional works, fluctuations, and inaccurate estimates or provisional sums—were highlighted in their findings. They made a number of recommendations, including thorough site investigations, government intervention, accurate and reasonable approximations, careful contractor selection, and effective time management.

Solomon Using Ethiopia as a case study, Melaku Belay, Seifu Tilahun, Mitiku Yehualaw, Jose Matos, Helder Sousa, and Endalew Temesgen Workneh (2021) examined the key factors that contribute to cost overruns and schedule delays in infrastructure projects in developing economies. a variety of data collection and different kind of questionnaires were employed and analysis instruments, Their data shows that the construction industry in Ethiopia saw an average cost overrun of 35% for building projects and 18% for road infrastructure projects. The findings demonstrated the extent of overspending and delays in road and building infrastructure projects.

In a 2017 study, Ashebir Shiferaw, Wubishet Jekale, and Murad Mohammed examined the factors that contribute to cost overruns in Ethiopia's federal road projects, namely in the Southern District. The main determinants influencing project cost performance during the pre-construction and construction stages of projects were examined, taking into account the three key construction partners (client, consultant, and contractor). Based on the results of a descriptive analysis, 40 project cost-related parameters were chosen, and clients, consultants, and contractors involved in Ethiopian road construction projects scored them according to the percentage of the maximum score. The project management, project execution, and project environment-related categories were applied to these 40 parameters that were chosen. Their utilization of case studies (archival reviews) and questionnaire surveys has been utilized to provide useful evidence on issues connected to the project cost performance.

Nardos Bekele, a graduate in project management from Saint Mary's University (2023) similarly as of other researchers she emphasized and listed variables which she accepted as that cause cost overrun. Her included variables included weak contract management, an unclear and unplanned procurement process, a lack of timely decision-making and corrective action, unresponsiveness from the stakeholder, increasing resource material prices and inflation in the cost of construction materials, volatile exchange rates, staffs with no experience which in turn leads to low labor productivity within the project team. As the regression analysis was done by her shows a positive correlation between the listed variables by her and cost overrun project cost of Kaizen.

**Sample from cost overrun Projects in Ethiopian Roads Administration within the Central Region of Construction Projects**

**Management ETHIOPIAN ROADS ADMINISTRATION WORKS MONITORING SYSTEM (WMS) as of Thursday, November 30,**

**2023 - Contract Progress Report (November 2023)**

<b>No</b>	<b>Contact Name</b>	<b>Commencement date</b>	<b>Contract Amount (incl. VaT)</b>	<b>Variation Orders</b>	<b>Escalation</b>	<b>Total Road Length</b>	<b>Consultants</b>	<b>Contractor</b>	<b>Cost overrun</b>
1	Construction Works of Alemketma-DegoloKelela, Contract 2: Degolo-Kelela Road Upgrading Project (71.58Km)	8-Apr-17	1,299,846,200	17,942,113.22	274,053,524.18	71.38	Beza consulting Eng.	Sunshine Construction plc	22%
2	Construction Works of Sodo-Tercha Road Upgrading Project, Contract 2: Omo River - Terch	2-Jun-15	1,674,383,032	66,190,699.08	199,877,938.06	100.8	Ethiopian construction design & supervision works corp. tran. & design super works secto	China Railway Seventh Group - CRSG	16%
3	Construction Works of Ankober - Awash Arba Junction Road Upgrading Project, Contract 2: Dulecha - Awash Arba	12-Sep-16	693,519,820	35,654,515.60	183,682,473.37	54.89	G&Y Engineering Consult PLC	Ethiopia Road Construction Corporation	32%
4	Construction Works of Mentamir-MethabilaMetehara Design and Build Road Project	18-Oct-17	1,096,639,115	0	192,537,019.28	82	Net consult consulting Engineer pl	Zhongemie Engineering Group Ltd	18%

**Sample from cost overrun Projects in Ethiopian Roads Administration within the Central Region of Construction Projects Management ETHIOPIAN ROADS ADMINISTRATION WORKS MONITORING SYSTEM (WMS) as of Thursday, November 30, 2023 Contract Progress Report (November 2023)**

5	Construction Works of Alemketema-DegeloKelela, Contract 1: Alemketema-Degolo road upgrading project	28-Apr-17	1,280,770,840	0	231,135,386.54	92.24	Beza consulting Eng.	GemhsuBe yene Constructi on Plc	18%
6	Construction Works of Muketuri - AlemKetema Road Project, Lot 1: Muketuri - KokebMesk (58Km)	##### ##	768,622,711	49,090,698.51	244,197,627.89	58.8	United Consulting engineers	China Railway No. 3 Engineerin g Group Co., Ltd	38%
7	Construction Works of Tulu bollo-Kela Design and Build Road Project	15-Oct-17	1,309,798,352	7,888,142.80	628,197,118.61	79.9	Associate Engineering consultant(AEC)	Hunan Huanda Road & Bridge Corporation	49%
8	Construction Works of Iteya - Robe - Seru Road Project, Lot 1:Iteya - Robe	7-Nov-17	1,324,234,510	27,238,467.66	253,073,425.47	75.6	Beza consulting Eng	China Railway No. 3 Engineerin g Group Co., Ltd	21%
9	Construction Works of Debrebirhan - Ankober Road Upgrading Project( re-bid)	23-Oct-18	1,083,570,868	171,214,160.42	708,297,522.84	44.47	CORE Consulting Eng	Sunshine Constructi on plc.	81%

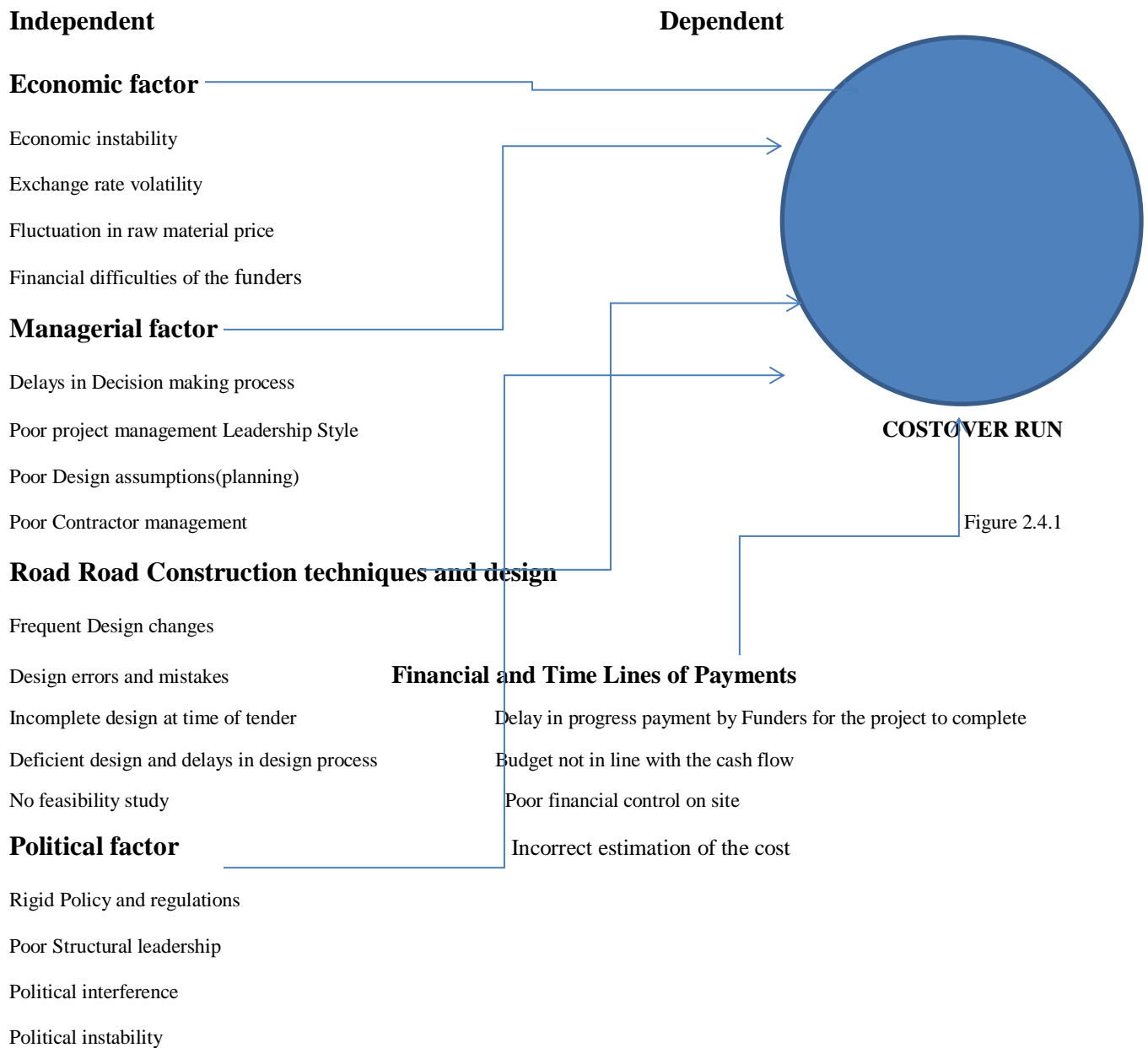
**Sample from cost overrun Projects in Ethiopian Roads Administration within the Central Region of Construction Projects Management ETHIOPIAN ROADS ADMINISTRATION WORKS MONITORING SYSTEM (WMS) as of Thursday, November 30, 2023 Contract Progress Report (November 2023)**

10	Construction Works of Tarmaber-MeleyayaSefedmeda- Spur 1-Meleyaya-Molale and Spur 2-Molale-Wegere Road Projec	24-Dec-18	1,906,200,297	0	137,138,705.87	118.83	Classic Consulting Engineers PLC	Defence Construction Interprise	7%
11	Construction Works of KokebMeskAlemketem	19-Sep-19	1,695,796,682	136,655,091.81	122,551,633.82	47.7	Value engineering PLC	China State Construction Engineering Co., Ltd.	15%
12	Construction Works of Bishoftu- ChefeDonsa DB Road Projec	27-Nov-19	914,847,890	62,729,416.06	65,835,435.69	55.14	CWCE JV Yooshin in Sub with G and Y	Rama Construction Pl	14%
13	Construction Works of Bulibula-Alage	12-Nov-20	686,000,000	0	149,650,663.48	38.82	UNICONE	Kibish Construction Plc	22%

As that can be seen in the above table Projects under Central Region Construction Projects Management have major cost overrun issues based on the sample projects the researcher have taken in to consideration the average cost over run in the 13 projects lists in the above is 27.15%. In the ERA more than 10% of cost overrun is considered to be alarming and dangerous.

## 2.10 Conceptual Framework

Many variable factors that usually bring cost overrun in road construction or building construction was listed out from the theoretical and empirical investigations done by different graduate students and researchers. It was vividly shown that there's a difference on cost overrun as the nation economy differs (developed or developing) and the kind of the study done by the scholars. Consequently, the present study utilizes the synopsis of findings from these previous inquiries, which it postulates as the primary causes of cost overruns in the Ethiopian road administration.



## **2.5. Knowledge Gap Identification**

In developing nations like Ethiopia road construction projects are well known for their inability to be finished on schedule, overspending, delays and scope creep. They are also known for their low communication practices and insufficient controls over scope change management, which are particularly evident in non-governmental and governmental organizations (Guerin, 2012). For construction projects and other types of projects budget and quality must met in timely manner unless the lose from the compromised quality is unbearable. When a project is finished with in the allocated cost in return demonstrates the general effectiveness of the planning, project management and execution of the project as well as the efficient tracking of the project progress which it may lead the project team for netter opportunity and chance to work better. Many private owned construction companies have tried to construct studies to determine the reasons for cost overruns on public building construction projects for internal and external uses of those companies, nevertheless the majority of these studies are not consistent with public projects or road projects. Thus This graduate thesis sought to fill this research gap by assessing the major factors of cost overrun on road construction projects: A Case Study of Ethiopian Road Administration.

## **Chapter Three**

### **3 Research Methodology**

#### **3.1 Research Design & Methodology**

##### **3.1.1 Introduction**

On this third chapter of the study the research design and approach is described starting the basic definition of the terms went further to how the study employed it. The chapter includes study's target demographic, sample size, and sampling methodology and In addition, the data source, data collection techniques, tools, and data analysis methodologies included in it.

### **3.2 Research Approach and design**

A researcher's methodological approach to comprehending and addressing the issue stated on the objectives is known as their research methodology. Thus there are three types of approach which are namely qualitative research approaches, mixed method research approaches, and quantitative research approaches. While the quantitative research approach asserts that reality is objective and singular, the qualitative approach deals with the multiplicity of reality and uses content analysis. A mixed research strategy combines pragmatism with reality-based context-based research methods. This study is mixed-methods in that it looks at how independent variables affect dependent variables, indicating a quantitative research technique, and it also uses the finance head interviews as a qualitative research approach. But still The utilization will determine the study's findings and conclusion of statistical data collected and analysed using SPSS software. the methods used in research projects for data collection, analysis, interpretation, and reporting are called research designs. This study used an explanatory research design that demonstrates cause-and-effect relationships between the principal factors which it can assign a number to, in conjunction with a descriptive research design and quantitative research approaches. It also used interviews and well-structured, closed-ended questionnaires. The study's goal is to analyse the primary causes of cost overruns in the road projects that ERA manages.

### **3.3 Source of Data**

Primary and secondary data were gathered for this investigation. While main data had been gathered via questionnaires from the aforementioned populations, secondary data were taken from annual reports. The following people received structured questionnaires are project managers, consultants, financial officers and managers, engineers, and economists. The study employed judgmental sampling approaches and a five-point Likert scale for data processing and processes. According to the researcher's assessment, the sample consisted of 60 key employees, including project managers, accountants, engineers, and economists from the Ethiopian Road Administration headquarters as well as employees from several road projects that ERA managed. In order to determine the sample size and disseminate the questionnaire to the appropriate number of participants, the researcher utilized 100% of the whole population. Potential

respondents received the questionnaires in person and, in certain situations, via electronic method. The researcher administered the questionnaire, which had both open-ended and closed-ended items with a 5-point Likert scale ranging from "Strongly Disagree" = 1 to "Strongly Agree" = 5.

As long as the participants are literate and able to write on their own, this method of data collection works well for a large number of people. It was used to collect pertinent data and expert opinions via questionnaires. In addition, a survey of the literature was done to create the conceptual framework for the investigation. Potential sources of cost overruns, the consequences of cost overruns, and strategies for managing and reducing costs were all found through the literature research. The literature review served as the foundation for creating the questionnaire that was sent to experts in the field of road infrastructure. The questionnaire was created with a high response rate from participants in mind.

### **3.4 Target Population and Sample**

#### **3.4.1 Target Population**

The monitoring and evaluation department, the finance directorate, the facilities and procurement department, and the building and design department are the key ERA departments from which the target population for this study was chosen. To ensure that the necessary knowledge, attitude, and perception on the questions presented in the questionnaires were responded to the required level for the generalizability of the analysis's result, the respondents were chosen for the questionnaires based on predetermined criteria based on their current role and duties, profession, and experience of the staff. As a result, the census technique was used in this study to collect the data needed for interpretation and analysis.

#### **Census Technique**

A smaller group of sample must be chosen for data gathering because it is frequently impractical to research the entire population. When there are less than 100 people in the population as a whole it is feasible to study the whole population instead on taking sample as it is done on this research (taking the whole population in to account). The terms 100% enumeration and

comprehensive enumeration are other names for the census sampling technique. (2012, Calteam Consulting Ltd.)

Due to the study's connection to the construction industry, the selection of respondents was based on a number of factors, including their profession and responsibilities, educational backgrounds, and staff experience. Based on information gathered from construction sites, the population comprises one project manager, twenty-three accountants, three lead engineers, eleven engineers, twelve economists, one data entry clerk, and nine respondents who declined to disclose their departmental roles. In all, sixty respondents were chosen for this study.

### 3.5 Model Specification and Explanation

Descriptive statistics and a multilinear regression model were employed in the data analysis to determine which the variables influencing cost overrun affecting it to increase or positively.

$$\text{COR} = \beta_0 + \beta_1 \text{PF} + \beta_2 \text{EF} + \beta_3 \text{MF} + \beta_4 \text{FTLF} + \beta_5 \text{RCTDF} + \varepsilon \dots \dots \dots (1)$$

Where; COR= Cost overrun, PF= Political Factor, EF =Economic Factor, MF = Managerial Factor, FTLF= Financial and time lines of payment factor, RCTDF = Road Construction techniques and design factor,  $\varepsilon$ =error term,  $\beta_0$  = coefficient

Based On five point Likert scale: SA means strongly agree, AG means Agree, NU means neutral, DA means disagree, SD means strongly disagree)

#### 3.5.1 Linear regression equation

Equation of linear regression Regression analysis is used to analyse the cost overrun reasons based on the components stated or to explain the relationship between the dependent variable (COR) and the independent variables. COR is described as a response or outcome variable, whereas PF, EF, MF, FTLF, and RCDF are specified as predictor and explanatory variables.

#### 3.5.2 Multiple linear regression analysis

Simple linear regression can be expanded upon with multiple linear regression. When predicting the values of two or more additional independent variables is necessary, it is employed. The researcher measured five factors: EF = Economic factor, MF = Managerial factor, PF = Political

factor, EF = Cost overrun, FTLF = Financial and time lines of payment, RCDF = Road Construction methods and design factor,  $\varepsilon$  = error term, and  $\beta_0$  = coefficient. How to analyse the strength of the effect of the factors and how does the independent variables ( the principal variables) affect the dependent variable (cost overrun) are the interesting questions.

### **3.6 Assumptions**

The following presumptions about the data gathered from the close ended questionnaires must met in order to go further for multiple regression models. The dependent variable's distribution needs to be normal for every value of the independent variable. For any value of the independent variable, the variance of the dependent variable's distribution should remain constant. Every observation should be independent, and there should be a linear relationship between the dependent and independent variables. Thus, independence, linearity, normalcy, and homoscedasticity are the underlying presumptions. Stated otherwise, a good model should have residuals that are randomly distributed and normally distributed, meaning that the unknown  $\varepsilon$ =error term is independent of PF,EF,MF, FTLF, and RCDF (also known as "homoscedasticity").

For multiple regression with a single addition, all the presumptions that apply to basic regression (with one independent variable) also hold true. A phenomenon known as multicollinearity arises when two of the independent variables have a strong relationship with one another. This leads to issues with interpretation and analysis. Examine each set of continuous (scale) variables' correlation coefficients before delving into the possibility of multicollinearity. In a regression study, only one of the two variables is required if the correlation is 0.8 or above, indicating a strong association. The researcher's use of SPSS additionally offers Collinearity diagnostics, which evaluate the connections between each independent variable and every other variable, within the Statistics menu of regression.

### **3.8 Validity and Reliability**

The extent to which a study measures what it is intended to measure is known as its validity (Paul C., 2009). A preliminary questionnaire based on the literature reviews was pretested on a

small sample population in order to determine its validity. This was mostly done to make sure the question's language is clear and precise (Royer & Zarlowski, 2001). The internal consistency of the notions is estimated by the reliability, as determined by Cronbach alpha. The items for socio-political aspects, road construction techniques and design factors, financial and time lines of payments factors, managerial factors, and economic factors were evaluated for dependability. The Cronbach alpha result for this study consider to be fit for further regression analysis with a value of 0.9, Cronbach alpha result between 0 and 1 shows increased reliability, the closer to 1 the reliable the population.



## Chapter Four

### 4 Data Presentation, Analysis, And Interpretation

#### 4.1 Data Presentation

In this chapter, the variables contributing to cost overruns in Ethiopian road administration are analysed, discussed, and concluded. The aim of demonstrating scientific data to refute each position served as guidance for the study. In order to analysis the data that has been done collected from the primary source the researcher used SPSS. The features of the respondents employed have been described using descriptive statistics. The influence that the independent factors have on the dependent variable has been ascertained by additional regression analysis.

The investigator distributed sixty surveys, with a response rate of sixty or one hundred percept (or 100%). Return rate on questionnaires is hundred percept the computation indicates that hundred percent of the questionnaires were returned. The discussion that follows is based on these statistics, which are thought to be an acceptable return rate for data analysis.

#### 4.2 Personal Profile of the Respondents

The general information about the respondent, including their gender, educational background, position, and experience in the administrative office, will be covered in this section of the paper..

##### 4.2.1 Table Summary of respondents' gender from the questionnaire

		<b>Gender</b>			
		Frequenc y	Percent	Valid Percent	Cumulative Percent
Valid	Male	28	45.9	46.7	46.7
	Female	32	52.5	53.3	100.0
	Total	60	98.4	100.0	
Missing	System	1	1.6		
Total		60	100.0		

(Source: Own Survey, 2024)

According to the table, there are as whole 28 male respondents—45.9%—and 32 female respondents—52.5%. This indicates that in the ERA road construction projects, women make up the majority of the respondents.

**Table Summary of respondents’ educational background from the questionnaire**

		<b>Educational background</b>			
		Freque ncy	Percent	Valid Percent	Cumulative Percent
Valid	Diploma	1	1.6	1.7	1.7
	First Degree	41	67.2	68.3	70.0
	Master's	18	29.5	30.0	100.0
	Total	60	98.4	100.0	
Missing	System	1	1.6		
Total		61	100.0		

(Source: Own Survey, 2024)

Table 4.2.2 reveals that among the respondents which the questioner obtained from, 18 of them have a master's degree (30.0%), 41 have a bachelor's degree (68.3%), and only 1 have a diploma (1.7%). The majority of responders (98.0%) have completed at least one bachelor's degree in education. This demonstrates the respondents aptitude for analysing, writing, and reasoning, which raises the questionnaire's validity.

**4.2.2 Table Summary of respondents’ position from the questionnaire**

		<b>Current position in the organization (Ethiopian Road Administration)</b>			
		Freque ncy	Percent	Valid Percent	Cumulative Percent
Valid	Project manager	1	1.6	1.7	1.7
	Engineer	11	18.0	18.3	20.0
	Accountant	23	37.7	38.3	58.3

Other	9	14.8	15.0	73.3
Lead engineer	3	4.9	5.0	78.3
Economist	12	19.7	20.0	98.3
Data entry clerk	1	1.6	1.7	100.0
Total	60	98.4	100.0	
Missing System	1	1.6		
Total	61	100.0		

(Source: Own Survey, 2024)

Table 4.2.3 again shows that of the responders in the administration office, 38.3% (23) are accountants, 1.7% (1) are project managers, 18.0% (11) are engineers, and the remaining 4.9% (3) are lead engineers. The primary players who have a direct impact on project costs are engineers, project managers, economists, and accountants, with a total percentage of over 80%. It follows that their reaction has important implications for the research.

#### 4.2.3 Table Summary of respondents’ experience in construction projects from the questionnaire

##### How long have you worked in Ethiopian road administration?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid less than a year	37	60.7	61.7	61.7
Valid 1-5 years	15	24.6	25.0	86.7
Valid 5-10 years	6	9.8	10.0	96.7
Valid above 10 years	2	3.3	3.3	100.0
Total	60	98.4	100.0	
Missing System	1	1.6		
Total	61	100.0		

(Source: Own Survey, 2024)

The respondents (ERA staffs) experience is displayed in the above table. The data indicates that 61.7% (37) of the participants have less than one year of experience as the researcher asks that even though they have less than one year experience here they have been working in different construction and consultant office which have a close partnership with ERA, And after that followed by 25.0% (15) with one to five years, 10% (6) with five to ten years, and 3.3% (2) with more than ten years. The aforementioned experience demonstrates that most of the respondents are less than a year experience as the researcher obtained information from Human resource department, the less experience in the road projects shows that once the projects are over the employees tend to terminate their contracts or the administration office do specifically if they are the primary project team.

### **4.3 Descriptive Analysis**

#### **4.3.1 Mean and Score for Factors of Cost Overrun**

The results of a descriptive analysis of the respondent's perceptions of the ERA's cost overrun factors are presented in this section. To assess and prioritize the primary reasons for the construction project's cost overrun, descriptive statistics were employed. Using the following formula, the five-point Likert scale, which had a range of 1 to 5, was converted to a relative importance index.

The table below display the descriptive statistics, which include the mean, standard deviation, and ranks for each. Based on the mean score

0-1.5	Not significant
1.50 to 2.50	Slightly significant
2.50 to 3.50	Moderately significant
3.50 to 4.50	Very significant
>4.50	Extremely significant

Items	SDA	DISA	N	AG	SAG	total	W	RII	MEAN
1.Economic factors	1	4		41	14	60	243	0.81	4.05
2.Managerial factor	2	7		35	16	60	236	0.786667	3.933333
3. Road Construction techniques and design factor	-	12	5	28	15	60	226	0.753333	3.766667
4.Political factor	6	12	2	11	29	60	225	0.75	3.75
5.Financial and time lines of payments factors	-	11	19	17	13	60	212	0.706667	3.533333

Source own survey (2024)

#### 4.3.2 Respondents Perception on the five principal Factors

There are five categories for the ERA's cost overrun reasons under the problem's predominance. To complete the project at the proper cost, the administration office must overcome or find solutions for several issues. The questions and the mean of the respondents' scores are displayed in the table below, which identifies the primary cause of the cost overrun.

Out of the five primary categories, item 1 (Economic factors) has a mean score of 4.05, indicating that the majority of respondents believe that economic instability, high exchange rate volatility, raw material price fluctuations, and funders' financial difficulties are the most significant factors. The average score for the second managerial factor, which is 3.93, indicates that the majority of respondents strongly favor poor management as the reason behind the road construction project's cost overrun. Other factors under the managerial factors category include poor design assumptions (planning), poor contractor management, delays in the decision-making process, and poor project management leadership style.

The mean score for Item 3 (road construction techniques and design factor) and Item 4 (political factor) is 3.76 and 3.75, respectively. This suggests that most respondents view these factors as moderately significant. The factors include: frequent design changes, errors and mistakes in design, incomplete design at the time of tender, poor design and delays in the design process, and no feasibility study.

Item 5: Factors pertaining to finances and payment schedules The average score of 3.53 indicates that a majority of respondents choose to maintain a modest level of significance regarding the relationship between financial variables and timely payment of building projects and cost overruns. This issue includes poor financial control on site, inaccurate cost estimation, budget that is out of line with cash flow, and delays in progress payments from funders for the project's completion.

### **Interview Response**

The researcher tried to conduct a quick interview session with lead officer in monitoring and evaluation department, this interview was done at the last minute of this study because of the tight time of the interviewee associated with current ongoing urgent projects.

He elaborated the cost overrun and factors in ERA quoted as follows which the name is made confidential for the purpose

“I have worked in ERA for 5 and half years. Within those years I had participated in handful of projects that was designed by our organization and its partners, with in those projects we have encountered cost overrun with in the contract projects quite a lot times I believe it is associated with the scarcity of foreign exchange to import item those are mandatory and not available in our country, the other two issue which are serious factors are very much poor management and control of the budget costs along political instability, As a public organization our vision is providing an adequate, reliable, high quality and standard road to the citizens but it makes harder to achieve our objectives with in the country’

The above response shows that Economic factor specifically exchange rate volatility, inflation are the major factors contributing for the project cost overrun in ERA alongside other major principal factors political instability and managerial factors.

## **4.4 Discussion**

### **4.4.1 Regression Analysis**

Multiple linear regression was used to investigate the causes of cost overruns in the road project since the independent variables are more than one. However, as discussed before all pertinent assumptions need to be verified before moving on to the regression analysis. Therefore, before beginning the regression analysis, the researcher looked at the following presumptions.

#### **Test for Linearity**

The first assumption test is The purpose of the linearity test, which is to ascertain whether or not there is a linear relationship between the independent factors and the dependent variable. The independent variables and the dependent variable should have a linear connection for the regression model to function well.

Examining the Normal Probability Plot (PP) of the Regression Standardized Residual Scatter plot allows one to verify the linearity assumption. The scatter plot of residuals, as displayed in figure 4.4.1, revealed that the points were arranged in a somewhat straight line from bottom left to top right. Thus, the researcher can be concluded that the linearity assumption was upheld.

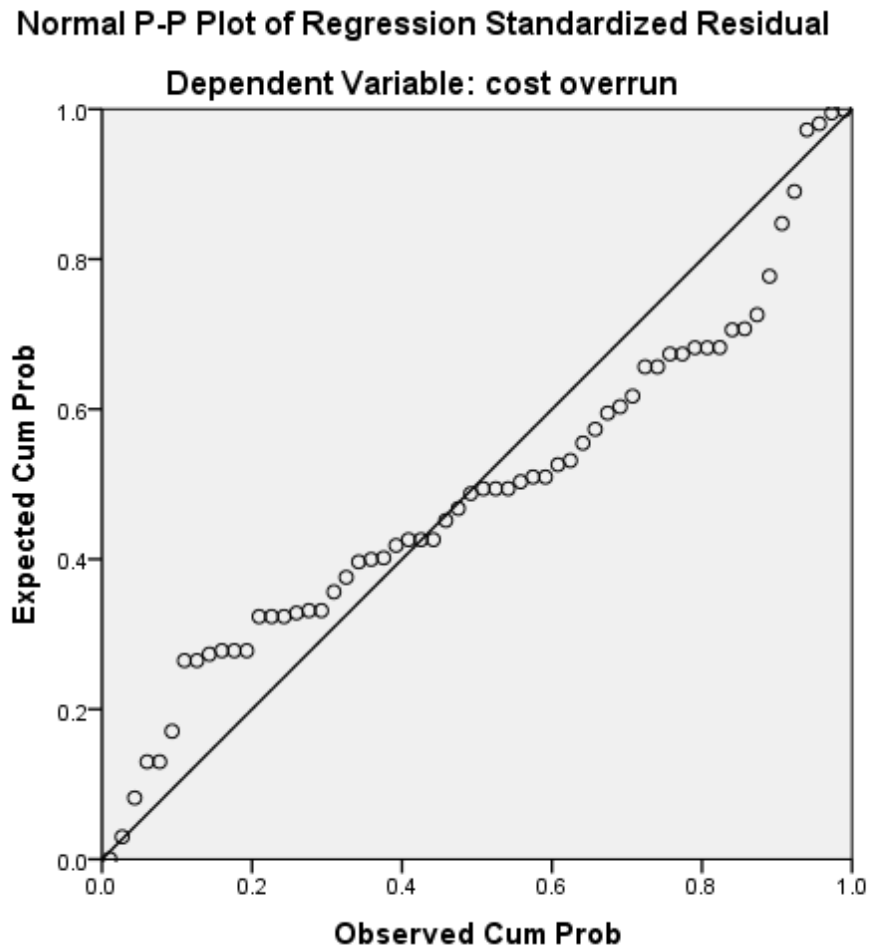


Figure 4.4.1.

A graphical method for determining if or not a data set is roughly normally distributed is the normal probability plot it shows with x axis and y axis graph representation taken from the regression analysis, as shown in Figure 4.4.1. Plotting the data against a theoretical normal distribution results in a roughly straight line formed by the points. Deviations from this line of straightness signify a departure from the normal plot line.

### Test for Normality

Ho; Normally distributed errors

Ha;Non-normal distribution errors

#### Tests of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Unstandardized Residual	.115	17	.200*	.959	17	.609
Standardized Residual	.115	17	.200*	.959	17	.609

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The Shapiro-Wilk test results show that all of the variables had p-values greater than 0.05. However, in this instance, since more than 50 samples are being handled, we will check the Kolmogorov-Smirnov test, which indicates  $0.115 > 0.05$ , indicating that the study's variables show a normal distribution in the model. As a result, it can be concluded that the residual value shows it is normally distributed with no disturbance in the model if there is any disturbance it can be controlled and one the regression analysis test before doing the regression is satisfied. Due to Kolmogorov-Smirnov test  $0.115 > 0.05$  value, the researcher is unable to exclude out Ho.

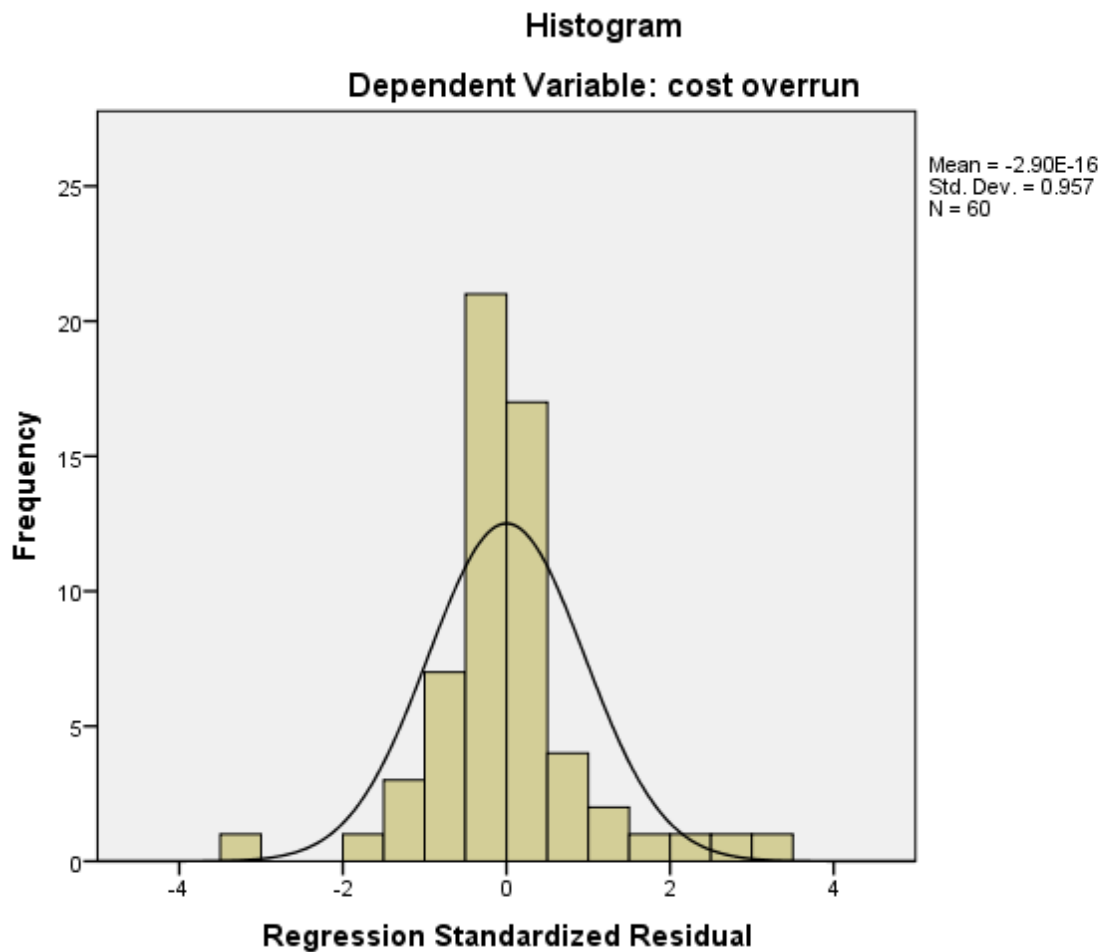


Figure 4.4.2

The bell shaped histogram shows what it will look like if there is a perfectly normal distribution in the model. As of this research variable model the residuals are quite near to the curve on figure 4.4.2, although some are relatively far from it but they are not too far from the bell shaped histogram. Therefore, the researcher have finalized it by saying that there is no violation of the assumption of a regularly distributed error term.

### Test of Multicollinearity

Multicollinearity occurs If there is a strong correlation between any or all of the independent variables or of it shows highly correlation, (Brooks, 2008). Whenever this happens either an additional significant variable should be introduced to the correlation test, or an irrelevant independent variable should be removed, if the multicollinearity problem in the model is too severe the model should be changed in order to protect the result from ambiguousness.

The other issue is Variance Inflation Factor (VIF), a measurement of the reciprocal of the complement of the inter-correlation among the independent variables, it can be identified and quantify the multicollinearity in the model which is literally what has been done the table under. If the variance inflation factor is precisely 10 or more, multicollinearity is an issue.

Model	Collinearity Statistics		
	B	Tolerance	VIF
(Constant)	.583		
Economic factor	.266	.583	1.716
Managerial factors	.081	.350	2.857
Road Road Construction techniques and design	.040	.486	2.056
Political Factor	.010	.391	2.555
Financial and Time Lines of Payments	.005	.469	2.131

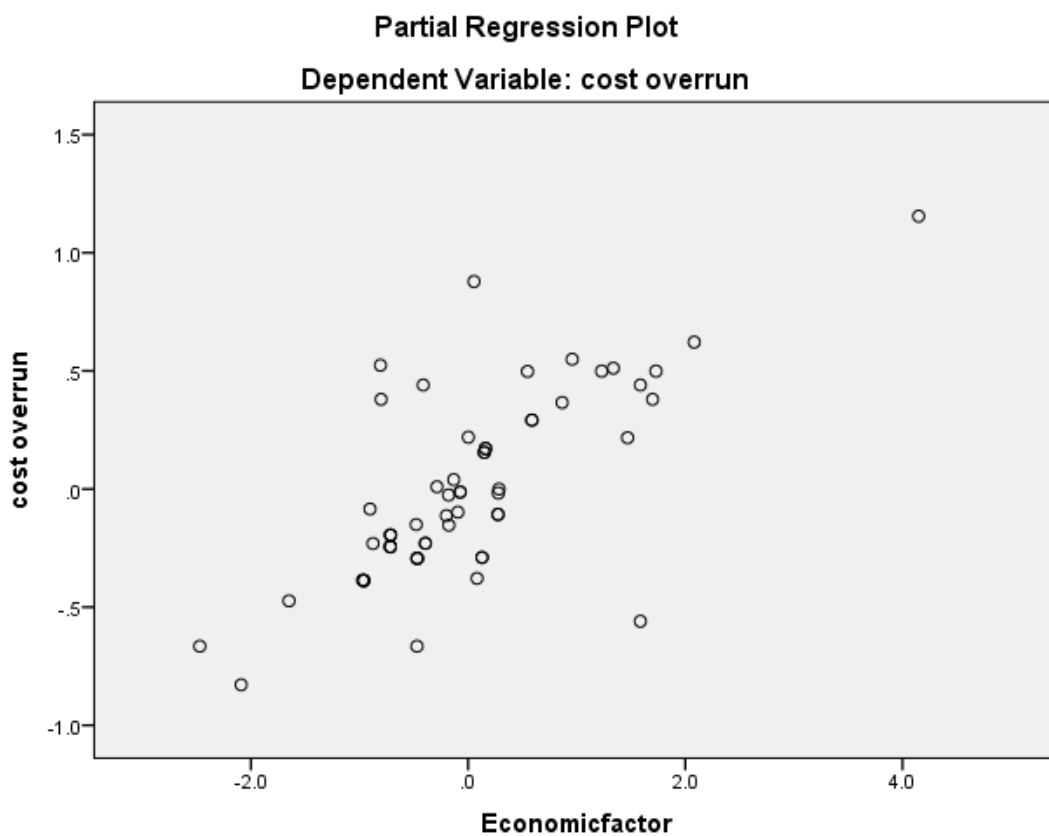
As of VIF there is also Tolerance (TOL) is used to determine the degree of collinearity and demonstrate that the variability of the given independent variable cannot be explained by another independent variable in the model. A multicollinearity issue may exist if a variable's TOL value is less than 0.1, which is the tolerance decision rule. There is no multi-collinearity issue with this

study because, as the table above illustrates, the VIF output for all independent variables was less than 10, and all tolerance (T) was larger than 0.1.

### Test of heteroscedasticity

Ho; There is no heteroscedasticity problem (homoscedasticity)

Ha; There is heteroscedasticity



Based on the diagram above, the scatter dotted plot output appears to show the spots are diffused from a specific pattern which means they are scattered everywhere as a spilled water showing no a single pattern to it, which it can be observed from the diagram the model doesn't show heteroscedasticity problem.

**Test of significance of the model fit**

The Durbin- Watson statistic lies acceptable number is 1.50-2.50 when ever seasonal error differences are small, on this research particularity it shows that Durbin- Watson is low which is a good sign and this indicates the presence of positive autocorrelation.

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.821 <sup>a</sup>	.674	.644	.287	2.303

- a. Predictors: (Constant), Financial and Time Lines of Payments, Managerial factors, Economic factor, Road Road Construction techniques and design, PoliticalFactor
- b. Dependent Variable: cost overrun

**ANOVA<sup>a</sup>**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	9.200	5	1.840	22.326	.000 <sup>b</sup>
	Residual	4.450	54	.082		
	Total	13.650	59			

- a. Dependent Variable: cost overrun
- b. Predictors: (Constant), FinancialandTimeLinesofPayments, Managerialfactors, Economicfactor, Roadconstructiontechniquesanddesign, PoliticalFactor.

As a result of the above ANOVA table, it is revealed that F is 22.326 with a p-value of 0.00 which, is statically significant at  $\alpha=0.01$

#### **4.4.2 Multiple regression analysis**

According to the above model description, there was a 64.4% ( $R^2=0.644$ ) predicted likelihood of effect to cost overrun for a combination of socio-political, economic, managerial, financial, and timeliness of payment and financial, construction techniques, and design aspects. The socio-political, economic, managerial, timely payment and financial, construction techniques rate, and internal factors (poor contract management, unclear procurement process, lack of timely decision-making, and corrective action) jointly determine (explain) 64.4% of the variance in project cost overrun. These factors are measured by the predictor variable, which accounts for 64.4% of the variation in cost overrun. This also indicates that the model is good fit, usually  $R^2$  varies from negative one to positive one which the lower the  $R^2$  the less the model fits, and vice versa. However, in this study factors not included in the analysis explained 35.6% of the overall cost overrun.

#### **Regression and Correlation Analysis between Factors**

Table4.12. Correlation Matrix for Cost over run (COR), Socio Political Factor (PF), Economic Factor (EF), Managerial Factor (MF), Financial Factor and Timelines of Payment(FTP), Road Construction techniques and design changes (RCTDF).

		<b>Correlation Analysis between Factors</b>					
Pearson Correlation		<b>COR</b>	<b>EF</b>	<b>MF</b>	<b>RCTDF</b>	<b>PF</b>	<b>FTP</b>
	COR	1	0.953**	0.891**	0.890**	0.858**	0.860**
	EF	0.953**	1	0.859**	0.889**	0.835**	0.860**
	MF	0.891**	0.859**	1	0.903**	0.911**	0.856**
	RCDF	0.890**	0.889**	0.903**	1	0.877**	0.872**
	PF	0.858**	0.835**	0.911**	0.877**	1	0.876**
	FTP	0.860**	0.860**	0.856**	0.872**	0.876**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS result of the own survey 2012, Note: Sig. \*N= sample size of 60

The aforementioned Table 4.12 displayed the association matrix among several parameters. It is clear from the correlation matrix between the elements that the economic factor has the highest association (0.953) with cost overrun, yet it cannot be concluded that this variable has a significant impact on cost overrun. and When we put in another way, this matrix displays the strength of the variables' relationship rather than the cause and effect of the variables The economic factor have sub factors that is included in it namely fluctuations in economic activity, volatile exchange rate in the economy, fluctuations in the price of resources.

The managerial factors were the next more significant predictive factor. This demonstrates a favourable link with cost overruns as well. The managerial elements cited are the primary causes of cost overrun occurrences, as indicated by the 0.891 connection between managerial and cost overrun. Those sub factors included in managerial factors that have an effect in the managerial system of the Ethiopian road Administration are slow decision making process which also brings out time delay in most projects, Poor project management Leadership Style, Poor Design assumptions(planning) this usually may even include frequent change of plans and designs in the

administration office and Poor Contractor management which doesn't consider the inflation and exchange rate that have a positive effect cost overrun or making it more vulnerable.

The third, and more crucial, element was the road construction procedures and design modifications, which had a substantial link with cost overrun ( $r = 0.890$ ). The results demonstrate how inadequate project management leadership, owner interference in every activity, and decision-making delays affect road construction practices and design revisions. These design changes and revisions usually is related to the poor management system and it is a factors which sometimes is affected by deficient design and delays in design process. The other big issue in the administration office is feasibility study. As the researcher learned from interview and reports there is no feasibility study done is Ethiopian road Administration. Which in turn affects the administration office with clarity of goals in the specific project, risk management, difficulty in documentation of different project related issues including lesson learned and etc. all negatively.

The other two factors are also important, which show somewhat strong (compared to the other three principal factors) correlation with the cost overrun. Political factors and Financial and timelines of payment factor have correlation of 0.858 and 0.860 respectively. Subsequently, the investigator examines the relationship between every factor and other ones. Thus relatively speaking, the economic factor is primary as of having the strongest relationship with cost overrun compared to the other four factors. The least correlated factor is political factor again it is relatively and compared to the other factors. So, the other principal factors which have strong correlation with cost overrun are managerial factors, road construction techniques and design and financial and timelines of payment respectively.

**Coefficients of Regression Model**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.883	0.123		4.728	.000
Economic factor	0.866	0.035	0.764	7.501	.000
Managerial factors	0.781	0.060	0.678	1.352	.001
Road Construction techniques and design	0.640	0.058	0.575	1.677	.004
Political Factor	0.110	0.056	0.423	1.187	.203
Financial and Time LinesofPayments	0.101	0.051	0.210	.091	.211

**The Regression Equation**

The model was cited as follows:-

$$COR = \beta_0 + \beta_1 EF + \beta_2 MF + \beta_3 RCDF + \beta_4 PF + \beta_5 FTFP + \epsilon \dots \dots \dots (1)$$

$$COR = \beta_0 + 0.86EF + 0.78MF + 0.64RCDF + 0.110PF + 0.101FTFP + 0.123\epsilon \dots \dots \dots (2)$$

According to the equation above, financial, managerial, political, economic, timely payment, construction methods, and design elements all had an impact on cost overruns on road projects. Table 4.14 above indicates that the economic regression coefficient is 0.86. This indicates that there is a positive correlation between cost overruns and economic considerations. This suggests that the main causes of cost overruns are economic considerations. For the managerial factor, the regression coefficient is 0.78. This indicates that there is a positive correlation between managerial component and cost overrun. Regression coefficient 0.64 indicates a positive association, and it is likewise good for road construction techniques and design. The political, financial, and payment schedule factors are, respectively, 0.110 and 0.101. This showed that

those two variables have a positive correlation but not significant with instances of cost overruns in ERA road construction projects.

In other words  $\beta_0$  is the value the model predicting or assuming all the factors have the value of zero. As of the regression equation or the coefficients of regression model the values of the independent variables shows the impact of each factors on cost overrun if all other independent variables are held constant or stagnant. Let's examine each of the factors (independent variables).

1. The regression coefficients for economic factor is 0.86, first being positive value shows there's a positive relationship between economic factors including all the sub factors under it and cost overrun. Then if all the factors or variables in the model are held constant, with the beta value of 0.86 shows that one deviation increase in economic factor will lead to 0.86 deviations increase in the cost overrun in Ethiopian road administration road projects.
2. The regression coefficients for managerial factors have a positive value of 0.78, All the factors or variables in the model being held constant, with the beta value of 0.78 shows that one deviation increase in managerial factors will lead to 0.78 deviations increase in the cost overrun in Ethiopian road administration road projects.
3. The third factor with regression coefficients 0.64 is road Construction techniques and design. if all the factors or variables in the model held constant, with the beta value of 0.64 it shows that one deviation increase in road construction techniques and design if all the factors will lead to 0.64 deviations increase in the cost overrun in Ethiopian road administration road projects.
4. The regression coefficients for political factor and financial and time lines of payment is 0.110 and 0.101 respectively even though the p value show insignificant level for both of the variables. There are quite lot of probable explanations for regression coefficient with insignificant p value, In this case the effect of the independent variables maybe indirect with the dependent variable or the sample taken from political factors and financial and time lines of payment is not representative of the large population it intended to represent

because of the inability of the ERA staff given current urgent projects from the prime minister office. Hence leading to inaccurate conclusion to the factors being insignificant. Either of the reasons may held true according to the study however three of the major factors included in this study have come out positive and significant effect on the dependent variable cost overrun in ERA road projects.

#### **4.5 Hypothesis Testing**

H1: The cost overrun of a road project and the economic element have a positive and statistically significant relationship. **Accepted**

H2: The managerial element and road project cost overrun have a positive and statistically significant association. **Accepted**

H3: Road construction techniques and design factor are positively and statistically significantly correlated with road project cost overruns. **Accepted**

H4: The political aspect and road project cost overrun have a positive and statistically insignificant association. **Rejected** Considering the regression analysis The political factor has a positive correlation, but the sig value of  $0.203 > 0.05$  does not indicate statistical significance.

H5: The financial and payment schedule factors are positively and statistically insignificantly correlated with cost overruns in road projects. **Rejected** The association between the financial and payment timeliness factors is favourable, but the sig value of  $0.211 > 0.05$  does not indicate statistical significance.

## **Chapter Five**

### **5 Summary Of Findings, Conclusion And Recommendations**

#### **5.1 Introduction**

There are three sections in this chapter, which is the last chapter of this study . the first part of this chapter provides an overview of the main findings, while the subsequent section presents the study's conclusions. The final section offers recommendations based on the findings and conclusions that could be relevant to the road construction industry in developing countries.

#### **5.2 Summary of Findings**

Taking in to account the research's major and specific objective the researcher have prepared questions around 7 with each of them having a sub section of questions. Out of the sixty surveys that were distributed, all sixty were deemed well legitimate to take it for further analysis and gathered for further examination. All respondents are Professionals working on construction sites in their respective professions have participated in this study. Professionals with organizational experience ranging from less than a year to fifteen years, including project managers, lead engineers, accountants, economists, and others, completed the questionnaire. The lead monitoring and evaluation officer have participated in the interview session. The statistical program Social Science Software (SPSS) was used to examine the gathered data. The hypothesis was tested using a straightforward multiple linear regression analysis.

The tables on the study display the results of calculated descriptive analyses. Prior to using the regression analysis few of assumptions were tested like linearity, and normal distribution were among the assumption tests that were carried out and after those assumptions were tested the model and independent variables were considered fit . The Relative Importance Index (RII) was used by the researcher to rank the opinions of the respondents after analyzing data on frequency, percent, mean, and standard deviation. The majority of respondents concur that the issue exists and happens frequently in the ERA, according to descriptive statistical research.

After all the necessary assumption was met before further progressing in the regression analysis on the road project questionnaire those assumptions was tested and met the needed regulations

the results of the regression analysis showed that cost overruns significantly affect project performance ( $R^2 = 0.644$ ,  $F\text{-ratio} = 22.62$ , and  $\text{sig} = 0.000 < 0.05$ ). Finally, from the five alternative hypothesis was adopted in light of the ANOVA table's results three were accepted and two of them rejected because of the insignificance of the coefficient results based on the regression table.

With reference to the particular goals and research issues that shaped the investigation, the study provides the following synopsis. The correlation result indicated that economic factors, managerial factors and road construction techniques and design are positively and significantly correlated with cost overrun in road construction project in ERA. It was discovered that these three factors are the most significant ones causing cost overrun in road construction projects in ERA.

### **5.3 Conclusions**

As presumed cost overruns negatively affect ERA's financial stability as well as the overall economy of the nation. The inability to quickly secure the fluctuating economy, manage contractibility of the projects with the frequent design changes required to cover rising costs exacerbates the issue of cost overruns. Successively delaying in securing the funds required to offset cost overruns would simply also drive up expenses, putting the project in danger of running out of control or perhaps never getting off the ground at all.

The study's goals have been effectively determined. The majority of the factors that contribute to cost overruns in ERA have been identified; the most significant factors among them are economic instability, exchange rate volatility, fluctuations in the price of raw materials, funder financial difficulties, delays in the decision-making process, poor project management leadership style, poor design assumptions (planning), interference from owners, frequent design changes, mistakes in design, inadequate design at the time of the tender, incomplete design, delays in the design process, and a poor risk management plan. Regression research revealed a substantial, positive, and robust relationship between those variables and the road project's cost overrun in ERA.

## 5.4 Recommendations

In accordance with the aforementioned conclusion in the above, the researcher suggests that the administration office (ERA) take into account the following recommendations

- Since ERA is owned by the government for cost overrun not to be increasing from time to time the concerned government body should monitor and evaluate the progress of the projects along the assigned budgets, this can be done in collaboration with the office's monitoring and evaluation department and Moreover if the relevant body can stabilize the political instability and intervention of other parties in the budget cost.
- As the researcher observed during the successive visits to the ERA, The department and the staffs concerned with the economy matter have tangible data about the projects so ERA has the ability to control and improve certain elements concerned about this because those economist can predict the most concerning factors like exchange rate volatility, inflation etc.
- From the questionnaires and regression analysis management factors is the second most affecting factor in ERA, it is out of question that the management issues should be attended and addressed by the office concerned it could start from anonymously asking staff what to do to improve the management issues.
- Conducting researches in ERA is also recommended to know the extent and duration of cost overrun and to understand the matters related to it.
- While hiring employees it must be based on appropriate qualifications and procedures based on ERA policy because qualified and good employees tend to work good and have self-awareness along the feeling of belongingness in the organization.
- ERA is known for its large public projects. If the projects are large it is expected to have large costs those costs though should be well monitored and controlled.
- Project managers are recommended to work closely with the team and stakeholders to tackle problems as soon as they emerge or to prevent them identifying the warning signs early as possible.
- Recording the lessons learnt from previous projects to avoid over budget

### **5.5 Implication for Further Research**

Future researchers, students or scholars can further study about time overrun in ERA, Risk assessment issues (since the researcher also figured it out the risk assessment is weak in government office's), cost overrun mitigation techniques because this research is only concerned with the cost overrun in ERA projects. And the study findings only tally with developing countries like Ethiopia with completed projects as final cost overrun is only vividly known for projects full completed.

According to the experiences of several studies and this study other than the other factors stated above, delivery mode, planning, timing, and scope all have an impact on project cost overruns and cost performance and research on these in road developments has to be done more.

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## APPENDIX 1



### **School of Graduate Student Master’s Program In Project Management**

#### **A. Questionnaire**

**Dear respondents,** The purpose of this study to do an analysis on the topic of the study focus is on the factors of that contribute to the existing cost overrun in ERA. As I appreciate your participation in the questionnaire I would like to make sure this study is only for graduate class

of Master’s Program in Project Management with no other hidden issue in the back plus **you do not have to write your name** which makes it completely confidential and safe

**Atsedemariam Bekele Asfawe**

Addis Ababa university school of commerce

**Questionnaire Section 1: General Background Information**

**Please Circle your response**

1. Gender

A. Male B. Female

2. Your Educational background?

A. Diploma B. First Degree C. Master’s Degree D. Ph.D.and above

3. Please state your current position in the organization (Ethiopian Road Administration) which you work on

A. Project Manager B. Engineer C. Accountant D. Other (please specify) \_\_\_\_\_

4. How long have you worked in Ethiopian road administration?

A. less than a year B. 1 – 5 years C. 5 – 10 years D. above 10 years

5. Do you think there is cost overrun in Ethiopian road Administration road project?

A. Yes B. No

**Questionnaire Section 2: Assessment of Level of Impact of the factors**

Please give your response by marking (√) in the corresponding space

Please indicate the significance rate of the following factors by ticking the appropriate number in the box. (N.B- Numbers symbolize the following: N.B On five point Likert scale: 1=Strongly agree, 2 = Agree, 3 = Neutral, 4= disagree, 5= Strongly disagree)

No.	Factors Causing Cost overrun	Level of Impact				
		1	2	3	4	5
1.	<b>Economic factor</b>					
	Economic instability					

	Exchange rate volatility					
	Fluctuation in raw material price					
	Financial difficulties of the funders					
<b>2.</b>	<b>Managerial factors</b>					
	Delays in Decision making process					
	Poor project management Leadership Style					
	Poor Design assumptions(planning)					
	Poor Contractor management					
<b>3.</b>	<b>Road Construction techniques and design</b>					
	Frequent Design changes					
	Design errors and mistakes					
	Incomplete design at time of tender					
	Deficient design and delays in design process					
	No feasibility study					
<b>4</b>	<b>Socio political Factor</b>					
	Rigid Policy and regulations					
	Poor Structural leadership					
	Political interference					
	Political instability					
<b>5</b>	<b>Financial and Time Lines of Payments</b>					
	Delay in progress payment by Funders for the project to complete					
	Budget not in line with the cash flow					
	Poor financial control on site					
	Incorrect estimation of the cost					

Please Provide any effects occurred in the project due to the cost overrun?

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 You can ask extra paper if you want to add for any suggestion. **Thank You for your time!**

