ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

PRICE ESCALATION AND ITS MANAGEMENT IN TURNKEY PROJECTS: THE CASE OF ETHIOPIAN RAILWAYS CORPORATION

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A Project Work Submitted to School of Graduate Studies in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Project Management

May, 2017
Addis Ababa

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DECLARATION

I hereby declare that this project work entitled **"PRICE ESCALATION AND ITS MANAGEMENT IN TURNKEY PROJECTS: THE CASE OF ETHIOPIAN RAILWAYS CORPORATION"** in partial fulfillment of the requirement for the degree of master of art in project management is my original work. This project work has not been presented for any other university and is not concurrently submitted in candidature of any other degree, and that all sources of material used for the thesis have been duly acknowledged.

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Statement of Certification

This is to certify that Dawit Tarekegn has carried out this project work on the topic entitled "PRICE ESCALATION AND ITS MANAGEMENT IN TURNKEY PROJECTS: THE CASE OF ETHIOPIAN RAILWAYS CORPORATION" under my supervision. This work is original in nature and it is sufficient for submission as the partial fulfillment for the award of Degree of Masters of Art in Project Management.

Abdurezak Mohammed, (PhD).

Signature _____

Date _____

ACKNOWLEDGEMENTS

I would like to express my appreciation to all organizations and individuals who have assisted me throughout the preparation and completion of this study. In particular, I would like to express my gratitude to my advisor Abdurezak Mohammed (PhD) for his suggestions and comments throughout the study.

ABSTRACT

The role of railway development for the economical growth and social welfare of a country is very indispensable. Especially for a developing country like Ethiopia, the expansion of rail network highly supports the strive in building competitive economy. Although it has been over hundred years for a rail to operate in Ethiopia, following its age the old one has been deteriorated and abandoned. It has been about ten years that the new spirit of a railway operation has revived in the country. As the new railway construction sector lacks experience and a well developed & systematic environment, it is highly prone industry to different risks including price escalation. So that the sector should stay awaken towards mitigation of price escalation to accomplish its objectives. Mitigating price escalation strictly requires the identification of the condition of the price escalation, the causes and effects together with the effective ways of mitigating the problem. This study has tried to enlighten the price escalation & its management in the Ethiopian railway construction sector. The analysis was supported by the use of Mean Score (MS), frequency tables and graphs. The study has identified that there is a noticeable disagreement on the understandings of price escalation in the EPC/Turnkey projects among the employer, contractors and consultants. National and global inflation, late project launch & project schedule changes; and fluctuation in money exchange rates beyond the level predicted were among the main factors that cause price escalation in the EPC/Turnkey railway projects of Ethiopia. On the other hand, project financing problem, high project cost and disputes between the employer & the contractors are the major effects of price escalation in the projects. Applying buyer-supplier partnership/relationship, using local instead of imported materials and developing regular monitoring system to assure appropriate market assessment & proper procurement procedure are mitigation mechanisms rated first to third based on their significance to the price escalation management. Recommendations on how to work on the disagreements and the collaborative reactions to be taken towards mitigating price escalation have been proposed based on the analysis of the results that enables to minimize the problems of price escalation on the railway construction projects.

Key words: *price escalation, EPC/Turnkey, railway projects.*

ACRONYMS

ACAF – Asphalt Contractors Association of Florida

DBB - Design – Bid - Build

FIDIC - Fédération Internationale des Ingénieurs-Conseils in French International Federation of Consulting Engineers in English

EPC - Engineering, Procurement, Construction

EPCM - Engineering, Procurement and Construction Management

ERC - Ethiopian Railways Corporation

EW - East West

GDP - Gross Domestic Product

ICE - Institution of Civil Engineering

JCT - Joint Contracts Tribunal

LRT - Light Railway Transit

MoWUD – Ministry of Works & Urban Development

MS - Mean Score

NEC - New Engineering Contract

NS - North South

RII - Relative Importance Index

SPSS - Statistical Package for Social Science

USD - United States Dollar

TABLE OF CONTENTS

LIST OF TABLES

.

.

LIST OF FIGURES

CHAPTER - ONE

INTRODUCTION

1.1 Background of the Study

Successful construction projects are those which are delivered to the required quality standards, safely, on time, and within the approved budget (Cunningham, 2013). The problem of cost overrun is very influential i.e it affects the other two factors, quality and time. The shortage of budget may lead to use of under qualified materials and labor; in addition, the shortage may enforce the employer to look at additional budget source which most time leads to project delay. One of the major causes of cost overrun is price escalation which is an increase in the cost of any construction elements of the original contract and base cost of a project due to passage of time (Williams et. al., 1999). It has been known that fluctuations of materials' prices, which are volatile, are a driver of project costs.

The most appropriate definition of price escalation for this study purpose is the one given by Jaeger, (1996) which states that price Escalation is the provision in a cost estimate for increases in the cost of equipment, material, labor, etc., due to continuing price changes over time. As the intention of this study is to address cost overrun mainly caused by a change in price of construction materials & labor at the railway projects of Ethiopian Railways Corporation; price escalation has been found more appropriate term than price adjustment or others. The phrase "price adjustment" is utilized by different authors for different range of cost related variation like for total price adjustment (adjusting the price for any possible reason allowed in the contract); however, in this study the phrase price escalation is to refer only the price increases in the cost of equipment, material, labor, etc., due to continuing price changes over time. In FIDIC (1999) Conditions of Contract for EPC/Turnkey Projects clause 13 defines price adjustment as a wide concept than price escalation including an adjustment for conditions unrelated to construction material or labor price. Moreover, the sub-clause 13.8 under variation and adjustment clause specifically states about price escalation as change in cost of materials and labor.

Cost overrun in general and price escalation in particular are more common to the construction industry. The complex nature of the construction projects specially those mega projects makes the construction environment highly disposed for cost overrun and price escalation. On the other hand, there is a great opportunity for these effects to become causes for further complications in the process. So a significant attention should be paid for price escalation issues in the construction projects especially in Ethiopia where most of the mega projects including the railway projects are financed through external loan. Fetene, (2008) explains that cost is one of the primary measures of a project's success and this is true, especially for public projects in developing countries like Ethiopia, because public construction projects in these countries are executed with scarce financial resources.

Improving the price escalation management and mitigating the related problems so is very important to minimize cost overrun in the project implementation. The appropriate management and mitigation of price escalation requires identifying the causes and effects of price escalation.

Identifying the possible root causes of construction price escalation helps that awareness will be created among the clients, consultants, contractors and other stakeholders in mitigating problems which may arise in the area of construction project financing, planning and procurement stage (Yadessa, 2015).

The other important issue for a better price escalation management is to understand the conditions of the contract about price escalation. As the desk study held revealed Ethiopian Railways Corporation (ERC) is employing EPC/Turnkey type of contracting in its all railway projects. To negotiate and handle the issues of price escalation in a manner that is fair to all the stakeholders; each party has to clearly understand the meaning of related clauses in the contract and evaluate the consequence.

1.2 Background of the Organization

ERC is a public enterprise which was established in 29th November/2007 based on Ethiopian council of Ministers regulation Nº 141/2007 (Federal Negarit Gazeta council of Ministers regulation No. 141/2007). Ministry of Transport is the supervising authority of ERC. The main purposes of the corporation are to build railway infrastructure, to operate cargo railway transport services, to operate passenger railway transport services and to engage in other related activities necessary for the attainment of its purposes.

Vision

- To see modern railways infrastructure and services and an efficient railway company that supports Ethiopia's endeavor in building a globally competitive economy, that uses electricity and connects the country's development centers and links with ports of neighboring countries.

Mission

- To support the fast growing economy of the country through constructing modern railways infrastructure which is cost effective and that transports bulk freight within short period of time and
- To expand passenger railways transport services and enhance public mobility.

On the official website of the corporation it has been declared that to establish a national railway network ERC has identified eight railway corridors for study, design and subsequent implementation, having a total estimated length of 5060km. The eight railway routes are:

Table 1.1 ERC Projects

Route No.	Route Name	Estimated Length(km)
1	Addis Ababa-Modjo-Awash-Dire Dawa-Dewanle	656
2	Modjo-Shashemene-Arbaminch-Konso-Moyale Including Shashemene-Hawasa and Konso-Weyto	905
3	Addis Ababa-Ijaji-Jimma-Guraferda-Dima including Jimma-Bedele (direct to Boma with further extension to south Sudan)	740
4	Ijaji-Nekemet-Assosa-Kumruk	460
5	Awash-Kombolcha-Mekele-Shire	757
6	Fenoteselam-Bahirdar-Wereta-Weldia-Semera-Elidar	734
7	Wereta-Azezo-metema	244
8	Adama-indeto-Gasera	248
	Total	4744

The construction of Addis Ababa LRT (Light Rail Transit) has been completed and operation has been launched. Of the two lines, the EW line will extend 17.35 kilometers, stretching from Ayat Village to Torhailoch, and passing through Megenagna, Legehar and Mexico Square. The NS line, which is 16.9 kilometres in length, passes through Menelik II Square, Merkato, Lideta, Legehar, Meskel Square, Gotera and Kaliti. Additionally, the two lines have a common track of about 2.7 km. Trial operations were begun on 1 February 2015, after several months of testing the project begun its operation on 20th September 2015.

On the other hand, the Addis Ababa/Sebeta-Meiso-Dewanle Djibouti (656km) railway project has been completed and soon will be in operation. The performance of the other two projecs Awash-Woldia/Haragebya (390km) and Mekelle-Woldia/Haragebya(260km) has become more than 50%. The rest of projects are on the way to be launched. (Babur" journal by ERC- Volume 1 No. 2, December/2014).

1.3 Statement of the problem

Now days, railway projects are being implemented in Ethiopia with huge investment of billions of USD. A great portion of this investment is obtained from foreign loan mainly from China. It is not difficult to consider how the country has taken high risk and become indebted for the sake of building these railway infrastructures. The successful completion and operation of these projects is a very significant and remarkable achievement to the country. As it is said before, one of the successful project characters is being completed within the approved budget. One of the main factors to reach at this achievement is developing an appropriate mitigation and managing mechanism for price escalation.

As a result of different causing factors, cost of construction projects exceeds the original contract price by a significant amount in most developing countries at the time of project completion. It

has also been observed that price escalation occurs frequently in the Ethiopian construction industry (Yadessa, 2015). The railway industry as one of the major component of construction industry is not safe from the challenges of price escalation. Moreover; together the high capital cost of railway construction projects, the price escalation effect would be more significant in the industry. Flyvbjer (as cited in Woyessa, 2014) explains that rail projects appear to be particularly prone to cost escalation, followed by fixed links. In the Ethiopian case, the construction cost control and price escalation management of the railway mega projects is relatively new to the country. In addition, there is no skilled man power present to construct a railway project by a local man power force. Following these, the occurrence of price escalation seems inevitable. The study of Woyessa has showed that in Addis Ababa Light Rail Transit project bankable feasibility study estimate was USD 400,234,004.25, contract price was USD 475,000,000.00, contract price plus cost increase according to questioner was USD 494,950,000.00 and contract price plus cost increase according to desk study was USD 498,750,000.00.

Therefore, the price escalation issues under EPC/Turnkey contracts; the causes and effects of price escalation; the price escalation mitigation and management adopted today and what improvement has to be employed should be critically identified. On the top of this, the practice of price escalation mitigation for those construction materials where the contractor is responsible for procurement and use but the price escalation is to be covered by the employer/client has to be particularly analyzed. Generally, the interest of this study is to assess the existing situation of price escalation in EPC / Turnkey contracts of Ethiopian Railways corporation's projects; evaluate the situation; identify challenges and recommend solutions.

1.4 Basic Research Questions

1- What is the current state of awareness of price escalation in the EPC/Turnkey projects of ERC?

2- What are the causes and effects of the price escalation in the EPC/Turnkey projects of Ethiopian Railways Corporation?

3- What are the existing price escalation management practices in ERC projects?

1.5 Objective of the study

General Objective:

The general objective of this study is to assess the condition and identify the main causes & effects of price escalation in the railway projects of Ethiopian Railways Corporation under the EPC / Turnkey contract and examine the current price escalation management practice with the aim of enhancing the mitigation practice in the specified and related projects. Furthermore, based on the findings of this research, conclusions and recommendations will

be given to strengthen those good practices; to improve weakened price escalation management process and mitigate possible problems which may rise in the future.

Specific Objectives:

The specific objectives of this study are:

- To assess the current state of awareness of the employer, contractors and consultants towards price escalation in the EPC /Turnkey contract of ERC railway projects.
- To identify the root causes and effects of price escalation under EPC / Turnkey contract in ERC railway projects.
- To assess the current price escalation management practices in the railway EPC / Turnkey projects.
- To identify methods to improve the price escalation management practices in the EPC / Turnkey railway projects.

1.6 Significance of the study

This study identifies the causes and effects of price escalation in EPC / Turnkey projects thereby assisting the enhancement of the understanding about the price escalation of EPC / Turnkey projects. As a result, this will enlighten on the mitigation and administration issue of price escalation in EPC / Turnkey projects. Finally, the study serves as a benchmark for further studies that take similar or related development challenges.

1.7 Scope of the study

The study considers the price escalation practice under EPC / Turnkey contracts only in the railway industry (excluding EPC / Turnkey projects in other construction sectors) and only railway projects in Ethiopian Railways Corporation (as it is the only railway project developer in the country). In addition, among many factors of EPC / Turnkey price adjustment issues only price escalation is considered due to time constraint.

1.8 Limitation of the study

The limitation faced while conducting this study was being unable to give adequate time and attention mainly by the respondents from the consultants to fill in the questionnaires and return on time. On the top of this, the credibility of the study may be influenced by the data collected from the secondary data sources which is a possible limitation that can be encountered in all research area.

1.9 Organization of the study

The thesis is organized with five chapters. The first chapter begins the basic research information as an introduction part of the research. The literature review is dealt in chapter two followed by the third chapter which covers research design and methodology in order to achieve the objectives of the study. The fourth chapter encompasses the analysis of findings and discussions part. The last chapter comprises the conclusions made and recommendations forwarded based on the major findings of the study.

CHAPTER – TWO

REVIEW OF RELATED LITERATURES

2.1 Introduction

This chapter presents a critical review of the research work that was done by various scholars in the area of price escalation of construction projects. This includes theoretical review, empirical review and conceptual frame work.

2.2 Theoretical Framework

2.2.1 Price Escalation in EPC / Turnkey contract

While reviewing this subtitle, it is must to have the concepts of three important aspects. The first is about price escalation which is the main content to be addressed in this study. The second is EPC/Turnkey Contract which is a type of construction contract where all the target projects of this study are employed in. Because the contract has so many financial and risk aspects that differentiate it from other construction contracts; it is advisable to consider what effects it will have on the price escalation practice in the projects. The third point is about FIDIC, also referred to as the International Federation of Consulting Engineers which is one of construction standard contract forms and is the one adopted by the target projects.

2.2.2 Price Escalation

Price Escalation is the increase in any element of project costs when the cost of that element is compared between two different periods (Lock, 2003). Escalation in the construction market in recent years has been extremely volatile, and this trend is expected to continue in the near future due to various and diversified factors. This situation has created a great deal of uncertainty and nervousness among construction field. The financial success of a construction project can be uncertain and at risk due to changes in escalation rates during construction (Bates, 1996). The success of a building construction project is mainly influenced by to what extent of cost escalation identified and allocated to the construction project. As significant portion of the factors that contribute for price escalation are out of control; budgeting for cost escalation is a major problem in the planning phase of projects (Dawood and Bates, 1998).

Yadessa, (2015) citing heritage foundation's estimate that Ethiopia's percentage of GDP (5 year compound annual growth) and inflation as at 2014 is 8.7% and 22.8% respectively; forwards his opinion that the cost contribution of construction projects to the GDP is so significant that proper attention should be given to construction industry in due possible time before the impact to the real growth of the country becomes a great concern. Furthermore, Yadessa reveals his experience with Ethiopian Roads Authority as highway engineer that he was involved in preparation of cost break down for construction projects during tendering and project execution period that ever since then he was able to observe a continuous rise in market price of construction materials, machinery and labor.

On the other hand, the issue of price escalation seems sensitive for developing countries like Ethiopia. As we have seen in the background part of this study cost is one of the primary measures of a project's success and this is true, especially for public projects in developing countries like Ethiopia, because public construction projects in these countries are executed with scarce financial resources and the majority of these scarce resources were obtained through foreign loan. From this scarce resource in Ethiopia for example, the construction industry is the highest recipient of government budget in terms of government development program. Consequently, public construction projects consume an average annual rate of nearly 60%, (MoWUD, in Weyessa 2014). The railway construction projects which are being conducted by Ethiopian Railway Corporation are among the major public projects being under taken by the Ethiopian government. Since most of the construction cost control and price escalation management of such a mega project is relatively new to the country; in addition, there is no skilled man power present to construct a railway project by a local contactor and local man power force; the occurrence of price escalation will be inevitable. Therefore a study of price escalation in the construction of railway projects being conducted at Ethiopian Railways Corporation will help to prevent from repeating some of the mistakes being made in various public construction projects which have been completed and which are being conducted by the Ethiopian government.

To have a better understanding of the price escalation factors is to understand the forces driving each factor or where the factor originates. With this understanding it is possible to design strategies for dealing with these price escalation factors. The factors that affect the estimate in each project development phase are by nature internal and external. Factors that contribute to price escalation and are controllable by the owner are internal, while factors existing outside the direct control of the owner are classified as external.

2.2.2.1 Factors that cause price escalation

There are a lot of factors that influence price escalation in construction projects. Chan and Park, in Fetene, (2008) have stated that the cost of a construction project is affected by a large number of factors because of the fact that construction is a multidisciplinary industry and its work involve many parties such as the project owner and various professionals, contractors and suppliers. Thus, a construction project cost not only depends on a single factor but a cluster of variables that are related to the characteristics of the project and to the construction team as well as the market conditions. According to a study made in Turkey by Arditi, et al in Fetene, (2008), the important sources for cost overruns were found to be inflationary pressures, increases in material prices and workmen's wages, difficulties in obtaining construction materials, construction delays, deficiencies in cost estimates prepared by public agencies and unexpected sub soil conditions were the most important sources for cost overruns. While numerous internal and external factors can lead to price escalation the following are explained in this study after trying to merge the above sources and other related concepts in different works (mainly Jennifer et.la, 2009 and Mohammed, 2013) together with considering EPC/Turnkey contracts documents. On the top of this, an emphasis is given for the factors that lead directly to price escalation in the sense of increase in material price. The following price escalation factors are described below for consideration in this study.

- **A Problem in the contract:** Poor contracting and poor contract management could be a factor of price escalation in construction projects. Sarwono, (2015) states that the most important thing before starting the construction project is deciding the right type of contract that will be used for the project's implementation. In order to get the proper decision, the understandings on various conditions of contracts are required. As per Sarwono, in Indonesia there are many projects that use the so called "modified" FIDIC Conditions of Contract for EPC/Turnkey Projects, but with the incorrect understanding on the reasons of using EPC/Turnkey Contract, so instead of solving the problem it may caused bigger problems in practice, many problems raised during the execution due to such incorrect understanding of the spirit of EPC/Turnkey Contract. Most of Employers choose the EPC/Turnkey Contract with minimum understanding of the essence of the EPC/Turnkey Contract. Their reasons of choosing the EPC/Turnkey Contract was the "tied schedule" and the "higher certainty of cost". However, FIDIC EPC/Turnkey Contract instead of fitting the Employer's need only, it still gives a chance to the contractor to submit their claim (like clause 13, 20 & some others) and even the price is fixed, payment could be made once the claim is accepted means that additional to the contract price can be done. One of the important noteworthy things is that a very careful consideration should be given when making agreements on escalation and adjustment issues.

- **Risk transferred to a party unable to control:** sometimes the division of risk between the employer/owner and the contractor could be a factor of price escalation. When risk is shifted to a party who is unable to control a specific risk, project cost will likely increase. In EPC/Turnkey contracts, the construction and procurement activities are carried by the contractors hence resulting in a limited control by the employer on the usage and purchase of construction materials. But the employer has the responsibility to cover or share the price increase in some or all construction materials.

- **Late Project Launch & Project schedule changes:** late project launch and project schedule change lead to a time gap where the price estimate will face unanticipated increases in inflation cost effects even when the rate of inflation is accurately predicted. Late hand over of construction sites for example, sometimes may happen and substantially increase the cost of construction projects. In most international projects in Ethiopia late site hand over is a common form of claim source for compensation for contractors (Girmay, 2003).

- **Effects of inflation**: In simple terms, inflation is caused by an increase in the stock of money that is available for spending while the quantity of goods available for purchase does not increase by a proportionate amount (Pickrell, 1992). The longer the expected construction period, the more account will need to be taken of expected inflationary price increases over time. Initial cost estimates will need to allow for the value that will need to be paid at the time the project actually goes ahead. Inflation can act to increase the original estimates of construction costs. Inflation may have been taken into account in the original estimates, but if the rate of inflation increases above the predicted level during the construction period, then the original cost estimate will be exceeded. Obviously any

other factor that delays a project will expose the project to the risk of further inflationary cost increases (Hufschmidt and Gerin, 1999).

- **Increase in Global Demand for Construction Materials:** One of the most fundamental factors determining the prices of any products or services including construction is the relationship between demand and supply in which the market prices are determined by the equilibrium conditions. However, this equilibrium is not static. It is determined by dynamic forces of the market and evolves over time as some sectors become more attractive than the others (Mohammed, 2013). In the last decade, the capability of material sources has not increased as much as demand has increased. This gap in the supply-demand equilibrium has resulted in increases in material prices. Steel, asphalt, cement, and aggregates are some of the most strongly affected commodities (Ajibade, 2009). Fetene, (2008) also has explained this that during periods of high development where the level of construction activity is unusually high in a particular region, there may be shortages of some construction materials. Sometimes the local market may not be able to supply the full demand of these construction materials; hence, a need may arise to import these construction materials from abroad. If this was not anticipated in the original cost estimate, delays may occur and/or the prices of these elements may increase which consequentially lead to delay and cost overrun for the project.

- **Failure in market assessment & procurement procedures:** This could be a factor when the price escalation is to be covered by a party not procuring the construction materials. The reason behind the failure in appropriate market assessment or/and failure to follow the proper procurement procedure could be either negligence or a share in the benefit from purchasing over market price. In EPC / Turnkey projects the contractor is responsible for both procuring and executing. In the case of Ethiopian Railways Corporation for example, as per the contract agreement sub-clause 13.8 of the particular condition of the contract agreement; the contractor is entitled to a difference of actual price and base price (assuming price escalation). This may lead the contractor to be negligent to properly assess the market price &/or even there may be a chance to not follow the proper procurement procedure and buy those construction materials at unfair high price making a deal with the supplier.

- **Shortage of skilled labor:** The current high volume of construction is creating a high demand for skilled construction workers. Labor shortages can have severe consequences especially sectors like construction, given the inter-relatedness of the production process and the backward and forward linkages that are involved (Henson and Newton, 1995). The shortages of skilled labor increase the contractor's risk, by increasing the likelihood of delay. The most obvious and direct consequence is that the construction job does not get started or completed in a timely fashion.

- **Limited Capacity of Material Producers:** The availability of material sources is falling short of the market demand. Some of the materials which are affected by this gap in demand and supply are cement, asphalt, and steel, among others. Material producers design the capability of their production facilities based on a prediction of future demand.

If there is a large uncertainty in future demand, material producers typically design their production facilities short of expected demand (Damnjanovic in Mohammed, 2013).

- **Fluctuation in Money Exchange Rates:** The exchange rate is particularly relevant if contracting services or other elements of the project are being purchased. If exchange rates change beyond the level predicted by the project sponsor (and the companies providing the services) then the cost of the project can increase. It can of course operate in the opposite way where the project sponsor takes advantage of a strengthening of his own currency. A study conducted in Nigeria revealed that, about 50 percent of the building materials and components incorporated into construction or parts of the materials ingredients required for the manufacture of the materials are sourced from overseas and this brings to closer attention the issue of foreign exchange and its inherent problems in construction industry and the need for local sourcing of building materials (Udeh in Mohammed, 2013).

- **Poor Estimation:** Sometimes poor estimation can result in project cost underestimation. Estimate documentation must be in a form that can be understood, checked, verified, and corrected. The foundation of a good estimate is the formats, procedures, and processes used to arrive at the cost. Poor estimation includes general errors and omissions from plans and quantities as well as general inadequacies and poor performance in planning and estimating procedures and techniques. Errors can be made not only in the volume of material and services needed for project completion but also in the costs of acquiring such resources.

2.2.2.2 Effects of Price Escalation

Effects are the consequences that will be encountered when price escalation occur on a construction project. Fetene, (2008) states that cost overruns have obvious effects for the key stakeholders in particular, and on the construction industry in general. To the client, cost overrun implies added costs over and above those initially agreed upon at the onset, resulting in less returns on investment. To the end user, the added costs are passed on as higher rental or lease costs or prices. To the professionals, cost overrun implies inability to deliver value for money and could well tarnish their reputations and result in loss of confidence reposed in them by clients. To the contractor, it implies loss of profit for non-completion, and defamation that could jeopardize his or her chances of winning further jobs, if at fault. To the industry as a whole, cost overruns could bring about project abandonment and a drop in building activities, bad reputation, and inability to secure project finance or securing it at higher costs due to added risks. The study of Fetene further identified the following as the major effects of cost overruns: delays during construction, supplementary agreement, additional cost, budget short fall, adversarial relationship between participants of the project, loss of reputation to the consultant, the consultant will be viewed as incompetent by project owners, high cost of supervision and contract administration for consultants, delayed payments to contractors, the contractor will suffer from budget short fall of the client and poor quality workmanship. After analyzing the conditions of EPC/Turnkey projects and the effects that may result from the specific actions of

price escalation, the following effects of price escalation are selected to be considered in this study.

- **Delay in the Project Performance:** Price escalation can result in delay of project performance in many ways. The desk study in Ethiopian Railways Corporation has revealed that the loan agreement made between ERC and foreign creditors did not include a case of price escalation. In such conditions when price escalation is happened the employer is enforced to look for further loan to fill the gap. Because facilitating a loan is not simple process a delay in project performance becomes inevitable.

- **High Project Cost:** It is obvious that price escalation is additional cost to a project so definitely will lead to high project cost. This is a direct effect of price escalation in a project. In another way, in the previous parts of this study it has been mentioned that there is high probability for the effect of price escalation to become a cause for further complications. In the above paragraph we have seen how price escalation could lead to a delay in a project performance. A delay in a project performance on the other hand brings many other situation which lead to further price escalation. Through a delay price of materials and labor could escalate; fixed costs of a project remain incurring regardless of project performance; exchange rate issues and others also could have a probability to aggravate the price escalation. Those projects that have not been scrapped or significantly delayed as a result of price escalation difficulties have frequently experienced higher project costs. Contractor and supplier fears regarding potential, future price escalation, and the absence of price escalation clauses in most construction contracts, often leads to higher contract prices and larger project costs (Pearl, 1994).

- **Project Financing Problem (Budget Short Fall):** Where construction cost overruns arise, the lenders will not expect, and will likely not agree, to advance additional funds to the project company to help fund the overruns. A desk study in ERC has shown that a financing problem especially a lack of foreign currency has been noticed following price escalation. It has to be recalled that the financing problem could result in failure to pay interim payment requests which again will lead to a request of an interest payment to the employer by the contractors and consultants.

- **Disputes among Stakeholders:** Sambasivan and Soon, (2007) discuss that disputes are insidious often resulting in time overrun, cost escalation, litigation, and complete abandonment of projects. Mohammed, (2013) explained that many construction disputes are arising out of disagreement and delay of hardship and expense during the construction project. Disputes in construction may be caused by one or a combination of several reasons. Most of the typical disputes are caused by factors such as unrealistic contract duration and costs, impact and ripple effects of delays, evaluation of the quality and quantity of works, differences in the interpretation of plans and specifications, unfulfilled duties, inefficiency and disruption (Groton, 1997).

2.2.2.3 Price Escalation Management:

As it has been explained in the above sections, price escalation in the construction market is a cumulative effect of a number of different factors. While each of them may contribute only a small amount to the overall cost of a project, when combined they are a significant driving force behind the rising costs of building a new infrastructure. Because there are so many factors contributing to escalation, managing escalation requires a variety of mechanisms. Many of the mechanisms will demand new ways of approaching construction design, procurement and a redistribution of the risk allocation in projects. Price escalation occurs during the planning, design and execution phases of a project. Price escalation management should also be applied on all phases of a project. Focusing early on price escalation factors will reduce cost growth at bid time or during construction. Different price escalation management mechanisms are applied in different industries and in different contract types. The causes of cost overrun in construction projects are varied, some are not only hard to predict but also difficult to manage (Morris and Hough in Fetene, 2008). For this study purpose the following price escalation management mechanisms are selected for their nature of applicability in EPC/Turnkey contract projects.

- **Contract Related Issues:** Price escalation clauses are issues in price escalation management both from the angle of being part of the contract and in contract administration aspect. Good negotiation when setting the contract and administrating it well with respect to price escalation is one management issue. Misunderstanding price escalation clauses in a contract and failure in implementation of the contract could give a way for poor price escalation management. Especially significant consideration should be paid for a fair sharing of price escalation costs. All the stakeholders should be incentivized to mitigate and manage it.

- **Bulk Material Purchase:** As builders, contractors have options related to the procurement of materials when they know that a cost escalation is likely. They may wish to have a strategic delivery/product storage plan to enable them to have materials strategically purchased and staged in advance of need. Strategies could include purchasing materials in advance themselves, or paying subcontractors to do so via payment for stored materials. Both approaches have potential issues to work through, including cost, contract, insurance and a variety of logistical implications. Everline, (2014) explained that contractors should buy materials in bulky at the start of the project to avoid the effects of price escalations.

- **Buyer-Supplier Partnership**: Partnerships present procurement executives with a chance to lower costs. Buyer – Supplier relationship has got a great consideration and it makes sense as the costs of purchased goods and services are the major portion of the total costs in companies. The earlier recommendations of keeping suppliers at arm's length seem abandoned. Emphasis is on potential benefits to be achieved through more collaborative relationships and "partnering with suppliers" (Carlisle & Parker 1989). There are many advantages that come as a result of building strong buyer and supplier relations over a period of time. There is a greater commitment from both groups which means that you will be better able to rely on them when it comes to orders and payments. There may also be more scope for discounts after the relationship is established and there

may be more flexibility in the timing of payments. Trust between the buyer and supplier is developed over time and this may allow for the sharing of information, forecasts, knowledge and customers between the buyer and supplier. Moreover, long term buyer and supplier relationships generally involve a high level of commitment and work to maintain. Entering into long term contracts may be involved so it is important to have accurate forecasts about the future performance and needs of both businesses.

- **Market Assessment & Procurement Procedure:** Most times making appropriate market assessment enables to identify the fair market price available in the time and following the procurement procedures in a formal and legal way avoids mischief and deliberate over market price transactions. If there is a regular system developed to control the procurement process i.e if there is a mechanism to check whether appropriate market assessment is made or not, and whether proper procedure is followed or not; transparency will lead to trust to be reign among the stakeholders.

- **Use of Local Materials:** When using local building materials the price escalation that may arise from transportation from abroad, fluctuation in money exchange rates, international inflation and increase in international construction materials need will be addressed. The use of local building materials has an important impact on the reduction of costs for a building project. The production costs of building materials and their prices are mainly affected by the prices of the raw materials from which they are produced, the place of production and the transport costs which are, in the case of imported raw materials, high. The selection of appropriate local natural raw materials would reduce energy consumption for the production of building materials and would also affect their prices. Nasir N. (2000), explains that local raw materials are easily accessible and do not incur such high transport costs, which can even be 50 % of the total costs.

2.2.3 EPC (Engineering. Procurement and Construction)/Turnkey:

Different writers understand the special contract types in construction in different ways and present differently. Nitin, (2010) states the available contracting options are Design – Bid – Build (Traditional Contracting), Design – Build, EPCM (Engineering - Procurement and Construction Management), EPC (Engineering, Procurement and Construction) / Turnkey. Each project delivery method has its own features regarding risk allocation, roles & responsibility, pricing and others. Joseph, (1997) on the other hand explains that the methods of contracting available to the employer can be split into two broad categories: design-bid-build, which separates the design and construction functions, and design-build, or turnkey, which places the entire project, including design and construction, in the hands of the contractor. The turnkey method is often referred to as "engineering, procurement and construction" (or "EPC"), especially in the context of project financing.

In its most extreme form, EPC is referred to as a Turnkey contract wherein employer involvement is only to turn the key after completion to commence operation of the constructed facility. Kyle & Cristian, (2009) state that the term “turnkey” indicates that the system is delivered to the client ready for operation. It is a type of contract typical of industrial plant

construction sector, comprising the provision of engineering services, procurement of materials and construction. The main importance of EPC is to have a single point of contact for the client with respect to all the aspect involved in a project. The outstanding feature of the EPC is that the ultimate price and time of the project have a great degree of certainty. This is a design & construct, where the project is largely contractor managed and the cost, risk and control are weighted towards the contractor and away from the owner. In EPC/Turnkey contract the majority of the risk is transferred from the owner to the contractor, due to this reason the contractor will add a substantial risk premium to the contract price.

The EPC contractor has direct sub-contracts with the construction contracts. The contractor would require broad range of experience across different industries. It is fixed price contract and there is minimal/no opportunity for the employer to change the design after the bid is accepted. The employer has to furnish precise requirements in terms of specifications, capacities and performance parameters. Tender review is very crucial to ensure that the contractor's proposed design meets the employer's requirements and are of the requisite quality. The contractor also has to invest greater resources in tender preparation as he is responsible for project delivery and the payment terms includes mobilization advance and milestone linked payment.

In addition to the above writers Jonathan, (2007) explains EPC Turnkey in a summarized way as follows: the idea behind the turnkey approach is, putting it crudely, for the contractor to be given the job to engineer, procure and construct the required works and then, once ready for operations, to hand over the keys to the owner so that it may operate the facility. Turnkey, in principle, means a contract whereby the contractor provides whatever is necessary for a certain purpose.

EPC / Turnkey is one of the global construction contracting models and the one employed by all railway projects in Ethiopia. Abhishek & Sanjay (2015) discussed that EPC/Turnkey contract is different from others, mainly in:

- ✓ **Design Responsibility**: Relating to design responsibility the contractor is solely responsible for designing. The Employer/Owner prepares its requirements in the form of specifications, for the sake of scope & other technical criteria, such as performance criteria often on a fitness for purpose basis.

- ✓ **Contract Price Determination:** In terms of contract price determination, there is generally as milestone based payments. In this mode the payments are made for the work conforming to the agreement & commensurate with the stages of completion of works.

- ✓ **Contract Administration Approach:** For Contract Administration, the Employer/Owner has to make his own arrangements. The owner hires consultants for monitoring the project. The consultants reduce the employer's involvement to the minimum during construction. This Employer's Agent hired to coordinate all processes on professional service agreement basis without direct responsibility for design & works.

- ✓ **Risk Allocation:** To distinguish the EPC from other traditional forms of project delivery, it is essential to understand the Risk Allocation. If both owners & contractors take a long-term view & take into consideration the benefit of consistently applying an optimal

method to themselves & for the rest of their industry, they will realize that over time optimizing risk allocation reduces everyone's cost & increases the competitiveness of all parties involved. Any ways in an EPC contract the risk is transferred from the owner to the contractor.

- ✓ **Performance Guarantee:** The performance guarantees undertaken by the contractor are based on certain assumptions with respect to the quality of raw materials used & the operating conditions, such as climatic conditions, availability & regularity in supply of utilities etc. Difficulties occur when the assumptions & the conditions prevailing mismatches/differs. A failure to meet contractual performance guarantees is often sanctioned by liquidated damages reflecting the degree by which guarantees have been missed.

The great confusion about EPC/Turnkey contract arises from the feature of the contract and the complex nature of the construction industry. One group of people, mostly in the employers side, state that the outstanding feature of the EPC is that the ultimate price and time so that the projects have a great degree of certainty. This is what it makes the EPC/Turnkey contract selected over the others. Why employers pay high contract price is considering the risk transferred to the contractors and the ultimate reason is to have a fixed cost and limited project time. So an issue of price escalation seems a paradox with the basic nature of the contract. On the other hand, the other group claim that in the construction industry, the contractor works in an environment of risk and uncertainty caused by the economic factors such as fluctuations in the costs of materials, labor and equipment. Contractors and suppliers working in today's volatile materials market find that estimating, bidding and financing the construction projects are challenges. Many face significant losses or erosion of anticipated profits because many of them are locked into fixed price construction contracts where contractors bear the risk of material price and supplier cost increases. Without the price escalation clause that allows for an adjustment to the contract price, if there is an unexpected rise in the market prices of key construction materials, a contractor will have no respite from such increases. It is necessary to have an escalation clause in the contract to guard against a sudden spurt in the cost of materials.

2.2.4 Fédération Internationale des Ingénieurs-Conseils (FIDIC)

A civil engineering construction contract is in fact almost an anomaly in real terms because it is usually written by the client without really negotiating with contractor. A contract is basically commitment between two consenting parties, which, if breached, remedial protection can be sought under the law by the affected party, since the law recognizes its performance as the rightful duty. The repeated use of a 'construction contact format' has lent it a certain amount of standardization with respect to its write-up and content, with regard to its various terms, conditions and clauses. Various contract forms are used for the construction contract and FIDIC is a global representative for the consulting engineering industry. Some of the other forms are the Joint Contracts Tribunal (JCT), Institution of Civil Engineering (ICE), the New Engineering Contract (NEC) and others.

FIDIC is well known for its work drafting standard form Conditions of Contract for the worldwide construction industry, particularly in the context of higher value international construction projects. Its users believe that FIDIC form of contract is considered to be well-balanced and equitable form that clearly defines the role and responsibility of all parties to a contract. It has a fair apportioning of risks, rights and obligations between the parties. It is in wide use of for international contracts. It contains a set of effective, clear and complete conditions. It contains a set of effective, clear and complete conditions.

FIDIC, also referred to as the International Federation of Consulting Engineers, produces standard forms of contract for civil engineering construction which are used throughout the world. FIDIC contracts are often referred to as the international standard. It is the main standard which has been in use in Ethiopia including Ethiopian Railways Corporation. Girmay, (2003) after watching different construction projects in Ethiopia have stated that one common element in all the international projects has been the use of the FIDIC form of Contract, which is gaining wide acceptance in the management and administration of international projects.

There are five types of forms of contract in the FIDIC family; these are:

• **Red Book**: Is intended for Civil Engineering construction works.

• **Yellow Book:** It has more emphasis on testing, commissioning procedures, guarantees etc and is suitable for manufactured plant, such as turbines, generators.

• **Silver Book**: Is intended to be suitable for turnkey bases and with strictly two-party approach.

• **Green book**: The green book is ideal for contracts of a smaller nature.

• **White Book:** The white book is used for Consultancy Services (Design and Supervision) in Design Bid Build (DBB) delivery system.

As it has been discussed in the previous section, FIDIC Clause 13 ‘‘Variations and Adjustments, Sub-Clause 13.8 ‘Adjustments for Changes in Costs’ reads as ‘if the Contract Price is to be adjusted for rises or falls in the cost of labor, Goods and other inputs to the Works, the adjustments shall be calculated in accordance with the provisions in the Particular Conditions.’’ If this Sub-clause applies, the amounts payable to the contractor shall be adjusted for rises or falls in the cost of labor, Goods and other inputs to the works, by the addition or deduction of the amounts determined by the formulae prescribed in this sub-Clause. To the extent that full compensation for any rise or fall in costs is not covered by the provision as of this or other Clauses, the Accepted Contract Amount shall be deemed to have included amounts to cover the contingency of other rises and falls in costs. As per the desk study made at ERC there are two types of calculation for price escalation.

- One is simply an agreement that the price of those compensable (by the employer to the contractor) construction materials on the date of the signing of the contract from selected sources will be used as a base price and any difference between a purchasing price and

base price will be compensable i.e if price increases the difference is to be given to the contractor and if price decreases the difference is to be given to the employer.

- The other is using a formula of FIDIC which is

$$Pn = A+b\frac{LL_n}{LL_o} + c\frac{CE_n}{CE_o}+d\frac{F_n}{F_o} + e\frac{S_n}{S_o}$$

Where

- "Pn" is the adjustment multiplier to be applied to the estimated contract value of the work carried out in period "n", this period being two months unless otherwise stated in the contract.

- "A" is a fixed coefficient stated in the relevant table of adjustment data, representing the non-adjustable portion in contractual payments.
- "b", "C", "d" and "e" are coefficients representing the estimated proportion of each cost element related to the execution of the works, as stated in the relevant table of adjustment data; such tabulated cost elements may be indicative of resources such as local labour, cement, fuel and imported materials.

- "LLn", "CEn", "Fn", and "Sn" are the current cost indices or reference prices of local labor, cement, fuel and imported materials respectively for period "n", each of which is applicable to the relevant tabulated cost element on the date thirty days prior to the last day of the period (to which the particular payment certificate relates); and

- "LLo", "CEo", "Fo" and "So" are the base cost indices or reference prices of local labor, cement, fuel and imported materials respectively, each of which is applicable to the relevant tabulated cost element on the base date.

2.3 Empirical Evidence

It has been discussed that as a result of complex nature of the construction industry and the volatile surrounding environment price escalation is almost inevitable event. Following this fact, so many researchers have been conducting different researches to identify the possible causes and effects of price escalation in different sectors of the construction industry. This part of the study tries to present different findings of the researchers towards the causes and effects of price escalation in the construction industry.

Eshofonie, (2008) has revealed a total of 40 causes of cost overruns with the top few causes being the following: incorrect planning, wrong method of estimation, contract management, fluctuation of prices of materials, previous experience of contractor, absence of construction cost data, additional cost and project financing. Eshofonie has further identified four effects of cost overruns which are company or firm liability to insolvency and liability of the companies or firms to bad debt; underutilization of man-power resources, plants and equipment; increased project cost due to extension of time: Longer project duration means that more resources will need to be allocated to the project, which then increases the project costs and project abandonment.

The study of Baloyi and Bekker, (2011) on the other hand revealed that increase in material cost, inaccurate material estimates, shortage of skilled labor, client's late contract award, project complexity, increase in labor cost, inaccurate quantity take-off, difference between selected bid and the consultants' estimate, change orders by client during construction and shortage of manpower. Rahman, Memon and Abd.Karim, (2013) identified the following as the top ten causes of cost overruns in large construction projects: fluctuation of prices of material, cash flow and financial difficulties faced by the contractor, poor site management and supervision, lack of experience, schedule delay, inadequate planning and scheduling, incompetent subcontractors, mistakes and errors in design, frequent design changes and poor financial control on site. These causes are indeed for a general cost overrun in construction industry. This study so that has a main focus on the price escalation i.e a change in price causing factors specifically.

When coming to Ethiopian case, a research work by Fetene, (2008) which is made on completed public building construction projects in Ethiopia has identified that 67 out of 70 public building construction projects suffered cost overrun. The rate of cost overrun ranges from a minimum of 0% to the maximum of 126% of the contract amount for individual projects. As per the study, from identified 39 causes of cost overrun for Ethiopian case the most important were found to be inflation or increase in the cost of construction materials, poor planning and coordination, change orders due to enhancement required by clients, and excess quantity during construction. Fetene further explained that the most common effects of cost overrun identified by his research were delay, supplementary agreement, adversarial relations among stakeholders, and budget shortfall of project owners. Fetene also concludes that cost overrun does not affect only those parties that are involved directly in the construction of a project, but its effects pass to the construction industry as a whole and consequently to the national economy of the country.

The work of Ashebir, Wubishet & Murad, (2017) on cost overrun in Ethiopian Road construction sector, based on the percentage of maximum score rank of 40 identified factors, six top rated factors identified were material price fluctuation, cost underestimation, delay in supply of raw materials, inadequate review of contract documents, lack of coordination at the design phase and lack of cost planning during pre and post contract stage have the highest impacts on the performance of project costs from the clients', consultants' and contractors' perspective. The study also has revealed that the magnitude of cost overrun among selected projects extended from 4.16% to 83.2% while the average magnitude of cost overrun was nearly 21.52%, and stresses that this is a significant amount when it compared with the number of projects.

An assessment made by Mohammed, (2013) on the Price Escalation and Adjustment Problems on Federal Road Construction Projects of Ethiopia claimed that poor estimation, improper planning and/or improper implementation of proper planning and project schedule changes are the identified major internal causes of price escalation and also increase in material cost/material price fluctuation, increase in global demand for construction materials, fluctuation in money exchange rates and limited capacity of material producers are the identified major external causes of price escalation in Ethiopian federal road construction projects. The work of Mohammed also has revealed that the major effects of price escalation are higher project costs, cash flow (project financing) problem of the projects, delay and dispute among parties. Mohammed also has identified that uncompensated increase in cost of construction materials, and construction price indices may over estimate or under estimate the market conditions as at

how prices have risen and selection of the most suitable index in using inflation indices are identified as major problems of price escalation & adjustment in Ethiopian federal road construction projects.

Similarly Yadessa, (2015) has assessed the causes of price escalation in the specified projects, Federal Road Construction Projects of Ethiopia, and concluded that the major five price escalation causing factors in the specified projects are cost inflation of construction materials, change in foreign exchange rate of imported materials, lack of proper budgetary planning and less emphasis given to planning by clients and financiers, cost of labor, equipment and material and the tendency of the client to stick to list bidder criteria rather than analyzing the bid offer against the engineers estimate. Moreover Yadessa described that the effect of price escalation of federal road contracts is necessitating the requirement of more funds to get injected into the road development program against the planned budget allocation program of clients' and financiers' . The effect has also transcended as far as clients' losing their contractual power to terminate and replace long overdue and liquidated road contracts with new ones as a result of the danger of facing an escalated project contract cost for the remaining portion of the work.

The final research work considered here is cost overrun and impact assessment of Addis Ababa's light rail transit construction project by Woyessa, (2014). As per this research among the main causes of cost overrun in the specified project the researcher has summarized the following:

- ✓ Delay and scope change of the contract date and items of work, the responsible parties for this cause were the client/owner. This resulted in Price adjustment with material at construction stage.

- ✓ Variation caused due to underground and elevated structures at construction stage the reasoning provided include Change of tunnel section in to elevated sections and problems observed at six of the junctions presented in the previous chapters, responsible parties for this cause were client/owner and contractor.

- ✓ Inadequate preconstruction study prior to the construction period which led to change in the control system and conceptual design of works and the main responsible parties for this were the client/owner and contractor.

- ✓ Type of project bidding and award (negotiation, lowest bidder…) which was caused due to lack of foreign currency and appropriate funding or loan to execute the project and the main responsible party noted was the owner/client.

- ✓ Finally Inadequate site investigation and unexpected ground conditions even though the ripples of this problem are shown in the construction stage of the project its roots belong in the pre construction stage and the main responsible party is the contractor.

2.4 Conceptual Framework

The conceptual framework in this study was used to show various factors that affect the performance of construction projects. The research studied a few selected variables based on their importance on performance of railway construction projects in ERC. The conceptual framework is presented by grouping factors sharing similar patterns of how they impact on price escalation based on the work of Fahad and Li (2013). They developed a typology according to the following steps: first, the empirical literature on infrastructure project cost overrun causes is reviewed and catalogued; second, based on the review a typology of cost overrun causes has been developed to provide a theoretical framework which organizes and describes, parsimoniously, the pattern of relationships between types of causes, overrun and corresponding management approaches - thus simplifying the seemingly complex pattern of relationships. The typology study organizes the main causes in four types (financial uncertainty, novelty, complexity, and time pressure).

Financial Uncertainty: This type represents factors impacting on the volatility of input costs for the project. Factors categorized under this group type are inflation, market growth, poor market assessment, poor suppliers capacity and fluctuation in exchange rate. These factors can lead to price escalation and then to those specified results through shortage of construction materials, unfair materials price, and decreased purchasing power of money.

Novelty: This type increases the uncertainty of tasks and outcome, thus making planning and estimating difficult. Factors categorized here are schedule change, poor estimation, and lack of skilled man power which lead to the specified results through dalliance, unexpected material price increase and high salary / wage.

Complexity: This type increases the complexity of coordination of parties and tasks, thus making it harder to meet preset targets. Factors categorized under this group type are contractual problems and unfair risk share. They lead to the expected results through unable to control price escalation and a gap leading to price escalation.

Time pressure: Forcing project team to take short-cuts, crashing, concurrent tasks/projects which are known to cause delays and overrun.

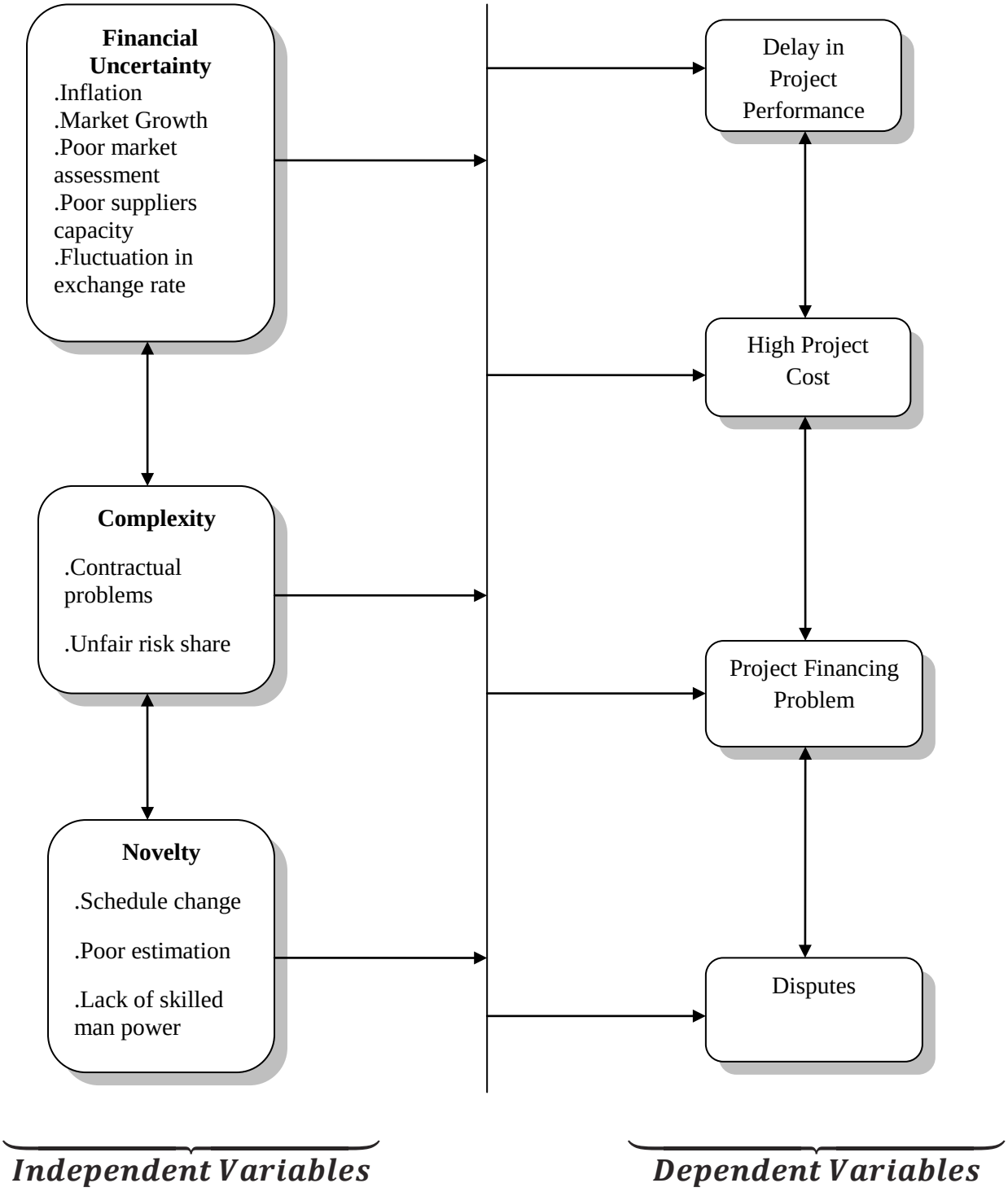
We can further categorize these items as independent variables which are stable and unaffected by the other variables rather affect and dependent variables that depends on other factors.

Independent Variables: inflation, market growth, poor market assessment, poor suppliers capacity, fluctuation in exchange rate, schedule change, poor estimation, lack of skilled man power, contractual problems and unfair risk share.

Dependent Variables: items to be categorized here are delay in Project Performance, High Project Cost, Project Financing Problem and Disputes.

For this study purpose the price escalation causing factors are categorized in three of the above groups. From each group the immediate causes for price escalation come out and lead to the specified price escalation effects. The conceptual framework is described in Fig. 2.1.

Fig. 2.1 Conceptual Framework



CHAPTER – THREE

RESEARCH METHODOLOGY

3.1 Research Design

The study is descriptive in its nature. Data was collected from relevant sources to evaluate the understanding of different stakeholders on the issues of price escalation, identify the main price escalation causing factors & their effects, and assess the current practice of price escalation management in EPC / Turnkey projects of ERC. Moreover, quantitative and qualitative approach has been applied, because it has been used to obtain valid information to achieve the objectives of the study. Hence the research design is mixed approach.

3.2 Type and Source of Data

For the purpose of this study, both primary and secondary sources of data are used in order to obtain relevant information. Primary data were collected through the administration of questionnaires with both open ended and closed ended questions to the respondents that were selected through purposive sampling and desk studies. Secondary data were collected through published works, journals and related articles that contributed to better understanding of the research topic.

3.3 Sampling Design

The sampling design that has been conducted for this research is non-probability sampling as the sample size that required for this research has been selected based on the respondents convenience to the research topic.

3.4 Sampling Technique

As the number of respondents is limited who are appropriate and who have the expertise in the area being studied; the technique that was used in this research is purposive sampling. This form of sampling enables to use judgment to select cases that will best enable to answer research question(s) and to meet the objectives. It involves the selection of a group from the population on the basis of available information.

3.5 Target Population

As the purpose of this study is to describe and explore the condition; the cause & effect of price escalation and assessing the practice of price escalation management at EPC / Turnkey projects of ERC; the research samples were gathered from the main stakeholders namely the employer, contractors and consultants in the railway construction industry selected based on their direct involvement in the railway construction activities. Because the effects of price escalation need considerable time to be identified; from all the projects of ERC those with work performance of

50% or above were decided to be included. So that the two completed railway projects (Addis Ababa LRT & Addis Ababa – Djibouti) and the two under construction railway projects with a construction progress of more than 50% (Awash – Woldia and Mekele – Woldia) were the only four projects fulfilled the criteria. The main stakeholders i.e the employer, the contractors and the consultants in these projects were the target population.

3.6 Sample Size

One of the significant factors in selecting appropriate sample size is to consider the time available for conducting the research work. As stated in Richard M. Jacobs (cited by Getachew, 2016) for survey research, it is common to sample 10 % to 20 % of the population. Considering the time constraint; 10 % of the permanent and professional employees from the contractors and the consultants i.e 18 from contractors and 12 from consultants decided as a sample. For the employer; although the 10 % exceeds 50, because the great majority of the employees lack enough knowledge towards price escalation details only 21 experts and managers in contract administration and cost analysis departments with price escalation information were selected. So that the total sample size was 51.

3.7 Data Collection Instrument

The instruments for this study are developed in such a way that the data collection approach is adopted for conducting the study from both primary and secondary sources. A questionnaire with both open & closed ended questions and desk study provide the primary data for this thesis while the secondary data sources include journals on project construction management, internet sources, and related archival documents on price escalation of projects. These different methods of data collection system have been used in order that the data or information obtained from one would supplement the other source where information gaps have been exhibited and enforcement of evidences is required.

3.8 Data Analysis

The data collected was analyzed using both quantitative and qualitative methods. For the data obtained using close ended items of the questionnaires both descriptive and explorative data analyses methods were employed to process and analyze the data using Statistical Package for Social Science (SPSS) software version 20. Frequency tables are used to display the results and Mean Score is used to rank the ratings given by the respondents. The weights given to different items have been tried to show in different graphs. On the other hand, the data obtained using open ended items of the questionnaires were analyzed by organizing the common ideas and concepts of the response into a meaningful format.

3.9 Validity & Reliability

For measuring what actually is intended to be measured with accurate and precise measurement procedure; the study used reliable and mostly recent sources of information. Questionnaire that is with both open & close ended questions and a desk study were developed so that the results of the data can be easily comparable. Generally, to ensure the quality of research and make it credible for the scientific community; the researcher gave due care to both validity and reliability issues of the

data, the research process in general as well as the research output. The questionnaires reliability was checked by the Cronbach‘s alpha test coefficient using SPSS software and the gained result was .78 which exceeds the recommended cut-off value 0.7. Therefore, based on the test, the results for the items are reliable and acceptable.

3.10 Ethical Consideration

Ethical considerations are expected to be involved in any kind of research study. This paper therefore has taken into consideration of those ethical issues on access and use of data, analysis and report of the findings in a moral and responsible way. Participants are assured that the source of data collected would remain confidential and that anonymity has been maintained. Through briefing the questionnaire to the respondents, oral consensus has been reached.

CHAPTER – FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter of the study deals with the analysis and discussion of the data gathered from the desk study and questionnaire survey. It includes the assessment of the causes and effects of price escalation and the practices of price escalation management in EPC / Turnkey railway projects of Ethiopian Railways Corporation. The procedure used in analyzing the results was aimed at identifying the understanding & attitudes of the main stakeholders i.e the employer, the contractors and the consultants towards price escalation issues; establishing the relative significance of the various factors that are responsible for price escalation of the specified projects and their respective effects on the projects and the stakeholders. The questionnaires were both close ended and open ended for they are intended to give each respondent an opportunity to identify the causes, effects and mitigation of price escalation at the railway projects in Ethiopia. The questionnaires were developed using five scales ranging i.e, Likert scale with five options of responses.

The analysis was aided by the use of Statistic Package for Social Science (SPSS) where the scores assigned to each factor by the respondents were entered and consequently the responses from the 41 questionnaires were approached through different statistical analyses for further insight. The contribution of each of the factors to overall price escalation was examined and the ranking of the attributes in terms of their criticality as perceived by the respondents was done by use of Mean Score table. Frequency tables and percentage tables also have been used whenever needed. During the desk study all relevant documents of each project such as contract document, amendments, FIDIC documents, interim payment certificate, and other related documents of the project were thoroughly investigated.

4.2. Questionnaire Response Rate

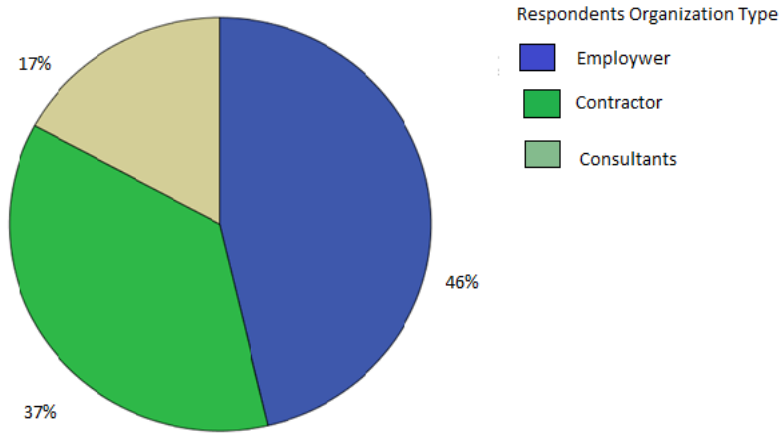
Detailed questionnaires with open and close ended questions were designed and distributed for the assessment of price escalation in EPC / Turnkey railway projects in Ethiopia, for this purpose the questionnaires were distributed to major stakeholders in the construction industry; these are Contractors, Consultants and Employers (project owners). To make the analysis more comprehensive a total of 51 questionnaires were distributed to consultants, contractors and employer (project owner) out of which 41 questionnaires were filled and returned. Table 4.4 below shows the number of questionnaires distributed to employer, consultants and contractors and the number of questionnaires returned from these stakeholders including their percentage response rate.

Table 4.1: Summary of number and percentage of questionnaires distributed and returned;

Respondent	Questionnaires Distributed		Questionnaires Returned		Response Rate
	No.	%	No.	%	%
Employer	21	41	19	46	90
Contractors	18	35	15	37	83
Consultants	12	24	7	17	58
Total	**51**	**100**	**41**	**100**	**80**

The overall response rate for the survey was 41 (80%). The response rate in the survey was 19 (90%) for Employers; 15 (83%) for Contractors, and 7 (58%) for Consultants (in addition to the limited time and some bureaucracy, there is a trend that one consultant supervises more than one project at a time; that is why limited numbers of questionnaires were distributed to consultants). Figure 4.1, Shows that among 41 questionnaire respondents 20 (46%) were from employers, 15 (37%) from contractors and 7 (17%) from consultants.

Fig 4.1: Respondents Organization Type



4.3 Respondents' Profile

Professionals at different levels of experience were targeted to fill the questionnaire survey. Out of the total questionnaire disseminated, 39% of professionals were from organizations of more than 15 years of experience in construction sector, around 15% from organizations with years of

experience in the industry between 11 -15 and 46% of them were from organizations with years of experience in the industry between 5 -10 years of experience.

Table 4.2: Years of experience of respondents' organizations in construction work

No of Years	Frequency	Percent	Valid Percent	Cumulative Percent
5-10	19	46.3	46.3	46.3
11-15	6	14.6	14.6	61.0
>15	16	39.0	39.0	100.0
Total	41	100.0	100.0	

On the other hand, a glance at individual experience of respondents show that out of the total questionnaire disseminated, 53.7% of professionals have more than 10 years of experience in construction sector, around 36.6% have 5-10 years of experience in the industry and 9.8% of them have less than 5 years of experience in the industry.

Table 4.3: Individual work experience of respondents in construction sector

No. of Years	Frequency	Percent	Valid Percent	Cumulative Percent
<5	4	9.8	9.8	9.8
5-10	15	36.6	36.6	46.3
>10	22	53.7	53.7	100.0
Total	41	100.0	100.0	

In regard to educational background, about 36.6 % of the respondents were first degree holders and around 63.4 % of the respondents were masters degree holders.

Table 4.4: The educational status of respondents

Educational Level	Frequency	Percent	Valid Percent	Cumulative Percent
First Degree	15	36.6	36.6	36.6
Masters Degree	26	63.4	63.4	100.0
Total	41	100.0	100.0	

4.4 Understanding of Price Escalation among stakeholders in EPC / Turnkey projects

This part of the study was intended to determine the understanding of the main stakeholders i.e the employer, the contractors and the consultants about price escalation in EPC / Turnkey projects. The attitude of employer, contractors and consultants towards price escalation issues in EPC / Turnkey projects has been tried to examine. The following table shows the mean score (MS) calculated to each item in this category both separately by employer, contractors & consultants; and in a weighted average form.

Table 4.5: Mean Score (MS) for understanding price escalation in EPC / Turnkey contracts

Item No.	Understandings	Employer MS	Contractor MS	Consultant MS	Weighted Average
Item2.6	ERC shall improve the price escalation clause of EPC/Turnkey contract	4.26	3.13	3.57	3.66
Item2.2	It is necessary to have an escalation clause in the contract	2.26	4.20	4.29	3.58
Item2.3	The price escalation clause is a well considered, fair and in favor of all parties.	2.05	3.87	3.86	3.26
Item2.5	ERC shall continue adopting the price escalation clause as it is now	2.00	4.00	3.57	3.19
Item2.4	The concept behind price escalation of EPC/Turnkey contract is well understood	2.84	2.87	3.71	3.14
Item2.1	Any compensation made by the employer for price escalation is not fair	4.16	1.40	3.00	2.85

As we can see from the table, the MS under the “weighted average” column are very near to average values. Further consideration of the result by breaking the responses in to respondents group (based on organization type) clearly indicates that the average values in the combined column are the results of nearly opposite extreme responses. Especially the responses given by contractors are nearly opposite to the employer i.e for those items employer gave high score, the contractor has given lower score and vice versa except for one item, item 2.4, that asks about the degree of understanding about the concept behind price escalation of EPC/Turnkey contract for negotiation and administration purpose; where both replied an average MS value (employer 2.84 and contractor 2.87). The responses of the consultants on the other hand lie between the contractors’ and the employer’s responses but far from the employer and very nearer to the contractors.

The following two tables show how priority and criticality differs between the employer in one side and the contractors and consultants in another side.

Table 4.6: High MS of employer compared to others two

	Item No	MS	Contractor's Responses		Consultant's Responses	
			MS	Rank	MS	Rank
Employer's First Rank	Item 2.6	4.26	3.13	4th	3.57	4th
Employer's Second Rank	Item 2.1	4.16	1.40	6th	3.00	6th

Table 4.7: High MS of contractor compared to others two

	Item No	MS	Employer's Responses		Consultant's Responses	
			MS	Rank	MS	Rank
Contractor's First Rank	Item 2.2	4.20	2.26	4th	4.29	1st
Contractor's Second Rank	Item 2.5	4.00	2.00	6th	3.57	4th

Item 2.1 exhibits that most of the respondents (about 84%) from the employer believe that in EPC/Turnkey contract based on the fact that the majority of the risk is transferred from the owner to the contractor, the contractor has added a substantial risk premium to the contract price; so any compensation made by the employer for price escalation is not fair where the MS value is 4.16. In addition, these respondents from the employer on their response to the open ended questions indicated that the primary feature of EPC/Turnkey contracts which makes them to be chosen by employers is ultimate price (fixed cost). They claim that if price escalation is to be paid by the employer, the concept of fixed price in EPC / Turnkey contract becomes invalid. On the other hand, all the respondents from the contractors and about 42% of the respondents from the consultants do not agree on this item with MS of 1.40 & 3.00 respectively. Following these arguments, the responses given to item 2.6 show that 73% of the respondents from the employer strictly believe with MS value of 4.26 that the current price escalation clause in the EPC / Turnkey contracts of ERC projects must be improved. Some of the opinions reflected by the respondents from the employer and which are subject for future study were:

- If possible completely removing out price escalation clauses,
- Limiting the price escalation items for which price indexes are readily available,
- Use of local source of price index, if possible, to assure the reliability

- The employer shall be vigilant in the price change and be accounted in the case price decrease.
- Exchange rate issues should be clearly specified

Table 4.8: Responses for understanding about EPC/Turnkey in percentage & respondent group

Item		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Item 2.1	Employer	0.00%	10.53%	5.26%	42.11%	42.11%	100%
	Contractors	60.00%	40.00%	0.00%	0.00%	0.00%	100%
	Consultants	0.00%	42.86%	14.29%	42.86%	0.00%	100%
Item 2.2	Employer	31.58%	36.84%	15.79%	5.26%	10.53%	100%
	Contractors	0.00%	6.67%	0.00%	60.00%	33.33%	100%
	Consultants	0.00%	0.00%	0.00%	0.71%	0.29%	100%
Item 2.3	Employer	26.32%	52.63%	10.53%	10.53%	0.00%	100%
	Contractors	0.00%	0.00%	46.67%	20.00%	33.33%	100%
	Consultants	0.00%	0.00%	14.29%	85.71%	0.00%	100%
Item 2.4	Employer	15.79%	26.32%	15.79%	42.11%	0.00%	100%
	Contractors	0.00%	20.00%	73.33%	6.67%	0.00%	100%
	Consultants	0.00%	0.00%	28.57%	71.43%	0.00%	100%
Item 2.5	Employer	36.84%	31.58%	26.32%	5.26%	0.00%	100%
	Contractors	0.00%	0.00%	13.33%	73.33%	13.33%	100%
	Consultants	0.00%	14.29%	14.29%	71.43%	0.00%	100%
Item 2.6	Employer	0.00%	10.53%	15.79%	10.53%	63.16%	100%
	Contractors	0.00%	0.00%	86.67%	13.33%	0.00%	100%
	Consultants	0.00%	14.29%	14.29%	71.43%	0.00%	100%

On the other hand, the responses given to item 2.2 indicate that about 93% of the contractors and all the consultants believe that because contractors work in an environment of risk & uncertainty and volatile materials market; without the price escalation clause that allows for a compensation for price change, the contractors will not be motivated to participate in the tender; so it is necessary to have an escalation clause in the contract with MS value of 4.20 and 4.29 respectively. Their responses to open ended questions showed that although the risks transferred to the contractors are considered and a price increment is made to the total contract price, the extreme volatile construction materials market, diversified risks and the uncertainty & nervousness of the construction sector will not be completely compensated by the increment. That is why they believe that the inclusion of price escalation clauses in the EPC / Turnkey contracts is necessary for the contractors to be motivated and to stay in the industry. The responses given for the same item (item 2.2) by the employer shows about 68% of the

respondents disagree with this item at MS value of 2.26. Following this, in item 2.5 about 86% respondents from the contractors and about 71% respondents from the consultants agree that the current price escalation clauses in EPC / Turnkey contracts of ERC shall continue as they are now with MS value of 4.00 & 3.57 respectively. About 67% of respondents from the employer on contrary disagree with this item at MS value of 2.00.

Item 2.3 indicates that for both the contractors (53%) and consultants (85%), the price escalation clause in ERC contracts that states the employer (ERC) will compensate a price increase in selected items like steel, cement, fuel and labor (in some) is a well considered, fair and in favor of all parties with MS of 3.87 and 3.86 respectively. About 78% of the respondents from the employer on the other hand, disagree with this item at MS value of 2.05. Some of the points mentioned by the respondents of the employer in their responses to open ended questions are the following:

- At the signing time of the contracts the concept behind these clauses were not well understood by the negotiating individuals of the employer.
- There was a capacity problem in the manpower of the employer following lack of experience and skill.
- There was an influence from those international creditors (in some projects all the creditors, contractors and consultants are from the same country).

4.5 Factors Causing Price Escalation

This section of the study deals with the analysis of the information collected from the questionnaires about the factors that cause price escalation. A list of factors causing price escalation was presented to the respondents to score them on the scale of 1 to 5 based on rate of occurrence in ERC projects. From the score assigned to each factors causing price escalation, the most important ones contributing to the causes of price escalation for EPC / Turnkey railway construction projects of Ethiopia were identified.

Fig 4.2: The weight given by the respondents to each factor that causes price escalation

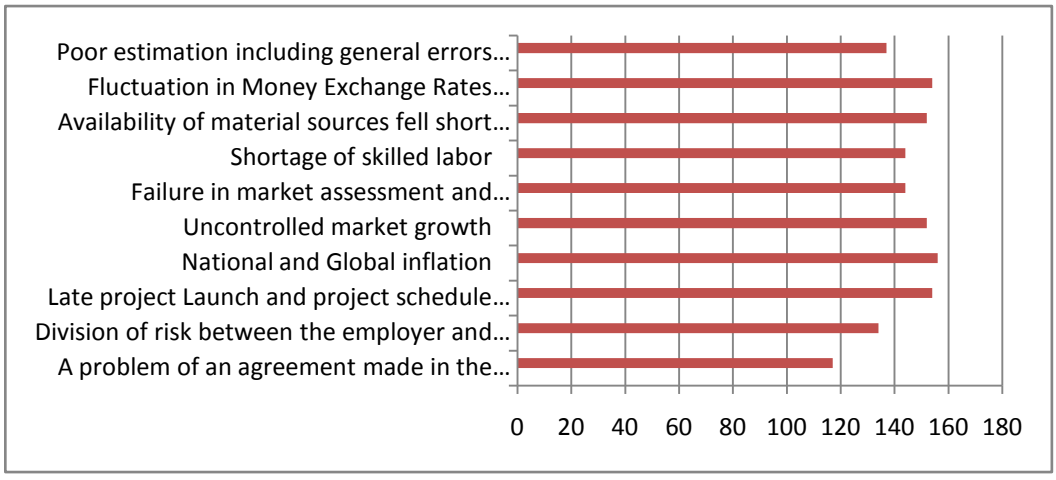


Table 4.9: Mean Score (MS) results for factors causing prices escalation

I.No	Items	Employer MS	Contractor MS	Consultant MS	Weighted Average
Item 3.4	National and Global inflation (material price fluctuation)	4.05	3.87	3.86	3.93
Item 3.9	Fluctuation in Money Exchange Rates beyond the level predicted	3.84	3.93	3.71	3.83
Item 3.3	Late project Launch and project schedule changes	3.89	3.73	3.57	3.73
Item 3.6	Failure in market assessment and purchase procedure	3.68	3.73	3.71	3.71
Item 3.5	Uncontrolled market growth	3.74	3.80	3.57	3.70
Item 3.8	Availability of material sources fell short of the market demand	3.63	3.67	3.43	3.58
Item 3.10	Poor estimation including general errors and omissions from plans	3.79	2.73	3.29	3.27
Item 3.7	Shortage of skilled labor	2.89	3.67	3.14	3.23
Item 3.2	Division of risk between the employer and the contractor	2.58	3.60	3.00	3.06
Item 3.1	A problem of an agreement made in the EPC/Turnkey contract	3.95	2.07	2.43	2.81

The above Table 4.9 shows the results of mean score for the factors causing price escalation. The weighted average result shows item 3.4 that is national & global inflation is very critical factor that causes price escalation in EPC / Turnkey railways projects with high weighted average mean score of 3.93. A glance at a detail response of the different group of respondents showed that the respondents from the employer and the consultant firms have rated this factor first at MS of 4.05 & 3.86 respectively and respondents from the contractors have rated it second with MS of 3.87. Increase in material cost (material price fluctuation) is one of the major factors that cause price escalation of the project. This result coincides with results of former studies reviewed in this study. Baloyi & Bekker, (2011); Rahman, Memon & Abd.kerim, (2013); Feten, (2008); Ashebir, Wubishet & Murad, (2017); Mohammed, (2013); and Yadessa, (2015) all these researches have rated this item, increase in material cost (material price fluctuation), as the first factor that causes price escalation. Feten further explains that inflation or increase in the cost of construction materials, according to Clause 70 of MoWUD conditions of contract, have higher impact on the final cost of the project at completion.

The other factor which was rated second as price escalation cause at EPC / Turnkey railway projects is item 3.9 which is fluctuation in money exchange rates beyond the level predicted at MS of 3.83. This is a factor that was rated first by the respondents from the contractors at MS of 3.93, second by the respondents from the consultants at MS of 3.71 and fourth by the respondents from the employer at MS of 3.84. A work by Mohammed, (2013) which rates fluctuation in money exchange rates as a third important factor for causing price escalation in road construction of Ethiopia explained that since the exchange rate has been deregulated, the prices of all materials and services have been increasing. Foreign exchange rate volatility may also impact on global trade patterns and thus affect a country's balance of payments position. Yadessa, (2015) also has identified fluctuation in money exchange rates as the second major price escalation causing factor in the road projects.

Item 3.3 which is late project launch and project schedule changes has been rated as a third factor that cause price escalation in EPC / Turnkey projects of ERC with MS of 3.73. Looking at the details of the responses we found that this item has been rated third by the respondents of the employer with MS value of 3.89. The respondents from the contractors and the consultants on the other hand have rated this item fourth with MS of 3.73 & 3.57 respectively. On a research conducted by Woyessa, (2014); delay and scope change of the contract date and items of work has been rated first as a factor for cause of cost overrun in Addis Ababa light rail transit project. The delay to launch a project could lead to a variation in price of materials and labor between time of feasibility study and at time of construction. The research by Baloyi & Bekker, (2011) has rated late contract award as a fourth significant factor which leads to cost overrun. Late contract award is the main reason for late launching of construction. It give a time gap (from estimation time to actual construction time) for a change in price of construction materials.

What makes the above rating significant is all the factors rated first to third in terms of weighted average are in the first four rated factors of each respondent group. In some items mainly item 3.1 and item 3.10, the respondents from the employer have different attitude from the respondents of the contractors and the consultants. For example, the respondents from the employer have rated second item 3.1 with MS of 3.95 which claims that a problem made in agreement and implementation of EPC/Turnkey contract has contributed for the price escalation

of ERC projects. Both the respondent groups from the contractors and the consultants disagree with this item rating it tenth (last) with MS of 2.07 & 2.81 respectively. This is because of the difference in the attitude of the respondents towards the understandings about price escalation in EPC / Turnkey contracts dealt in the previous portion of this study. The other factor which is rated fifth by the respondents from the employer with Ms of 3.79 is item 3.10 which is about poor estimation including general errors and omissions from plans. As this issue is mainly the work of the contractor in EPC / Turnkey contracts; the writer of this paper believes that the respondents from the contractors have rated this factor ninth with MS of 2.73.

4.6 Effects of Price Escalation

This part of the study presents the analysis made on the effects of price escalation as per the rate given by respondents.

Fig 4.3: The weight given to each effect of price escalation by the respondents

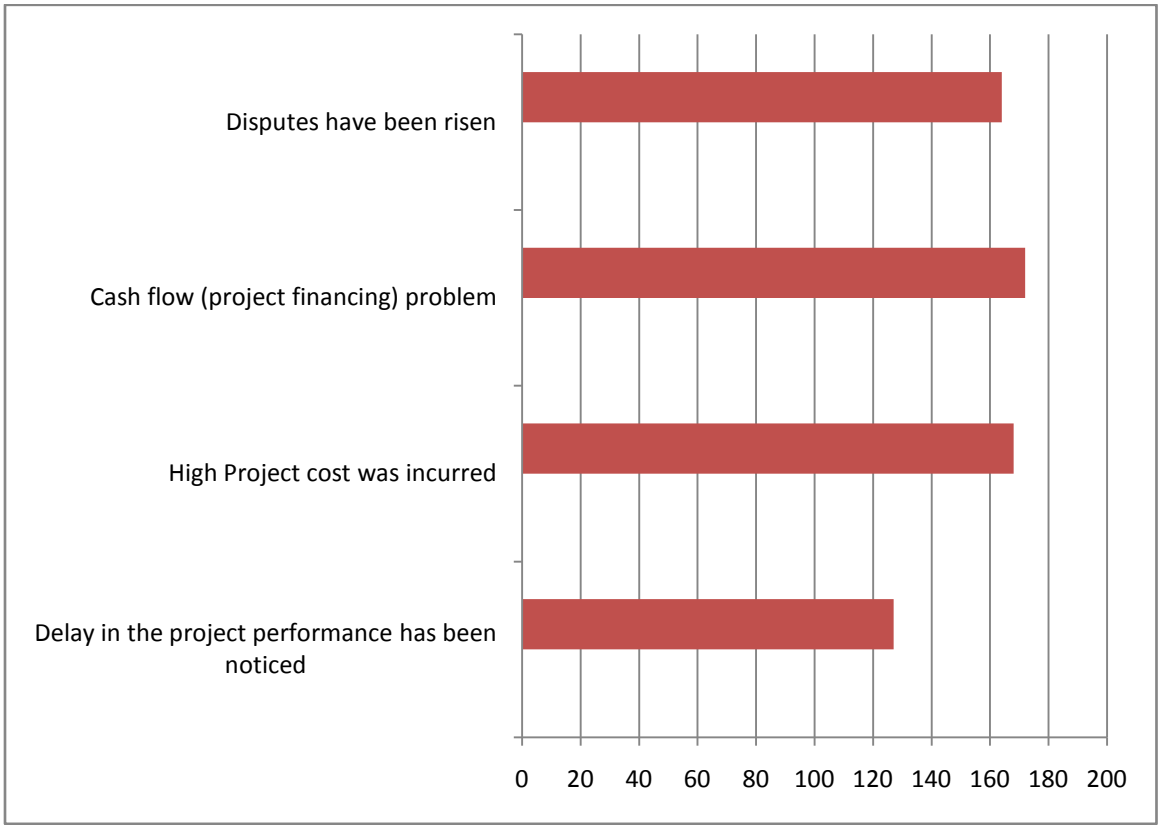


Table 4.10: MS results for effects of prices escalation

I.No	Items	Employer MS	Contractor MS	Consultant MS	Weighted Average
Item 4.3	Project financing problem	4.32	4.40	3.43	4.05
Item 4.2	High Project cost was incurred	4.37	4.07	3.43	3.95
Item 4.4	Disputes have been risen	3.84	4.47	3.43	3.91
Item 4.1	Delay in the project performance has been noticed	2.68	3.67	3.00	3.12

Item 4.3 which is financing or cash flow problem has been rated as the first effect of price escalation in ERC railway projects with MS of 4.05. The result was arrived relatively with better agreement among the respondents. On the other hand, the effect rated first in terms of weighted average was able to be rated separately by each group (org type) as second (MS 4.32) by employer, second (MS 4.40) by contractors, and among the three first rated effects (MS 3.43) by consultants. Especially when the projects are being financed through a loan; it is common for the loan to be lent is some portion of the contract price. When a price escalation which is more than expected at the beginning happens, cash flow problem is inevitable because of inability to secure project finance or securing it at higher costs due to added risks (Mbachu and Nkado in Fetene 2008).

Mohammed, (2013) on the other hand explained that the high rate given for financing problem indicates the high importance of cash for the progress of project. Any shortage of cash for the contractor will cause many problems such as slow progress and work decline in productivity. Also the contractors will not be able to purchase the needed equipment and materials for work. So this finding highly coincides with the findings mentioned in the review of literature.

The other effect rated second in the weighted average result with MS of 3.95 is Item 4.2 which is high project cost incurred from the consequences of price escalation in the railway projects of ERC. Looking at the effect's rate separately shows that the item was rated first (with MS 4.37), third (with MS 4.07) and among those rated first (with MS 3.43) by the employer, the contractors and the consultants. This finding again highly coincides with the findings of many previous studies on the topic. Those projects that have not been scrapped or significantly delayed as a result of price escalation difficulties have frequently experienced higher project costs. Contractor and supplier fears regarding potential, future price escalation, and the absence of price escalation clauses in most construction contracts, often leads to higher contract prices and larger project costs (Pearl, 1994). Fetene, (2008) explains that excessive cost overrun requires additional budget, this in turn eat up the scarce financial resources of the country, which lead to further budget short fall for construction projects. This prevents the planned increase in property and

service production from taking place, and this phenomenon in turn affects, in a negative way, the rate of national growth.

The third rated effect was item 4.4 which is a dispute rose among the main stakeholders i.e the employer, the contractors and the consultants as a result of price escalation with MS of 3.91 in weighted average result. The employer has rated this effect third with MS of 3.84; the contractors rated it first with MS of 4.47 and consultants rated it among the three rated first with MS of 3.43. (Sambasivan and Soon, in Mohammed, 2013) explained that disputes are insidious often resulting in time overrun, cost escalation, litigation, and complete abandonment of projects. Many construction disputes are arising out of disagreement and delay of hardship and expense during the construction project. Fetene, (2008) claim that adversarial relationship between participants of the project is one of the major effects of price escalation in the construction projects.

Through responses to open ended questions respondents have indicated some effects of price escalation like lower quality of projects, hard currency problems, and being imposed for additional loan. Both in terms of logic and in terms of the situations observed in the desk study, these suggested effects have high probability of being effects of price escalation in EPC / Turnkey projects so the writer of this study recommends to investigate this issue in the future studies.

4.7 Current price escalation management practices in the railway projects of ERC

This section of the study has analyzed the current price escalation management/mitigation mechanisms adopted by ERC in its EPC / Turnkey railway projects. In addition, the attitude of respondents from the employer, contractors and consultants towards the strength/competence of the price escalation management in the projects is analyzed. List of price escalation mitigating mechanisms which are appropriate for EPC / Turnkey were selected and presented to respondents to score them on the scale of 1 to 5 (where *1= Very Weak, 2= Weak, 3= medium, 4= Strong and 5= Very Strong),* so that the respondents rated each mechanism based on the current price escalation mitigation practices in ERC railway projects.

Fig. 4.4: The Mean Score (MS) given to the current price escalation management practices in ERC railway projects

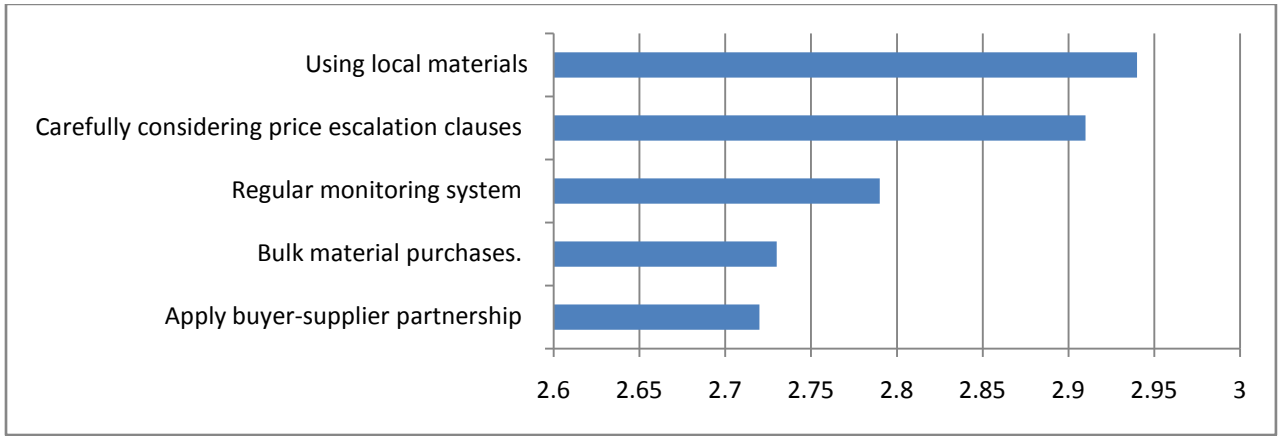


Table 4.11 presents the mean score (MS) of the result given by respondents to the current application of price escalation mitigation mechanisms at the railway projects of ERC. The overall result of the responses show that the price escalation mitigating mechanisms presented for the respondents are currently being used at a very low level in the ERC projects.

Item 5a.5 which is using local construction materials instead of imported materials whenever possible has been rated first by the respondents with MS of 2.94 in the weighted average column which is although better than the rest, is slightly less than the medium performance that needs to be improved and encouraged. Both the respondents from the employer and the contractors have rated this mechanism second with MS of 3.00 and 2.87 respectively. The respondents from the consultants have rated first this mechanism of price escalation mitigation. Generally speaking, there is a trial to utilize local materials in the construction of the railway EPC / Turnkey projects of ERC however the extent of utilizing the local construction materials instead of imported materials is not satisfactory for the respondents.

Table 4.11: Mean Score (MS) results for current prices escalation management practices

I.No	Practice	Employer MS	Contractor MS	Consultant MS	Weighted Average
Item 5a.5	Using local instead of imported materials	3.00	2.87	3.00	2.96
Item 5a.1	Carefully considering price escalation clauses	3.05	2.67	3.00	2.91
Item 5a.4	Monitoring system for appropriate market assessment	2.95	3.00	2.43	2.79
Item 5a.2	Minimizing the effect through bulk material purchases	2.89	2.73	2.57	2.73
Item 5a.3	Apply buyer-supplier partnership	2.79	2.80	2.57	2.72

Similarly items 5a.1 and 5a.4 are rated second and third by the overall result given by the respondents with MS of 2.91 and 2.79 respectively. The above justification of lower performance also applies to these items. The degree to which careful consideration is paid for price escalation clauses and monitoring system applied for appropriate market assessment are very low. These things are clearer in a table of percentages which shows the responses being separated by the respondent group and the five scales of ratings as follow.

Table 4.12: Responses to current price escalation mitigation mechanisms in percentages by separating to respondent groups and rating scales:

Item		Very Weak	Weak	Medium	Strong	Very Strong	Total
Item 5a.1	Employer	5.26%	21.05%	36.84%	36.84%	0.00%	100.00%
	Contractors	0.00%	40.00%	40.00%	20.00%	0.00%	100.00%
	Consultants	0.00%	28.57%	42.86%	28.57%	0.00%	100.00%
	Total	2.44%	29.27%	39.02%	29.27%	0.00%	100.00%
Item 5a.2	Employer	0.00%	47.37%	15.79%	36.84%	0.00%	100.00%
	Contractors	0.00%	33.33%	40.00%	26.67%	0.00%	100.00%
	Consultants	0.00%	57.14%	28.57%	14.29%	0.00%	100.00%
	Total	0.00%	43.90%	26.83%	29.27%	0.00%	100.00%
Item 5a.3	Employer	0.00%	42.11%	36.84%	21.05%	0.00%	100.00%
	Contractors	0.00%	13.33%	73.33%	13.33%	0.00%	100.00%
	Consultants	0.00%	42.86%	57.14%	0.00%	0.00%	100.00%
	Total	0.00%	31.71%	53.66%	14.63%	0.00%	100.00%
Item 5a.4	Employer	0.00%	36.84%	31.58%	31.58%	0.00%	100.00%
	Contractors	0.00%	20.00%	46.67%	33.33%	0.00%	100.00%
	Consultants	0.00%	57.14%	42.86%	0.00%	0.00%	100.00%
	Total	0.00%	34.15%	39.02%	26.83%	0.00%	100.00%
Item 5a.5	Employer	5.26%	10.53%	63.16%	21.05%	0.00%	100.00%
	Contractors	0.00%	40.00%	20.00%	40.00%	0.00%	100.00%
	Consultants	0.00%	14.29%	71.43%	14.29%	0.00%	100.00%
	Total	2.44%	21.95%	48.78%	26.83%	0.00%	100.00%

The above table of percentages for the responses on the current practice of price escalation management shows that even the item which has been believed to be practiced better than the rest i.e item 5a.5 (using local instead of imported materials whenever possible) has been rated as weak & very weak by 24.39% of the respondents and as medium by 48.78% of the respondents. Only 26.83% of the respondents have rated it as strong. Similarly the second rated item for being practiced in price escalation mitigation, item 5a.1 (carefully considering price escalation clauses) has been rated weak & very weak by 31.71% of the respondents. 39.02% of the respondents rated it as medium and only 29.27% responded strong. As we continue watching down the low rated items, it becomes more obvious that the listed price escalation mitigation mechanisms which are believed to be appropriate mitigation instruments for EPC / Turnkey construction projects in different literatures are not being used in the specified railway projects.

Table 4.13: Mean Score (MS) results for item 5a.6, the status of prices escalation management in ERC projects

Item No.	Status	Employer MS	Contractor MS	Consultant MS	Weighted Average
Item 5a.6	Generally, how do you rate the price escalation management at ERC projects?	2.42	2.20	3.00	2.54

The above table shows the attitude of respondents towards the strength of the price escalation management process in the railway projects of ERC. The consultants relatively believe that the price escalation management is medium with MS of 3.00. However, the employer and the contractors do believe that it is weak with MS of 2.42 and 2.20 respectively. To see these results in another way let us look at the following table.

Table 4.14: Responses for item 5a.6 in percentage & respondent group

Item 5a.6		Very Weak	Weak	Medium	Strong	Very Strong	Total
The current price escalation management is strong	Employer	15.79%	47.37%	15.79%	21.05%	0.00%	100%
	Contractors	20.00%	40.00%	26.67%	13.33%	0.00%	100%
	Consultants	0.00%	28.57%	42.86%	28.57%	0.00%	100%
	Total	14.63%	41.46%	24.39%	19.51%	0.00%	100%

The above table shows that a very significant percent of the total respondents i.e 56.09% have rated the current price escalation management as weak and very weak. From the remaining respondents 24.39% rated the item as medium and 19.51% rated as strong. The majority of the respondents from the employer and the contractors, 63.16& & 60% respectively, evaluate the current price escalation management as weak and very weak.

4.8 Level of Significance of the price escalation management practices

Here the intention is not to measure the current actual price escalation management mechanisms in use at the railway projects. It is to rate the level of significance according to compatibility and effectiveness to price escalation management in ERC from those listed mechanisms obtained from related literatures.

Fig 4.5: The weight given to the level of significance for specified price escalation management practices

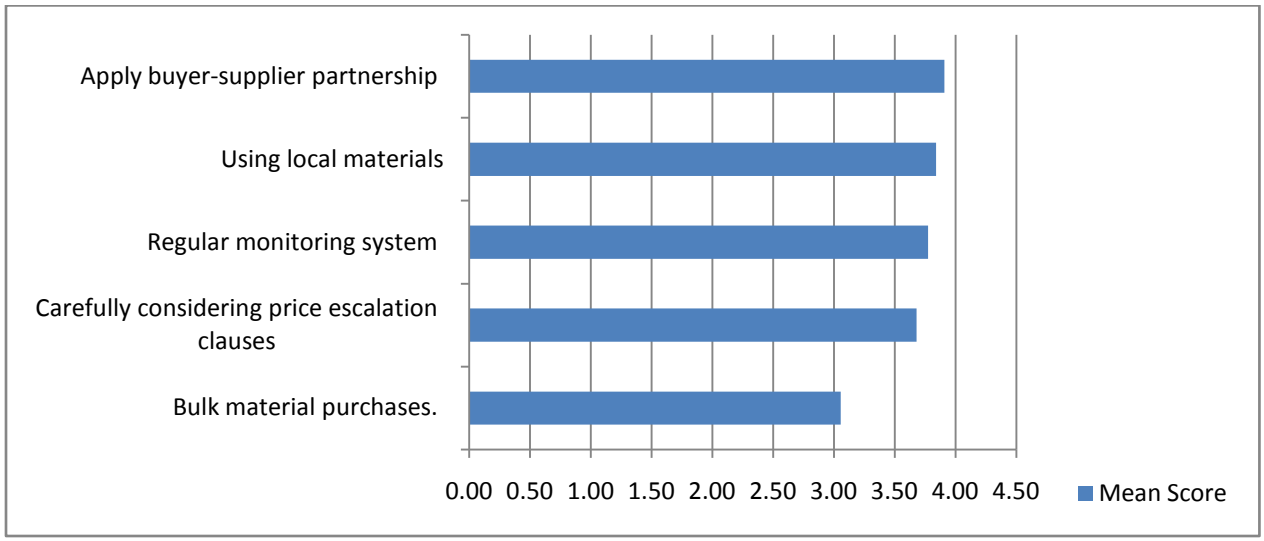


Table 4.15: Mean Score (MS) results for the level of significance of the prices escalation management practices

I.No	Practice	Employer MS	Contractors MS	Consultants MS	Weighted Average
Item 5b.3	Apply buyer-supplier partnership	3.89	4.00	3.86	3.92
Item 5b.5	Using local instead of imported materials	4.16	3.80	3.57	3.84
Item 5b.4	Monitoring system for appropriate market assessment	3.74	3.67	3.71	3.71
Item 5b.1	Carefully considering price escalation clauses	3.95	3.20	3.43	3.53
Item 5b.2	Minimizing the effect through bulk material purchases	3.63	3.27	3.00	3.30

Item 5b.3 which is making an effort to apply buyer-supplier partnership and provide long-term contract to address fast rate of price increase has been rated first in the level of significance of mitigating price escalation problems with weighted average MS of 3.92. It is not rated first only in the weighted average column but rated first at MS of 4.00 and 3.86 by the employer and the contractors respectively. The items rated first to third are resulted from more agreement among respondents as the visible differences of respondents is shown in the items rated low. Through buyer-supplier partnership there are different mutually beneficial long-term programs. As the relationship is evolved towards a new style in order to respond to intensified competition and complexity; through long-term contract and other means it assists to address those price escalation factors rated as significant by the respondents like inflation in the construction materials market, fluctuation in money exchange and uncontrolled market growth for construction materials. Although many literatures reviewed propose applying buyer – supplier partnership as one important mitigating mechanism, no previous study from the empirical evidence has put this item as the top rated price escalation mitigation mechanism.

The other item rated as the second significant price escalation management mechanism by the respondents is item 5b.5 with MS of 3.84 in the weighted average column which consults using local instead of imported materials whenever possible. Moreover, in addition to utilizing locally available construction materials and labor, an environment which is suitable for the manufacturing of these materials should be created by all responsible parties. Yadess, (2015) explained that government should create a stable economy by attracting and motivating local companies to specialize in the production of enough construction materials from local market to avoid price fluctuations associated with imported construction materials. Mohammed, 2013 also has identified considering the use of local construction materials during designing stage as one major price escalation mitigating mechanism.

Item 5b.4 which states that developing regular monitoring system to assure appropriate market assessment and proper procurement procedure is rated as the third significant price escalation management instrument by the respondents with MS of 3.71 in the weighted average column. Regular monitoring system to assure appropriate market assessment and proper procurement procedure is always necessary and becomes very important when the items are purchased one party and the price escalation (the amount in excess of the base price in some contracts) is compensated by another party. Sometimes the party responsible for purchasing the materials may fail to show diligence for making the appropriate market assessment and identify the fair price as the difference is readily compensable in some contracts. There could be also a way for a fraud to be committed, i.e the party responsible for the purchasing (and price escalation is to be compensated by other party) of the construction materials may deal with the suppliers to buy items by over market price so to have a share with the suppliers for the difference they made. So having a regular monitoring system to assure appropriate market assessment and proper procurement procedure helps to identify the time's fair market price and protect fraud through attending proper procurement procedure.

CHAPTER – FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

One of the success criteria of the construction industry is being cost effective. The issue of cost effectiveness on the other hand is to be completed within budget which is highly dependent on factors like price escalation. So mitigating price escalation is striving for the big achievement of the industry. To mitigate price escalation requires identifying the root causes of price escalation. On the top of this; the mitigating mechanism which was appropriate in one sector of the construction industry may not be appropriate in the other one or at least the effectiveness varies. So, the objective of this study is to assess the condition and identify the causes and effects of price in the Ethiopian railway construction sector EPC /Turnkey railway projects of ERC and recommend improvements on the management of the price escalation. To achieve these objectives, the study used desk study and questionnaire survey as a research instruments. The analysis was aided by the use of Statistic Package for Social Science (SPSS) where the scores assigned to each factor by the respondents were entered and consequently the responses were subjected to further statistical analysis using the relative importance index and correlated using spearman's correlation coefficient. Based on the results from the analysis the following conclusions have been derived and summarized in accordance with the objectives of the research.

5.2 Conclusions

I. Regarding the first objective of this study, the assessment of the understandings by stakeholders towards price escalation in EPC / Turnkey contract projects of ERC revealed that there is a significant disagreement on the understandings of price escalation in EPC / Turnkey projects of ERC between the respondents of the employer in one side and the respondents of the contractors and consultants in another side.

   Most of the respondents from the employer organization have reflected in their responses towards the condition of price escalation in EPC / Turnkey projects that they believe that in EPC/Turnkey contract based on the fact that the majority of the risk is transferred from the owner to the contractor, the contractor has added a substantial risk premium to the contract price; so any compensation made by the employer for price escalation is not fair. They claim that one of the outstanding feature of EPC / Turnkey contract and the primary intention of applying this contract in ERC is to know project cost reasonably in other words to fix the project budget; so the concept of price escalation negates this feature of the contract. In addition, the price escalation clause in the EPC / Turnkey contracts of the railway projects in

ERC that imposes the employer (ERC) to compensate a price increase in selected items like steel, cement, fuel and labor (in some contract) is not a well considered, unfair and in favor of the contractors as per these respondents. The respondents through their responses to open ended questions have indicated possible reasons for this unfairness to happen as:

i. Not well understanding the concept behind price escalation clauses at time of contracts signing;
ii. A capacity problem in the manpower of the employer following lack of experience and skill;

iii. An influence from those international creditors (in some projects all the creditors, contractors and consultants are from the same country); and

iv. Absence of discussion & participation of all concerned parties.

Following these issues, the respondents from the employer strictly believe that for the future ERC shall improve the price escalation clause of EPC/Turnkey contracts. Responses to open ended questions by the respondents from the employer have described some actions to be taken in reviewing the current contracts if possible and in negotiating for the future. Some of them are:

i. If possible completely removing out price escalation clauses,

ii. Limiting the price escalation items for which price indexes are readily available,

iii. Use of local source of price index, if possible, to assure the reliability

iv. The employer shall be vigilant in the price change and be accounted in the case price decrease.

v. Exchange rate issues should be clearly specified

On the other hand, the respondents from the contractors and consultants have reflected their beliefs towards the conditions of price escalation in EPC / Turnkey projects of ERC that because contractors work in an environment of risk & uncertainty and volatile materials market; without the price escalation clause that allows for a compensation for price change, the contractors will not be motivated to participate in the tender; so it is necessary to have an escalation clause in the contract. In addition, they believe that the price escalation clause in the EPC / Turnkey contracts of the railway projects in ERC that imposes the employer (ERC) to compensate a price increase in selected items like steel, cement, fuel and labor (in some

contract) is a well considered, fair and in favor of all parties. They also claim that for the future ERC shall continue adopting the current price escalation clause of EPC/Turnkey contract. Both group of respondents from the contractors and the employers believe that the understanding on the concept behind price escalation of EPC/Turnkey contract is not satisfactory to negotiate on and administer the agreements.

II. The second objective of the study was identifying the causes and effects of price escalation in EPC / Turnkey projects of ERC. National and global inflation, fluctuation in money exchange rates beyond the level predicted and late project launch & project schedule changes are identified as the top three major causes of price escalation in EPC / Turnkey railway projects of Ethiopia. Among the major identified effects of price escalation in EPC / Turnkey contract projects of ERC; project financing problem, higher project costs and disputes among stake holders are the top three effects. Through the responses to open ended questions respondents have indicated some effects of price escalation like lower quality of projects, hard currency problems, and being imposed for additional loan.

III. Regarding the third objective of this study, the current price escalation management practices in the railway EPC / Turnkey projects assessed and found that use of local materials instead of imported materials and carefully considering price escalation clauses are the two current price escalation mitigating mechanisms at ERC rated first and second by the respondents with MS of 2.96 & 2.91 respectively. However, from the total respondents only 26.83% agree that currently use of local materials is strongly acting as price escalation mitigating mechanism and only 29.27% agree that carefully considering price escalation clauses is strongly acting as price escalation mitigating mechanism. The rest of respondents replied medium and weak.

    With regard to total strength of the current price escalation management about 63.16% respondents from the employer, 60% respondents from the contractor and 28.57% respondents from the consultants have responded that the current price escalation management is weak & very weak. 15.79%, 26.67% & 42.86% from the employer, contractors and consultants respectively have responded as medium. On the other hand, 21.05% from the employer, 13.33% from the contractor and 28.57% from the consultant have responded that the current price escalation management in ERC is strong.

IV. Finally for the fourth objective of this study, considering the conditions of price escalation in EPC / Turnkey contracts of ERC railway projects the respondents have rated the following mitigation mechanisms first to third based on their significance to the price escalation management. Applying buyer-supplier partnership/relationship, using local instead of imported materials whenever possible and developing regular monitoring system to assure

appropriate market assessment & proper procurement procedure are the three mitigation mechanisms proposed by the respondents.

5.3 Recommendations

Based on the findings of the study, the following recommendations are expected from key stakeholders in the railway construction projects, the employer, contractors and consultants in order to minimize price escalation of the railway construction projects in Ethiopia.

I. There should be proper communication among all the stakeholders working on the projects in order to improve the understanding towards price escalation issues and reduce the disagreement. All stakeholders should ensure collaboration that they can actively engage with each other to spend their time trying to solve their problems rather than working out how to blame the other side for it. Therefore, a much more coordinated effort of trainings and skills development seminars for concerned professionals on the main concept of price escalation in EPC / Turnkey contract case needs to be carried out frequently. It is only through open discussion that common understandings develop among stakeholders and problems get identified and solved. On the top of that, the convincing of one another and collaboration will generate confidence among the stakeholders. Lack of consensus on the common issues of price escalation could give a way for continued weakened price escalation management.

II. It will not be surprising to learn that, in practice, the particular provisions of the FIDIC Silver Book are commonly subject to heavy negotiation between the contractors and the employer. There is much depends on the relative bargaining power of the parties and, of course, the skill and experience of the negotiators. Especially the employer has to devote on developing the competency of its higher officials that represent the organization in such negotiations. All concerned parties have to participate in one or another way and provide their contribution. The employer has to make the possible maximum effort to avoid or reduce any influence that will take away fairness from the negotiation. EPC / Turnkey contract should be drafted very carefully with respect that the administration of an escalation clause has to be remarkably straightforward. Working to have appropriate price escalation sharing has an overall benefit for all the parties. Allocating the price escalation (with all important consideration) to the party who is best able to control and mitigate is a mechanism with better cumulative result. On the other hand, the employer has to look forward and investigate for a better construction delivery method instead of simply sticking to the existing one.

III. Much focus should be placed on the major factors causing price escalation in the projects and awareness should be created among the stakeholders in order to minimize the price escalation in the railway construction projects of Ethiopia. Identification and understanding the factors

that lead to price escalation in all projects encourages stakeholders in their efforts to perform mitigation practices.

IV. All the parties; the employer, the contractors and the consultants should work together to develop comprehensive price escalation mitigation system which enables a collaborative reaction towards price escalation causing factors and should be fair, consistent, in favor of all the parties and acceptable by all the stakeholders.

V. There are no straightforward solutions to the challenges of price escalation in railway construction projects. There are, however, steps that can be taken to minimize their effects, the major one being the use of efficient price escalation management tools and practices. Price escalation risk can be addressed and managed through different procurement strategies and procurement contracting mechanisms. Creating buyer-supplier partnership and long-term contracts are alternatives in avoiding frequent price increment and an adversarial approach between buyers and suppliers. In addition, all the stakeholders have to work with the manufacturing industry to locally manufacture some of the imported construction materials whenever it is possible. Moreover, a regular system should be developed where all the main stakeholders participate that market assessment should be seriously conducted and the contractor strictly follow the procurement procedure which is legal and believe suitable by all the parties.

VI. Clients must ensure that no significant time should pass before getting projects to launch after cost estimate is done and budget has been set. In addition, their demand in schedule changes during the construction period should have no adverse effects on the critical activities so as to avoid causing price escalation.

VII. All the parties, especially the employer together with the government shall work hard towards improving the capacity and competence of domestic contractors and consultants until they get well competent and well equipped to handle such complex and high tech projects. In addition, a great emphasis should be given to foster the required skilled man power. These things are believed to bring high relief through reducing the stress that comes from inflation and exchange rate fluctuation and also help to avoid loss of foreign currency.

5.4 Direction for future study

In order to make the findings of this study broad and more completed the following core study areas that are believed to add value further to the concept of price escalation in EPC / Turnkey contracts in the Ethiopian railway construction industry are proposed for future studies.

- ✓ Project fixed price and Price escalation in EPC/Turnkey contract. Are they inclusive or exclusive each other?

- ✓ Is it possible to completely remove price escalation clauses from EPC / Turnkey contract?

- ✓ Knowledge transfer in EPC/Turnkey contracts where the contractor is doing all the designing, procuring and engineering works.

- ✓ Competency and bargaining power shown in Ethiopian Railways Corporation EPC / Turnkey contracts negotiations.

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APPENDIXES

- **Questionnaire**

Addis Ababa University
Faculty of Business and Economics
School of Commerce
MA Thesis Questionnaire

A Survey on Assessment of Price Escalation Issues in EPC/Turnkey projects

Dear Sir/Madam,

The purpose of this survey is to obtain data for the specified study being conducted as a partial fulfillment of MA Degree in Project Management at Addis Ababa University. The questionnaire is designed to obtain professional opinion on issues of the Price Escalation in EPC/Turnkey projects. The study is presumed to identify the conditions; the possible causes and effects; the management; and the mitigation of price escalation in EPC/Turnkey railway projects. It intends to critically assess the price escalation practice; to create awareness among the different stakeholders of the projects and to recommend possible remedial measures in mitigating price escalation related problems. All data included in this questionnaire will be used only for academic research purpose and will be strictly confidential.

Thank you for your invaluable time and cooperation in advance.

Regards,

Dawit Tarekegn
Tel: 0911-426285
E-mail: dawittarekegn@*gmail.com*
April, 2017 - Addis Ababa

Please consider each question in terms of your organization's experience and/or your personal knowledge. Please indicate your response by ticking "√" mark at the appropriate box or by filling the blank spaces provided, as appropriate. You may kindly use the back side of the paper if the blank space is not sufficient.

Part one: General Information

1.1 Organization /Company Name: …….

1.2 On what discipline is your company engaged in the railway construction sector?

Contractor ☐ Consultant ☐ Employer ☐

Other, specify…….……..

1.3 How long has your organization been involved in railway construction sector?

< 5 years ☐ 5-10 years ☐ 11-15 years ☐ >15years ☐

1.4 Your work experience in construction projects and construction project related works:

<5 years ☐ 5-10 years ☐ >10 years ☐

1.5 Educational status?

Certificate ☐ First Degree ☐ Masters Degree ☐ PhD ☐

Please express your opinion based on the representative numbers listed below by marking (√) under each preference.

1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

Part Two: Understanding of Price Escalation in EPC/Turnkey contracts of ERC

How do you understand the conditions of price escalation that exist in the EPC/Turnkey contracts in general and in the contracts of railway projects of ERC in specific?

S.N	Conditions	1	2	3	4	5
2.1	In EPC/Turnkey contract the majority of the risk is transferred from the owner to the contractor, due to this reason the contractor will add a substantial risk premium to the contract price; so any compensation made by the employer for price escalation is not fair.					
2.2	Because contractors work in an environment of risk & uncertainty and volatile materials market; without the price escalation clause that allows for a compensation for price change, the contractors will not be motivated to participate in the tender; so it is necessary to have an escalation clause in the contract.					
2.3	The price escalation clause in ERC contracts that states the employer (ERC) will compensate a price increase in selected items like steel, cement and fuel is a well considered, fair and in favor of all parties.					
2.4	Generally the concept behind price escalation of EPC/Turnkey contract is well understood by all parties to negotiate on and administer the agreements.					
2.5	For the future ERC shall continue adopting the price escalation clause of EPC/Turnkey contract as it is now.					
2.6	For the future ERC shall improve the price escalation clause of EPC/Turnkey contract.					

If you responded 1 or 2 to item 2.3, what are the drawbacks in the clause?----------
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If you responded 1 or 2 to item 2.4, what gaps did you notice? What shall be done to resolve these issues?----------

If you responded 4 or 5 to item 2.6, how shall it be improved?----------

What other points do you want to mention about price escalation clause in EPC/Turnkey contract of railway projects of ERC----------

Part Three: Causes of Price Escalation in EPC/Turnkey projects of ERC

The possible causes of price escalation in railway construction EPC/Turnkey projects which are identified from different literatures and documents are listed in the table below. Based on your experience what is the likely contribution of these factors to price escalation in the railway construction projects that you have involved in?

1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

S.N	Causes	1	2	3	4	5
3.1	A problem of an agreement made in the EPC/Turnkey contract with respect to price escalation clause is one factor.					
3.2	There is price escalation resulted from the division of risk between the employer and the contractor, i.e there are risks shifted to a party who is unable to control them.					
3.3	Late project Launch and project schedule changes have contributed for the price escalation of ERC railway projects.					
3.4	National and Global inflation is one of the main factors for those railway projects' price escalation.					
3.5	Uncontrolled market growth specific to construction materials is one factor.					
3.6	Failure to make appropriate market assessment and to follow the proper procedure in purchasing those construction materials is also a factor.					
3.7	Shortage of skilled labor has been one price escalation factor by leading to increased labor price & delay in project time.					
3.8	Shortage of construction materials created when the availability of material sources fell short of the market demand is one factor.					
3.9	Fluctuation in Money Exchange Rates beyond the level predicted has increased the price of imported materials and services.					
3.10	Poor estimation including general errors and omissions from plans and quantities as well as general inadequacies and poor performance in planning and estimating procedures and techniques is also a factor.					

What other causes of price escalation in EPC/Turnkey railway projects of ERC do you know? ---
---

Part Four: Effects of Price Escalation

Here under, the possible effects of price escalation in railway construction EPC/Turnkey projects which are identified from different literatures and documents are listed in the table. Please indicate the effects in the case of railway construction projects of ERC based on your experience.

1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

S.N	Effects	1	2	3	4	5
4.1	Delay in the project performance has been noticed as a result of price escalation.					
4.2	High Project cost was incurred from the consequences of price escalation.					
4.3	Cash flow (project financing) problem has been faced by the projects.					
4.4	Disputes have been risen among the stakeholders (mainly between employer and contractor)					

What are other effects of price escalation in EPC/Turnkey railway projects of ERC?----------
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Part Five: Price Escalation Management

Consider the **CURRENT** price escalation management of the railway projects at ERC and evaluate the current status of application of the following mechanisms to mitigate price escalation problems (to what extent have these mechanisms been in use?).

1= Very Weak 2= Weak 3= medium 4= Strong 5= Very Strong

S.N	Mechanisms	1	2	3	4	5
5a.1	Carefully considering price escalation clauses both at the signing and execution time.					
5a.2	Minimizing the effect of price escalation through bulk material purchases.					
5a.3	Making an effort to apply buyer-supplier partnership and provide long-term contract to address fast rate of price increase.					
5a.4	Developing regular monitoring system to assure appropriate market assessment and proper procurement procedure.					
5a.5	Using local instead of imported materials whenever possible.					
5a.6	Generally, how do you rate the price escalation management at ERC projects?					

What other price escalation mitigating mechanisms are in use at ERC?----------
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If you responded 1 or 2 for item 5a.6 what are the gaps? How can they be resolved?----------
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From your experience, please express your opinion on the degree of significance of these price escalation mitigating mechanisms.

1= No Significance 2= Minor Sign. 3= Average Sign. 4= High Sign. 5= Very High Sign.

S.N	Mechanisms	1	2	3	4	5
5b.1	Carefully considering price escalation clauses both at the signing and execution time.					
5b.2	Minimizing the effect of price escalation through bulk material purchases.					
5b.3	Making an effort to apply buyer-supplier partnership and provide long-term contract to address fast rate of price increase.					
5b.4	Developing regular monitoring system to assure appropriate market assessment and proper procurement procedure.					
5b.5	Using local instead of imported materials whenever possible.					

What do you recommend to improve the price escalation management and related problem mitigation practices in the EPC/Turnkey projects of ERC?

A, For the Client----------

B, For the Contractors----------

C, For the Consultants----------

Thank You Again For Your Collaboration!