Addis Ababa University

School of Commerce Department of Project Management
Post Graduate Program

ASSESSMENT OF THE EFFECT OF PRICE ESCALATION IN REAL ESTATE PROJECTS

By Meron Sheferaw Gebru

A project work submitted to Addis Ababa University, School of Commerce department of Project Management in partial fulfillment of the requirements for Master of Arts in Project Management

Advisor: Adane Atara (PhD)

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Addis Ababa, Ethiopia

Addis Ababa University School of Commerce

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Signed by the Examining committee

Advisor	Signature	Date
Internal examiner	Signature	Date
External examiner	Signature	Date

DECLARATION

I, Meron Sheferaw, declare that this project work is my original work and has not been presented for the award of a degree in any other university, and that all source of materials used for this project work have been duly acknowledged.

Name: Meron Sheferaw

Signature: _____

Date: _____

Letter of Certification

This is to certify that the project work entitled assessment on the effects of price escalation in real estate projects is the original work of Meron Sheferaw, done under my close guidance and submitted for examination with my approval as a university advisor.

Name: Dr. (Advisor)

Signature: _____

Date: _____

Approval sheet

This is to Certify that the project work prepared by Meron Sheferaw, entitled assessment on the effects of price escalation in real estate projects submitted in partial fulfillment of requirements of the Degree Of Master Of Arts In Project Management In School Of Commerce, Addis Ababa University, Complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the Examining Committee:

Advisor	**Signature**	**Date**
Internal Examiner	**Signature**	**Date**
External Examiner	**Signature**	**Date**
External Examiner	**Signature**	**Date**

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Signature: _____ Date: _____

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Acronyms and abbreviations

BEA-Bureau of Economic Analysis

GDP - Gross Domestic Product

GDPPI - Gross Domestic Product Chain-Type Price Index

PMBOK Guide- Project Management Body of Knowledge Guide

PPI - Producer Price Index

RPC – Real Price Change

SPSS - Statistical Package for the Social Sciences

Abstract

The purpose of this study is to investigate the effect of price escalation on real-estate projects in terms of cost, time and quality. Construction is unique, complicated, exposed to different risks and carried out by integrating different disciplines. This unique characteristics expose the industry to various types of risks. One of the major risk is price escalation. Price escalation is a problem that affects highly the construction industry. Real estate project is categorized as a major segment of Construction Industry. Real estate projects usually take longer time to accomplish the desired goal. The probability of occurrence of price escalation during the implementation phase of a project in general is high. When price fluctuation occurs in a project, the estimation will be mismatched with the actual cost. So, it is difficult to complete the project within the given budget. As a result of this problem, the project will be at risk of cost overrun, time delay and quality degradation. It also causes dispute among stakeholders. This study used descriptive type of research design to answer the research question how price escalation affects real estate projects. And quantitative method approach is used by collecting primary data from 81 participants. Descriptive statistics and inferential analysis was done to interpret the data acquired. The tool used in the study for analysis purpose is Statistical Package for the Social Sciences Version 26.00. The study found effects price escalation on real estate projects to be on cash flow of projects, project delay, increased cost of projects, quality degradation and claim and dispute among parties. The study analyzed that price escalation has significant effect on real estate projects' cost, time, quality and stakeholders involved in projects.

Key words: Price escalation, project cost, project time & Project quality.

Chapter one

Introduction

Construction Industry is an important sector that has a great effect on the growth of economy of a country. The scope of Construction Industry is too broad which includes building of a dam, real estate projects, road construction etc. Real estate project is categorized as a major segment of Construction Industry. Real estate is material possession consisting of land developments which embraces buildings, fixtures, roads, structures, and utility systems. Property rights provides a title of possession to the land, improvements, and natural resources like minerals, plants, animals, water, etc.(Corporate Finance Institute, 2022)

Real estate projects usually takes longer time to accomplish the desired goal. The probability of occurrence of price escalation during the implementation phase of the project in general is high. Price escalation is a variation in the price of specific goods or services in a given economy over a period of time. It is one the major risks in a real estate project and this escalation may contribute for failure of achieving the desired goal of the project.

According to (Ethiopian Economic Association et al., 2008), in the period 2002/03- 2006/07 the construction industry share 5.2% of the total GDP which indicates that the industry has major role to the Ethiopian economy. Over this period the sector has recorded comparatively higher growth as compared to the growth of GDP. Bigger investment on the development and expansion of various infrastructure projects like roads, airports and residential and non-residential housing units has been developed during this period.

Time and cost overrun are major risk factors affecting construction projects. Project success is viewed as being affected by both delays and cost escalation. Cost escalation is a universal issue, particularly in the construction sector, and their impacts frequently lead to conflict between owners, particularly government owners, project managers, and contractors, due to changes in project costs after the owner has made the choice to construct. (Jeya and Nandhini , 2016)

1.1 Background of the study

Cost escalation is a critical problem in the construction industry. This escalation influences different aspects of projects. Every material has increased outrageously due to different reasons. This problem is leading projects to cost overruns, delay project deadlines and quality degradation.

As Belachew et al. (2017) noted, material cost fluctuation has major effect on the status of project cost .The overall project cost will be affected if this risk is underestimated by the main stakeholders such us clients, consultants and contractors. According to (Kharbanda & Jain, 2018) ,in Construction Contract, the term escalation is crucial as a result of price fluctuation of major construction elements such as price of cement, steel, labors and aluminum, etc. is inevitable. It is essential to point out the causes of price fluctuation in order to handle escalation in construction projects. It is not easy to forecast escalation for the contractor during the bidding phase due to high range of market price fluctuation. For short term projects, the contractor shall use upcoming price escalation factor or estimate the rates on the basic costs. It helps the contractor to claim for adjustments when price variation occurs on the same type of item.

Generally, escalation is appropriate for long term projects. Budget of a project is mostly affected by price escalation which leads the project to cost overrun which highly affects the contractor. So, it forces the contactor to consider high contingency during the bidding phase of the project. In construction contract document, regulated provision is mandatory to manage unexpected price escalation since construction work is done based on the pre stated contract agreements between different parties. (Kharbanda & Jain, 2018)

1.2 Statement of the problem

Construction is unique, complicated, exposed to different risks and carried out by integrating different disciplines. It also has specified target, limited resources, scope, definite time and budget. This unique characteristics expose the industry to various types of risks that present difficulty for a project to be delivered within bounded time, estimated costs and required quality. Price escalation is one of the major risks that hold back a project from accomplishing the deliverables.

Price escalation in general is a problem that affects each and every sector. This problem affects highly the construction industry. It is not easy to predict the upcoming fluctuations in a timely and accurate manner. When price fluctuation occurs in a project, the estimation will be mismatched with the actual cost. So, it is difficult to complete the project within the given budget. As a result of this problem, the project will be at risk of cost overrun, time delay and quality degradation. It also causes dispute among stakeholders.

Real estate projects are highly prone to the risk of price fluctuation problem until this day. Increasing construction materials' price and supply chain shortage are basic reasons for the price escalation in the construction industry. Covid 19 pandemic has also resulted in material shortage and rise of construction material cost which affects highly real estate projects. Currently in our country, the rate of price escalation on the construction material is significant.

Price escalation influence the construction industry highly and it causes delay, reduced scope of projects, project cancelation. Price escalation could also impact public projects negatively. (Vamsidhar et al., 2014). Another study also conducted in Niger and it shows that fluctuation of prices of materials has a very significant effect on the cost of construction. (Olukyode et al., 2015)

This research has assessed the effects of price escalation in real estate projects and how we can manage the problem to protect projects from the effects of price escalation.

1.3 Research Questions

1.3.1Main research question

The general question of this research is

How does price escalation effect real estate projects?

1.3.2 Sub research questions

What are the major factors contributing to price escalation?

How does price escalation affect certain stakeholders involved in real estate projects?

1.4 Objectives of the study

1.4.1General Objective of the study

The main objective of this study is to assess the effects of price escalation that occur in real estate projects in Ethiopia.

1.4.2 Specific objectives of the study

- To assess the effects of price escalation on real estate projects.
- To assess the effects of price escalation on major stakeholders.

1.5 Significance of the study

Currently, price escalation is a critical concern to almost every country in the world. It is obvious that price escalation in real estate projects is very challenging phenomena that affects the contractors, consultants, client, society and the economy of the country. The result of this research could be helpful to be aware price escalation problem may occur in selected real-estate projects and to minimize its effect once the problem occurs. Basically, it helps to realize to what extent price escalation affects such kinds of projects and to formulate intervention method to reduce the effects of the problem.

More comprehensive information on the major effects associated with price escalation in real-estate projects is provided, which will be vital for future researches on the topic. This study will be of paramount importance in understanding the nature of its effects so that the solution will be a step closer. The key focus areas in cost escalation in the construction industry are uncovered and examined. Besides painting a vivid picture on the effects of price escalation in real estate projects, the study also pen lighted the pattern in the effects of price escalation of construction projects to deal with the problem at hand.

1.6 Scope of the study

The scope of this study is limited to investigate the effect of price escalation on selected real-estate projects in Addis Ababa. The time scope of this study ranges from March to June, 2022. It shows that the effects are significantly related to the issue at hand. The study focused on where the effects plunge severely among the affected groups. It emphasized on the maximum effects of the problem on projects. The population of this study only focused on consultant, contractors and clients involved in real estate projects located in Addis Ababa.

1.7 Limitation of the study

Although it was attempted to achieve the best information out of this study, some factors limited its fullest potential. Due to shortage of time and budget, this study was conducted only on selected real estate projects and covers certain stakeholders involved in real estate projects in Addis Ababa.

1.8 Definition of Terms

1.8.1 Conceptual definition

Real estate project: As Sharma (2018) notes, it is defined as "the development of a **building**, converting an existing building or a part in **apartments**, development of land into apartments / plots for the purpose of selling and includes common areas, development works, all improvements and structures thereon and all easement, rights and appurtenances belonging to such building or land or structure".

Estimate Costs: Cost estimation is the method of forecasting the amount of overall cost used to deliver a project. (Project Management Institute, 2013)

Budget: refers to the accepted estimated cost of a project required to achieve project deliverables. (Project Management Institute, 2013)

Building cost escalation: According to (Forecasting Escalation in Building Costs Calculating, Documenting and Reviewing Allowances, 2008), cost escalation refers to price increment to the estimated cost in building construction over a defined period.

Contingency Reserve: is a reserved budget within cost baseline used for mitigation responses for recognized risks. (Project Management Institute, 2013)

Project Cost Management: is the process of planning, estimating, budgeting, financing, funding, managing, and controlling costs to finish the project within a given budget. (Project Management Institute, 2013)

Project Time Management: it a management process that helps to deliver a project within a specified time. (Project Management Institute, 2013)

Project Quality Management: is the process that controls the quality of a project based on the required specification. (Project Management Institute, 2013)

Risk: an uncertain event that could happen in a project and affects a project's objectives positively or negatively. (Project Management Institute, 2013)

Variation: the difference between the actual condition and the estimated situation from the baseline plan. (Project Management Institute, 2013)

Stakeholder: anybody who is involved in a project or affected by the product of a project. (Project Management Institute, 2013)

Customer Satisfaction: it is customer's judgment whether the product met or exceeded the customer's expectations. (Project Management Institute, 2013)

1.9 Organization of the study

This research paper is organized into six chapters. Chapter one covers introduction, background of the study and the industry, statement of the problem, research questions, objectives of the study, conceptual definition of terms and concepts, significance of the study, scope and delimitations of the study.

Chapter two presents review of related literatures which include theories of price escalation, factors which lead to the occurrence of price escalation problems, effects of price escalation on projects, methods to mitigate price escalation in real estate projects, research gap and conceptual frame work.

Research design and methodology, sampling design such as target population, sampling frame, sampling technique, sample size and sampling procedure, sources of data, data collection methods and instruments, data analysis methods, validity and reliability of the research, research ethics are included in chapter three.

Chapter four and five discuss about findings of the study which include demographic and socioeconomic characteristics of the respondents, differentials and determinants on the effects of price escalation in real-estate projects; and major findings of the study, respectively.

The last chapter represents summary, conclusion and recommendations of the study.

References and appendices where documents such as research instrument documents and are included.

Chapter Two

Literature Review

Introduction

This chapter focuses on reviewing the work of previous studies regarding price escalation and factors and effects of price escalation on construction project and related matters. Accordingly, this chapter discusses studies conducted by other researchers concerning price escalation in general and construction project's cost escalation in particular. Different theories of escalation and inflation are also presented in this chapter.

2.1 Theoretical literature review

2.1.1 Escalation

Escalation refers to variations in the price of specific goods and services in specific industries. Inflation is merely one factor that influences the price of a market set of goods and services. Price change, market price change, particular price change/growth, and price escalation are all synonyms for escalation. De-escalation is the opposite of positive price escalation. (Department of Defense, 2017

According to (department of defense, 2017), escalation can be calculated for a single item or a bunch of items. Escalation is synonymous with inflation when the market set of products is used across the entire economy. Aside from this important difference, escalation and inflation are conceptually and numerically the same. Many factors influence escalation, including inflation, market fluctuations, changes in the supply of system-specific materials, suppliers' and the government's business costs, government procuring policies, economies or diseconomies of scale, changes in the workforce and other inputs to production, effect rate and technical development.

2.1.2 Inflation

Department of defense (2017) defines inflation as an increase in the general level of prices over time. The overall price level is an average of all commodities and services exchanged across the whole economy. Deflation is a term for a fall in the general price level that occurs infrequently over a long period of time. It is the opposite trend to inflation. Inflation is considered as a reduction in the purchasing power of money. Money is the measure of value by which the worth of all other things is measured, and it is on one part of every commercial transaction. When the price level rises, money buys smaller items.

Inflation is defined as a change in price across the entire economy rather than a change in the price of a particular product or service. Inflation is calculated as a weighted average of prices across the entire economy, indexed to a base year. The Gross Domestic Product Chain-Type Price Index, known as the GDP Price Index and abbreviated also as the GDPPI, is the inflation index utilized by the federal government in its budgeting. The index is created by the Department of Commerce's Bureau of Economic Analysis (BEA) using value-added prices of all final goods and services produced on American soil. (Department of Defense, 2017)

Escalation is the term used to describe a price change of a particular item or service. Price variations caused by the mix of goods being measured or significant changes in product qualities are not included. The GDPPI is one of several published pricing indexes that is used as controlling method for quality. Most labor price indexes, on the other hand, are not quality-adjusted and are not accounted for demography or productivity. (Department of Defense, 2017)

According to (department of defense, 2017) some of the examples of escalation are listed below

- Increases in soldier and civilian salary
- Raises in contractor manpower’s wage rate
- Alteration in a service's unit price
- An increase in the Electronics Producer Price Index(PPI)
- An increase in the gasoline prices per liter.

2.1.3 Theories of inflation

Several economists have proposed various inflation theories. The economists who developed inflation theories are essentially classified into two groups: monetarists and structuralists. As shown in the figure three different inflation theories are explained by Nitisha (2015),

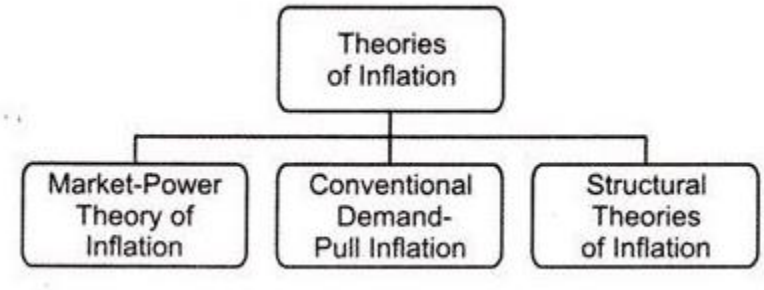


Figure 1.Three different theories of inflation

2.1.3.1 Market-Power Theory of Inflation

When a single or a group of sellers decide on a new price that is higher than the competitive price, this is referred to as a market-power pricing in an economy. Such organizations set prices at a degree where they can make the most profit, regardless of consumer purchasing power. (Nitisha, 2015)

2.1.3.2. Conventional Demand-Pull Inflation:

Extreme level of inflation is expressed by the market power theories of inflation. Based on the market power theories, inflation occurs when there is less demand. But the conventional demand-pull theorists assumes that inflation occurs when the total demand exceeds over the total supply of the market. For instance, when consumption increases in the level of employment, inflation will be inevitable. When the level of employment saturates, the economy also reaches its highest manufacture capacity. The supply of goods and services cannot be raised any further at this time, while demand for goods and services is increasing quickly. Inflation occurs in the economy as a result of this demand-supply mismatch. (Nitisha, 2015)

2.1.3.3 Structural Theories of Inflation:

Structural economists are located between market power and conventional demand pull. Based on the structural theory of inflation, Market power is one of the reasons that causes inflation, but it is not the sole one. Supporters of structural theories argue that inflation is caused by structural misalignments in the country or some of the business environment's institutional aspects. (Nitisha, 2015)

2.1.4 Real price change

Inflation and real price change (RPC) are the two components of escalation. Inflation, by definition, influences all prices in the same ratio, whereas RPC is the percentage of price escalation that is unaccounted for by inflation. A positive real price change suggests that the product has gotten more expensive in comparison to an economy-wide set of goods and services, whereas a negative RPC shows that it has become less expensive. Positive RPC encourages customers and businesses to conserve the item's use from an economic standpoint. Negative RPC, on the other hand, encourages users to utilize the item more frequently. Real price change, like escalation, can be quantified in money or proportion terms. (Department of Defense, 2017)

2.2 Empirical literature review

2.2.1 Cost escalation

According to (Surabhi & Ketan , 2018), cost escalation has two phases. These are pre- tender and contract phase escalation. Fig 1 shows the phases of cost escalation

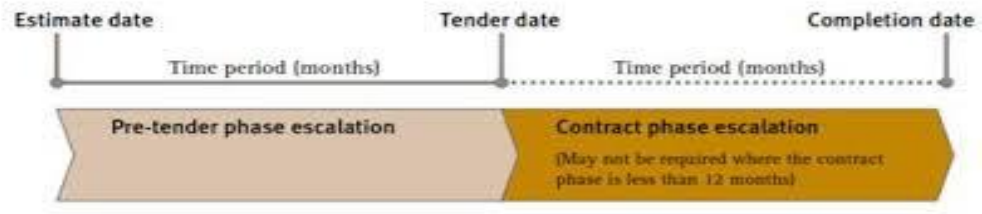


Figure 2. Phases of cost escalation.

Source :(Surabhi & Ketan , 2018)

2.2.1.1 Pre tender phase escalation

Based on Surabhi & Ketan (2018), the time between projects' cost estimation development and the bidding date for projects must be predicted and be prepared for the potential change in price. In all circumstances this contingency is essential when an estimation has been prepared prior to the bid date and necessary to recognize the essential variables such as preparation date of Cost estimation, bid date, anticipated rate of escalation, time interval between estimation date and bid date. 'Sensitivity analysis' is used in projects when choices for starting, constructing, and completion are being examined. It helps to predict price escalation. And it analyzes how a project's financial outputs are vulnerable to certain parameters.

2.2.1.2 Contract phase escalation

A contingency for cost escalation between the projected bid date and the expected date of delivery of the project must be provided when it is predicted that costs may rise throughout the contract phase. When the contract phase is comparatively short, a provision for contract phase escalation would not be required. Having contract phase escalation is crucial especially when construction costs are growing tremendously, and similarly on mega projects where high project values and long contract periods are expected to have significant escalation. (Surabhi & Ketan, 2018)

2.2.2 Factors contributing to cost escalation

Different factors influence the cost of a project, and most of the factors are interconnected and interdependent. The cost of a project will fluctuate over time, which indicates that the possibility of varying costs is determined by the passage of time. As these parameters vary over time, the cost will vary as well. Fluctuation of cost of materials and rental equipment associated with the rate of inflation factor happen each year in construction projects. Design changes or addition to the scope of work is what occurs, obtained from a list of total work changes that have been measured in value with respect to the original project cost. (Wisnu Broto et al., 2017). Inflation was also noted as a major factor in cost escalation. As a result, bids were rarely adjusted to account for inflationary effects, especially by local construction companies in Zambia. (Muya et al., 2013).

According to construction industry specialists, lack of supervision, delayed payment, design error, varying site conditions, and an absence of cost management were the top potential causes of cost escalation. Nazif et al. (2020) conducted a study that the most commonly observed elements in construction works that cause cost escalation were discovered to be delayed payment, lack of supervision, lack of budgetary control, and fluctuation. Furthermore, the findings suggested that design errors, significant variation, unreliable cost estimation techniques, change in prices of raw materials, and delayed payment were the most significant variables contributing to cost escalation in construction projects. (Nazif et al., 2020).

Clients' inconsistencies or delays in releasing payments result in cost escalation and scheduling delays. Delayed payments almost usually result in higher project costs since the risk is moved on to the clients, who must handle the cost of interest charges. Contractors' poor financial management, on the other side, might result in schedule delays and poor quality. Contractors who use inadequate financial management methods are more likely to run out of funds before they can complete project activities. When contractors are short on cash, they may be tempted to 'cut corners' or postpone project completion. (Muya et al., 2013).

In the research from Jeya and Nandhini (2016), major factors of cost escalation were recognized. The major factors are government policies, taxes, raw material input, environmental protection and labor cost. Delays in work approval, delayed decision making, contract bid price higher than initial budget, and price adjustments are some of the identified important factors for cost overrun. Muya et al. (2013) stated that poor estimation are usually blamed for inaccurate cost estimations. Because of this factor engineers' estimations could be significantly lower than bid pricing or the selection of the most responsive financial offers provided during the tendering stage.

According to (Samiullah et al., 2017), the top most essential factor of cost escalation in Pakistani road projects was discovered to be the owner's financial problems. Because of this situation, the client or owner is having difficulty funding the project. As a result, cost escalation issues develop in Pakistani construction projects. Having difficulties with cash flow is also another factor of cost escalation. If the contractor has no problems with cash flow from the client, he or she will be able to execute the project on time and on schedule. Due to a possible lack of funds or a cash flow

difficulty, the contractor pause or delay their construction activities on construction site, which could lead to an escalation risk in construction projects.

Changing design frequently is also one of the critical variables of cost escalation. The construction project's activities begin with the client's and consultant's blueprints. If project building activities are subjected to frequent design revisions, this might lead to cost escalation in the projects. Delays in receiving drawings from the client and consultant suspend construction activity for an undetermined amount of time, which might result cost escalation in projects. It has been noted that the client and consultants are accountable for this factor. Changes in material specifications can also be factor of cost escalation projects since it requires a lot of time for confirmation and for materials to be delivered at the site. Due to an intervention of client or owner in the project, a task of the project is put on hold or sometimes requires longer time for confirmation from the client. The client's involvement causes the project's costs to rise. (Samiullah et al., 2017)

Samiullah et al. (2017) also stated that political influences result in cost escalation. A project is approved with appropriate budget that is allowed for a specific project, but due to political pressure, money from that project are transmitted and relocated to another project, or a project contract is awarded to a beginner contractor, causing escalation in price.

Based on (Shane et al., 2009) research, Internal and external factors influence the estimation throughout each project development step. Internal factors are those that lead to cost escalation and can be controlled by the owner, whereas external factors are those that are beyond the owner's command.

Internal cost escalation factors are those that the can be managed by the owner of a project. Some of the primary internal factors can be noted during the development of planning and designing of the project. These are bias, delivery/ procurement approach, project schedule changes, engineering and construction complexities, scope changes, scope creep, poor estimating, and the issue of inconsistent contingency. During the implementation phase of a project, poor management and defective design are the factors that lead to cost escalation. Even when the rate of inflation is precisely forecasted, changing project’s schedule especially extensions caused by budget restrictions or design issues, can result in unexpected increases in cost inflation. Because of the project's geographical area or function, engineering and construction complexities might make

design work difficult, resulting in internal collaborations problems and design error. Internal coordination issues might include conflicts or challenges amongst the many disciplines engaged in project planning and design. (Shane et al.,2009)

External factors of cost escalation are those by which the client has only a limited or no direct control. However, these factors must be considered by the client when estimating project expenses. External factors including local government concerns and requirements, fluctuations in the rate of inflation, scope modification, scope creep, and market conditions can cause cost escalation during the development of the planning and design phase. External factors such as local government concerns and requirements, market conditions, unforeseen events, and unforeseen situations can all contribute to cost escalation during construction phase. During the estimation process, the possibility of such events must be considered. It's important to remember that each of these components can act alone or with others concert. (Shane et al.,2009)

According to (Kaliba et al., 2009) study that clients were accountable for the majority of the major causes of cost escalation. Clients were solely responsible for four of the key factors of cost escalation. Contractors were in charge of two, with consultants sharing the burden for the third. The parties involved shared responsibility for bad or heavy weather. The majority of the causes of cost escalation were also recognized as being manageable. Only bad weather and inflation were out of our control, therefore the problem of cost escalation could be eliminated.

Responsibility and category of the major cause of cost escalation

Causes of cost escalation	Responsibility (who bares the cost?)	Category of factor
Bad weather	Shared	Uncontrollable
Inflation	Client	Uncontrollable
Schedule delay	Contractor	Controllable
Scope changes	Client	Controllable
Local government pressures	Client	Controllable
Strikes	Contractor	Controllable
Technical challenges	Contractor and consultant	Controllable
Environmental protection and mitigation costs	Client	Controllable

Table 1. Causes of cost escalation

Source:(Kaliba et al., 2009)

Maqsoom et al. (2021) summarized all the causes of cost escalation studied by different researchers in a table format.

Summary of cost escalation factors

Study	Country	Factors
Bing et al. (2005)	United Kingdom	Inexperience of contractor, variations in the prices of construction material, recurrent changes in design, unstable economy, bank loans and financing offered at a high-interest rate, and deceitful practices as well as kickbacks.
	United Kingdom	Changes in design, uncertainties/risks of the project, improper planning & scheduling, complications, and poor performance by the employed subcontractors.
Akinci and Fischer 1998	Developing countries	Substandard management, erroneous estimates of materials and financial stature of the employed contractor.
Enshassi et al. 2009	Ghaza	Design & documentation risks, labor and workforce risks, site operations risks, procurement risks, financial management risks, contract & management risks, and communication & coordination risks.
Le-Hoai et al. 2008	Vietnam	Poor supervision & management at the site, inefficient assistance in project management, owner's & contractors issues of finance and changes in design.
Amoatey et al. 2015	Ghana	Delay in interim payments, escalation of inflation, material price escalation, unavailability of funds, change orders, and poor capital market.
Rauzana (2016)	Indonesia	Errors in the estimation of budget, execution & reporting relationships and project documentation.
Kaliba et al. (2009)	Zamibia	Weather conditions, changes in scope, additional cost for environmental protection, delays in schedule, labor strikes, technical difficulties, escalation of prices, and regulatory authority pressures.
Gonzaiez et al. 2013	Chile	Improper planning and poor subcontracting practices.
Kaming et al. 1997	Indonesia	Design issues, site operations issues, and issues of planning or management.

Table 2. Summary of factors of cost escalation

Source (Maqsoom et al. (2021)

2.2.3. Effects of price escalation

Kaliba et al. (2009) discovered in his study that cost escalation causes project delays, poor quality, project extensions, project termination, conflict, and cost overruns. These consequences could have a negative effect on the economy if it is not managed properly.

According to (Ercan, M., 2017) research findings it show that if a proper price escalation provision is not included in the contract, cost escalation causes not only project delays but also poor project quality. Furthermore, cost escalation causes cash flow issues throughout the execution phase and may result in a contract dispute. Knight and Fayek (2000) stated that the most prevalent effect is on a project timeline or a destruction in the flow of activity.

Challenges on the work site can irritate team members or demoralize, reducing performance. Another major effect of factors including monitoring performance, an unattainable timeframe, team motivation, and lack of experienced manpower is low quality performance, which leads to redo and wasted time. Delays can be caused by delayed activity, requiring revision, or escalating costs of material and equipment. The organization of a project, the arranging of subordinates, the work performance, the quantity of rework, and the project's overall cost are all influenced by monitoring of performance. (Knight and Fayek , 2000)

According to (Musarat et al.,2021), inflation affects the price of supplies, labor, and machines, causing the original and final costs of the project to diverge. He also mentioned that construction expenditures are volatile, and material, labor and equipment costs are always fluctuating, causing economic growth to be dynamic. Inflation is becoming a big issue, negatively impacting the construction industry. Apolot et.al. (2013) concluded that the cost of materials, machinery, and other construction inputs is rising as a result of inflation. Where relevant stakeholders have no other choice, they tend to extend the project in order to avoid cost overruns, which are mostly caused by inflation.

Shah, R. K. (2016) indicated that when the rate of inflation rises, the cost of materials rises as well. As a result clients will be subjected to pay additional payment caused by ambiguity of inflation other than the estimated construction costs. Oghenekevwe et al. (2014) reported that inflation has caused a significant increase in the cost of construction materials, which has resulted in significant cost overruns. Based on (Goyal, 2017) research analysis, he came to the conclusion that the growth in material prices is attributable to inflation, which leads to cost overrun. He also shows that inflation affects not just material price but also labor wage, which will have an effect on the total project cost.

2.2.4 Mitigation methods effects of price escalation

A research suggested the client to give due consideration to price escalation effects and assign experts to asses contracts before signing as price escalation effect can have protective clauses of price adjustments in the contract. (Aschalew et al., 2018) The client would benefit if performances are monitored and managed by professional in different phases of the project and assess the course of the project according to designed plan. (Gashaw, 2013)

Clients should encourage their employees with trainings and incentives from time to time. Clients are advised to have properly working accountable system in place and be able to predict risks and act on agreements of the contract (Dinsa, 2015)

Contractors are recommended to make timely purchase of construction materials and manage the delivery of their purchase to make sure it is available when needed. (Gashaw, 2013) Contractors are also advised to ask consultants the possibility of replacing materials with equally functional material when price escalation is high or material is unavailable. (Hailu et al., 2015)

Since clients strongly rely on consultants' suggestions, consultants are expected to provide a design with properly studied estimation of price escalation. The consultant is also expected to monitor the project closely and update the client in every phase. The client should assess progress in meetings and should let the project move on to the next phase after his approval. (Aschalew et al., 2018) Client should emphasize on the effectiveness of his progress meetings. (Gashaw, 2013)

One paper strongly suggests to start with studding materials that are highly vulnerable to market price change before making a contract and make a working plan with stake holders. Consultants should build protective contracts by including backup plan that mandate additional funds when price escalates or make the contract to be for a very limited time frame to avoid the price change. All stakeholders involved in a project are protected by price escalation clauses. (Starczewska, 2021)

Price escalation clauses help contractors when they face rapid increase in material and running costs. Clients do not end up having their projects delayed or terminated as contractors tend to work as effectively as possible according to the price escalation clause in the contract. (Starczewska, 2021)

As price escalation clauses can be key factors for a project success, one has to give thorough evaluation to contracts and negotiate on a clause that lineate towards a safe price adjustment. (Starczewska, 2021)

There should be a working communication channel between all the stakeholders to monitor the progress of the project and to timely give solutions that may arise while the project is running. All stakeholders should document major changes in the project and refer their original time table so that they can control the project time. (Mohammed, 2017)

When there is a need to make a change on an existing plan regarding price escalation, it is wise only to state major changes affecting the project. It is more important to closely monitor price escalation and take action early before the effect worsens. (Mohammed, 2017)

2.3 Research Gap

Nowadays price escalation has become a major problem in the world in general .There are plenty price escalation contracts clauses to protect the project from effects of escalation but still the problem is significantly affecting projects from achieving their goals. Several researchers have studied about price escalation in the construction industry and other sectors as well. However, there isn't much research done on the effect of price escalation specifically in real estate projects in Ethiopia.

2.4 Conceptual framework

According to the above reviews, the following conceptual framework gives as brief illustration about effects of price escalation on projects. Price escalation is the independent variable and the dependent variable is its effect on projects in terms of project cost, time and quality.

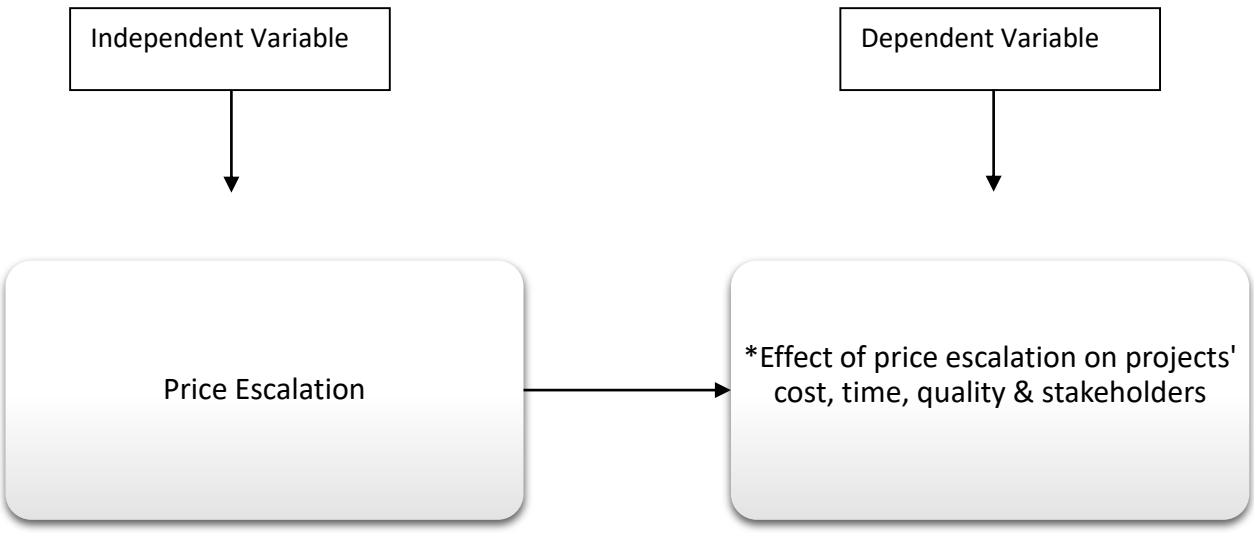


Figure 3. Conceptual fame work

Chapter Three

Research Design and Methodology

Introduction

In this section are stated what is has been done and where, how it was done, what data was needed, the proposed tools used in the data collection and the methods of analyzing the data was described in.

3.1 Research Design

The study aimed to systematically assess the effect of price escalation in real estate projects, to investigate this under-researched topic to establish a cause-and-effect relationship. This study gathered mainly primary data while conducting the study.

The research design refers to the overall strategy that must be chosen to integrate the different components of the study in a coherent and logical way, thereby, ensuring that the study will effectively address the research problem (De Vaus, 2001). The core reason which led to the selection of the particular design is the need to perform descriptive study on the assessment of effects of price escalation in real estate projects. Hence, quantitative research approach is selected to be the main tool in this study.

3.2 Research approach

The study follows quantitative approach. Quantitative approach is a method that measures data numerically and helps to determine the relationship between set of variables. This study defines the relation between price escalation and its effect on the projects' cost, time, and stakeholders.

3.3 Sampling design

3.3.1 Target Population

Target population refers to a group of people on whom it wants to conduct research and develop conclusions. (Barnsbee & Nghiem, 2018).The target population of this study focused on above grade 3 real-estate companies located in Addis Ababa and the study included major stakeholders related to the real estate projects. Hence it involved contractors, client and consultant.

3.3.2 Sample Size

Ethiopian investment commission reported that around 117 investment companies invested on 56 real estate project since 2015. But only 43 real estate projects are located in Addis Ababa. (M., 2018). It is hard to estimate the number of population from this information. If the size of the population is very large or unknown, the following equation helps to determine the sample size.

$$N = p(1-p)\left(\frac{Z}{E}\right)^2$$

Equation 1: Sample size determination

Where,

N- Necessary sample size

Z - Standard normal distribution reflecting the confidence level (e.g., Z = 1.645 for 90%) and

E - Tolerable error (± 7 %)

p- 0.5 can be used to generate the most conservative, or largest, sample size.

The sample size for this study will be calculated as the following:

$$N = 138.06$$
$$\mathrm{N} = 139$$

3.3.3 Sampling technique

The study used non probability sampling techniques by selecting samples of real estate companies using convenient method and selecting stakeholders using purposive method.

3.4 Sources of Data

3.4.1 Primary source

This study was obliged to rely majorly on primary data source as it hopes to be descriptive research and aims to become a source for future resources. Primary data sources are taken from main stockholders involved in certain real estate projects.

3.4.2 Secondary source

The study also used secondary data source from published books, journals, articles, magazines, previously published papers on related topics, and the internet. It will be useful no matter how small the amount of information that can come from these sources may be.

3.4 Data Collection methodology

Both primary and secondary data will be collected to produce prominent research document. In the primary data collection questionnaire will be used to gather data on the nature of effects of price escalation in real estate projects. Secondary data will be gathered from reading reviews of various literatures written about price and price escalation effects in real estate projects in both global context and in Ethiopia, browsing internet sources and newspapers and going through published and unpublished reports.

3.4.1 Data collection instrument

The quantitative data collection instrument is via questionnaires that were prepared comprising different parts. One part being background of the respondent. Another part of the questionnaire focused on the effects of price escalation in real estate projects. The last part involves respondent's suggestions for the mitigation methods of price escalation. It is of both closed and open-ended questions using the English language.

3.5 Data analysis methods

The study used quantitative data analysis method. The quantitative data collected using questionnaire is analyzed after the data collection was completed using quantitative descriptive statistics and inferential analysis. The collected quantitative data was coded and put in statistical computer software, SPSS. And tables, and pie-charts are used to analyze the collected data. Similarly, descriptive statistics such as frequency and percentages is used to analyze the collected data. Statistics Package for the Social Sciences (SPSS) version 26 is used to save time and to make analysis simple and precise.

3.6 Validity and reliability

3.6.1 Validity

Maximum effort was made to minimize possible errors committed in the field enumeration process. Technical arrangements was made to reduce the chance of the occurrence of errors.

Before the actual field enumeration started, due time was spent on designing the questionnaire to encompass skipping mechanisms and logical linkage among the questions to help pre-collection error avoidance. Great care was taken during the post-data collection process of data clearing and data management. The researcher proceeded conducting the study per the advisor's approval of the questionnaire.

3.6.2Reliability

One method of ensuring reliability of a research is using a questionnaire in conducting research. . It was tried to ensure the reliability of the questionnaire itself by using Cronbach's Alpha method. Based on the facts, evidences and sounded objectives, the researcher tried to make sure the outcome of the data analysis process are consistent, accurate and highly stable as possible. This is the most common method for checking reliability of Likert scale questions. The table shows the SPSS reliability analysis of the study to be alpha value of above 0.7 and according to (Taber, 2018) alpha value greater than 0.7 is acceptable. Therefore, the questionnaire is reliable.

Table 3: Reliability test result

Variables	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Factors contribute for price escalation	0.887	0.885	10
Effect of Price escalation on projects' cost, time and quality	0.728	0.751	5
Effects of price escalation on several stakeholders	0.827	0.840	9
Mitigation methods of price escalation	0.750	0.713	6
Combined result	0. 851	0.855	30

(Source: own survey, 2022)

3.7 Research Ethics

During the study, full information was given to the study participants on the purpose and nature of the research and only those who gave their consent to participate accordingly, were enrolled as the respondents of the study. Information obtained from the participants will remain confidential. The participants' anonymity will be kept strictly and freedom of expression was granted. Additionally, all the secondary data used in this paper have been properly cited all the information collected throughout this research will only be used for the purpose of this study.

Chapter four

Data Analysis and interpretation

Introduction

This chapter presents the analysis of the data gathered from questionnaire. The data was analyzed using descriptive analysis method using SPSS statistic version 26. 00. Descriptive statistic and correlation analysis was carried out to describe the data.

4.1 General information of respondent

This section shows the general demographic information of the respondents. This information summarizes the background of the respondents' and it consists type of the organization, respondent's profession and work experience in the real estate projects.

4.1.1Response rate

Total of 139 questioner were distributed to contractor, client and consultant involved in real estate projects. But the number of responded questioners were 81. The response rate of the questionnaire is 58.27%.

4.1.2 Demographic information

As shown in the table 4, among 81 questionnaire respondents', 45.68% were contractors, 35.80% consultants and 18.52 % were clients. It also shows that 58% of the respondents' have less than five years of experience, 39.5% of the respondents have six to ten years of work experience and the rest 2.5% have more than fifteen years of experience. Regarding to respondents' profession, 48.1% are office engineers, 17% consultants and 16% are project managers, the rest are another type of profession.

Table 4 : Demographic information of respondents

Demographic	**Variables**	**Frequency**	**Percentage**
Respondent's organization	Contractor	37	45.68 %
	Consultant	29	35.80 %
	Clients	15	18.52 %
Total		81	100 %
Work experience in years	Less than Five	47	58.0 %
	six to ten	32	39.5 %
	Eleven to fifteen	2	2.5 %
Total		81	100 %
Profession	Office Engineer	39	48.1 %
	Site Engineer	4	4.9 %
	Project Manager	16	19.8 %
	Consultant	17	21.0 %
	Other	5	6.2 %
Total		81	100 %

(Source: own survey, 2022)

4.2. Descriptive Statistics

This section focuses on the descriptive statistics of the collected data. The Questionnaire consisted 5 point Likert scaled type of questions. Each question contain 5 options to choose the appropriate answer. The point ranges from 1 to 5 which are 5= Very High effect, 4 = high effect, 3= Average, 2= Low effect and 1= Very low effect.

4.2.1 Descriptive Statistics of factors contributing to price escalation

Several price escalation factors has been discussed in the literature review. This section shows the statistics of some of the major causes of price escalation in real estate projects,

There are many factors contributing to price escalation. The participants were requested to rank the factors of price escalation on real estate projects based on their experience. Table 5 shows the statistics in the responses for each factors. 81% of the respondents put both inflation and fluctuation of dollar exchange rate effect as very high. Economy of the country was marked in 56.8% of the responses as very high and in 43.2% as high. Market conditions stated as affecting price escalation highly in 72.8% was also stated to have average effect in 27.2% of the responses. The factor that came to have 19.8% very low effect, 39.5% minor effect and 40.7% average effect in price escalation in the responses is shortage of labor or skilled workers. Engineering and construction complexities were responded as having average effect in 50.6% of the responses, low effect in 35% of the responses and very low in 6.2% of the responses. Inconsistent application of contingencies were to show average effect in 54.3% of the responses, low effect 39.5% of the responses and very low in 6.2% of the responses. The factor that had an average effect in 28.4%, low effect in 50.6% of the responses and very low in 21% of the responses is ambiguous provision of contracts. Improper planning &/or improper implementation turned out to have an average effect in 37% of the responses and low effect in 63% of the responses. Project schedule change was seen to have average effect in 23.5% of the responses and low effect in 76.5 % of the responses.

Table 5: Descriptive statistics of factors contributing to price escalation

S.no	Question	Very high		High		Average		Low		Very low	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1	Inflation	66	81.5	15	18.5	-	-	-	-	-	-
2	Fluctuation of dollar exchange rate	66	81.5	15	18.5	-	-	-	-	-	-
3	Market Conditions	-	-	59	72.8	22	27.2	-	-	-	-
4	Economy of the country	46	56.8	35	43.2	-	-	-	-	-	-
5	Shortage of labor/skilled workers	-	-	-		33	40.7	32	39.5	16	19.8
6	Engineering & construction complexities	-	-	-	-	41	50.6	35	43.2	5	6.2
7	Inconsistent application of contingencies	-	-	-	-	44	54.3	32	39.5	5	6.2
8	Ambiguous contract provisions	-	-	-	-	23	28.4	41	50.6	17	21
9	Improper planning &/or improper implementation	-	-	-	-	-	-	30	37	51	63
10	Project schedule change	-	-	-	-	-	-	19	23.5	62	76.5

(Source: own survey, 2022)

4.2.2 Descriptive Statistics of effect of price escalation on real estate projects

Table 6 shows price escalation effect on real estate projects in different frequencies that were depicted in the responses. Price escalation had very high effect on increased cost of projects in 80.2% of the responses and high effect in 19.8% of the responses. Price escalation was said to have very high effect on project delay in 85.2% of the responses and high effect in 14.8% of the responses. Price escalation brings about quality degradation in very high degree in 30.9% of the responses, in a high degree in 66.7% of the responses and in average in 2.5% of the responses. Price escalation was shown to bring claim and dispute among parties in very high degree only in 18.5% of the responses while in a high degree in 81.5% of the responses. Price escalation affects cash flow of projects very highly in 91.4% of the responses and highly in 8.6% of the responses.

Table 6: Descriptive Statistics of effect of price escalation on projects

S.no	Question	Very high		High		Average		Low		Very low	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1	Increased cost of projects	65	80.2	16	19.8	-	-	-	-	-	-
2	Project delay	69	85.2	12	14.8	-	-	-	-	-	-
3	Quality degradation (substitution of material with low quality)	20	30.9	54	66.7	2	2.5	-	-	-	-
4	Claim and dispute Among Parties	15	18.5	66	81.5	-	-	-	-	-	-
5	Cash flow of projects	74	91.4	7	8.6	-	-	-	-	-	-

(Source: own survey, 2022)

4.2.3 Descriptive Statistics of effect of price escalation on stakeholders

Table 7 shows the effect price escalation has on certain stakeholders in different frequencies that were found in the responses. The effect of price escalation has in adversarial relationship between stakeholders was responded as very high in 2.5% of the responses, as high in 29.6% of the responses, as average in 64.2% and as low in 3.7%. Effect of price escalation on loss of reputation of consultants was responded as very high in 2.5% of the responses, as high in 24.7% of the responses, as average in 69.1% of the responses and as low in 3.7% of the responses. High cost of supervision was brought about by price escalation in very high degree in 1.2% of the responses, in high degree in 3.7% of the responses, in average in 90.1% of the responses and in low degree in 4.9% of the responses. Price escalation was said to have very high effect on contractors' payment delay in 50.6% of the responses and high effect in 49.4% of the responses. Price escalation was shown to result in need for additional budget allocation in a very high degree in 64.2% of the responses and in a high degree in 35.8% of the responses. Respondents put the effect of price escalation on poor performance as very high in 53.1%, as high in 39.5%, as average in 4.9% and low in 2.5% of the responses. Price escalation has very high effect on client dissatisfaction in 71.6% of the responses, high effect in 25.9% and average effect in 2.5% of the responses. Price escalation brings frustration in a very high degree in 74.1% of the responses and in a high degree in 25.9% of the responses.

Table 7: Descriptive statistics of effect of price escalation on stakeholders

S.no	Question	Very high		High		Average		Low		Very low	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1	Adversarial relationship between stakeholders	2	2.5	24	29.6	52	64.2	3	3.7	-	-

2	Loss of reputation of consultants	2	2.5	20	24.7	56	69.1	3	3.7	-	-
3	High cost of supervision and contract administration for consultants,	1	1.2	3	3.7	73	90.1	4	4.9	-	-
4	Contractors' payment delay	41	50.6	40	49.4	-	-	-	-	-	-
5	Need for additional budget allocation	52	64.2	29	35.8	-	-	-	-	-	-
6	Poor performance	43	53.1	32	39.5	4	4.9	2	2.5		
7	Client dissatisfaction	58	71.6	21	25.9	2	2.5	-	-	-	-
8	Frustration on stakeholders	60	74.1	21	25.9	-	-	-	-	-	-
9	Budget deficit , Additional cost	62	76.5	19	23.5	-	-	-	-	-	-

(Source: own survey, 2022)

4.2.4 Descriptive Statistics of mitigation methods of price escalation

Table 8 puts respondents' suggestions to mitigate adverse effect of price escalation on real estate projects. 16% of respondents put considering escalation clauses in contracts as highly effective measure, 51.9% as average, 16% less effective and again 16% as ineffective. Another suggestion

was purchasing materials in bulk put as highly effective by 96.3% of the respondents, average by 2.5% of the respondents and less effective by 1.2% of the respondents. 32.1% of respondents put using Cost-Plus contracts being as highly effective and 67.9% as average. Developing program-wide contingencies and risk management was found to be highly effective in 84% of the responses and average in 26% of the responses. 84% of the responders put regular cost monitoring throughout the project to be highly effective and 16% put it as ineffective. Considering locally available materials in design was found to be highly effective in 50.6% of the responses and average in 49.4% of the responses in mitigation of the effect of price escalation in real estate projects.

Table 8: Descriptive Statistics of mitigation methods of price escalation

S.no	Question	Very highly effective		Highly effective		Average		Less effective		Ineffective	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
1	Consider escalation clauses in contracts	-	-	13	16	42	51.9	13	16	13	16
2	Purchasing materials in bulk	-	-	78	96.3	2	2.5	1	1.2	-	-
3	Use Cost-Plus contracts	-	-	26	32.1	55	67.9	-	-	-	-
4	Developing program-wide contingencies and risk management			68	84	13	16	-	-	-	-

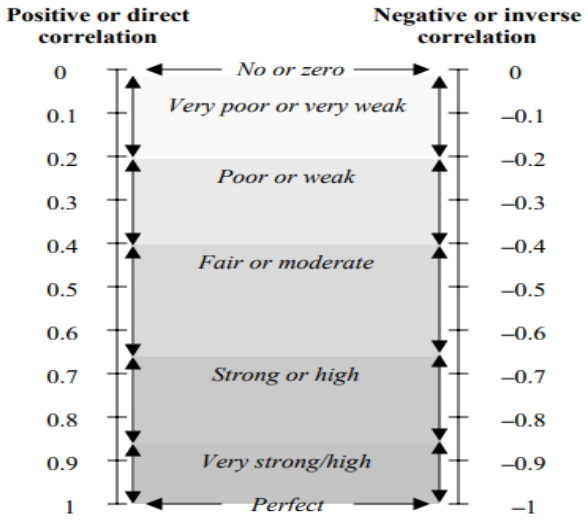
5	Regular cost monitoring throughout a project	-	-	68	84	-	-	-	-	13	16
6	Considering locally available materials in design	-	-	41	50.6	40	49.4	-	-	-	-

(Source: own survey, 2022)

4.3 Correlation analysis

Correlation analysis evaluates the linear relationship between variables. In this study, Pearson's correlation coefficient method is used to measure the relationships. The correlation coefficient determines the strength of the correlation between variables. If the correlation coefficient is positive one, it means the relationship is perfect. And the relationship is said to be inversely correlated when the value is -1. Figure 5 shows the interpretation of correlation coefficient value within the interval.

Figure 4: Interpretation of correlation coefficient



Source: (http://pages.intnet.mu/cueboy/education/notes/statistics/pearsoncorrel.pdf)

The correlation of variables of this study is measured using SPSS 26. The correlation was done between the dependent and independent variable of this study. Another method in SPSS to evaluate the correlation between variable is the 2-tailed test. This value will show if there is a statistically significant correlation between two variables. If the 2-tailed value is greater than 0.05 then there is no statistically correlation between the variables while a 2-tailed value of less than or equal to 0.05 indicates a significant relation between the variables. The result is shown in the table 9 and 10. The correlation between price escalation and its effect on projects' cost, time and quality is 0.452 which is significant at the 0.01 level, this means there is a significant relationship between the two variables in the sample and also in the population. The correlation between price escalation and its impact on stakeholders is 0.328. These two variables also have relationship in the sample as well as the population.

Table 9: Correlation between price escalation and effects of price escalation on projects

Correlations

		Price escalation	Effect of price escalation on projects' cost, time and quality
Price escalation	Pearson Correlation	1	.452**
	Sig. (2-tailed)		.000
	N	81	81
Effect of price escalation on projects' cost, time and quality	Pearson Correlation	.452**	1
	Sig. (2-tailed)	.000	
	N	81	81

***. Correlation is significant at the 0.01 level (2-tailed). (Source: own survey, 2022)*

Table 10: Correlation between price escalation and effect of price escalation on stakeholders

Correlations

		Price escalation	Effect of price escalation on stakeholders
Price escalation	Pearson Correlation	1	.328**
	Sig. (2-tailed)		.003
	N	81	81
Effect of price escalation on the stakeholders	Pearson Correlation	.328**	1
	Sig. (2-tailed)	.003	
	N	81	81

***. Correlation is significant at the 0.01 level (2-tailed). (Source: own survey, 2022)*

4.4. Regression Analysis

Regression analysis is followed by correlation analysis to investigate the effect of price escalation on the project's cost, time, quality & stakeholders Regression analysis is a reliable method of identifying which variables have effect on a topic of interest population. Before performing a regression analysis the researcher have checked the necessary assumptions were not violated.

4.4.1Diagnosis test

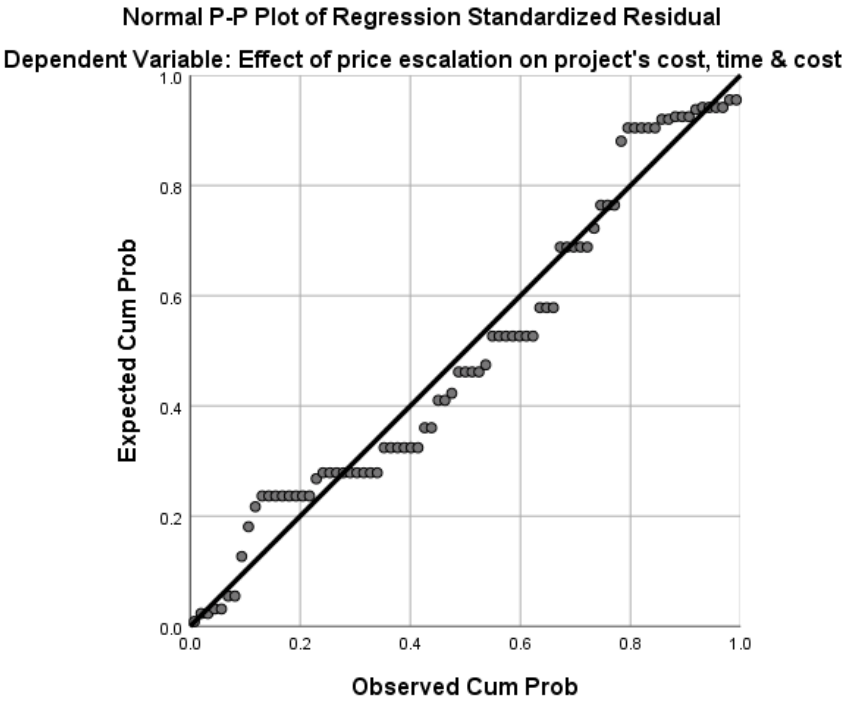


Figure 5: Normal P-P plot of regression standardized Residual

(Source: own survey, 2022)

Normally distribution: The developed histogram by SPSS shows whether the residuals are normally distributed or not. The normal distribution describes how the values of a variable are distributed. (Al-Hemyari, 2018) Below is the histogram, indicating normal distribution for the data collected.

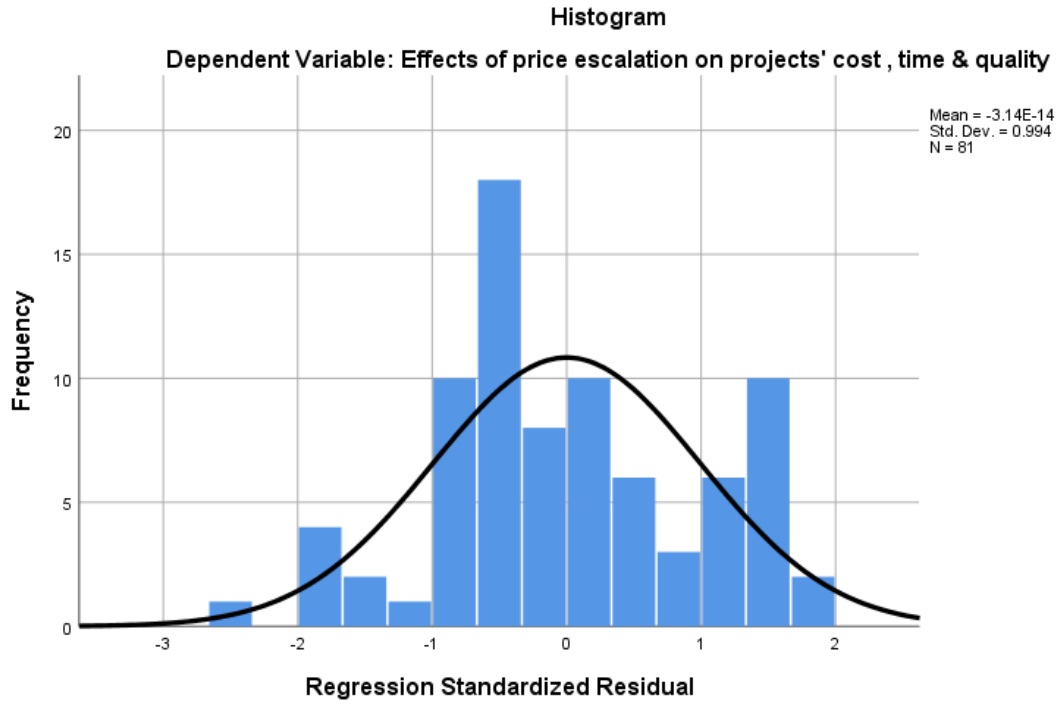


Figure 6: Histogram to check normal distribution of data

(Source: own survey, 2022)

Outliner: is an observed data point that has dependent variable that is very different than that is predicted by the regression model. These values can reduce the fit of the regression equation to predict the value of the dependent variable. Therefore, there should be no significant outliers in the collected data. In SPSS, the existence of outliner in the data are distinguished by checking the value of Standardize residual. An observation with a standardized residual that is larger than 3 (in absolute value) is deemed by some to be an outlier. (The Pennsylvanian State University, 2018) As shown in the table 11, this assumption is satisfied.

Table 11: Standardized residual value from SPSS

		Model-1 (Effect of price escalation on real-estate projects' cost, time & quality)
Standardized Residual Value	Min	-2.383
	Max	1.699

(Source: own survey, 2022)

4.4.2Linear regression analysis

Linear regression is used when to predict the value of a variable based on the value of another variable. This study is trying to check price escalation (independent variable) and its effect on projects' cost, time & quality (dependent variable).

Table 12: Model summary of the linear regressions test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.452[a]	.204	.194	.24496

a. Predictors: (Constant), Price escalation
b. Dependent Variable: Effects of price escalation on projects' cost, time & quality

(Source: own survey, 2022)

• **R and R^2 values:** The R value represent the simple correlation while the R^2 indicates how much of the dependent variable can be explained by the independent variable. The value of R^2 of this model demonstrated as 20.4% of effects of price escalation on projects' cost, time & quality (dependent variable) can be predicted by price escalation (independent variable).

Table 13: ANOVA result table from the linear regression test

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.215	1	1.215	20.251	.000[b]
	Residual	4.740	79	.060		
	Total	5.956	80			

a. Dependent Variable: Effect of price escalation on projects' cost time & quality

b. Predictors: (Constant), Price escalation

(Source: own survey, 2022)

• Next, the researcher have checked that the regression equation fits the data (i.e., predicts the dependent variable) by checking the ANOVA table created by SPSS after analyzing the data. If the value of significance in this table is less than 0.05, then the model works better than simply using the mean to explain the relation. And on the analysis done on SPSS for the model it was found that, the significance is closer than 0 (less than 0.05) which implies, the model works well. Additionally, the critical F-value is 20.251 at 95% level of confidence. Thus, the model is statistically significant that means the overall regression model is a good fit for the data.

Table 14: The coefficient table result from the linear regression test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.591	.227		15.789	.000
	Price escalation	.320	.071	.452	4.500	.000

a. Dependent Variable: Effect of price escalation on projects' cost time & quality

(Source: own survey, 2022)

The coefficients table revealed that price escalation (X) is significant with (sig-value = 0.00 which is < 0.05) in affecting projects' cost time & quality (Y).

$$y = \beta_0 + \beta_1 X$$

Equation 2: Linear regression equation

Effect of price escalation on projects' cost, time & quality = 3.591 +0.320 price escalation

Chapter Five

Summary, Conclusion and Recommendations

5.1 Summary of Findings

Price escalation, in general, has shown significant effect in the previous studies done. This study also came to have similar finding as some factors are also global. The study participated 81 personnel and majority of them are contractors and the rest are consultants and clients.

In the study, 58% of the respondents have less than five years of experience and 2.5% have more than fifteen years of experience

The reliability of the questionnaire was tested by Cronbach's Alpha method in SPSS 26 and the reliability analysis of the study is value of above 0.7 which is acceptable. The questionnaire of the study consisted 5 point Likert scaled type of questions.

The participants ranked the factors contributing to price escalation on real estate projects based on their experience. Respondents put both inflation and fluctuation of dollar exchange rate effect price escalation very highly which indicates that they contribute extremely to price escalation on real estate projects in Ethiopia. Economy of the country, market Conditions, inconsistent application of contingencies, engineering & construction complexities, shortage of labor, ambiguous contract provisions, improper planning &/or improper implementation and project schedule change were put as factors impacting price escalation in decreasing order.

Participants also ranked price escalation effect on real estate projects. Highly sensitive aspects influenced by escalation in the study are cash flow of projects, project delay and increased cost of projects. Quality degradation and claim and dispute among parties were also highly impacted by price escalation in the study.

The study found the effect price escalation has on certain stakeholders in different degree.

Budget deficit or additional cost, Frustration on stakeholders and client dissatisfaction resulted more frequently upon price escalation according to the study. Need for additional budget allocation, Poor performance and Contractors' payment delay occur due to price escalation. Adversarial relationship between stakeholders, loss of reputation of consultants and high cost of supervision and contract administration for consultants were also results of price escalation in the study.

The study also incorporated suggestions to mitigate adverse effect of price escalation on real estate projects. Suggested measures to be highly effective are purchasing materials in bulk, regular cost monitoring throughout a project and developing program-wide contingencies and risk management. Considering locally available materials in design, using Cost-Plus contracts and considering escalation clauses in contracts were suggested for minimizing price escalation effects. In this study, Pearson's correlation coefficient method is used to measure the relationships. The correlation between price escalation and its effect on project's cost, time and quality is 0.452 which is significant at the 0.01 level. Hence, the variables in the study have significant relationship in the sample and also in the population. The correlation between price escalation and its effect on stakeholders is 0.328. These indicates the study can be applied for the population.

The linear regression analysis results also implies that price escalation have a positive significant effect on projects' cost, time & quality with a positive significant correlation ($r=0.452$, Sig. value=0.00) and (β value= 0.320 with Sig. value=0.00<0.05).

5.2 Conclusion

The study answered the research question how price escalation effects real estate projects found significant factors contributing to price escalation on real estate projects. The effects are on cash flow of projects, project delay, increased cost of projects, quality degradation and claim and dispute among parties. The other question answered by the study is contributing factors to price escalation; which are inflation, fluctuation of dollar exchange rate, economy of the country, market conditions, inconsistent application of contingencies, engineering & construction complexities, shortage of labor, ambiguous contract provisions, improper planning &/or improper implementation and project schedule change. The question regarding certain effect on stakeholders by price escalation was also described in the study. Budget deficit or additional cost, Frustration, client dissatisfaction, need for additional budget allocation, poor performance and contractors' payment delay, adversarial relationship between stakeholders, loss of reputation of consultants and high cost of supervision and contract administration for consultants were brought on the stakeholders. The research studied possible mitigation methods and came up with; purchasing

materials in bulk, regular cost monitoring throughout a project and developing program-wide contingencies and risk management, considering locally available materials in design, using Cost-Plus contracts and considering escalation clauses in contracts.

5.3 Recommendations

After conducting this study the researcher was able to put recommendations to mitigate effects brought on real estate projects by price escalation.

Highly effective methods the study recommends are:

- Regular cost monitoring throughout a project and
- Developing program-wide contingencies and risk management.

Other effective recommendations are:

- Considering locally available materials in design,
- Using Cost-Plus contracts and
- Considering escalation clauses in contracts

It is visible in the study that further and deep studies are highly recommended to mitigate the effect of price escalation on real estate projects. Studies can be done on each factors and mitigation strategies.

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Annex

Questionnaire

Dear,
I desperately need your time to fill out the following questionnaire. This questionnaire is a fundamental instrument for the research titled "Assessment of the effects of price escalation in real estate projects" for partial fulfillment of the requirements of a Master degree in Project Management. Your response is very important and helpful to the result of this research.

Section A-Personal and organizational background of the respondent

1. Name of the organization (Optional)

_____

2. Address: (Optional)

_____

3. E-mail address; (Optional)

_____

4. Type of your organization (Please tick ("√") when it is an appropriate answer

☐ Consultant
☐ Contractor
☐ Client (owner)

5. What is your profession(Please tick ("√") when it is an appropriate answer)

- ☐ Office Engineer
- ☐ Site Engineer
- ☐ Project Manager
- ☐ Consultant
- ☐ Other: _____

6. Experience of work in years

- ☐ Less than five years
- ☐ Six to ten years
- ☐ Eleven to fifteen years
- ☐ More than fifteen years

Section B: Effect of price Escalation in real estate projects

The following section focuses on the possible effects of price escalation in real estate projects identified from literatures. Please indicate the most recurrent effects in real estate projects based on you experience among the following lists. (Please mark ("√") on the right answer)

7. Currently, what is the level of price escalation in our country?

- ☐ Very low
- ☐ Low medium
- ☐ Average
- ☐ High
- ☐ Very High

8. Based on the current condition which factor contribute more to the price escalation?

	Very Low	Low	Average	High	Very High
Inflation	☐	☐	☐	☐	☐
Fluctuation of dollar exchange rate	☐	☐	☐	☐	☐
Market Conditions	☐	☐	☐	☐	☐
Economy of the country	☐	☐	☐	☐	☐
Shortage of labors / skilled workers	☐	☐	☐	☐	☐
Engineering & construction complexities	☐	☐	☐	☐	☐
Inconsistent application of contingencies	☐	☐	☐	☐	☐
Ambiguous contract provisions	☐	☐	☐	☐	☐
Improper planning &/or improper implementation	☐	☐	☐	☐	☐
Project schedule change	☐	☐	☐	☐	☐

9. What are the effects of price escalation in real estate projects (Please tick ("√") when it is an appropriate answer)

	Very low	Low	Average	High	Very high
Increases cost of the project	☐	☐	☐	☐	☐
Project delay	☐	☐	☐	☐	☐
Quality degradation (substitution of material with low	☐	☐	☐	☐	☐
Claim and dispute Among Parties	☐	☐	☐	☐	☐
Affects cash flow of the project	☐	☐	☐	☐	☐

10. Please specify if the effectis not mentioned on the above table

11. What are the effects of price escalation on the stakeholders (Contractor , Client & consultant) (Please tick ("√") when it is an appropriate answer

	Very low	low	Average	High	Very high
Adversarial relationship between stakeholders	☐	☐	☐	☐	☐
Loss of reputation to the consultant,	☐	☐	☐	☐	☐
High cost of supervision and contract administration for consultants,	☐	☐	☐	☐	☐
Contractor's payment delay	☐	☐	☐	☐	☐
The contractor will suffer from budget short fall of the client,	☐	☐	☐	☐	☐
Poor quality workmanship,	☐	☐	☐	☐	☐
Client dissatisfaction	☐	☐	☐	☐	☐
Creates frustration on stakeholders.	☐	☐	☐	☐	☐
Budge deficit , Additional cost	☐	☐	☐	☐	☐

Section C: Mitigation method of price escalation

12. What are the methods you use to mitigate price escalation risks? (Please tick ("√") when it is an appropriate answer

Check all that apply.

	Ineffective	Less effective	Average	High effective	Very high effective
Consider fluctuation/escalation clauses	☐	☐	☐	☐	☐
Bulk material purchases & suppliers partnerships	☐	☐	☐	☐	☐
Use Cost-Plus contracts	☐	☐	☐	☐	☐
Develop program- Regular cost monitoring throughout the	☐	☐	☐	☐	☐
Consider locally available material in design	☐	☐	☐	☐	☐

13. Please specify if you use another mitigation methods of price escalation risk?

14. Please suggest any methods of minimizing the effects of price escalation