SAINT MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

THE MAIN CAUSES OF COST OVERRUN ON PUBLIC HOUSING PROGRAMS IN THE CASE OF ADDIS ABABA CITY ADMINISTRATION

BY:

MELAKU ALEMAYEHU YIHUN

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MAY, 2017

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A THESIS SUBMITTED TO THE SCHOOL OF BUSINESS AND PUBLIC ADMINISTRATION OF ST. MARY UNIVERSITY IN A PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ART IN PROJECT MANAGEMENT

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Approved by Board of Examiners

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External examiner	Signature	Date
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Internal examiner	Signature	Date

Dedication

This work is dedicated to my uncle Seyoum Donzen Belay for his love, patience, wisdom and spirituality! I will always remain grateful for your kindness. May the Lord place your soul in Heaven!

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Above all Glory is to God for his unspeakable gifts!

List of Abbreviations/Acronyms

AAHPO – Addis Ababa Housing project office

GTP – Growth and Transformation Plan

US – United State of America

UK – United Kingdom

G+ - Ground plus

EVM – Earned Value Management

CAP – Control Account Plan

SV – Schedule Variance

CV – Cost Variance

ECT – And so on

EC – Ethiopian Calendar

MoFED – Ministry of Finance and Economic Development

MoWUD- Ministry of Works and Urban Development

FI – Frequency of Index

AI – Average Index

SPSS – Statistical Products and Service Solution

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ABSTRACT

Construction industry contributes significantly in improving socio-economic growth of a country. However, this industry usually faces chronic problems such as time overrun, cost overrun, poor quality and others. Of all these, cost overrun is a major problem that occurs globally including Ethiopia. Hence, this study focused on identifying the main factors of cost overrun for public housing construction projects in the case of Addis Ababa City Administration. Data collection was done through structured questionnaire and office document review, which was designed based on 25 factors found from the literature. A total of 79 questionnaires were distributed to clients, consultants and contractors and 60 questionnaires were collected and which 50 responses were found valid. Descriptive statistics methods were employed through frequency Index/ mean score and average Index to understand the variables of cost overruns, the frequency of occurrence and significant impacts each causative factors on the studied area. The findings from the study identified that, from 25 identified factors, only the most causative factors are 22 and the top five factors are Material cost increased by inflation, Labor cost increased due to environmental restriction, Lack of experience of project location, Change in foreign exchange rate/ for imported materials, Contractors financial difficulties. Likewise, based on the possibility of occurrence the top five were identified, these are-payment delay for contractors, contractors financial difficulties, power interruption, incorrect quantity take-off, change in foreign exchange rate. Meanwhile, based on significant impacts of factors were identified. The most frequent way of using bidding methods in housing programs was open tendering. The overall effects that occurred in housing programs revealed through survey are – low productivity, project delay, low quality housing handover to beneficiaries or tenants, disputes among stakeholders E.T.C. Meanwhile, cost discrepancy of approved budget from actual cost for each 10/90, 20/80, 40/40 housing programs is 38%, 13.5%, and 15.5% respectively.

Key Words: housing programs, cost overrun, public housing

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

In this thesis, analyzes the root causes, the impact and the overall effects of cost overrun on governmental 10/90, 20/80 and 40/60 housing project undertaking by Addis Ababa city Administration. Cost is among the major considerations throughout the project management life cycle and can be regarded as one of the most important parameters of a project and the driving force of project success. Despite its proven importance, it is not uncommon to see a construction project failing to achieve its objectives within the specified cost (Memon et al, 2010). Al- Najjar (2008) defines cost overruns as the change in contract amount divided by the original contract award amount**.** This variation occurred during construction stage by means of practitioners**.** Identifying the contributory factors that appear this variation is a crucial aspect to secure the project success. The issue of cost overrun in construction projects is very dominant in both developed and developing countries likes Ethiopia, but this trend is very severe in developing countries like Ethiopia, where these overruns sometimes exceed 100% of the anticipated cost (Azhar, Farooqui, & Ahmed, 2008).

1.2. Brief History of Housing Program in Ethiopia

Condominium housing program in Ethiopia cited by United Nations Human Settlement Program (2010) revealed that, during the first half of the twentieth century, at the time of Emperor Haile Selassie, land and housing in Ethiopia were controlled by a select few individuals and groups who owned and tightly controlled land and housing development. Low-income households had little option but to rent housing and this was done outside of any formal control or planning system. In 1962, for example, 58% of the land in Addis Ababa was owned by only 1,768 individuals, equating to ownership of over 10,000m2 each, and leading to 55% of housing units being rental housing.

In 1974 evolution is the result of overthrow of Emperor Haile Selassie and means of established the 'Derg' regime. In July 1975, Proclamation No. 47: 'Government Ownership of Urban Lands and Extra Houses' nationalized all urban land in an effort to force a fairer distribution of wealth

across the country. During this time, two new typologies in the housing sector were established: Government-owned rental units, administered by the Agency for the Administration of Rental Houses, and Kebele Housing managed by Kebele Administration units, the smallest government administration unit, operating at the neighborhood level. During this time approximately 60% of housing in Addis Ababa was rental accommodation and Kebeles accounted for 93% of this rental accommodation.

In 1994, Following the new constitution and federal system of government, a rural development policy and named the Land Reform Program was introduced. Addis Ababa's first housing policy, incorporating the Government's practice of maintaining public ownership, was also implemented at this time but it assumed that the housing market alone would meet the demand for affordable housing of the low-income population.

After the 1974 Ethiopian revolution, the rapid growth of population in Addis Ababa presents extraordinary pressure on the existing housing policy and on the entire infrastructure like- water, electrical power supply, drainage and roads. Planned development of the past was unable to meet the needs of the community and forced to develop public housing re-development plan in GTP I and II (Condominium Housing Program in Ethiopia cited by United Nations Human Settlement Program (2010)). The Ethiopian Federal Democratic Government took considerable effort to improve the housing conditions in Addis Ababa city by maintaining different housing programs like- 10/90, 20/80 and 40/60 respectively.

Cited by Addis Ababa Saving Houses Development Enterprise (2016), 40/60 housing program was commenced in 2013 to provide public housing for meddle income tenants on the basis of one bed rooms, two bed rooms and three bed rooms with a setting price of 162,000 birr, 250,000 birr and 386,000 birr respectively, but this initial estimated selling price changed in to unspecified amount due to inflation of construction materials, labor costs and design changes. Currently, 58,709 condominium units are under construction on 13 sites around Addis Ababa, from this 1200 condominium are built and handover at the end of 2016 for tenants. However, most of the projects are running behind schedule which has brought serious backlash from people saving money. Generally, 160, 000 city dwellers registered for the 40/60 condominium scheme on 2013 up to now and around 154,000 are saving money each month. Out of these

people, an estimated 13,000 people have paid the full amount (100%) while an estimated 29,000 people have paid (40%) of the total cost.

According to Addis Ababa Housing Project Office (AAHPO- 2016), Addis Ababa City Administration has delivered 105,000 houses to tenants in the last 10 years. Annually, the administration allocates over 6.3 billion birr for the construction of 10/90 and 20/80 condominiums. More than 860,000 of Addis Ababa's dwellers have registered in the 10/90 and 20/80 housing schemes. The office had initially planned to construct 335,000 houses in the five years of GTP II. However, no new construction has been undertaken due to waiting the approval of city council to start anew 10/90 and 20/80 housing project, considered ideal for construction. Currently, there are over 130,000 houses already in progress across several coroners of the city. Yet several houses are lagging behind schedule, often blamed on power interruption, poor capacity of some contractors and mismanagement in supervision and procurement procedures.

1.3. Statement of the Problem

The inability to complete projects on time and within budget continues to be a chronic problem worldwide and is worsening. According to Ahmed et al. (2002), cost overruns on construction projects are a universal phenomenon. Azhar (2008) states that the trend of cost overruns is common worldwide and that it is more severe in developing countries, like Ethiopia. In Ethiopia, the current government formulated different housing strategies to minimize the residential shortage; it can be constructed by saving of tenants and subsidiary of government. This shows there is scarce resource in terms of finance and land. Allocated budget which is initially estimated is not met due to different unforeseeable factors that rose from involved parties, from the initial stag up to execution of the projects, which means, all need to be eliminated or mitigated to ensure accomplished the projects within allocated time and budget. Therefore a crucial aspect of practitioners of governmental public housing projects that needs to be focused on identifying the root causes of cost overrun in current phenomena. Different literatures proven that, Housing projects are entrapped by various types of causes, some are- inadequate or inefficient equipment, tools and plants , unreliable sources of materials on the local market, inadequate manpower, (e.g., in terms of numbers, poor training, lack of training, etc), delayed payment to contractors, subcontractors and/or suppliers , rework required due to poor work or the

wrong materials used by contractors , change of work scope and/or changes in material specifications, poor communication among stakeholders (e.g., slow responses to site queries, late receipt of drawings, etc), disputes among the parties involved in the project (clients, contractors, consultants) , high inflation, insurance and interest rates , contractor's work load, bureaucracy, site accidents E.T.C (*Bubshait and Al-Juwait (2002), Frimpong, Oluwoye and Crawford (2003); Kouskili and Kartan (2004), Alinaitwe, Mwakali and Hansson (2007), Kaliba, Muya and Mumba (2008).*

This study endeavored to investigate the root causes of cost overrun in public housing construction projects undertaking in Addis Ababa City Administration Housing Project. The problem identified is that, Addis Ababa City Administration housing Project program delivers their accomplished houses to tenants behind the schedules due to most houses required additional budget to finalized the project, that is initial estimated cost is less than the actual cost at completion due to unidentified root causes. Hence, it is important to establish if these limitations prevail in the selected 10/90, 20/80 and 40/60 housing scheme by assessing the overall effects of cost overrun, by revealing uncover root causes of cost overrun with respects to frequency of occurrence and impact on final cost of the housing programs.

After conducted this specific research, enable the stakeholders to aware additional causative factors that led to cost escalation besides city administration and stakeholders revealed, and also concurrently shows the impact and the overall effects of cost overrun in their housing programs execution. In spit to this the study also intended to contribute knowledge in the area of housing construction industry in the case of Ethiopia.

1.4. Research Questions

For this study the research questions were proposed to achieve research problem stated above. Based on this understanding basic question are:-

1. What is the level of cost overrun in governmental housing programs?
2. What are the main effects of cost overrun in housing construction?
3. What are the main contributory factors for cost overrun in governmental housing programs?

If the above basic questions are responded or accurately gathered from involved parties through structured questionnaires and review of office documentation, the study should have prevailed the impacts or occurrences of cost overrun in housing construction projects in the selected area.

1.4. Objectives of the Study

By taking the background of above avowed problems in the public housing construction, the study formulates the following objectives:

1.4.1. General Objectives

To assess the main causes and over all effects of cost overrun on governmental public housing construction under governed by Addis Ababa City Administration housing construction project office.

1.4.2. Specific Objectives

To achieve this principal objective, the study enabled the researcher to develop specific sub-objectives. **These specific objectives** are:

1. Identifying the main causes of cost overrun on public housing construction.
2. Identifying the overall effects of this cost overrun in public housing industry.
3. Identifying the extent of cost overrun between main governmental public housing construction projects (10/90, 20/80 and 40/60 housing projects).

1.5. Definition of Terms

For the purpose of this research,

1. **Cost Overrun** is defined as the difference between the final actual cost of a housing construction projects at completion and the contract amount that was agreed or approved by the concerned parties.

2. **Public Housing** – is housing owned and run by a local public housing authority and aim established to provide decent and safe household housing for eligible low income families, elderly and persons with disabilities (cited by U.S Department of housing and urban development(2016)).

   For the purpose of this research, it is defined as condominiums constructing and governed by local housing project offices, and using taxpayer resource and saving of tenants to building the houses that is initially to fill the gap of residential shortage and for urban development.

3. **10/90 Housing Scheme**- it refers tenants are expected to pay 10% of transfer price upon owning the house, and the rest 90% will be paid on installment in 25 years (Alebel, Berihau, and Simon, 2016).

4. **20/80 Housing Scheme**- it refers tenants are expected to pay 20% as a down payment, and the rest will be paid within 15- 20 years (Alebel, Berihu, and Simon2016).

5. **40/60 Housing Scheme**- it refers tenants are expected to pay 40% as a down payment, and the rest will be paid within 15-20 years (Alebel, Berihu, and Simon, 2016).

1.6. Significance of the Study

This study believed to be relevant for: one, it will stimulate all involved parties or practitioners look for more effective solutions for the identified root causes of cost overrun in the case of Addis Ababa city Administration housing programs. Second, the concrete suggestions of the study will use by the concerned body at least to minimize the causes and negative impacts of cost overrun that exist in governmental public housing construction projects. Finally, the study will

have valuable importance for further study and add new idea to the existing knowledge of public housing construction industry.

1.7. Scope of the Study

Cost overrun, both private owners and governmental public housing construction projects, are caused by many factors. Each causes of cost overrun will have various likelihood occurrence and impact on the final cost of the housing construction project. Therefore, it is important to identify both key causes of cost overrun based on their occurrence and their impact on governmental public housing construction projects that intended to execute or to be implemented in Addis Ababa city administration housing project office. The overall effects of cost overrun on the stakeholders, on the housing construction industry, and on the local economy will be identified.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Construction industry is necessary in every country to provide physical developments which help in improving social and economic needs of country (Abedi, Mohamad, &Fathi, 2011). Likewise other countries, in Ethiopia construction industry trend in the past 10 years shows a yearly growth rate of 12.43 and this shows a share of 5.3% of the country's GDP (ECIDP, 2014). Hence, construction industry has been growing rapidly worldwide. General construction focuses on residential and non-residential constructions and also general civil engineering works, like-metal works, electrical works, plumbing, sewerage and sanitary works, refrigeration and air-conditioning work, painting work, carpentry, tiling and flooring work, and glass work. Likewise housing construction projects, Flyvbjerg, Holm, & Buhl (2003) in their global study concluded that cost overrun is a major problem in the construction industry, where 9 of 10 projects are faced by these overruns which commonly range between 50 to 100%. In developed countries like UK also construction industry is affected by this problem (Olawale & Sun, 2010) and nearly one third of the client's complaint that their projects generally overrun the allocated budget (Jackson, 2002).

In Ethiopia, since the introduction of condominium housing construction about a decade ago, the dominant housing topology has changed from single to multi-storey (up to G+12) to maintain the population density of the core areas of major cities, particularly Addis Ababa where the site of multi-storey condominium buildings has become common. The design of each condominium block constitutes various typologies, Condominium housing in Ethiopia (2011). Due to the expanding of public housing construction projects in Addis Ababa time to time, the housing projects exposed to different factors that lead cost overruns, time delays and low quality works. According to Addis Ababa city Administration housing project office (2016), the major determinates of cost escalation are: inflation of construction materials, labor costs, design changes, power interruption, poor capacity of some contractors and mismanagement in supervision and procurement procedures.

Set the luminosity of the above, the purpose of this chapter is to review the literature in the area of causes of cost overrun in housing construction projects. The review highlights definition of

cost overrun, its main causes and the problems it encounters. Furthermore, it tries to identify the gap in the literature.

The review has three sections. Section 1 presents a review of the theory of main causes of cost overrun in housing construction projects in summary. Section 2 presents a review of the relevant empirical evidences on cause of cost overrun and its effects in the housing construction industry. Finally, conclusion and knowledge gap present in the third.

2.1. Theoretical Review: Cost Overrun

According to Azhar et al (2008), cost is one of the major considerations throughout the lifecycle of a project. Unfortunately, most of the projects failed to achieve project completion with the estimated cost. Besides time overrun, cost overrun is also a serious problem in the housing construction industry. This is a major problem both in developed and developing countries, like Ethiopia. The trend is more severe in developing countries where these overruns sometimes exceeds 100% of the anticipated cost of the project (Azhar et al. 2008).

The history of the construction industry worldwide is full of projects that were completed with significant amount of cost overruns (Olawale& Sun, 2010). Despite the wide availability and use of different project management methods and software packages, many construction projects still suffer cost overruns (Olawale& Sun, 2010). Developed countries have lessons to learn as well since cost overrun in the construction industry is a worldwide phenomenon (Ameh, Soyingbe, &Odusami,2010) and its ripples are normally a source of friction among clients, consultants and contractors on the issue of project cost variation. Project cost overruns create a significant financial risk to clients. However, in spite of the risks involved, the history of the construction industry is full of projects that were completed with significant cost overruns (Garry, 2005). Like other developing countries, Ethiopia construction industry is also facing a lot of challenges in completing the construction projects within the estimated cost (fetene,2008) and from his desk study finding concluded that more than 97% of public building construction projects are suffered by cost overrun. The finding of fetene (2008), shared the worldwide investigation of flyvbjerg et al, 2003 regarding on cost overrun in construction industry.

2.1.1. Definition of Cost Overrun

Cost overrun is also called "cost escalation," "cost increase," or "budget overrun" (Zhu & Lin, 2004 in Enshassi, Al-Najjar, &Kumaraswamy, 2009). Cost overrun defined by different researchers in different way, but the most comprehensive and expressive way of definitions compatible for this study is:

Cost Overrun: is the excess of actual cost over budgeted cost which occurs when the final cost of the project exceeds the original estimates (Azhar et al., 2008).

Or

Cost Overrun: is measured as a percentage of actual costs over the estimated costs of the project (Cantarelli, 2009; Choudhury & Phatak, 2004) as shown in expression below:

Cost Overrun = (Actual Cost−Estimated Cost)/Estimated cost

Or

Cost Overrun- The amount by which actual costs exceed the baseline or approved costs (Wideman, 2002).

For the purpose of this research, it is defined as the difference between the final actual cost of a housing construction projects at completion and the contract amount that was agreed or approved by the concerned parties (Azhar et al., 2008).

2.1.2. The Main Causative Factors of Cost Overrun in Construction Industry

Cost overrun in construction projects can occur due to many reasons. It is very crucial to determine these root causes in improving cost performance. Since, many research works had been carried out in determining these root causes of cost overrun in construction industry, hence a comprehensive literature review was carried out to uncover these main factors affecting cost overrun in public housing construction projects in the case of Addis Ababa city Administration.

Kaming, Olomolaiye, Holt, & Harris (1997), they are identified factors influencing construction cost overruns on high-rise building projects in Indonesia through a questionnaire survey administered on 31 project managers. The results showed that top factors that increase project cost were materials cost increased by inflation, inaccurate quantity take-off, labor cost increased

due to environment restriction, lack of experience of project location, lack of experience of project type, unpredictable weather conditions and lack of experience of local regulation.

Jackson & Steven (2001), examined the causes of cost overrun in building projects of Ilorin through questionnaire survey and found that main factors of cost overruns were fluctuation in the prices of materials/Labor, variation orders, delay in honoring certificates, lack of proper analysis of tenders, selection of incompetent contractors, lack of proper appraisal of projects and unrealistic representation of clients needs.

Jackson (2002), studied reasons of budget overrun in UK through questionnaire survey and found that major reasons of cost overrun were design changes, design development factors, information availability, method of estimation, performance of design team and project management.

Chang (2002)studied the reasons of cost increase through 4 case projects to quantify their contributions in engineering design projects in USA. The finding of the study showed that the major reason for cost increase was owner request of changes in scope and additional works.

Frimpong et al. (2003) conducted a questionnaire survey consisting of 26 factors to study major contributors of cost overrun in groundwater drilling projects in Ghana. Out of 26 factors considered, top 10 factors are monthly payment difficulties, poor contract management, material procurement, inflation, contractor's financial difficulties, escalation of material prices, cash flow during construction, planning and scheduling deficiencies, bad weather and deficiencies in cost estimates prepared.

Koushki et al. (2005) studying problem of cost increase in the private residential projects of Kuwait mentioned that three main contributors to cost overruns were contractor-related problems, material-related problems and owners' financial constraints.

A study conducted by Nega, (2008) on predominant factors for cost overrun in public building construction projects in Ethiopia are identified the following major cost overrun factors. These are 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.

Long, Lee, and Jun Yong Lee(2008)**,** they conducted questionnaires and interviewing survey on 78 Vietnams experts, they investigated 21 main causes of cost and time overrun construction projects in Vietnams were inferred and the top five causes of cost overrun in large construction projects are poor sit management and supervision , poor project management assistance , financial difficulties of owners , financial difficulties of contractor and design changes.

Azhar et al. (2008) investigated cost overrun causes in construction industry of Pakistan. A survey using questionnaire containing forty two (42) factors showed that the top ten cost overrun factors found were fluctuation in prices of raw materials, unstable cost of manufactured materials, high cost of machineries, lowest bidding procurement procedures, poor project (site) management/ poor cost control, delays between design and procurement phases, incorrect/ inappropriate methods of cost estimation, additional work, improper planning, and unsupportive government policies.

Enshassi et al. (2009) conducted questionnaire survey to identify major causes of cost overrun in construction projects of Gaza and revealed 42 factors amongst contractors, consultants and owners. From his revealed top ten factors that cause cost overruns as perceived by the three parties includes- increment of materials prices due to continuous border closures, delay in construction, supply of raw materials and equipment by contractors, fluctuations in the cost of building materials, unsettlement of the local currency in relation to dollar value, project materials monopoly by some suppliers, resources constraint (funds and associated auxiliaries not ready), lack of cost planning/monitoring during pre-and post contract stages, improvements to standard drawings during construction stage, design changes, and inaccurate quantity take-off.

Preliminary Study on Causative Factors Leading to Construction Cost Overrun conducted byAftab, Ismail &Ade Asmi (2011) through questionnaires survey of concerned parities and ranked based on average index(1.00-2.5) that they found 59 common causes of cost overrun that occurred in Malaysia construction. The top ten causes identified are poor design and delays in design, Unrealistic contract duration and requirements imposed, lack of experience, late delivery of materials and equipment's, relationship between management and labor, delay preparation and approval of drawing, inadequate planning and scheduling, Poor site management and supervision, mistakes during construction and change in material specification and type.

Henry, Ruth and Dan (2013) revealed the main causative factors in the case of Uganda public constructions are: changes in the work scope, high inflation and interest rates, poor monitoring and control, delayed payments to contractors and fuel shortages. Meanwhile the top five factors that were ranked the highest in terms of their impact on cost overruns were changes in the work scope, high inflation and interest rates, fuel shortages, poor monitoring and control and delayed payments to contractors.

Study of Factors Causing Time and Cost Overrun throughout Life Cycle of Construction Project in the Case of Malaysia conducted by Ismaaini , Ismail Abdul and Aftab(2013), they involved 308 public sectors and 51 private sectors practitioners in their study to categorize 35 previously identified main causes of cost and time overrun in construction industry based on each source of project life cycle phases. from the revealed the top six factors causing cost overrun in each phases are - Inadequate monitoring and control(construction phases), Mistakes and Errors in design(design & construction phase), Incomplete design at the time of tender (design phase), Poor design and delays in Design(design phase), Contractual claims, such as, extension of time with cost claims(construction phase), high cost labor, labor absenteeism, fluctuation of prices of materials and inaccurate quantity take-off (construction phase).

Causes of Contractor Cost Overrun in Construction Projects in the Case of Ethiopian Construction Sector conducted by Zinabu and Getachew (2015), through involving 140 contractors, consultants and clients on their questionnaires survey, they revealed the top five factors that causes cost overrun in construction projects on the side of contractors are poor planning, fluctuation of prices of materials, poor productivity, inflationary pressure and project financing.

Delays and cost increases in the construction of private residential projects in Kuwait conducted by P.A. Koushki, K. Al- Rashid and N.Kartamy(2015), comprises of 170 private residential project owners and 27 developers in the study, they revealed the top five causes of cost overrun occurred in private residential projects in Kuwait are related with contractor problem, material related problem, owners financial constraints, change orders and bad weather condition.

2.1.3. The Overall Effects of Cost Overrun in Construction Industry

Mbachu and Nkado(2004), 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/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/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 (Mbachu and Nkado , 2004). All these consequences undermine the viability and sustainability of the construction industry.

In Ethiopia, according to the finding of Nega (2008), the common effects of cost overrun in general in the country are : project delay, 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, Poor quality workmanship, Dissatisfaction by project owners and consequently by end users, Negative attitude towards the construction industry by the higher public authority and by the society as a whole, The contribution of the construction industry to the growth of national economy of the country will be less, Cost overruns in construction projects prevent the planned increase in property and service production from taking place (this phenomenon in turn affects, in a negative way), Weakens the growth of the construction industry by eroding mutual trust and Respect, Pours money unnecessarily to the project at hand at the expense of other new projects, Distorts fair and equitable resource distribution, Discourage investment (the investment on building construction by public clients will be less, hence the number of projects will decrease in the future), Creates skeptical outlook on appraisal of other new construction projects, Some project owners (clients)

become reluctant to effect additional payments to contractors and they view the cost overrun as a fabricated thing.

2.1.4. Cost Estimation and Control in Housing Construction Projects

2.1.4.1. Cost Controlling Procedures

Many authors' revealed in different way regarding on cost control, but all the aim is to insure that all project costs no more than intended initially. In general it helps to avoid construction project cost overruns and scheduling lapses by ensuring the progress of the job matches time estimates and forecasts of material, labor and overhead expenditures, Patrick Gleeson (2011).

In general speaking, cost control is concerned with a) influencing the factors that create changes to the cost baseline to ensure that changes are agreed upon, b) determining that the cost baseline has changed, and c) managing the actual changes when and as they occur, project management institution(2000).

Inputs necessary to prepare cost control documents are – cost baseline, performance report, change requests and cost management plan. Meanwhile, tools and techniques necessarily to be employed in cost control process, project management Institution (2000) are:-

- Cost change control system – It includes the paperwork, tracking systems, and approval levels necessary for authorizing changes.
- Performance measurement – it help to assess the magnitude of any variation that do occur.
- Earned value management (EVM)-All EVM Control Account Plans (CAPs) must continuously measure project performance by relating three independent variables: 1) The Planned Value, the physical work scheduled to be performed, including the estimated value of this work, 2) The Earned Value, physical work actually accomplished, including the estimated value of this work, 3) Actual Costs incurred to accomplish the Earned Value. The relationship of Earned Value less and Planned Value constitutes the Schedule Variance (SV). The relationship of Earned Value less Actual Costs constitutes the Cost Variance (CV) for the projects.
- Additional planning and

- Computerized tools - such as project management software and spreadsheets, are often used to track planned costs versus actual costs, and to forecast the effects of cost changes.

2.1.4.2. Cost Estimation of Housing Construction Projects

Washington State of Transportation institution (2015),define Cost estimating is the predictive process used to quantify, cost, and price the resources required by the scope of the project, to better manage budgets and deliver projects that do not exceed the identified scope, and that are on time throughout the development process. And also avowed simultaneously, estimation process can be seen in four areas, lasso szonyi (20011):

- **To state financial plan-** it is affected as cost estimates are used to obtain and allocate funding for the overruns of the estimated project costs.
- **To Public satisfaction-** is increased if housing construction projects show and prove to the general public that they are timely and within budget.
- **To Project control-** relies on cost estimates to help keep projects within the appropriate fiscal boundaries. Although not necessarily a "check and balance" format, the existence of the original estimate will keep the project from growing and expanding beyond its spending limit.
- **To projects encounter problems,** and their estimates come "under fire," great scrutiny is given to the project and its associated estimates. The ability to confront and solve problems and obstacles relies in large part on the quality of the estimate and the documentation, which, if done properly, will provide critical support to project success.

2.1.4.2.1. Cost Estimation Methodology

According to Washington State of Transportation institution (2015), cost estimating methodology can be applied in housing construction at various stages of project development stages. This includes:-

1. **Parametric methods-** are to be applied to housing projects in the planning, scoping, or early design stage. These methods involve techniques that use historical data to define the cost of the typical housing construction using measurements that are easily determined, such as cost per one building, cost per interchange, and cost per intersection. Two

techniques are commonly used in parametric estimating: (1) analogous (similar) projects and (2) historical percentages.

2. **Historical bid-based methods-** are commonly to be used to develop housing construction cost estimates, and are appropriate when design definition has advanced to the point where detailed quantification of bid items is possible. The unit cost prices used are collected and stored from prior projects. They should be modified or adjusted to reflect current prices and project-specific conditions such as geographic location, quantity of items needed, and the scheduled timing of project advertisement.
3. **Cost-based estimate methods- are** based on estimating the contractor's cost for materials, equipment, and labor for an item or a set of items. Estimated contractor overhead and profit are added. This may be appropriate in situations where historical unit prices are not available, or where historical bid-based information is not suitable for the project under consideration. Contractors also generally utilize a cost-based estimating approach to prepare their bids. This method can be used to support the decision for contract award/rejection and to support any future price negotiations with the contractor after contract award.
4. **Risk-based estimate methods-** are to be used the probabilistic relationships between base cost, base durations, and risks related to the housing construction projects. This approach may incorporate a variety of techniques, including historical data, cost-based estimating, and the best judgment of subject matter experts for given types of work. To develop the base cost, the cost of the project should be all goes as planned. Risks (opportunities or threats) are then to be defined and applied to the base cost through modeling (Monte Carlo simulation) to provide a probable range for both project cost and schedule.

2.1.5. Project Procurement Management

It includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team. The organization can be either the buyer or seller of the products, services, or results of a project. It includes the contract management and change control processes required to develop and administer contracts or purchase orders issued by authorized project team members, Project management Institution (2013).

2.1.5.1. The Main Process of Project Procurement Management

2.1.5.1.1. Plan Procurement Management

It is the process of documenting project procurement decisions, specifying the approach, and identifying potential sellers. The key benefit of this process is that it determines whether to acquire outside support, and if so, what to acquire, how to acquire it, how much is needed, and when to acquire it. Meanwhile, the basic inputs that needed to perform this process are – project management plan, requirements documentation, risk register, activity resource requirements, project schedule, activity cost estimate, stakeholder registration, enterprise environmental factor and organizational process asset (project management institution,2000).

2.1.5.1.2. Conduct Procurements

Conduct Procurements is the process of obtaining seller responses, selecting a seller, and awarding a contract. The key benefit of this process is that it provides alignment of internal and external stakeholder expectations through established agreements (project management institution, 2013).

2.1.5.1.3. Control Procurements

It is the process of managing procurement relationships, monitoring contract performance, and making changes and corrections to contracts as appropriate. The key benefit of this process is that it ensures that both the seller's and buyer's performance meets procurement requirements according to the terms of the legal agreement, project management institution (2000).

2.1.5.1.4. Close Procurements

It is the process of finalizing all procurements involved in the project. The key benefit of this process is that it documents agreements and related documentation for future reference, project management institution (2000).

2.1.5.2. Procurement Procedures and Practices in Ethiopia (from Bidding to Contract Award)

Cited by World Bank (2003), Federal Governments of Ethiopia is using various procurement methods. The most are – open tendering, two stage tendering, request for proposal, restricted tendering, requests for quotation and single source procurement.

Tecle Hagos and Mahelet (2009), states that open tendering is the preferred procedure of procurement. Under open tendering, the procuring entity must prepare an invitation to tender as well as tender documents. The invitation to tender must be brought to the attention of those who may wish to submit tenders by advertisement in newspapers that have wide circulation within the country.

The restricted Tendering, which is available if the costs of open tendering would be disproportionate to the value of the contract, is below the prescribed maximum. Restricted Tendering is also available if there are only a limited number of suppliers. Restricted Tendering is similar to "open tendering" except that the invitation to tender is given only to selected persons. Similarly the Direct procurement or single source procurement, which is available if there is only one supplier or if there is an urgent need, or if the procurement is for goods or services in addition to those already supplied under another contract. In this procedure, a Government department negotiates directly with the supplier (construction law of Ethiopia, 2009).

Request for Proposals, which is available to procure services that are advisory or are of a predominantly intellectual in nature. In this procedure, the procuring entity invites expressions of interest by publication of an advertisement in the press. The Procuring entity determines which persons who express interest are qualified to be invited to submit proposals. Similarly "Request for Quotations" (pro forma), which is available to procure goods that are readily available and

for which there is an established market. In this procedure the procuring entity prepares a request for quotations and gives it to selected persons. The successful quotation is the one with the lowest price that meets the requirements in the request for quotations, Tecle Hagos and Mahelet (2009).

"Negotiated procurement" occurs under a two envelop system, using sequential opening of the technical and financial proposals. Only those bids that meet the technical criteria are opened and the contract is negotiated with the lowest bid, in order to lower the price (construction law of Ethiopia, 2009).

Since March 2001, the Institution of financial regulation provide for the application of domestic preferences for local contractors, when it concerns local competition. Eligibility for the domestic preference for products of metal and engineering industries is deemed to be locally produced if the domestically added value is at least 15%. A preference formula is also being devised for local contractors.

According to institute of financial regulation in Ethiopia (2001), Contracts above certain money thresholds require MOFED (ministry of finance and economic development) approval (> Birr 500,000 for local bidding, and > 2 million for international bidding).

According Tecle Hagos and Mahelet (2009), Consultants are normally chosen from a short list of qualified firms, information on which is obtained from expressions of interest or through advertisement or from locally kept data bases. Except for small to medium size contracts (< Birr 200,000 and < 700,000, respectively), terms of reference are well prepared in most cases. For large contracts, which are more likely financed by external aid agencies, the Request for Proposals contains adequate information on the selection process and evaluation criteria, but this is not the case for locally funded contracts (institute of financial regulation in Ethiopia (2001).

2.1.6. Licensing and Registration of Contractors and Civil Engineering Consultants

2.1.6.1. Contractors

Cited by Tecle Hagos and Mahelet(2009), All contractors registering under the guidelines are required to register first with the Ministry of Trade in accordance with the Commercial Code of Ethiopia and related directives of the MoWUD(ministry of works and urban development).It is after securing a registration certificate from the Ministry of Trade that an application for registration with the MoWUD can be entertained.

Every contractor has the option of submitting an application for registration as a contractor in any one of the following categories (construction law of Ethiopia, 2009):-

- **General Contractors:** These are contractors who are qualified to undertake a variety of construction works such as buildings, roads, railways, bridges, etc.
- **Building Contractors:** These are contractors who are qualified to undertake building construction and related works.
- **Road Contractors:** These are contractors who are qualified to undertake construction of roads and other related civil engineering works.
- **Specialized Contractors;** These are contractors who are qualified to undertake construction activities in specialized trades such as electro mechanical installation works, painting and decorations, sanitary installation works, wood and metal works and landscaping and other related activities.

The criteria for registration of a contractor in any of the categories listed above differ based on the grade to which the contractor is applying. There are 10 grades which are categorized accordingly based on required skilled manpower and the construction cost of the project that the contractor is seeking to undertake (construction law of Ethiopia, 2009). General Contractors, Building Contractors and Road Contractors can register in the ten grades based on the following criteria, Tecle Hagos and Mahelet(2009) are:-

Grade 1 -Construction cost of Birr >20,000,000 and expected to have seven professional engineers.

Grade 2 -Construction Cost of Birr up to 20,000,000 and expected to have seven professional engineers.

Grade 3 -Construction cost of Birr up to 15,000,000 and expected to have five professional engineers

Grade 4- Construction cost of Birr up to 10,000,000 and expected to have five professional engineers

Grade 5- Construction cost of Birr up to 5,000,000 and expected to have five professional engineers.

Grade 6- Construction cost of Birr up to 2,500,000 and expected to have two professional engineers

Grade 7 - Construction cost of Birr up to 1,000,000 and expected to have two professional engineers E.T.C.

2.1.6.2. Consulting Office

Consulting service vary discipline to discipline. Due to this variation, registration on consulting office can be consulting architects and engineers, consulting architects, general consulting engineers, or specialized consulting engineer. Consultants registering in office for consulting architects and engineers may participate in the preparation of total design documents for building and civil projects befitting their categories. Those consultants registered in the Office for General Consulting Engineers may participate in the preparation of all engineering design works befitting their category. On the other hand, applications for registration in the Office of Specialized Consulting Engineers may be submitted in the specific fields of engineering- like structural, road, sanitary and mechanical, foundational, electrical, quantity surveying, and surveying (construction law of Ethiopia, 2009).

2.1.7. Project Lifecycle (Phases) for Construction Projects

The project manager and project team have one shared goal: to carry out the work of the project for the purpose of meeting the project's objectives. Every project has a beginning, a middle period during which activities move the project toward completion, and an ending (either successful or unsuccessful), Watt (2016).

According to watt (2016), A standard project typically has the following four major phases, that is- initiation, planning, implementation, and closure. Taken together, these phases represent the path a project takes from the beginning to its end and are generally referred to as the project "life cycle."

2.1.7.1. Project Initiation Phase

According to Watt, 2016 cited in his web-site, during initiation phase, the project objective or need is identified; this can be a business problem or opportunity. An appropriate response to the need is documented in a business case with recommended solution options. Once the recommended solution is approved, a project is initiated to deliver the approved solution and a project manager is appointed. The major deliverables and the participating work groups are identified, and the project team begins to take shape. Approval is then sought by the project manager to move onto the detailed planning phase (Watt 2016).

2.1.7.2. Project Planning Phase

The next phase, the planning phase, is where the project solution is further developed in as much detail as possible and the steps necessary to meet the project's objective are planned. In this step, the team identifies all of the work to be done. The project's tasks and resource requirements are identified, along with the strategy for producing them. This is also referred to as "scope management." A project plan is created outlining the activities, tasks, dependencies, and timeframes. The project manager coordinates the preparation of a project budget by providing cost estimates for the labor, equipment, and materials costs. The budget is used to monitor and control cost expenditures during project implementation (Watt 2016).

Finally, you will want to document a quality plan, providing quality targets, assurance, and control measures, along with an acceptance plan, listing the criteria to be met to gain customer acceptance. At this point, the project would have been planned in detail and is ready to be executed (Watt, 2016).

2.1.7.3. Project Implementation Phase

During the third phase, the implementation phase, the project plan is put into motion and the work of the project is performed (Watt 2016). It is important to maintain control and communicate as needed during implementation.

2.1.7.4. Project Closing Phase

During the final closure, or completion phase, the emphasis is on releasing the final deliverables to the customer, handing over project documentation to the business, terminating supplier contracts, releasing project resources, and communicating the closure of the project to all stakeholders. The last remaining step is to conduct lessons-learned studies to examine what went well and what didn't. Through this type of analysis, the wisdom of experience is transferred back to the project organization, which will help future project teams (Watt, 2016).

2.1.8. Conceptual Framework

As attested from the above theoretical review, different researchers investigate causative factors of cost overrun according to the project types. These indicate that, a contributory factors of cost increase at project completion stage is varies from project to project and also from countries to countries. For instance, in the case of Vietnam, long le- hoai, young dai lee, & Jun youg lee (2008), they revealed the main causative factors of cost escalation in construction projects. The top five are Poor sit management and supervision, Poor project management assistance, financial difficulties of owners, financial difficulties of contractors and Design change. Likewise, In the case of Uganda's, Alinaitwe, Ruth Apolot, & Dan Tindiwens (2013), they revealed the main causative factors of cost escalation in public sector construction projects in general. The top five are - change in the work scope, high inflation and interest rate, poor monitoring and control, delayed payments to contractors and fuel shortages. From these two investigations, the

researcher understood that there is variation in terms of contributory factors with respect to frequency and impact. Therefore, this research declares the main contributory factors of cost overrun on public housing construction in the case of Addis Ababa city housing programs besides factors acknowledged by the city housing programs, like- price fluctuation of materials, power interruption, labor cost, design changes, mismanagement and supervision, poor capacity of some contractors and procurement procedures.

2.2. Empirical literature

The success of any project can be measured by various norms like time performance, cost performance, quality standards, achieving safety and health, etc. Atkinson (1999) stated that cost, time and quality serve as Iron Triangle for success of any project. Of these, cost performance is the most important indicator of project success (Frimpong et al., 2003; Olawale& Sun, 2010). It presents not only the firm's profitability but also the productivity of organizations at any point during the construction processes. It can be seen easily in the project account and is always used to measure project performance against the estimated target.

Unfortunately, construction industry in general has been experiencing poor cost performance which described its inability to complete projects within budget. This chronic issue is experienced worldwide and becoming more critical as been revealed in World Bank report in 1990. The report pointed out that 63% of the 1778 financed construction projects faced poor performance with overrun in budget at an average of 40% as cited by (Ameh et al., 2010; Zujo et al., 2010). For worldwide scenario, Flyvbjerg et al. (2003) had studied 258 projects in 20 nations which approximately US$90 billion worth of project with size ranging from US$1.5 million to $8.5 billion. They found that cost escalation happened to almost 9 out of 10 projects with an average of 28% higher than forecasted costs. The study concluded that cost performance has not improved over the time and its magnitude has not changed for the past 70 years. The problem of cost overrun is common issue in both developing and developed countries (Angelo & Reina, 2002) However, it is more severe in developing countries where actual cost exceeded 100% of the anticipated cost of the projects (Azhar et al., 2008).

Let see one by one empirical finding on cost overrun both developed and developing countries revealed by different researchers.

2.2.1. Empirical Finding on Cost Overrun in Developed Countries

As revealed by olawale& son (2010) and cited by Aftab(2013), the most developed countries that stilled suffered by cost overrun in their projects execution are listed below. These are –

- **UK Scenario:** A research conducted by Barrick (1995) showed that nearly one third of the clients in UK complaints that their projects generally overrun budget. Further, Department of Environment, Transport and the Regions (DETR, 2000) reported that approximately 55% of projects face the problem of cost overrun with huge amount as cited by (Jackson, 2002). For example, British library faced three times over the original budget, Guy's house at £152M doubled its original budget (NAO, 1998) parliamentary office building in London also at cost of £250M doubled its original budget (Wheeler, 1998) and Holyroad project in Glasgow took £230M against £90M of the original budget (Fairs, 2001).
- **USA Scenario:** A study conducted in 1994 consisting of 8,000 projects showed that only 16% of the projects satisfied the three famous performance criteria: completing projects on time, within budgeted cost and quality standard (Frame, 1997). In study of project performance of cost plus fixed fee projects, Chang (2002) conducted case studies on four projects. He found that the entire four projects were facing cost overrun ranging from 12.3% to 51.3% at an average of 24.8% of the contract amount. The Government Accountability Office also stated that 77% of highway projects in the USA experienced cost escalation (Cantarelli, Flyvbjerg, Molin, & Wee, 2010).
- **Netherlands Scenario:** Investigation on 87 projects (29 road projects, 28 rail projects and 30 fixed link projects) revealed that cost overrun was the common problem at an average of 10.3% of project cost. The study showed that the percentage of cost overrun in road projects was the highest with the rate of 18.5% followed by rail projects with 7.6% and finally fixed link project with 4.5% (Cantarelli, 2009).
- **Norway Scenario:** Odeck (2004) studied the performance of construction projects controlled by Norwegian Public Roads Administration. He found that cost overrun was a severe problem and the amount of overruns ranged from -59% to 183%.
- **Sweden Scenario:** The Auditor General of Sweden (1995) report showed a narrow focus on cost overruns involving transport projects. It covered 15 projects (8 road and 7 rail

projects). The report showed that average capital cost overrun for road projects was 86% (ranging between 2 and 182%) and for rail projects this overrun was 17% (ranging from -14% to 74%) as cited by (Cantarelli et al., 2010).

- **Portugal Scenario:** Auditing report of public projects published by the National Court of Audit Portugal (NACL, 2000) on the cost performance of 26 major motorway projects, underground projects launched between 1985 and 2000 and 98 Expo projects revealed that in motorway projects, average cost overrun was 39% of project cost. In underground projects, cost overrun averaged 311% while the Expo projects had cost overruns averaged as much as 41%. Further, an investigating 66 construction projects with average initial contract amount was €16.530.674. Average final costs of these projects reached €18.584.954 with an average cost overrun of €2.054.280 i.e. 12% of the initial average cost (Moura, Teixeira, &Pires, 2007).

2.2.2. Empirical finding on cost overrun in developing countries

Likewise developed countries different research shows that most of the developing countries including Ethiopia still suffered by cost overrun in their public construction in general. Revealed by olawale& son (2010) and cited by Aftab (2013), the most are:-

- **Bosnia and Herzegovina:** In a study of 177 structures, it was found that the contracted price was not met in 41.23% of structures. Another study of 53 building projects including 29 new construction and 24 reconstruction projects showed that average cost overrun in reconstruction projects was 9.23% white it was 6.84% for new construction projects (Zujo et al., 2010; Zujo& Car, 2008).
- **Ghana:** Frimpong et al. (2003) studied cost performance of water drilling projects and found that 38 of total of 47 investigated projects (at a rate of 75%) were facing cost overrun whereas only 25% were completed within the budget.
- **India:** A study of 290 projects showed a total of Rs 20,024 cost over the contract cost of projects as Rs 27,568 with an average of 73% of cost overrun as cited by (Gupta, 2009).
- **Korea:** Lee (2008) investigated 161 projects which included 138 road projects, 16 rail projects, 2 airport and 5 port projects. Findings of study showed that 95% of road projects had cost overrun at rate of 50% of the project cost, all the rail projects faced cost overrun

at the rate of 50% of projects cost while airports projects had overrun of more than 100% of project cost and port projects had approximately 40% of cost overrun.

- **Malaysia:** Malaysians Auditor General 2008 (in Khamidi, Khan, &Idrus 2011) showed that completion of electrified double track project between Rawang and Ipoh resulted in a cost overrun of RM 1.43 billion. Endut et al. (2009) analyzed cost overrun problems by investigating 308 public and 51 private projects (a total of 359 projects). They found that only 46.8% and 37.2% of public sector and private sector projects completed within the budget respectively with average cost deviation of the project was 2.08%. The maximum deviation was found as 80.76% of project cost.
- **Nigeria:** Jackson & Steven (2001) studied the problem of cost overrun by investigating 15 projects in all in and found that 73.7% project faced cost overrun at an average of 34.7% of the initial project cost. They also conducted a questionnaire survey and mentioned that only 10% respondents have not experience cost overruns at all while 75% of the respondents mentioned that cost overruns have sometimes occurred in building projects, 15% said it always occurred. Through 61 cases studies Aibinu & Jagboro (2002) found that the projects had a mean percentage cost overrun of 17.34%. Later on an investigation of 137 construction projects showed that 55% of projects were facing cost overrun problem. These overrun ranged from 5% to a maximum amount of 808% of project cost (Olatunji, 2008). A research of cost escalation on infrastructure projects conducted by Omoregie& Radford (2006) showed that a minimum percentage of cost escalation was found as 14% of the budgeted cost.
- **Pakistan:** Azhar et al. (2008) stated that cost overrun was a common problem in construction projects. The minimum range of cost overrun experienced was found as near around the 10% of the total cost of the project. In large construction firms these overrun ranged up to about 40% while in medium size firms this percentage increased up to nearly about 60% of the project cost.
- **Thailand:** Meeampol & Ogunlana (2006) studied cost performance on 99 highway construction projects and found that only 46 projects only were satisfied with cost performance while the others faced poor cost performance.

- **Uganda:** Northern by-pass project in Kampala was overrun by more than 100% and a study of a total of 30 projects showed that 53% of the projects had cost overruns (Apolot, Alinaitwe, &Tindiwensi, 2011).
- **Vietnam:** Government has acknowledged the construction cost overruns problem as the big headache, especially with government-related funded projects (Le-Hoai et al., 2008).
- **Zambia:** Kaliba, Muya, &Mumba (2009) studying the project performance in road construction projects of worth U$542.7 found that more than 50% of projects could not meet the contract budget and were facing cost overrun.
- **Ethiopia:** studied by Fetene (2008), from his field study of 70 public constructions projects, revealed that 67 out of 70, (95.7%) of public building projects suffered by cost overrun in their projects execution. For this building construction projects, the actual cost at completion exceeded by 0 up to 126% from contract amount.

2.3. Conclusion and knowledge gap in the literature review

The review of literature discloses the existence of gaps knowledge in respect of causative factors of cost overrun in housing construction projects and also it enhance to test the causative factors founded by different researchers are concurrently applicable in the case of public housing construction at the context of Ethiopian working habit. As per the researchers, there are investigations in developing countries like- Indonesia, Ghana, Ethiopia, Vietnam, and Uganda E.T.C.

Let compare their identified causative factors according to ranked across each investigation of the country on the samples of the above Examples.

- In the case of Indonesia, Kaming, Olomolaiye, Holt, & Harris (1997), they revealed the top causative factors of cost overrun in the case of high rising building are;-

1. Material cost increased by inflation
2. Inaccurate quantity take-off
3. Labor cost increase due to environmental restriction
4. Lack of experience project location
5. Lack of experience of project type
6. unpredictable weather conditions and
7. Lack of experience of local regulation.

- In the case of Ghana, Frimpong, et. Al (2003), revealed that the top causative factors of cost overrun in ground water drilling projects are:-

1. Monthly payment difficulties
2. Poor contract management
3. Procurement
4. Inflation
5. Contractors financial difficulties

- In the case of Ethiopia, Nega (2008), investigated that the main causative factors in public construction projects in general are;-

1. Inflation or increase the cost of construction materials
2. Poor planning and coordination
3. Change order due to the enhancement required by clients
4. Excess quantity during construction

- In the case of Vietnam's, long le- hoai, young dai lee, & Jun youg lee (2008), they revealed the main causative factors of cost escalation in construction projects in general are :-

1. Poor sit management and supervision
2. Poor project management assistance
3. Financial difficulties of owners
4. Financial difficulties of contractors
5. Design change

- In the case of Uganda's, Alinaitwe, Ruth Apolot, & Dan Tindiwens (2013), they revealed the main causative factors of cost escalation in public sector construction projects in general are:-

1. Change in the work scope
2. High inflation and interest rate
3. Poor monitoring and control
4. Delayed payments to contractors
5. Fuel shortages

As attested from the above, we can concluded the rank of causative factors of cost escalation are varies from one country to the other. For instance, inflation in Ethiopia and Indonesia priority factors, in Ghana the fourth factors, and Vietnam and Uganda inflation is not the top five factors in their construction execution. Beside to this, the causative factors of cost escalation across developing countries is varies due to the types of projects were executed. For instance, in the case of Ghana ground water drilling projects, the causative factors of the first fifth are – monthly payment difficulties, poor contract management, related with procurement, inflation and contractors financial difficulties but in the case of Indonesia high rising projects, the first fourth main causative factors of cost escalation are- inflation, inaccurate quantity take-off, labor cost increased due to environmental restriction and lack of experience project location. From these two countries, the first top causative factors included in both countries are only inflation. Therefore these gaps lead the researcher to the research idea and question of this study. "What are the main causes of cost overrun in public housing construction projects in the case of 40/60, 20/80 and 10/90 housing programs in Addis Ababa Administration"? In identifying the causes of cost escalation in the selected area, the involved parties makes their selves ready to response or eliminate the root causes of each causative factors in their project execution and able to delegate the causative factors for each stakeholder.

CHAPTER THREE

RESEARCH METHDOLOGY

3.1. Research Design

The purpose of this chapter is to describe the choice of appropriate research method for the study. Research design is specific research methodology philosophies and techniques used to achieve the objective of the study. The research were developed from observation of practical problems on 10/90, 20/80 and 40/60 of governmental housing projects budget allocation and uses led to cost overrun that constructed and on the way of construction stage undertaking by Addis Ababa city administration. Basically the research questions were oriented to investigate the main cause of cost overrun, significant impact and their overall effects on these particular projects. So the research design will help to integrate different components of the research in coherent and logical way. For this research, the research design is descriptive. It is descriptive, because the research basically focuses on practical projects to realize the reasons and impacts of cost overrun through identifying rate of cost overrun, the main variables of cost overrun and their overall effects cost overrun and also showed the rate of discrepancy between the contract amount and the actual cost at completion.

Research Approach

The research problem along with the philosophy of research methodology would guide the choice of the appropriate research method. On the basis of knowledge claims (such as positivist, social constructivism, advocacy or participatory, and pragmatic approaches), strategy of inquiry that guide selection of particular research methods and specific research methods of data collection and analysis. Creswell (2009) characterizes research approach in to quantitative, qualitative and mixed approach.

Given the above points in the mind of the researcher, this study adopted mixed type of research approach in collecting and analyzing data in order to better understand the research problem. Mixed approach implemented sequentially, in which the researcher starts with gathering qualitative data and then gather quantitative data.

3.2. Census Techniques

It is a study of every unit, everyone or everything, in a population (Calleam Consulting Ltd(2012). Census has its advantage, the most are- provides a true measure of the population rather than sampling techniques, benchmark data may be obtained for future studies, detailed information about small sub-groups within the population is more likely to be available, Calleam Consulting Ltd(2012). Due to this and other consideration like – a total population of the study is less than 100; it preferred to apply census techniques rather than sampling techniques.

Defined target population of this study particularly includes city Administration housing project office project administrator employees, Addis Ababa saving housing development Enterprise project administrator employees and 10/90; 20/80 and 40/60 housing scheme contractors and consultants that had more than 5 years working experience respectively, since they are qualified to explain and response the required inquire as per researcher interest.

Referring payroll and hired profile obtained from above avowed office master file for the month March 2017, currently they are around 32 consultants, 30 contractors and the sum of 17 project administrators hired by city housing administration office and Addis Ababa city saving housing development enterprises on the basis of projects duration(for consultants and contractors) and permanently (for executor). Depending on the projects sizing about 17 executors and 62 consultants and contractors are working currently on the above avowed office, out of which 100 % executors, contractors and consultants had more than 5 years' experience in this specific projects, which leads as to the approximate target population of this research. Were taking this figure as a starting point that limits the total population of this study, which is a total of 79. Therefore respondent distribution was undertaken through census techniques, which are 17 respondents from clients (project owners), 30 respondents from contractors and 32 respondents from consultants.

3.3. Source and Tools/ Instruments of Data Collection

The main sources of data types for this work are primarily and review selected office documentation to refer the contract agreement and other relevant data for this study. The selected public housing project types only included in this particular study are public housing projects that executing within four years period. Primarily data were collected by distributing open ended and close ended structured questionnaires to selected clients, contractors and consultants. The respondents are asked to provide information on previous and existing housing projects in relation to name of project, starting and completion date, contractual and actual duration, pre-contract budget, contract sum and final cost (after Pearl et. al, 2003). Specific features of the projects such as type of project (10/90, 20/80 or 40/60 housing program), procurement methods, nature of works and tendering methods are also requested.

In general, information is obtained using the **survey questionnaires** includes:

- Clients, contractors and consultants personal characteristics like – age, education level and gender E.T.C.
- Information on the main causes of cost overrun on governmental housing construction projects.
- Information on the level of impact of causes when they are happens in one project life cycle.
- Information on the overall effects of cost overrun.
- Information on frequency of occurrence of causes of cost overrun in one project life cycle.
- Information on responsible parties for the causes of cost overrun.
- Tendering methods of the institution E.T.C.

Information is obtained by **reviewing office documentation** are:

- Information on each project contract agreement, estimated budget, actual cost at completion, supplementary agreements, projects duration, project location, gross floor area for building project, project design and site E.T.C.

After hypothesized variables of cost overrun in general construction projects are taken from literature review, the respondents are asked about their agreement on these variables of causing cost overrun in the case of housing construction projects. To done this, five point likert-scale of 1 to 5 was adopted to assess the consensus level of the respondents on causative factors of cost escalation in housing construction and ranked through their mean value. Where,

1= Strongly Agree

2= Agreed

3= Neutral

4= Disagree

5= Strongly Disagree

After the main causative factors of cost overrun are identified and ranked accordingly, the respondents are asked to determine the frequency of occurrence within one project life cycle. Likewise, a five point of likert-scale of 1 to 5 were employed. Where,

1= no frequency

2= slightly

3= moderate

4= high

5= extremely

The data were computed by using the formula of frequency index, that is

$$F.I = \frac{\sum_{n=1}^{5} \text{ai.ni}}{4\text{N}} \quad \text{…………………………………………………………….. (1)}$$

Where, a= constant expressing the weight assigned to each response (range from 1 for extremely happen to 5 not happen), n= frequency of each response and N= total number of response.

After factors of cost overrun in housing constructions are identified, the respondents were asked to rank the significance level of factor affecting public housing construction cost. Likewise, a five point likert-scale of 1 to 5 was adopted to assess the degree of significance of each cause. Where,

1=extremely significant (ES),

2= very significant (VS),

3= moderately significant (MS),

4= slightly significant (SS) and

5= not significant (NS)

Data was analyzed by using average index method as follows:

$$AI = \frac{\sum (1X1+2X2+3X3+4X4+5X5)}{\sum(X1+X2+X3+X4+X5)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where;

- AI= Average index
- X1 = Number of respondents for "Extremely Significant"
- X2 = Number of respondents for "Very Significant"
- X3 = Number of respondents for "Moderately Significant"
- X4 = Number of respondents for "Slightly Significant"
- X5 = Number of respondents for "Not Significant"

Evaluation range to assess significant level for this study is applied by referring previously adopted by Ghani, A (2006) and Abdullah MR (2010). This means;

The calculated value of AI is between 1 and 1.5(1.00 < AI < 1.50), were said, Extremely Significant,

The calculated value of AI is between 1.5 and 2.5(1.50 < AI < 2.50), were said, Very Significant,

The calculated value of AI is between 2.5 and 3.5(2.50< AI < 3.50), were said, Moderately Significant,

The calculated value of AI is between 3.5 and 4.5(3.50< AI < 4.50), were said, Slightly Significant and

The calculated value of AI is above 4.5 (AI > 4.5), were said, Not Significant.

3.4. Procedures of Data Collection

This research has adopted field survey methodology and selective office document review to uncover factors influencing on cost overruns arising during construction stage. To identify the cost overrun factors in public housing construction projects, literature reviews and informal discussion with prototype practitioners of all parties involved in housing construction industry were carried out. After that, a pilot questionnaire was prepared. The designed questionnaire was

randomly distributed to three principal construction parties (executor, consultant and contractor). For each factor, the respondents were requested to answer frequency of occurrence, severity and also requested to identify the causative factors cost overrun in the case of Addis Ababa city housing construction projects. A five-point scale of 1 to 5 was adopted for evaluating the impacts of each factor and occurrence. In order to fit into conditions in public housing construction industry in the case of Addis Ababa city administration, a pilot test was performed for preliminary questionnaire. One expert from each category was involved in this pilot test. One senior housing projects follower and coordinator from clients, one contractor took currently 20/80 housing project from Addis Ababa city administration housing projects office and one consultant hired by city Administration for 10/90 and 20/80 housing projects. Each pilot respondent had more than 7 years of experience in construction industry. Likewise this thesis Advisor, they were asked to critically review the design and structure of the questionnaire. Their valuable comments were used to revise the research questionnaire. After revising the questionnaire, the second pilot questionnaire was distributed to these three experts. At this time, the comments received were positive and no change was necessary. The questionnaire was ready to survey.

In the structured questionnaires, twenty five causes of cost overrun drawn from literature review are categorized in to four. These are:

- ✓ Owner related factors group comprises owner financial difficulties, design change, payment delay for contractors, material procurement, change order, delay preparation and approval of drawing, power interruption, selection of incompetent contractors and consultants and governmental bureaucratic.
- ✓ Contractors related factors group comprises lack of experience of project location, contractors financial difficulties, poor sit management and supervision, incomplete design at the time of tender, inaccurate quantity take-off and unavailability of competent staff.
- ✓ Consultants' related factors group consists of inappropriate or incorrect methods of cost estimation, excess quantity during construction, supplementary / additional work and, inadequate or deficiency in planning; scheduling and coordination.
- ✓ External factors related group consists of material cost increased by inflation, labor cost increased due to environmental restriction, unpredictable weather condition, change in

foreign exchange rate for only imported construction materials, project materials monopoly by some suppliers and materials shortage in the local market.

And lastly gave the chance for each respondent to add any additional causes of cost overrun other than provided that they known through experience. They very few added causes, however, are not significant.

- **The Characteristics of Respondents**

Face-to-face delivery is preferred to promote respondents and help to raise the response rate, therefore only employed this system by researcher itself. A total of 79 questionnaires are delivered to each involved parties of housing construction projects that is- clients, consultants and contractors. The chosen public housing projects are located under Addis Ababa city Administration in different corner of the city. Questionnaires are collected and statistically processed by SPSS V20. Before analyzing, the incomplete data are eliminated to ensure they are adequate and appropriate for statistical testing. Fifty (50) full responses are obtained showing a response rate of 63.3%.The response rate from contractors, executor and consultants is 83.3%, 59% and 47% respectively. Regarding number of years involved in public housing construction projects, 100% of respondents have between five and ten years work experience on this specific public housing construction. This ratio reflect the current phenomenon of , that is a large amount of young practitioners have been graduated in recent years to meet the vast human demand, and they have got high positions in their projects. Regarding on the type of public housing projects involvement of the respondents are 50% of respondents are involved in 20/80 housing project, 20% of the respondents are involved in 10/90 housing project and 30% of respondents are involved 40/60 housing project. Since most of the respondents are selected from 20/80 housing projects, because this project execution is counted long time in the city housing strategic as compared with others housing program schemes.

3.5. Methods of Data Analysis

For this study, only descriptive method is employed in the data analysis. As introduced earlier, in the data analysis “frequency index”, “average index” method, mean score and percentage were adopted to know the responsibility parties, ranking the causative factors of cost overrun, to measure the frequency and the significant level of each causes of cost overrun for public housing construction projects in the case of Addis Ababa city Administration. As discussed earlier Likert’s scale of five ordinal measures of agreement towards each statement (1, 2, 3, 4 and 5) is used to calculate the frequency index and average index for each factor that is used to determine the relative ranking.

CHAPTER FOUR
RESULTS AND DISCUSSION

This part of the research deals with the analysis and discussion of the data gathered from document review in each office and questionnaire survey. The investigation of Questionnaires survey comprises bidding procedures, types of housing program executed, the identification of the existence and extent of cost overrun, main causes of cost overrun, rate of occurrences of variables of cost overrun and the impact of the variables of cost overrun on the final/total cost of the project. Finally, the effects of cost overrun on the various stakeholders on the construction industry are also revealed.

As clearly specified on the methodology part, the procedures used in analyzing questionnaires survey result was aimed to established the significance level of each factors on the cost overrun in the studied area.

From each office document review, all the documents of each 10/90, 20/80 and 40/60 housing scheme such the approved contract amount, contract time during signing of the contract, actual cost at completion, actual completion time at completion of the project, project site, each housing block, rising floor and housing type were thoroughly investigated. These help to understand the reasons behind each project for cost overrun, and to investigate how the actual cost at completion deviates from the contract amount. Meanwhile collecting these data helped to analyze and draw the discrepancy rate of cost overrun and contract amount on the basis of housing type.

4.1. Review of Questionnaires Survey

A total of 79 questionnaires sets were distributed to practitioners involved in public housing construction industry, that is 10/90, 20/80 & 40/60 housing scheme in the selected area. By conceptualizing this phenomena, the review of collected 50 fully filed questionnaires are endeavored as follows:

4.1.1. Demographics of the Respondents

The demographics of the respondents that were participated in the survey are summarized as follows:

Table 4.1.1, Demographic Characteristics of the Respondents

No.		Frequency	%age	Cumulative %age
1.	Gender type			
	• Male	47	94	94
	• Female	3	6	100
2.	Types of Respondents			
	• Clients	10	20	20
	• Consultants	15	30	50
	• Contractors	25	50	100
	Total	50	100	
3.	Distribution of the respondents based on types housing schemes			
	• 10/90 housing scheme			
	- Clients	-	-	
	- Consultants	5	10	50
	- Contractors	5	10	50
	Sub total	10	20	
	• 20/80 housing scheme			
	- Clients	5	10	20
	- Consultants	10	20	40
	- Contractors	10	20	40
	Sub total	25	50	
	• 40/60 housing scheme			
	- Clients	-	-	
	- Consultants	5	10	33.3
	- Contractors	10	20	66.7
	Sub total	15	30	
	Total	**50**	100	
4.	Academic qualification			
	• BSC degree holder	28	56	56
	• MBA/Msc master holder	22	44	100
	• PhD holder	-	-	-
	Total	50	100	
5.	Work experience			
	- 5 years	17	34	38
	- 6 years	19	38	72
	- 7 years	8	16	88
	- 8 years	5	10	98
	- 9 years	1	2	100
	Total	50	100	

Source; survey result

Table 4.1.1 attested that the majority of the respondents 94% (47) participated in the survey were males and 6% (3) were female respectively.

Likewise, on table 4.1.1 declared that respondents of 20% (10), 30% (15) and 50% (25) participated in the survey were clients, consultants and contractors respectively, meanwhile, from this respondents 20% (10), 50% (25) and 30% (15) involved in the survey were selected from 10/90, 20/80 and 40/60 housing schemes respectively.

In general on the above table 4.1.1 conformed that, 56% (28) respondents participated in the survey were degree holder and the rest had obtained MBA/MSc degree in construction engineering, and similarly, the majority of respondents 38% (19) & 34%(17) involved in the survey had 5 and 6 work experience in housing construction which shows that the respondents were competent enough and capable to participate in the survey.

4.1.2. Types of Bidding or Tendering Employed on 10/90, 20/80 & 40/60 housing program

As declared on the literature review, the most common using of tendering or bidding methods of the federal democratic of Ethiopia, especially Addis Ababa city Administration public housing projects are - open tendering, two stage tendering, request for proposal, restricted tendering, requests for quotation and single source procurement. From this common methods, the most frequent employed types of tendering are open tendering, restricted or fixed tendering and selective or request for proposal.

From survey result, the degrees of conscious among each party are presented as follow:

Table 4.1.2, Summary of the Respondents of Tendering Methods Employed on 10/90, 20/80 & 40/60 housing scheme.

Methods	frequency	%age	Cumulative %age
Open bid	50	100	100
Selective bid	-	-	-
Fixed bid	-	-	
Total	50	100	

Source: survey filled

From the above avowed data, 100% (50) of the respondents agreed that open tendering is the most common methods.

As per the clients, contractors and consultants' response concluded that common methods of the tendering practices in the case of Addis Ababa city Administration public housing projects are open tendering.

4.1.3. Main Causative Factors of Cost overrun on Housing Programs

After identifying from literature different factors that result in cost overrun of housing construction projects, questioner was prepared, incorporating 25 factors and the responses are ranked in Table 4.1.3 below according to their mean scored. As per the clients, consultants and contractors response top ten factors that cause cost overrun of public housing construction projects and similarly, three variables not the means of cost overrun on public housing construction projects in the studied area are identified. The general information on the identified factors on the basis of each selected client, consultant and contractors response are presented below.

Table 4.1.3, Summary of Clients, Contractors and Consultants Response on Factors for Cost Overrun,

No.	Hypothesized Cause s of Cost Overrun	Frequency of the Respondents					
		Strongly Disagre	Don't Agree	Neutral	Agreed	Strongly Agree	Mean Scored
1.	Material shortage in the local market	1	21	2	25	1	2.92
2.	Delay preparation & approval of drawing	1	14	6	28	1	2.72
3.	Change order	0	0	4	45	1	2.06
4.	Labor cost increased due to environmental	1	0	0	49	0	2.04
5.	Change in foreign exchange rate/ for imported	0	0	1	49	0	2.02
6.	Materials procurement	0	0	0	50	0	2.00
7.	Owner's / executor financial difficulties	0	0	0	49	1	1.98
8.	Power interruption	0	0	0	44	16	1.88
9.	Inadequate / deficiency in planning , scheduling	0	0	0	43	7	1.86
10.	Contractors financial difficulties	0	0	0	42	8	1.84
11.	Material cost increased by inflation	0	0	0	42	8	1.84
12.	Lack of experience of project location	0	0	0	41	9	1.82
13.	Governmental bureaucratic procedures	0	0	0	35	15	1.7
14.	Design change	0	0	0	34	16	1.68
15.	Excess quantity during construction	0	0	0	34	16	1.68
16.	Payment delay for contractors	0	0	0	32	18	1.64
17.	Incomplete design at the time of tender	0	0	0	31	19	1.62
18.	Inaccurate quantity take-off	0	0	0	30	20	1.6
19.	Incorrect / inappropriate methods of cost	0	0	0	30	20	1.6
20.	Supplementary / additional work	0	0	0	25	25	1.5
21.	Poor sit management & supervision	0	0	0	24	26	1.48
22.	Selection of incompetent contractor's and	0	0	0	13	37	1.26
Factors identified by clients, contractors and consultants factors not causes of cost overrun in Addis Ababa city housing schemes							
23.	Unavailability of competent staff	0	43	7	0	0	3.86
24.	Project materials monopoly by some suppliers	1	40	9	0	0	3.84
25.	Unpredictable weather condition	1	37	6	6	0	3.66

Source: survey filled and SPSS V.20 result

As per the clients, contractors and consultants response, from 25 hypothesized variables that causes cost overrun taken from literature review, the majority of the respondents agreed that 22 of causative factors, that is- Material cost increased by inflation, Labor cost increased due to environmental restriction, Lack of experience of project location, Change in foreign exchange rate/ for imported materials, Contractors financial difficulties, Owner's / executor financial difficulties, Change order , power interruption E.T.C, are occurred during the execution stage of 10/90, 20/80 and 40/60 housing scheme in the case of Addis Ababa city Administration housing project and Addis Ababa City Administration saving housing development enterprise.

Likewise, on the basis of clients, contractors and consultants' response, the three causative factors that are not happened in selected housing projects are factor of unpredictable weather condition, project materials monopoly by some supplier and unavailability of competent staff. This finding shows that there is agreement in the literature review. However there are some differences between the results of the literature review and the questionnaire survey investigation. For instance, in Addis Ababa city housing schemes project materials monopolized by some suppliers are tolerated factors or not considered as variables of cost overrun for domestic clients, contractors and consultants but for foreign contractors, clients and consultants are not tolerable factors. This is due to the basic construction materials suppliers of these projects for contractors are the government itself in the case of Addis Ababa city Administration housing schemes projects.

Similarly, in Addis Ababa City public housing projects, unpredictable weather condition is not considered as a causative factor for cost overrun but for foreign projects it is one factors of cost overrun. This finding variation is due to environmental location of the country as a whole, that is, Addis Ababa city convince rate of environmental location for building every housing construction projects are more suitable than the projects executed foreign developed and developing countries, this can be proved by evaluating the performance of every constructed project reports undertaken in the city.

Meanwhile, regarding on unavailability of competent staff, the finding discrepancy from foreign and Addis Ababa city housing projects involved parties occurred due to the availability of competent skilled man power and selection procedures performed by the countries. In the case of

Addis Ababa city, there is excessive skilled man power in the area because of this the rate of hiring not compatible employees is less.

In general, the causative factors identified by the respondents involved in the survey were ranked by using statistical mean by employed SPSS V.20, from these, the top ten causative factors that exists on housing schemes are material shortage in the local market, delay preparation and approval of drawing, change order, labor cost increased due to environmental restriction, change in foreign exchange rate, material procurement, owner's/ executor financial difficulties, power interruptions, inadequate planning, scheduling and coordination and contractors financial difficulties.

4.1.4. Responsibility Parties for the Causative Factors of the Cost Overrun

On table 4.1.3 above, declared the main causative factors that occurred during execution of 10/90, 20/80 and 40/60 housing projects. This helps to know the stakeholders that involved in the execution of these housing projects and direct liability for the causative factors when they are occurred or happened. The survey result on the identification of responsibility parties is summarized below:

4.1.4, Summary of Responsibility Parties for Causative Factors of Cost Overrun

No.	Hypothesized Cause s of Cost Overrun	Frequency of the Respondents						
		Client	Contractors	Consultants	Others	Rate Scored in % age		
						client	Contractor	Consultants
1.	Material cost increased by inflation	47	0	3	0	94	-	6
2.	Labor cost increased due to environmental restriction	0	39	11	0	-	78	22
3.	Lack of experience of project location	10	32	8	0	20	64	16
4.	Unpredictable weather condition	18	32	0	0	36	64	-
5.	Selection of incompetent contractor's and consultants	35	15	0	0	70	30	-
6.	Change in foreign exchange rate/ for imported materials	34	1	14	1	68	2	28
7.	Design change	1	0	49	0	2	-	98
8.	Supplementary / additional work	1	0	49	0	2	-	98
9.	Payment delay for contractors	41	0	9	0	82	-	18
10.	Materials procurement	28	0	22	0	56	-	44
11.	Contractors financial difficulties	0	50	0	0	-	100	-
12.	Inadequate / deficiency in planning , scheduling & coordination	26	0	24	0	52	-	48
13.	Owner's / executor financial difficulties	50	0	0	0	100	-	-
14.	Change order	27	0	23	0	54	-	46
15.	Excess quantity during construction	0	50	0	0	-	100	-
16.	Poor sit management & supervision	8	20	22	0	16	40	44
17.	Incorrect / inappropriate methods of cost estimation	14	0	36	0	28	-	72
18.	Project materials monopoly by some suppliers	28	10	0	12	56	-	24
19.	Delay preparation & approval of drawing	35	0	15	0	70	-	30
20.	Incomplete design at the time of tender	0	9	41	0	-	18	82
21.	Inaccurate quantity take-off	0	0	50	0	-	-	100
22.	Governmental bureaucratic procedures	43	0	7	0	86	-	14
23.	Unavailability of competent staff	13	37	0	0	26	74	-
24.	Material shortage in the local market	44	6	0	0	88	12	-
25.	Power interruption	50	0	0	0	100	-	-

Source; survey filed and SPSS V20 result

As per clients, contractors and consultants response involved in the survey, from identified factors, factors that directly related with clients or owner of the projects are material cost increased by inflation, selection of incompetent contractors and consultants, change in foreign exchange for imported materials, payment delay for contractors, materials procurement, inadequate/ deficiency in planning, scheduling and coordination, owner/ executor financial difficulties, change order, project materials monopoly by some suppliers, delay preparation & approval of drawing, governmental bureaucratic procedures, material shortage in the local market and power interruption.

As per clients, contractors and consultants response participated in the questionnaire survey, from identified factors, factors that directly related with contractors are labor cost increased due to environmental restriction, lack of experience of project location, unpredictable weather condition, contractors financial difficulties, excess quantity during construction and unavailability of competent staff. This finding is some extent similar with the finding of zinabu and getachew(2015), investigate on factors of cost overrun related with contractors in the case of Ethiopia construction sectors. However there are some differences between the results of zinabu and getachew and the questionnaire survey investigation. For instance zinabu and getachew revealed the top causative factors related with contractors are price fluctuation, inflation, monopoly supplier E.T.C., but as per clients, contractors and consultants response involved in the survey revealed that these all factors are problem related with client/ owner of the project. This variation is appeared due to the type of the construction project and project contract agreement. In the case of Addis Ababa city public housing projects, all necessary construction materials are supplied by the client itself and deducted from the contract cost or total budget of the project. On the other hand labor cost increased due to environmental restriction, lack of experience of project location, contractor's financial difficulties, unpredictable weather condition and unavailability of competent staff are similar with this investigation tremendously.

As per clients, contractors and consultants response participated in the questionnaire survey, from identified factors, factors that directly related with consultants are design change, supplementary/ additional work, incorrect/ inappropriate methods of cost estimation, incomplete design at the time of tender and inaccurate quantity take-off. This investigation is more else

similar with the finding were obtained by Nega, 2008 and other reviewed literature included in this study.

4.1.5. Measuring the Frequency of Main Causative Factors of Cost Overrun in 10/90, 20/80 & 40/60 housing program

The frequency of occurrence each causative factors of cost overrun on selected housing schemes were computed by using frequency index methods. Frequency index used to expresses occurrence frequency of factors responsible for cost overrun in the case of Addis Ababa city Administration housing schemes. It is computed as per the following formula:

$$F.I = \frac{\sum_{n=1}^{5} \text{ai.ni}}{4\text{N}} \quad \text{..... (1)}$$

Where, a= constant expressing the weight assigned to each response (range from 1 for extremely happen to 5 not happen), n= frequency of each response and N= total number of response. Likewise, a five point of likert-scale of 1 to 5 were employed. Where,

1= no frequency

2= slightly

3= moderate

4= high

5= extremely

Table4.1.5, Summary of Clients, Consultants and Contractors Response, Frequency Index and Ranking

Causes	Summary of Responses of Clients, Consultants and Contractors					Frequency index	Ranking
	5= Extremely	4= High	3= Moderately	2= Slightly	1= No Frequency		
Payment delay for contractors	11	39	0	0	0	1.055	1
Contractors financial difficulties	7	42	1	0	0	1.030	2
Power interruption	6	38	5	1	0	0.995	3
Incorrect quantity take-off	5	40	4	1	0	0.995	3
Change in foreign exchange rate	3	40	6	1	0	0.975	3
Inadequate planning, scheduling and coordination	4	38	5	3	0	0.965	4
Material cost increased by inflation	0	42	6	2	0	0.950	5
Poor sit management & supervision	1	37	7	5	0	0.920	6
Excess quantity during construction	0	34	8	8	0	0.880	7
Supplementary / additional work	0	31	3	16	0	0.825	8
Labor cost increased due to environmental restriction	0	10	23	16	1	0.710	9
Lack of experience of project location	0	1	39	10	0	0.705	10
Incorrect / inappropriate methods of cost estimation	1	18	1	30	0	0.700	11
Change order /scope	0	4	38	8	0	0.690	12
Design change	0	2	33	15	0	0.685	13
Materials procurement	0	2	33	15	0	0.685	13
Incomplete design at the time of tender	0	9	19	22	0	0.685	13
Government bureaucratic procedures	1	18	0	26	5	0.670	14
Owner/ executor financial difficulties	0	2	24	24	0	0.640	15
Unavailability of competent staff	0	11	2	25	12	0.560	16
Selection of incompetent contractors and consultants	1	0	5	28	16	0.460	17
Delay preparation & approval of drawing	0	0	3	32	15	0.440	18
Material shortage in the local market	0	0	7	21	22	0.425	19
Unpredictable weather condition	0	0	13	3	34	0.395	20
Project materials monopoly by some suppliers	0	1	6	0	43	0.325	21

Source: survey filed and SPSS V20 result

As per clients, contractors and consultants response participated in the questionnaire survey, the frequency of occurrence of factors of cost overrun on the studied area were ranked based on the results of frequency index. Meanwhile, as per the finding, 25 factors of cost overrun taken from literatures were ranked in to 21 that attested on table 4.5.1 above.

The top ten factors of cost overrun that occurred on the public housing projects in the case of Addis Ababa city Administration on the basis of frequency index are payment delay for contractors- frequency index(1.005), contractors financial difficulties- frequency index(1.030), power interruption- frequency index(0.995), incorrect quantity take-off- frequency index(0.995), change in foreign exchange rate – frequency index(0.995), inadequate planning, scheduling & coordination- frequency index(0.965), material cost increased by inflation – frequency index(0.950), poor sit management and supervision- frequency index(0.920), excess quantity during construction- frequency index(0.880) and supplementary/ additional work – frequency index(0.825).

4.1.5.1. Comparison of Survey Result with Previous Studies Based on Frequency

As already stated on the literature review section, there are different factors that potential to increase the final cost of every construction projects. These factors are differing from construction projects to projects besides the ranking of each factors investigation. Below table, describes the investigation and ranking of top factors based on frequency of nega, hennery; ruth &dan, dinesh; emerites & apte, and survey results.

Table 4.1.5.1., Summary of comparison factors of cost overrun based on frequency investigated by nega, hennery; ruth & dan, dinesh; emerites & apte, and survey result.

	Nega	Henry, ruth & dan	Dinesh, prof. Emerites & Apte	Survey result
1.	Inflation	Change of work scope	Material shortage in the local market	payment delay for contractors
2.	Fluctuation	Inflation	Shortage of labor	contractors financial difficulties
3.	Change in foreign exchange rate	Poor monitoring & control	Late delivery of material , equipment and site	power interruption
4.	Change order	Delay payment to contractor	Unavailability of competent staff	incorrect quantity take-off
5.	Lack of planning and coordination	Fuel shortage	Delay payment to contractors	change in foreign exchange rate
6.	Additional cost due to variation cost	Project complexity	Financial difficulties to contractors	inadequate planning, scheduling &
7.	Failure to identify problems and	Shortage of material in the local market	Incomplete drawing at the time of tender	material cost increased by inflation
8.	Changes in planning and	Incomplete document	Poor communication & coordination	poor sit management and supervision
9.	Insufficient geotechnical	Poor communication	Financial difficulties by the owner	excess quantity during construction
10.	Contractors financial	Incompetent staff	Incorrect quantity take-off	supplementary/ additional work

As clearly attested on the above table 4.1.5.1, from top ten factors identified by the researchers, there is variation regarding on factors and ranking between each researchers finding results. For instance, priority factors for nega, hennery; ruth & dan, dinesh; emerites & apte, and survey result is inflation, change of work scope, material shortage in the local market and payment delay for contractors respectively. As proved on the survey results on table 4.5.1, inflation is ranked on 7^{th}, change of work scope is ranked 14^{th} and material shortage in the local market is ranked 19^{th}.

Similarly, due to project type execution, some factors are not acute for escalation of cost in the Case of housing program. For instance, for public housing construction projects fuel shortage, incomplete documents and shortage of labor are a tolerable factors, which means, were not a reason to increase the final cost of the projects. This is due to-

- Availability of different size fuel deposit tanker that enhances to overcome fuel shortage exists on the market.
- The housing program is running by well qualified consultants and technical advisors, this led less appearance of incomplete document to increase the cost of the total project.
- Existence of trained manpower on the area high in number in the labor market.

4.1.6. The Main Causes of Cost Overrun Based on Negative Impacts

As clearly specified methods and procedures on the methodology part that were employed to know the significant levels of each factors in public housing program, in this section identification of the level of impact of each 25 factors that took from literature review were computed through Average index methods.

Average index were computed by using:-

$$AI = \frac{\sum (1X1+2X2+3X3+4X4+5X5)}{\sum(X1+X2+X3+X4+X5)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Where;

- AI= Average index
- X1 = Number of respondents for “Extremely Significant”
- X2 = Number of respondents for “Very Significant”
- X3 = Number of respondents for “Moderately Significant”
- X4 = Number of respondents for “Slightly Significant”
- X5 = Number of respondents for “Not Significant”

Evaluation range to assess significant level of each factor was applied by referring previously adopted by Ghani, A (2006) and Abdullah MR (2010). This means;

The calculated value of AI is between 1 and 1.5 (1.00 < AI < 1.50), were said, Extremely Significant,

The calculated value of AI is between 1.5 and 2.5 (1.50 < AI < 2.50), were said, Very Significant,

The calculated value of AI is between 2.5 and 3.5 (2.50< AI < 3.50), were said, Moderately Significant,

The calculated value of AI is between 3.5 and 4.5 (3.50< AI < 4.50), were said, Slightly Significant and

The calculated value of AI is above 4.5 (AI > 4.5), were said, Not Significant.

Based on this understanding, the results are shown below table, and from the result, the factors with average index from 1.00 to 2.50 were selected as common factors affecting the selected public housing program.

Table 4.1.6, Summary of Clients, Consultants and Contractors response, Average index and Ranking,

Causes	Summary of responses of clients, consultants and contractors					Average index	Ranking
	Extremely significant	Very significant	Moderately Significant	Slightly Significant	Not significant		
	1	2	3	4	5		
Owner/ executor financial difficulties	41	9	0	0	0	1.18	1
Contractors financial difficulties	40	10	0	0	0	1.2	2
Power interruption	23	2	2	2	0	1.4	3
Unpredictable weather condition	28	22	0	0	0	1.44	4
Payment delay for contractors	17	27	6	0	0	1.65	5
Design change	13	36	1	0	0	1.76	6
Incomplete design at the time of tender	7	42	1	0	0	1.88	7
Poor sit management & supervision	7	37	6	0	0	1.98	8
Material cost increased by inflation	0	50	0	0	0	2.00	9
Incorrect / inappropriate methods of cost estimation	24	26	0	0	0	2.00	9
Unavailability of competent staff	5	41	2	2	0	2.02	10
Materials procurement	5	37	8	0	0	2.06	11
Selection of incompetent contractors and consultants	2	42	5	1	0	2.10	12
Material shortage in the local market	0	41	7	2	0	2.22	13
Incorrect quantity take-off	1	35	14	0	0	2.26	14
Inadequate planning, scheduling and coordination	5	24	21	0	0	2.32	15
Change order /scope	0	34	14	2	0	2.36	16
Supplementary / additional work	0	37	3	9	0	2.38	17
Delay preparation & approval of drawing	3	23	23	1	0	2.44	18
Lack of experience of project location	0	28	10	12	0	2.68	19
Government bureaucratic procedures	1	13	36	0	0	2.7	20
Excess quantity during construction	0	19	25	6	0	2.74	21
Change in foreign exchange rate	0	0	39	11	0	3.2	22
Labor cost increased due to environmental restriction	0	1	36	13	0	3.24	23
Project materials monopoly by some suppliers	1	0	21	25	3	3.58	24

Source: survey filed and SPSS V.20 result

As avowed on the above table 4.1.6, the factors that have extreme significant (the average index result ranges from 1.00 up to 1.5) and very significant (the average index result ranges from 1.5 up to 2.5) are the common factors of the studied housing program. Based on this conformance, from 25 factors that took from literature review, only 19 factors are the common factors with a significant impact on the final cost of the housing program. And the rest 6 factors have tolerable impacts on the execution of housing program.

As per the finding declared on above table 4.1.6, factors that have extreme significant impacts on the final cost of the housing program, when they are happened, are owner's financial difficulties, contractor's financial difficulties, power interruption and unpredictable weather condition. From this finding, we can understand that factors that identified there is very less probability to occur under executing housing projects but has very high impact on the housing projects when they are happen. For instance, unpredictable weather condition is ranked based on frequency at table 4.1.5 above is 20^{th} but this factors ranked based on severity is 4^{th}under categorized extremely significant.

As per the finding declared on the above table 4.1.6, top factors that have high significant impacts on the final costs of the housing program, when they are happened, are payment delay for contractors, design change, incomplete design at the time of tender, poor site management and supervision, material cost increased by inflation, incorrect/ inappropriate methods of cost estimation, unavailability of competent staff, material procurement E.T.C.

As per the finding declared on the above table 4.1.6, factors that have tolerable or very less impact on the final costs of the housing program, when they are happened, are lack of experience of project location, government bureaucratic procedures, excess quantity during construction, change in foreign exchange rate, labor cost increased due to environmental restriction and project materials monopoly by some suppliers.

4.1.6.1 Comparison of Survey Result with Previous Studies Based on Impacts

Aftab, Ismail and Ade Asmil Study revealed that, only 49 factors have significant impacts on construction in general, from 79 factors of cost overrun worldwide investigated by different researchers by using Average index methods in the case of Malaysian construction industry. But,

according to clients, contractors and consultants' response result, in the case of Addis Ababa city Administration public housing program from 25 identified factors of cost overrun only 19 factors have significant impacts. The comparison between the top ten of this finding, nega finding in the case of Ethiopia public construction and the survey result are listed below table.

Table 4.1.6.1 summery of nega, Aftab; Ismail & Ade asmil and survey result.

Survey result	**Ranks**	**Previous result in the case of Ethiopia**	**Ranks**	**Previous result in the case of Malaysian**	**Ranks**
Owner/ executor financial difficulties	1	Inflation	1	Unpredictable weather	1
Contractors financial difficulties	2	Price fluctuation	2	Inadequate planning and scheduling	2
Power interruption	3	Unforeseeable risks	3	Shortage of material in the local market	3
Unpredictable weather condition	4	Change in foreign exchange rate	4	Shortage of site worker	4
Payment delay for contractors	5	Supplementary work	5	Delay in decision making	4
Design change	6	Change order	6	Late delivery of site, material and equipment	5
Incomplete design at the time of tender	7	Lack of experience of project location	7	Price fluctuation	6
Poor sit management & supervision	8	Material shortage in the local market	8	Design change	7
Material cost increased by inflation	9	Incomplete document	9	Government bureaucracy	7
Incorrect / inappropriate methods of cost estimation	9	Unpredictable weather condition	10	Unrealistic contract duration and equipments imposed	7

Source : document review

The comparison shows there is some difference the survey result and previous studies. Results show that Owner/ executor financial difficulties is ranked as the firs most significant cause of cost overrun as perceived by involved practitioners in public housing program whereas the previous study of nega and Aftab; Ismail & Ade asmil found that this factor ranks at 25th and 18th respectively.

Similarly, results show that contractors financial difficulties is ranked 2th most significant causes of cost overrun in the case of public housing program but this factor ranked 12th and 11th in the case of construction in general according to nega and Aftab; Ismail & Ade asmil study respectively.

Likewise, results shows that power interruption is ranked 3th most significant causes of cost overrun in the case of public housing program but this factor ranked 16th by the study of Ismail & Ade asmil and not consider this as a factor of cost overrun under the study of nega.

Likewise, results shows that unpredictable weather condition is ranked 4th factors of cost overrun for public housing program and meanwhile for construction industries this factor is ranked 10th and 1th according to investigation of nega and Ismail & Ade asmil respectively. This result in both case occurred at the top ten significant causes of cost overrun category.

Similarly, results shows that payment delay for contractors is ranked 4th most significant factor of cost overrun for public housing programs but this factor is ranked under nega and Ismail & Ade asmil study is 25th and 57threspectively.

Similarly , results show that Design change is ranked 6th , Incomplete design at the time of tender is ranked 7th , Poor sit management & supervision is ranked 8th , Material cost increased by inflation and incorrect/ inappropriate methods of cost estimation is ranked 9th factors of cost overrun for public housing programs but according to nega investigation, these factors are ranked 16th,20th, 14th, 1th and 19th and Ismail & Ade asmil investigation are also ranked these factors 13th , 24th, 8th, 33th and 15th respectively.

In general, the overall comparison result revealed that the significant level of each causative factors of cost overrun are differ from construction to construction and the meanwhile from country to country.

4.1.7. The Overall Effects of Cost Overrun in Public Housing Program

The basic goal of any practitioners involved in any industry is to achieve the compilation of the project with in time and stipulated budget. In fact the complexity and acute of problem raised by involved practitioners in the public housing construction due to many reasons, like personal interest conflict, lack of mainstreaming sense of ownership E.T.C., there are some effects that occurred on public housing construction projects as the basis of cost overrun.

As per the responses of clients, contractors and consultants participated on questionnaires survey, the most common effects of cost overrun in housing programs are :-

- Low productivity
- Project delay
- Low quality housing handover to beneficiaries
- Disputes among stakeholders
- Total abandonments of the housing projects
- Led to arbitration
- Inappropriate use of public budget
- Delay payment to contractors
- Difficult to achieve the contribution that expected from the housing industry to the growth of the national economies of the country in general.
- Skilled manpower's are suffered due to involvement of unsecured business environment.
- Due to excessive uses of tax payer budget and saver money tenants to housing construction, it led backlash of their activities and blame the government policy and practices as a whole.

4.2. Document Review

4.2.1. Cost Performances of Each Housing Scheme

Most of the projects are facing the problem of cost overrun. However, the degree or rate of cost overrun varies from housing schemes to housing schemes in general. In document review, cost overrun it was notably found that each prototype housing type that started their construction

within four years are not accomplished within the budgeted or contracted cost and also contracted project duration, in other orders, 100% of public housing schemes in the studied area are faced on cost overrun and project delay as compared with contracted cost and contracted project duration. The results of cost performances of selected site to 10/90, 20/80 and 40/60 housing scheme are presented in below;

Table 4.2.1, Summaries of data on 10/90 types of housing program,

Types of housing	Number of block	Typology	Project site	Contracted cost to accomplish the project	Contracted Date in E.C	Contracted duration to accomplish the project in months	Actual cost incurred to accomplish the project	Actual date accomplished the project In E.C	Total months spent to finalize the project	Cost variation in %	Time variation in %
10/90	24	G+ 2	Bole Arabsa	1,357,542.4	Apr. 2005	6	1,560,393.6	Mar. 2009	47	38	783.3

Source: office document review

Note: each 10/90 housing scheme avowed above are only studio room. And E.C in this study used as Ethiopian calendar.

As attested in the above table 1, the rate of discrepancy between the contracted or budgeted project cost and incurred cost to finalize the condominium are 38% (202,851.2 birr).

Similarly, 10/90 constructed houses delegate to the tenants is after 41 months (3 years and 4 months) from the scheduled due to vast project delay. As many researchers acknowledged in the literature review, project delay is the first and the most contributory of cost over run in construction industry. Likewise, in the case of Addis Ababa city Administration 10/90 housing scheme, we can concluded that project delay is one of causative factor of cost overrun other than factors investigated in questionnaires survey, this is because the business environment by nature are dynamic.

Table 4.2.2, Summaries of data on 20/80 types of housing program,

Types of housing	Number of block	Typology	Estimated cost to accomplish the project	Contracted Date in E.C	Contracted duration to accomplish the project in months	Actual cost incurred to accomplish the project	Actual date accomplished the project	Total months spent to finalize the project	Cost variation in %	Time variation in %
20/80	34	R(G+4)	136,534,725.61	Jan. 2005	10	173,401,101.5	Mar. 2009	50	27	400
20/80	3	S(G+4)	13,355,425	Jan. 2005	10	14,370,437	Mar. 2009	50	7.6	400
20/80	27	R(G+4)	100,747,689	Jan. 2005	10	119,937,725	Mar. 2009	50	16	400
20/80	12	S(G+4)	44,620,989.14	Jan. 2005	10	51,288,493.26	Mar. 2009	50	13	400
20/80	26	R(G+4)	110,901,292.8	Jan. 2005	10	129,709,114.4	Mar. 2009	50	14.5	400
20/80	6	S(G+4)	23,332,554.8	Jan. 2005	10	25,361,472.6	Mar. 2009	50	8	400
20/80	24	R(G+4)	76,660,404	Jan. 2005	10	87,392,860.6	Mar. 2009	50	14	400
20/80	6	R(G+4)	17,931,935.3	Jan. 2005	10	19,448,953.7	Mar. 2009	50	7.8	400
20/80	17	R(G+4)	78,907,454	Jan. 2005	10	91,752,853	Mar. 2009	50	14	400
20/80	3	R(G+4)	12,780,363.8	Jan. 2005	10	14,523,140.7	Mar. 2009	50	12	400
20/80	21	R(G+4)	85,155,233.6	Jan. 2005	10	105,067,358	Mar. 2009	50	18	400
20/80	9	S(G+4)	5,509,1001	Jan. 2005	10	42,377,697.4	Mar. 2009	50	13	400
20/80	2	S(G+7)	31,764,851.1	Jan. 2005	18	35,690,843.9	Mar. 2009	42	11	133.3
TOTAL	190		739,210,267.36			893,384,368.5			13.5	

Source; office document review

Note: the site of each listed above 20/80 housing schemes are bole Arabsa, bole bulbula, yika abado and arat kill basha woldi site. And also Each 20/80 housing schemes comprises one bed room, two bed room and three bed room.

As attested in the above table 2, the discrepancy of budgeted or contracted cost and acute cost incurred to executed 20/80 housing scheme at the site of bole Arabsa, bole bulbula, yika abado and arat kilo are ranged from a minimum of 7.6 % (1,015,012.3 birr) to a maximum of 27% (36,866,375.9 birr). In addition to declared to 10/90 housing scheme contributory factors of cost over run in construction industry, that is, vast project delay, in the case of 20/80 housing project executed under Addis Ababa city Administration project office, there is another contributory factor, Which is the complexity of housing skeleton increased, rising floor and the size of housing block increased. That means,

In 10/90 housing project scenario, each house type is comprises one bed, living room and toilet and also only two floor type houses. But in 20/80 housing scenario, the house type is comprises one bed , two bed and three bed, and in addition to this the building includes facilities like- better dinner and living room, toilet, storage, bath and kitchen and also the building rising floor are 4 and 7.

Likewise, complexity of housing skeleton increased, due to the size of housing block increased, in table two avowed that, the housing block is 34 were the cost increasing rate is 27 % (36,866,375.9 birr) from the contracted project cost and the housing block is 21 were the cost increasing rate is 18% (19,912,124.45 birr) from the budgeted cost but the housing block is 3 were the cost increasing rate is only 7.8%(1,521,965.05 birr) from the contracted cost of the project and the meanwhile, the housing block is 6 were the cost increasing rate is 7.8 % (1,521,965.05 birr). From this observation, as per the finding, we can concluded that the number of housing block were increased the cost of construction is concurrently increased because of the construction required excessive trained man power, eligible contractors and consultants, and also quality staff and management procedures. The overall rate of cost overrun, by declared different factors appeared on 20/80 housing scheme, is 13.5%. In general this finding is similar with the investigated by Mr. Dinesh and Prof. Emeritus M. R. (2016) in the case of Nigeria residential high rising building.

Table 4.2.3, Summaries of data on 40/60 types of housing,

Types of housing	Project site	Number of block	Typology	Contracted cost to accomplish the project	Contracted date in E.C	Contracted in month	Actual cost incurred	Actual date accomplished in E.C	Time executed	Cost variation in %	Time variation up to date in %
40/60	Sengatera	5	G+12	**167,027,828.8**	**Dec. 2005**	27	193,752,281.4	Mar. 2009	33.5	16	24
40/60	Crown	14	G+9	**301,434,882.1**	**May 2006**	23	346,649,814.4	Mar. 2009	34	15	47
40/60	Asko	13	G+13	**568,985,400.4**	**Mar. 2008**	27	Not yet completed	In progress	38	Not yet known	41
40/60	Ehil nigid	6	G+13	**241,929,657.6**	**Mar. 2008**	27	Not yet completed	In progress	51	Not yet known	89
40/60	Tourist nigd	11	G+18	**794,283,670.2**	**Mar. 2008**	28.5	Not yet completed	In progress	34.7	Not yet known	22.18
40/60	Hinsta akiriba	8	G+13	**284,538,419.7**	**0ct. 2007**	27	Not yet completed	In progress	48	Not yet known	79
40/60	Meri	14	G+13	**524,702,406.4**	**Oct. 2007**	18	Not yet completed	In progress	32	Not yet known	77
40/60	Bole bulbula lot 1	20 8 = 28	G+13 G+7	**296,329,193.2**	Nov. 2007	18 15	Not yet completed	In progress	39 33	Not yet known	120 120
40/60	Bole bulbula lot 2	15 1 8	G+15 G+13 G+ 9	**1,027,424,825.06**	Nov. 2007	18	Not yet completed	In progress	36	Not yet known	100.9
40/60	Bole ayat lot 1	14	G+8	**199,729,182.8**	Oct. 2007	13	Not yet completed	In progress	22	Not yet known	118
40/60	Bole ayat lot 2	22 10 = 32	G+8 G+10	**453,706,868.68**	Oct. 2007	13 15	Not yet completed	In progress	29 31	Not yet known	120.5 105.8
40/60	Bole ayat lot 3	32 9 = 41	G+8 G+10	**201,214,690.68**	Oct. 2007	13 15	Not yet completed	In progress	24.4 30	Not yet known	85.7 98
40/60	Bole ayate lot 4	14 8 16	G+8 G+10 G+13	**1,201,840,091.43**	**Nov. 2007**	13 15 18	Not yet completed	In progress	29 31 34	Not yet known	120 105 88
40/60	Bole ayat site 2	33 15 =48	G+13 G+15	**,156,137,794.65**	**Sep. 2007**	18 24.5	Not yet completed	In progress	27 30	Not yet known	20 21
40/60	Summit site	10	G+8	**170,229,139.20**	**Sep. 2007**	16.7	Not yet completed	In progress	21	Not yet known	45.5
40/60	Bole beshale site	21 22 15	G+9 G+13 G+15	**2,243,000,529.52**	**Sep. 2007**	17.5 18 24.5	Not yet completed	In progress	21 27 29	Not yet known	19.7 21.5 19.7
TOTAL											

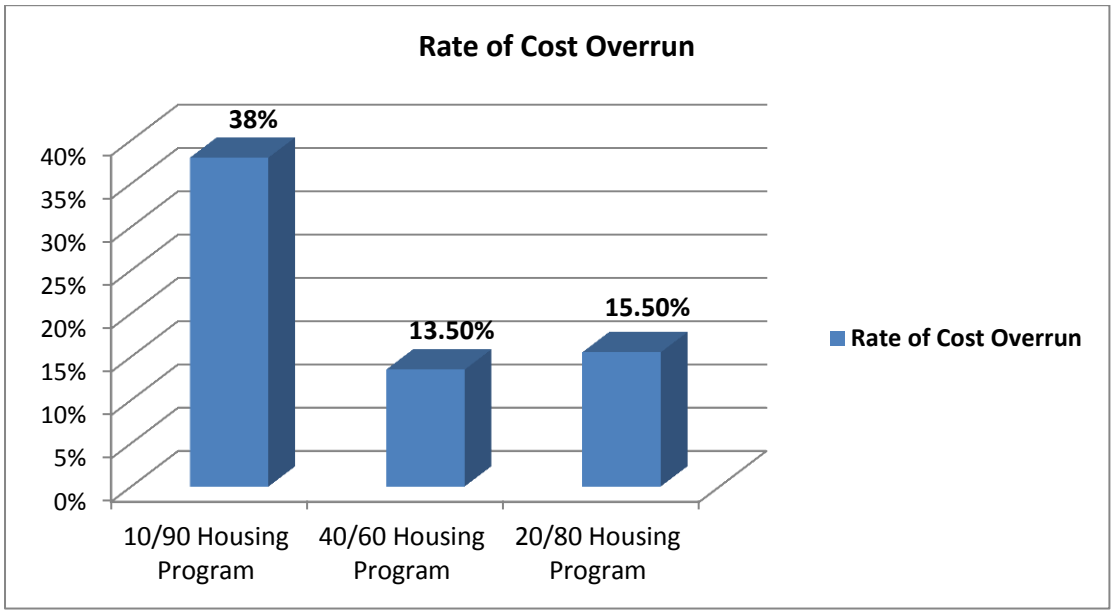
Source: office document review

As attested in the above table 3, the discrepancy of budgeted or contracted cost and acute cost to accomplish 40/60 housing scheme at different sit of the project are not yet known except 2 sit, that is, sengatera and crown project sit. Due to this reason, only the study focused on this two completed housing projects for the full analysis of cost overrun. Therefore, the total cost variation required to executing project sit sengatera is 16 % (26,724,452.6 birr) and the project completion time additionally required from the contracted time is also 24% (6.5 months), spent to finalize the project as per housing quality standards. And also the total cost variation employed to finalize the housing project sit of crown is 15% (45,215,232.3 birr) and the project completion time additionally required to finalize this project is 47% (11 months). From this two completed project, we can said, the rate of cost overrun is 15.5% (35,969,842.5 birr) and project delay rate is 36.5% (9 months). And also we concluded that the rate of project delay decreased or closed to project contracted duration, other than other variables identified in survey, the amount of project cost that needed supplementary to accomplish the 40/60 housing scheme projects are become less and less.

4.2.2. Summary of rate of cost discrepancy between each housing scheme

From the above avowed table 1, 2& 3, revealed that 100% of housing schemes are currently faced on the cost overrun in their project execution stage, as compared with the approved or budgeted contractual project cost, by means of the availability of excessive project delay. Under this portion, let seen the discrepancy rate that appeared on each housing schemes by using graphically representation:

Figure 4.1.1 cost variation between each studied housing programs



As per finding, we can concluded that the cost overrun rate varies from housing scheme to housing scheme and higher cost overrun rate (38%) exists on 10/90 housing scheme and lower (13.5%) and (15.5%) of cost overrun rate appeared on 20/80 and 40/60 housing scheme respectively on the basis of the selected prototype housing scheme to this study. Generally the cost overrun range these housing programs are from 13.5% up to 38%.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

This section presents conclusions, limitation of the study and recommendation. Results have been discussed in line with the research objectives stated earlier in Chapter one. This section concludes by suggesting recommendation for each involved parties to mitigate the root causes of cost overrun in public housing programs under the studied area.

5.1. Conclusion

Financial resources are so scarce in developing countries like Ethiopia, hence, cost related issues in Addis Ababa city Administration housing projects are sensitive issues because they are implemented by using tax payer and tenant saver money resources. Therefore, carrying out a research in this area will have a paramount importance.

Identification of causes of cost overrun is a prerequisite to minimize or to avoid cost overrun in public housing program. The main objective of this research is, therefore, to identify and investigate the critical causes and the overall effects of cost overrun on public housing programs executed under Addis Ababa city Administration. Document review was undertaken to identify the existence and extent of cost overrun on the selected housing programs. Questionnaire survey was also used to identify the main causes, the impact and overall effects of cost overrun in public housing programs at Addis Ababa City Administration. Clients, consultants and contractors were asked to identify the variables of cost overrun, frequency of occurrence of the variables and the significant effects of the variables in Addis Ababa City Administration housing program. The analysis of the results from the open-ended and close ended part of the questionnaire was carried out using descriptive analysis.

From the results of the analysis of document review and respondents' responses the following Conclusions are drawn:

1. Justification of the existence and extent of cost overrun on housing program is important before identifying the causes of cost overrun. 100% of 10/90, 20/80 and 40/60 housing program investigated in the research suffered by cost overrun in their execution. For these

public building construction projects, the actual cost overrun ranges from 13.5% to 38% of the contract amount.

2. Rate of cost overrun is found to be influenced by the contract amount, complexity of housing skeleton and the size of housing program. From document review, the data gathered from 10/90, 20/80 and 40/60 housing program shows that the rate of cost overrun is found to decrease the number of block and the rising flower of the housing is decrease and increase the rate of cost overrun in the reverse.
3. There are significant variations in the total amount of cost overrun on housing programs were investigated in this research. From document review results, 40/60 and 20/80 housing programs have the lowest rate of cost overrun, where as 10/90 housing program have the highest rate of cost overrun.
4. From the results of this thesis, 21 causes of cost overrun were identified by the respondents. The causes of cost overrun were identified based on the responses of the respondents. The most frequent causes of cost overrun are also identified by the research based on the ranking of the rate of occurrences of the variables of cost overrun. The top ten causes of cost overrun based on frequency are payment delay for contractors, contractors financial difficulties, power interruption, incorrect quantity take-off, change in foreign exchange rate, inadequate planning; scheduling & coordination, material cost increased by inflation, poor sit management and supervision, excess quantity during construction and supplementary/ additional work.
5. From the results of this thesis, the most common significant causes of cost overrun in the final budget of the housing program were declared through average index and ranked accordingly the result. The most are payment delay to contractors, design change, incomplete design at the time of tender, poor sit management and supervision, material cost increased by inflation, incorrect/inappropriate methods of cost estimation, unavailability of competent staff, material procurement E.T.C
6. From the results of this thesis, the responsibility parties are investigated. Based on this,
    - Factors related with client's are 14, from these, the most factors are – material cost increase by inflation, selection of incompetent contractors and consultants, change in foreign exchange rate, payment delay for contractors, material procurement, E.T.C.

- Factors related with contractors are 6, from these, the most are – labor cost increased due to environmental restriction, lack of experience of project location, unpredictable weather condition, contractor's financial difficulties, E.T.C.
- Factors related with consultants are 5. These are design change, supplementary/ additional work, incorrect/inappropriate method of cost estimation, incomplete design at the time of tender and inaccurate quantity take-off.

7. Based on the survey results of this thesis, the most frequently implemented bidding type are open, since they are influenced due to the availability of compatible applicants in the local market, and government rule and regulation.
8. From this research, the consequences of cost overrun in housing programs are low productivity, project delay, low quality handover to beneficiaries, disputes among stockholder, project abandonment, E.T.C.
9. From the results of this thesis, there is variation on the ranking of factors of cost overrun based on frequency and significance from previous study results, since variation occurred due to project location, project agreement and types of project execution.
10. From this research clients are those who are severely affected by cost overrun, since they are forced to look for additional money to complete the housing construction projects. However, it should be noted that client affects that adverse effects on the national economy of the country as a whole.

5.2. Limitation of the study

It is not denial that any research papers from its initiation to completion perhaps encounter a limitation. Besides, there are some of the limitations that face in the preparation of this research thesis are the time allotted is really too short, difficult to get organized data on each office and reluctance of the respondent are major problems encountered to finalized this research.

5.3. Recommendation

According to the finding obtained through this study, there are some recommendation for involved parties, like- clients/ owner, contractors and consultants:

5.3.1. For Client/ Owner

Clients are one of the most important parties who invest their money for realization of public housing projects, and they are the key role players starting from conception through construction up to handover the project to the beneficiaries. The following recommendations are expected from clients:

1. The executer or owner of the housing program should give sufficient time to approval of drawing, design and site preparation work.
2. The bidding procedures undertaking by the client must participatory and advertising through printing and mass media to get qualified contractors and consultants as they need.
3. Fulfill contractual obligations, especially as regards to payment of contractor's works duly executed, procurement should undertake before commencement of the housing projects and supply all necessary construction materials and equipment's timely based on required quantity and quality. Clients should ensure that adequate funds are available before projects are started, so that the client can pay to contractors, consultant and purchase material in accordance with the contract agreement and specification.
4. Client disseminate all necessary information from the beginning of the project up to closure of the projects with contractors, consultants and tenants to secure deception among them and also build good communication channel.
5. Minimize red-tape; that is, minimize unnecessary and excessive bureaucratic procedures in the clients' organization.
6. Client triggers their regular monitoring and evaluation procedures to eliminate power interruption rise by involved practitioner.
7. Secured foreign exchange rate to import construction materials that not available in domestic markets: hence avoid shortage of construction materials at the time of constructing that lead cost overruns due to delay.

5.3.2. For Consultants

The consultants are one of the vital players in public housing program projects. Hence, the following recommendations are for consultants:-

1. Consultants should surveillance the progress of each building public housing program in accordance with the specification and design that approved by involved parties. Hence, consultant enables to take correction action on time.
2. Be awarded and exercise accordingly to minimize the probability of occurrence of the causative factors of cost overrun on public housing programs that identified by on the sides of consultants.
3. Consultant should evaluate the cost performance of each contractor on phases with respect to the performed work. Hence, minimize request of supplementary/ additional work, design change and change order on executing of the projects.
4. Consultants facilitate and enforce the executor timely contractors requests are responses as needed, like – payment, request construction materials in terms of quantity and quality.
5. Consultants should develop sense of ownership. These enhance to minimize cost overrun due to delay and bureaucracy.

5.3.3. For Contractors

Likewise the consultants, contractors are one of the vital players in public housing program projects. Hence, the following recommendations are for contractors:-

1. Use construction materials and finance took from client for the purpose of constructing the housing programs other than used for personal uses and for other constructing building.
2. Contractors must hire well qualified skill manpower and eligible sub-contractors, hence, minimize the cost overrun due to quality problem.
3. Ensure efficient time to management and supervision through proper work break down planning, activity duration estimation, and schedule development and control; to avoid delay and hence to avoid cost overrun due to delay.
4. Resolve timely disputes and conflicts occurred during project progress among involved parties and workers: to avoid project delay and abandonment that leads housing program cost overrun due to these reason.

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Appendices

St. Mary University

School of Graduates Studies

Masters of Project Management (MBA)

Questionnaire to be filled by clients (executor), consultants and contractors

Dear respondents

The purpose of prepare this questionnaires is to enhance me to carry out a research for partial fulfillment of the requirement for Masters of degree in Project Management (MBA). The research focus on Addis Ababa City Administration public housing programs , that is 40/60, 20/80 and 10/90 housing projects, with the topic of " **the Main causes of cost overrun in public housing construction projects".** The main causes of cost overrun, frequency and impacts in the housing construction projects questionnaires are tools used to collect data from selected respondents to make better understanding and to know real practices on identified issues in the context of our country. Hence, to gather the information, I kindly request your assistance in responding to the questions listed below. Any information you present will be kept absolutely confidential and will only be used to academic purpose. Your cooperation and prompt will be highly appreciated.

"Thank you very much in advance"

Melaku Alemayehu
(Graduating student)

N.B:

- Writing your name is not necessary.
- Please tick your chose appropriate to the box.
- If you have any suggestion, question or confusion on the listed question, you can list out at last page of the questionnaire.

1. Your Gender
    a. Male
    b. Female

2. Your Educational background?
    a. Diploma holder
    b. Degree holder
    c. MSC/ MA holder
    d. PhD holder

3. Your professional job?
    a. Clients (executor of the project)
    b. Consultants
    c. Contractors

4. How many years do you have work experience on governmental housing construction projects? ----------.

5. What types of housing scheme does you taking from Addis Ababa City Administration housing Projects?**(fill by only consultants and contractors)**
    a. 10/90 housing scheme
    b. 20/80 housing scheme
    c. 40/60 housing scheme

6. What your opinion about the types of bidding procedures is frequently implemented in your office? **(fill by only clients or executor)**
    a. Fixed
    b. Open bid
    c. Selective bid or other ----------.

7. What your opinion about main causes of cost overrun in governmental public housing construction projects are listed below? And also who is blamed?

No.	Hypothesized Variables of Cost Overrun	R Choose for respondents					Responsible parties			
		strongly Disagreed	Don't Agree	Neutral	Agreed	Strongly agreed	Client/ government	Contractors	Consultants	Others
1.	Material cost increased by inflation									
2.	Labor cost increased due to environmental restriction									
3.	Lack of experience of project location									
4.	Unpredictable weather condition									
5.	Selection of incompetent contractor's and consultants									
6.	Change in foreign exchange rate/ for imported materials									
7.	Design change									
8.	Supplementary / additional work									
9.	Payment delay for contractors									
10.	Materials procurement									
11.	Contractors financial difficulties									
12.	Inadequate / deficiency in planning , scheduling & coordination									
13.	Owner's / executor financial difficulties									
14.	Change order									
15.	Excess quantity during construction									
16.	Poor sit management & supervision									
17.	Incorrect / inappropriate methods of cost estimation									
18.	Project materials monopoly by some suppliers									
19.	Delay preparation & approval of drawing									
20.	Incomplete design at the time of tender									
21.	Inaccurate quantity take-off									
22.	Governmental bureaucratic procedures									
23.	Unavailability of competent staff									
24.	Material shortage in the local market									
25.	Power interruption									

8. What your opinion about possibility of occurrence/ frequency of main causes of cost overrun in governmental public housing construction projects in one project execution processes ?

No.	Hypothesized Cause s of Cost Overrun	**Likelihood Occurrence in One Project Execution**				
		No frequency	Slight	Moderate	High	Extremely
1.	Material cost increased by inflation					
2.	Labor cost increased due to environmental restriction					
3.	Lack of experience of project location					
4.	Unpredictable weather condition					
5.	Selection of incompetent contractor's and consultants					
6.	Change in foreign exchange rate/ for imported materials					
7.	Design change					
8.	Supplementary / additional work					
9.	Payment delay for contractors					
10.	Materials procurement					
11.	Contractors financial difficulties					
12.	Inadequate / deficiency in planning , scheduling & coordination					
13.	Owner's / executor financial difficulties					
14.	Change order					
15.	Excess quantity during construction					
16.	Poor sit management & supervision					
17.	Incorrect / inappropriate methods of cost estimation					
18.	Project materials monopoly by some suppliers					
19.	Delay preparation & approval of drawing					
20.	Incomplete design at the time of tender					
21.	Inaccurate quantity take-off					
22.	Governmental bureaucratic procedures					
23.	Unavailability of competent staff					
24.	Material shortage in the local market					
25.	Power interruption					

9. What your opinion about the impacts of the main causes of cost overrun in governmental public housing construction projects?

No.	Hypothesized Causes of Cost Overrun	**Negative Impacts in One Project Execution**				
		Not Significant	**Slightly Significant**	**Moderately Significant**	**Very Significant**	**Extreme Significant**
1.	Material cost increased by inflation					
2.	Labor cost increased due to environmental restriction					
3.	Lack of experience of project location					
4.	Unpredictable weather condition					
5.	Selection of incompetent contractor's and consultants					
6.	Change in foreign exchange rate/ for imported materials					
7.	Design change					
8.	Supplementary / additional work					
9.	Payment delay for contractors					
10.	Materials procurement					
11.	Contractors financial difficulties					
12.	Inadequate / deficiency in planning , scheduling & coordination					
13.	Owner's / executor financial difficulties					
14.	Change order					
15.	Excess quantity during construction					
16.	Poor sit management & supervision					
17.	Incorrect / inappropriate methods of cost estimation					
18.	Project materials monopoly by some suppliers					
19.	Delay preparation & approval of drawing					
20.	Incomplete design at the time of tender					
21.	Inaccurate quantity take-off					
22.	Governmental bureaucratic procedures					
23.	Unavailability of competent staff					
24	Material shortage in the local market					
25.	Power interruption					

10. Please list some effects that occurred in housing construction projects due to cost overrun?

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11. If you have further comments, please indicate in the space provided below.

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Declaration

I, **Melaku Alemayehu Yihun**, have carried out independently a research work on the main causes of cost overrun on public housing programs in the case of Addis Ababa City Administration" for partial fulfillment of the requirement of the MBA program in project Management with the guidance and support of the research advisor.

This study is my original work and that has not been presented for any degree or diploma program in this or any other university/institutions, and that all source of materials used for the thesis have been duly acknowledged.

Declared by: **Melaku Alemayehu**

Signature: _____

Date: _____

Endorsement

This is to certify that Melaku Alemayehu Yihun has carried out his research work on the topic entitled **"the Main Causes of Cost Overrun on Public Housing Programs in the case of Addis Ababa City Administration"**. The work is original in nature and is suitable for submission for the reward of the M.A Degree in Project Management.

Supervisor: Tiruneh Legesse (Ass. Professor)

Signture ----------

Date ----------