COST OVERRUN IN ADDIS ABABA SAVING HOUSE
CONSTRUCTION PROJECTS

By

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A Thesis submitted to

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DECLARATION

I hereby declare that this thesis entitled “Cost Overrun in Addis Ababa Saving House Construction projects” was composed by myself, with the guidance of my advisor, that the work contained herein is my own except where explicitly stated otherwise in the text, and that this work has been published, in whole or in part, for any other degree or professional qualification.

Name: GirumMoges T/Haimanot signature: ___________ Date: ___________
CERTIFICATE

This is to certify that the thesis prepared by Mr. GirumMoges T/haimanot entitled “Cost Overrun in Addis Ababa Saving House Construction projects” and submitted in fulfillment of the requirements of the degree of MBA in Construction Management complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

Signed by Examining Board:

1. Internal Examiner ___________________ Signature___________ Date_______

2. External Examiner ___________________Signature___________ Date_______

3. Thesis Advisor____________________Signature___________ Date_______

4. Thesis Co-Advisor____________________Signature___________ Date_______
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ABSTRACT

Cost overrun is considered as one of the most significant problems that weigh down projects progress and leaving the project in great troubles. Mostly in developing countries like Ethiopia construction projects are characterized by overruns in cost. In Ethiopia Cost overruns occur in every construction projects but the magnitude varies significantly from project to project. This leads to severe need of addressing the acute issue of construction cost overrun. Therefore, the main objective of this research was to dig out the main causes and effects of cost overrun in 40/60 saving house construction projects. To accomplish the objective of the research, questionnaire survey and desk study was conducted. A total of 52 questionnaires were collected from client, contractor and consultants. Budget scarcity by client, poor procurement and delay supply of raw materials, Financial difficulties by contractor, Delay in construction, Poor financial planning and management, Delay in decision making, Market inflation, failure of specific coordinating, Poor material and Equipment handling on site and Infrastructure problems are found to be main causes from 47 supposed factors and desk study. The magnitude of cost overrun was 30-51%, and all stakeholders, construction industries, the government and highly the end users have been affected by this cost overrun.

Key words: cost overrun, cause, effect, 40/60 saving house.
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ABBREVIATIONS

AAIHDP .... Addis Ababa Integrated Housing Development Program
AASHDE … Addis Ababa Saving Houses Development Enterprise
CBE ………. Commercial Bank of Ethiopia
CL ………… Client
CS …………. Consultant
CT …………. Contractor
EF ……….. External Force
FDRE …….. Federal Democratic Republic of Ethiopia.
GDP …….. Gross Domestic Product
MoWUD …. Ministry of Works and Urban Development
MSEs ……. Micro and Small Enterprises
1. INTRODUCTION

This chapter covers six basic subtitles that are: background, statement of the problem, objective of the research, scope and limitations of the research, research type and research structure.

1.1 Background

The construction industry is a sector of the economy that transforms various resources into constructed physical economic and social infrastructure necessary for socio-economic development. Due to the advent of industrialization and recent developments, this industry is taking a pivotal role for construction of buildings, roads, bridges, and so forth.

The role of the construction industry plays in socio-economic development is very significant. It provides the basis up on which other sectors can grow by constructing the physical facilities required for the production and distribution of goods and services. The construction industry has a significant multiplier effect on the economy as a whole (MoWUD, 2006).

According to MoWUD, (2006), the interrelationship the construction industry and the broader economy largely emanates from three of the industry’s characteristics, namely:

➢ The public sector is its major client

➢ It’s large size, ability to produce investment or capital goods which contribute significantly to national GDP; and

➢ It is a major source of employment, directly and indirectly by its multiplier effect

This construction industry has been increasing the last two decades in Ethiopia

On the other way, the industry is facing lots of problems including proper quality, on time
delivery and within budget which is the basic requirements that any construction should fulfill.

Cost overrun is a common problem that causing delay in the construction industry, not only in developing countries but also in developed one. (Raj Kapur Shah, 2016)

Since there is a financial scarce proper using of estimated budget or cost effectiveness is very essential and also sensitive requirement for the construction projects especially in developing country like Ethiopia.

Though the range has dissimilarity within researchers, many literatures have indicated that, in our country all (100%) public construction projects are going through cost overrun problem ranging 1% - 300% from the estimated cost. (Ashebir.et.al, 2017), (Abebe D., and Girmay K., 2003), (Merid Taye, 2016).

Nowadays, Addis Ababa is challenged with housing shortage due to the continually increasing population growth and immigration from different corners of the country. In 2004 E.C, the City government launched the Addis Ababa Integrated Housing Development Program (AAIHDP) to alleviate housing shortage. (UN-HABITAT, 2011). The program comprises of four different schemes based on percent of advance payment modalities such as 10/90, 20/80, 40/60 and housing association.

The 40/60 saving house project is the one which has implemented for ‘upper middle income’ targeted population. Based on that 39,229 housing units has been constructing in 13 different sites of the city and as per the contract time (AASHDE, November 2015 Monthly Progress Report) all houses should be transferred to the registered people on November 30/2016. But Only 1,292 40/60 saving housing units in Senga-tera and crown 40/60 project sites are about to be transferred to the public out of 39,229 housing units that are
under construction. As per commercial bank of Ethiopia report, 156,932 people are registered for 40/60 saving housing units in August 2013(http://capitalethiopia.com, Aug.10, 2015). At the current rate of construction, it might take decades to deliver the houses fully to the registered public under the 40/60 housing scheme.

It is true that, the delay could be a cause and starting point of different causes, such as materials and labor cost inflation, shortage and inflation of currency, etc. that can lead to cost overrun in construction projects. Based on the above and other factors the AASHDE had raised the price for the house from 3200 birr to 4918 birr per m².

1.2 Statement of the problem
In our country Ethiopia, the growth rate of population has been growing. However, it is not matched up to the developed and also some developing country, urbanization is growing in recent years due to the migrating of people from urban areas. The driving forces are educational, commercial, political and social, environmental and other factors. The number of migrant from different state of the country to Addis Ababa is rising rapidly. Accommodating these dwellers and ensuring a comfortable and healthy residential houses or surroundings have been the main activity of Addis Ababa city Administration; especially, in the last two decades. The residents are facing different life challenges due to market inflation and joblessness. Besides these, shortages of residential house and the unbalanced increment of house rent is the big challenge for occupants. The 40/60 saving houses is the one strategy which have implemented by the Government to play a prominent role in order to minimize the shortage of house. Although it seems a better initiative for residents, time and cost overrun are the big problems and headache for the dwellers who have registered in this program.
ADDISBIZ.com (2018) reported by indicating Capital Ethiopia as source: When the 40/60 condo housing schemes began in 2013; AASHDE set the price at 2, 289, 3,300 and 3,860 birr per square meter for one, two and three bedrooms respectively. But the 972 houses were delivered last year ASHDE raised the prices from 3,200, birr to 4,918 birr per square meter which meant that a 124sqm two-bedroom condo costs 609.8 thousand birr, and a 150sqm three bedroom737.7 thousand birr and a 168sqm four bedroom 826.2 thousand birr. The report continued and said that, Then CBE told winners to add the interest rate price from the previously increased price which meant that one bedroom buyers paid 701,270 birr while the two and three bedrooms paid 847, 650 birr and 950,000 birr respectively.

As a matter of fact; budget scarcity of the country, shortage of house and due to other various factors; this problem should need a quick and appropriate solution. On the other hand, Based on the depth of the problem there is no sufficient research in order to minimize cost overrun in Addis Ababa saving house construction projects. For this reason, the research questions have designed based on the research gap and objectives of this thesis, these are:

❖ What are the main causes of cost overrun in 40/60 saving house projects?
❖ Which party /stakeholder/ is more responsible for cost overrun?
❖ How much is the extent/magnitude of cost overrun?
❖ What are the effects of cost overrun in 40/60 saving house projects?
❖ What are the mitigation measures to avoid or minimize cost overrun?

1.3 Objective of the study
Addressing the research question the overall aim of the study is to evaluate the potential
causes and effects of cost overrun in 40/60 saving house projects in Addis Ababa.

Hence the objectives of the study are to:

❖ assess the basic factors that make impact on the project to cost overrun problem
❖ Indicate the degree of responsibility of the stakeholders
❖ point out the magnitude of cost overrun
❖ Evaluate the effects of cost overrun in 40/60 projects.
❖ Point-out the mitigation measures to minimize or avoid cost overrun in 40/60 projects

1.4 Scope of the Study
The research identified the major causes and effects of cost overrun in the construction of 40/60 saving houses project in Addis Ababa, through questionnaire survey and case study. In the questionnaire survey, from thirteen 40/60 project sites (having 16 lots), 5 of them are participated from Consultants and Contractors side, but besides these 5 sites, head office staff members have been also participated from Client side. In the desk study the selected two transferred projects which are appropriate to identify the cause and effect of cost overrun in the projects.

1.5 Limitations of the study
In this research, only the three contractual parties (Client, consultants and contractors) participated out of the many project stakeholders. Due to time and budget constraints, it was not possible to address all the sites and workforce. However, by engaging the head office staff members; I have tried to identify the main causes and effects of cost overrun in the projects. It was difficult to found documents; especially, there was no final payment to know the ultimate magnitude of cost overrun.
1.6 Thesis Structure

The thesis is organized into five chapters as follows:

Chapter 1—this chapter begins with the discussion on background and general introduction to the research, statement of the problem, objectives and research type.

Chapter 2- is a literature review from professional journals, books, internet searches, etc. This chapter essentially provided in conceptual, theoretical and empirical form of review and hence it has: the construction cost management, cost control, estimating cost, causes and magnitude of cost overrun in Ethiopia and abroad construction projects, effects of cost overrun and cost overrun in AASHDE.

Chapter 3- discussed the research design and methodology followed in order to achieve the objectives of the study.

Chapter 4- The results of the data obtained from the questionnaire survey and desk study on 40/60 housing construction projects; including interviews were presented and discussed accordingly.

Finally,

Chapter 5- conclusions and recommendations were forwarded based on the major findings of the study and discussed how the research objectives align with the findings.
2. LITERATURE REVIEW

2.1 General
The construction industry is complex in its nature because it comprises large numbers of parties as owners (clients). These are; the contractors, consultants, stakeholders, and regulators. Despite this complexity, the industry plays a major role in the development and achievement of society’s goals. (Enshasi et al, 2009). Despite this complexity, the industry plays a major role in the development and achievement of society’s goals. It is one of the largest industries and contributes to about 10% of the gross national product (GNP) in industrialized countries (Navon, 2005). However, many local construction projects report poor performance due to many evidential project-specific causes. Project performance can be measured and evaluated using a large number of performance indicators that could be related to various dimensions (groups) such as; time, cost, quality, client satisfaction, client changes, business performance, health and safety. Time, cost and quality are, however, the 3 predominant performance evaluation dimensions. (Enshasi et al, 2009)

From the above, the most important performance problem in the construction industry is cost overruns. Cost overruns occur in every construction project and the magnitude of this cost overrun varies considerably from project to project. On the other hand Cost performance is the most important indicator of project success (Olawale and Sun, 2010). It represents not only the firm’s profitability but also the productivity of organizations at any point during the construction processes. It can be seen in the project account and is always used to measure project performance. Generally, Construction industry has been facing poor cost performance which describes inability to complete project within budget
(Abdul Rahman, et al. 2013). Therefore, it is essential to define the actual causes and effects in order to minimize and avoid cost overrun in any construction project. This chapter reviews literature concerning the major causes and effects of cost overruns in order to recognize the related information regard those issues.

2.2 Cost management in construction projects

In construction almost all clients are interested in obtaining fully functional facilities that are completed in time, cost, quality and scope. A builder who is able to construct within the estimated time and budget, to the right standards and scope is an excellent builder. (Otim, et al. 2008)

Cost management is the total process, which ensures that the contract sum is within the client’s approved budget or cost limit. It is the process of helping the design team design to a cost rather than the QS costing a design. The basis of the design cost control using the cost-planning technique is the analysis of existing projects into functional elements in order to provide a means of comparison between projects planned with data from existing projects. A building element is defined as part of a building performing a function regardless of its specification. Elemental analysis allows the comparison of the costs of the same element to be compared between two or more buildings. As the cost element under consideration is performing the same function, an objective assessment can be made as to why there may be differences in costs between the same elements in different buildings. There are four main reasons why differences in costs occur these are: - Differences in time (inflation), Quantitative differences, Qualitative differences and Differences in location. (Eldash, 2012)
2.2.1 Definition and Classification of cost

The Constructor.org (2018) described that Major classification of construction projects costs are: Project direct costs and Project Indirect Costs

Total Project Cost = Project Direct Costs + Project Indirect Costs

i. Direct Costs of Construction Project

The costs and expenses that are accountable directly on a facility, function or product are called as direct costs. In construction projects, the direct costs are the cost incurred on labor, material, equipment etc.

In construction, the costs of materials, labor, equipment, etc., and all directly involved efforts or expenses for the cost object are direct costs. Direct costs are those for activities or services that benefit specific projects, for example salaries for project staff and materials required for a particular project. (Wikipedia, 2018)

These costs for a construction project are developed as estimates by means of detailed analysis of the contract activities, construction method, the site conditions, and resources. Different direct costs in construction projects are material costs, labor costs, subcontractor costs, and equipment costs. (The constructor.org, 2018)

ii. Indirect Costs of Construction Project

The costs, unlike direct costs, are not directly accountable for a particular facility, product or function. Indirect costs can be either variable or fixed.

Indirect costs are, but not necessarily, not directly attributable to a cost object. It should be financially infeasible to do so. Indirect costs are typically allocated to a cost object on some basis. In construction, all costs which are required for completion of the installation, but are not directly attributable to the cost object are indirect, such as overhead. In manufacturing, costs not directly assignable to the end product or process
are indirect. These may be costs for management, insurance, taxes, or maintenance, etc. (Wikipedia, 2018). The constructor.org (2018) also described as the main sections coming under indirect costs are personnel costs, security costs, and administration costs. These costs do not have a direct connection with the construction project. The indirect cost can be classified as:

a. Project Overhead Costs

In a construction project, the cost of some of the items cannot be directly allocated for a specific activity. Most of the site related costs come under this section and are categorized as project overhead costs. Project overhead costs can either be fixed or time-related costs. Different costs coming under overhead costs are the costs of stores, safety facilities, workshops, offices, staffs and parking facilities. All those plants that are required to support the working crews will come under this cost. (The constructor.org, 2018)

The overhead cost is estimated by a detailed analysis of the site-related activities and their cost. Hence an accurate cost estimate is obtained. Most of the companies make use of forms and checklist developed by them to estimate these costs. The site overhead costs account for 5 to 15% of the total project costs.

b. General Overhead Costs

The general overhead costs cannot be directly charged for a specific project. These form the costs that are used to support the overall activities of the company. The general overhead costs will include the cost of the design engineers, expenses of head-office, cost of directors and managers, schedulers, etc. The general overhead expense and cost are found reasonable through continuous monitoring of the company expenses. The general
overhead costs account for 2 to 5% of the contract direct costs. The amount of the general overhead that should be allocated to a specific project equals: (The constructor.org, 2018)

2.2.2 Cost management
Cost management is concerned with the process of planning and controlling the budget of a project or business. It includes activities such as planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget. Cost management covers the full life cycle of a project from the initial planning phase towards measuring the actual cost performance and project completion (Bouvrie, 2018).

Different literatures stated that cost management has the following basic steps (Bouvrie, 2018; Buchner, 2015)

➢ Resource planning
➢ Cost estimating
➢ Cost budgeting
➢ Cost control

2.2.2.1 Resource planning
In the initial phase of a project the required resources to complete the project activities need to be defined. Work Breakdown Structures (WBS) and historical information of comparable projects can be used to define which physical resources are needed. You can think of the required time, material, labor, equipment, etc. Once the resource types and quantities are known the associated costs can be determined. (Bouvrie, 2018)
Project Resources and Controls Resource inputs at the project site which produce outputs in the form of work include: men, materials, machinery and money. The success of a project depends upon the performance of these input resources when controlling costs (Hendrickson, 1998). The clients should do everything possible to avoid unnecessary delays as it is one of the leading causes of cost escalation.

i. Materials

One of the big problems on most building sites is the large amount of materials wastage due to varying circumstances (Butler, 1982). This problem requires a supervisor to constantly be on the lookout for the losses. According to Hendrickson (1998), wastage of materials can take place during the procurement process, storage, and during utilization. Wastage during procurement can result from one or more of the following causes: buying materials of wrong specifications, buying more than the actual requirements to cater for unrealistic and unforeseen eventualities, untimely buying of short-life materials, improper and unnecessary handling of materials, and wastage in transportation. Wastage during storage can occur due to the following reasons: damages and breakages during handling, deterioration due to incorrect storage, incorrect maintenance and short-shelf life and losses due to fire, thefts/vandalism, and exposure to extreme climatic conditions. Other causes are lack of pre-work preparation and coordination, improper accounting and poor storekeeping, negligent and careless attitude of the supervisor, high rate of deterioration due to long storage at the place of work, and over-issues from the central stores and failures to return unused surplus materials to the stores. According to Chitkara (2005), some unavoidable wastage is inherent during utilization, but excessive wastage is of concern to the management as it affects the productivity adversely, with consequences of
extra costs. Most problems relating to material wastage revolve around requisitioning and ordering, receipt and checking of deliveries from suppliers, offloading and handling, storing and protecting, and issuing, distributing and use of materials.

ii. Plant

In construction, some tasks are labor intensive, some predominantly employ equipment, and some use a combination of both. While the actual work done and the associated labor is accounted by the supervisor concerned, the equipment and productivity control is undertaken to determine its employment time, the output achieved, and its productivity at site (Hendrickson, 1998). The main purpose of the control is to minimize wastage in utilization so that the overall project cost is not affected (Chitkara, 2005). Alinaitwe (2006) observed that industrializing construction would probably reduce the cost of construction by about 30%.

iii. Labor

Labor productivity achieved at the site for a given work provides a measure of the laborers’ efficiency and effectiveness and the level of site organization. It shows the total time for which the laborer was employed at work, the time he was productive on work and the time he remained unproductive (Chitkara, 2005). Craftsmen use about 40% of available time on productive activities, and about 33% of the time on non-value adding activities (Alinaitwe, 2006). Productive times are wasted for various reasons such as idle waiting, unnecessary travelling, late starting, early quitting, unscheduled breaks, and delays in the receipt of tolls, delays to receive materials and work instructions. Assessment of the level of industrialization in Uganda and the effect on productivity and other metrics were done by Alinaitwe (2006) and the results indicated that the cost of
labor is of the order of 30 to 40% of project costs. The metrics confirmed that labor is a significant factor in the cost of buildings and more efforts are required to industrialize the industry. According to Chitkara (2005) cost control process involves accounting of actual productivity, and comparing with the standard, analyzing the causes for variations taking remedial measures for improvement. Raina (1999) emphasizes the need for close supervision and good working relationship.

iv. Time-Cost Relationship

Chitkara (2005) said the relationship between time and cost is a very important aspect in the control of costs on site as any variation in time has automatic implication on cost. It is important to report and record all the works involving materials, plant and labor on sites. This enables the contractor be able to know the costs and expenses of the resources used on site and compare with the initial cost budget. Various report techniques used include; daily or weekly and monthly recording, schedule control, site daily diary report and the project budget. (Otim, et al. 2008)

2.2.2.2 Cost estimating

An estimate can be defined as the calculated prediction of the amount of money required to undertake a specific amount of work in the year in which it was prepared. For the project manager to effectively plan and control a project, accurate estimating is essential. Accurate estimates of project costs provide an essential part of the proper basis for management decisions and control.

Several cost estimating methods can be applied to predict how much it will cost to perform the project activities. The choice for the estimation method depends on the level of information available. Analogous estimating using the actual cost of previous, similar
projects can serve as a basis for estimating the current project. Another option is to use
parametric models in which the project characteristics are mathematically represented.
Estimates can be refined when more information becomes available during the course of
a project. Eventually this results in a detailed unit cost estimate with a high accuracy. The
Remaining uncertainties in estimates that will likely result in additional cost can be
covered by reserving cost (e.g. using escalation and contingencies). (Bouvrie, 2018)
The most obvious reason for producing cost estimates is to assist in pricing decisions, but
that is by no means the whole history. Cost estimates are usually needed for all types of
projects, including in-house projects without fixed prices. Timescale planning, pre-
allocation of project resources, the establishment of budgets for funding, manpower and
cost control, and the measurement of achievement against expected performance all
demand the provision of sound estimates.
Ahuja (1994) cited by Fetene (2008), stated that estimating is the primary function of the
construction industry; the accuracy of cost estimates starting from early phases of a
project through the tender estimate can affect the success or failure of a construction
project. He also stated that many failures of construction projects are due to the result of
inaccurate estimates. A study conducted in United States of America on cost estimating
problems associated with pioneer energy projects and process plants revealed that 74% of
cost growth was caused by underestimation, that is, improper estimation (Merrow, 1988).
Cost is a major factor in most decisions regarding construction; as construction cost
estimate is prepared before the actual construction of the project, much study and thought
must be put into the primary and subsequent estimating phases as they form the future
construction documents. Estimates made in the early phase of a project are particularly
important because they affect the most basic decisions about a project: whether it will be undertaken at all; how large it will be; how elaborate, sophisticated and durable it will be.

<table>
<thead>
<tr>
<th>Project stage</th>
<th>Concept development</th>
<th>Design</th>
<th>Advertisement</th>
<th>Bid/Award</th>
<th>Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
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<tr>
<td>Estimating function</td>
<td>Conceptual estimate</td>
<td>Design estimate</td>
<td>Pre-bid Estimate</td>
<td>Bid Analysis collusion detection</td>
<td>Cost Analysis</td>
</tr>
</tbody>
</table>

Figure 2.1; Estimate Development in Relation to Project Development (Source: Jonathon, 2002)

As a project progresses from concept to final design more of the unknown factors can be eliminated from the estimate and numbers that reflect the design can be produced (Figure 2.2). Estimates at final design, prior to bid, are often referred to as the engineer’s estimate, and are used to finalize project funding prior to bid solicitation and construction. Proper estimating and control of the project, especially at early design phase is crucial to the construction industry.

Figure 2:2; Estimate Accuracy vs. Project Development phase (Source: Jonathon, 2002)
The cost estimate forms together with a project schedule the input for cost budgeting. The budget gives an overview of the periodic and total costs of the project. The cost estimates define the cost of each work package or activity, whereas the budget allocates the costs over the time period when the cost will be incurred. A cost baseline is an approved time-phased budget that is used as a starting point to measure actual performance progress.

2.2.2.3 Cost budgeting
The cost estimate forms together with a project schedule the input for cost budgeting. The budget gives an overview of the periodic and total costs of the project. The cost estimates define the cost of each work package or activity, whereas the budget allocates the costs over the time period when the cost will be incurred. A cost baseline is an approved time-phased budget that is used as a starting point to measure actual performance progress. (Bouvrie, 2018)

Cost budgeting involves allocating the overall cost estimates to individual work items in order to establish a cost baseline for measuring project performance. PMBOK7(1996)

Fig 2:3 Cost budgeting (source: PMBOK7 (1996)
2.2.2.4 Cost control

Cost control is a process where the cost of the construction project is managed through the best methods and techniques so that the contractor does not suffer losses when carrying out the activities of the project. One of the aims is to construct at the cheapest possible costs consistent with the project objectives (Otim, et al, 2008).

Cost control is concerned with measuring variances from the cost baseline and taking effective corrective action to achieve minimum costs. Procedures are applied to monitor expenditures and performance against the progress of a project. All changes to the cost baseline need to be recorded and the expected final total costs are continuously forecasted. When actual cost information becomes available an important part of cost control is to explain what is causing the variance from the cost baseline. Based on this analysis, corrective action might be required to avoid cost overruns.

Dedicated cost control software tools can be valuable to define cost control procedures, track and approve changes and apply analysis. Furthermore, reporting can be enhanced and simplified which makes it easier to inform all stakeholders involved in the project.

Different literatures and researches show that Cost controlling techniques and mechanisms of construction projects in developing countries is not in good health. According to Otim, et al. (2008) Most project managers and contractors in Uganda find difficulty in controlling costs on their construction sites due to a number of problems which include poor project preparation, lapse in management and control, over budgeting, poor materials, labor shortages, increased cost of materials, delays in deliveries, wastage of materials, unexpected weather changes, loss of materials, insecurity and poor communication. This results into cost and time overruns, conflicts, and sometimes abandoning projects.
Cost control is concerned with:

- Influencing the factors which create changes to the cost baseline to ensure that changes are beneficial,
- determining that the cost baseline has changed, and
- Managing the actual changes when and as they occur.

Cost control includes:

- Monitoring cost performance to detect variances from plan.
- Ensuring that all appropriate changes are recorded accurately in the cost baseline.
- Preventing incorrect, inappropriate, or unauthorized changes from being included in the cost baseline.
- Informing appropriate stakeholders of authorized changes. (USA P.M.I., 1996)

During the execution of a project, procedures for project control and record keeping become indispensable tools to managers and other participants in the construction process. According to Dharwadker (1985), cost control can be achieved by selecting the right man for the right job, the right equipment and tools for the right work and the right quality of materials, in the right quantity, from the right source, at the right price and delivered at the right time. Managers are expected to be well equipped to execute the project, with due consideration to the quality of work, yet within the estimated cost and limits.
General overview of Project cost management

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Figure: 2.4. Project Cost Management Overview (source: PMBOK7:1996)
2.3 Cost overrun

Cost overrun is considered as one of the most considerable problems that hinder projects progress, since it reduces the contractor’s profit leading to enormous losses, and leaving the project in massive troubles. Construction cost is one of the peak criteria of success of a project throughout its lifecycle and is of high concern to those who are involved in the construction industry. All projects, regardless of size, complexity are saddled by targets and uncertainty. Mostly in developing countries construction projects are characterized by overruns in cost. Cost overruns occur in every construction project and the magnitude varies significantly from project to project. Thus what is Cost overrun mean?

**Definitions:**

- **Cost overrun**: excess of actual cost over budget. Cost overrun is also sometimes called “cost escalation,” “cost increase, or “budget overrun.” Cost overrun is defined as the change in contract amount divided by the original contract award amount. This calculation can be converted to a percentage for ease of comparison. The difference between the actual cost and the initially projected cost. (G.V. et al, 2016)

  \[
  \text{Cost overrun} = \frac{\text{Final contract amount} - \text{Original contract amount}}{\text{Original contract amount}}
  \]

- **Cost overrun**: the difference between the final actual cost of a construction project at completion and the contract amount, agreed by and between the owner and the contractor during signing of the contract. (Fetene, 2008)

- **Cost overrun**: the increase of the final actual cost of a construction project (usually expressed as a percentage of original contract amount) at a completion
over the original contract amount, agreed by and between the client (the project owner) and the contractor during the signing of the contract. (Wakjira, 2011)

Therefore: for this thesis Cost overrun is an excess amount of a project cost which is the actual cost deducted from the estimated cost.

2.4 Cost overrun around the world

The problem of cost overrun, especially in the construction industry, is a worldwide phenomenon, and its consequences are normally a source of argument among clients, consultants and contractors on the issue of project cost variation. Project cost overruns create a significant financial risk to clients. In the study made by Ahady, et al. (2017) stated that, in the past several decades, construction industries of many countries have faced the issue of cost overrun, though it is commonly acknowledged, the causes subject to more debate. The most important problem which led to the construction cost overrun in developing countries is fluctuations and increases in material price. Although all the factors are not similar to every project but most factors such as poor management, inaccurate material estimates and financial status of the contractor are common to the projects in the developing countries.

More over on his research “A study of the causes of cost overrun in construction industry in Afghanistan”: also identified the frequency of experience of cost overruns in the construction projects in Afghanistan and the survey result indicated that 6 out of 10 projects fall into this category.

According to Niaza, et al. (2016) Due to various factors, cost overrun is often more of a challenge in developing countries where budget problems are just one factor in often poor project performance. In Afghanistan, construction cost overruns are the most substantial
problem (facing all parties to a project; suppliers, subcontractors, main contractors and clients).

Another study was conducted by Shah (2017) to identify an exploration of causes for delay and cost overrun in different three countries (Australia, Malaysia & Ghana). Although the main factors and magnitude varies among those countries, the researcher confirmed that there were a delay and cost overrun in each country.

According to a very comprehensive research done by Flyvbjerg (2002) in global construction, it was found that 9 out of 10 projects had cost overrun. The researcher investigated about the actual cost and the estimated cost in public work project. He has undergone various methods and found that the difference between actual cost and the estimated cost is due to technical factors, economic factors, psychological factors and political factors. From factors he concluded that in every infrastructure project, the actual cost will be higher than estimated cost. He added that the cost under estimation occur not only by error and mostly by strategic misrepresentation.

Due to various factors, cost overrun is often more of a challenge in developing countries where budget problems are just one factor in often poor project performance. Niazi and Painting (2017) studied about the Significant Factors Causing Cost Overruns in the Construction Industry in Afghanistan, and found that: construction cost overruns are the most substantial problem which is facing all parties to a project; suppliers, subcontractors, main contractors and clients in Afghanistan.

The study about causes of cost overrun in construction which was studied on the case of Indian construction also discussed the contribution of construction industry for growth and economy of India and the other side of effects of cost overrun in this massive
investment. The Indian construction industry is an integral part of country’s economy and its growth and a conduit for a substantial part of India’s development investment. The industry plays a pivotal role in developing the country’s infrastructure, a pre-requisite for high levels of economic growth. Most construction projects experience cost overrun and it put massive financial burden on the client or owner. (Subramani, et al. 2014)

2.5 Cost overrun and its magnitude in Ethiopia
Based on the construction type and scope, level of development, weather condition of the countries and other different factors the magnitude of cost overrun varies from one country to the other in extreme manner.
As an example: Mehamid, et al. (2013) Stated that the average cost overrun in Palestine construction is between 10%- 30% of the project’s estimated cost.
Different researchers have specified different percentage for the magnitude of cost overrun in Ethiopia based on the study area. Merid (2016) has studied to see the effect of Time and Cost Overruns on Ethiopian Construction Projects that are performed by Defense Construction Enterprise. They found that cost overrun ranges from a minimum of 1% to the maximum of 47% of the contract amount.
Turkey, (2011) confirmed that from the desk study: the average cost overrun was found to be 26.95% of the contract amount, the actual cost overrun ranging from -32.8% to 230.54%. The result of the questionnaire survey also strengthens this finding; it indicated that the perceived average cost overrun was found to be 34.18% of the contract amount found that in federal road construction projects.
Another study was conducted by Belachew (2017) to identify the causes of cost overrun in Federal Road Projects of Ethiopia. According to the research, the degree of cost
overrun among selected project lengthened from 4.16% to 83.2%. The average magnitude of cost overrun was nearly 21.52% based on the three major construction parties (client, consultant, and contractor) and the principal factors that affect project cost performance were investigated. Lack of training, benefit realization and production supports were the primary reason for cost overrun at the execution processes of the projects as per clients’ perception while lack of training, implementation process or bureaucrat and benefits realization were the primary reason for cost overrun at the execution processes as per contractors’ perception.

Abubeker (2015) confirmed cost overrun problems of Addis Ababa road projects by using Questionnaire survey and desk study: the researcher found that 100% of the road construction projects suffered both time and cost overrun. The rate of time overrun ranges from a minimum of 25% to the maximum of 264.38% of the contract amount and cost overrun ranges from a minimum of 4.11% to the maximum of 135.06% of the contract amount.

For this topic there is one good research in our country entitled: causes and effects of cost overrun on public building construction projects in Ethiopia, which is conducted by Fetene (2008), he explained that, from the results it was found that 67 out of 70 public building construction projects suffered cost overrun. The rate of cost overrun ranges from a minimum of 0% to the maximum of 126% of the contract amount for individual projects. In this research it was found that the rate of cost overrun decreases with the increase in contract amount.

The respondents identified 39 causes of cost overrun for Ethiopian case. The most important causes of cost overrun were found to be inflation or increase in the cost of
construction materials, poor planning and coordination, change orders due to enhancement required by clients, excess quantity during construction.

2.6 Main causes of cost overrun
In the research made by Ashebir, et al. (2016) described that the main causes of cost overrun are material price fluctuation, cost underestimation, delay in supply of raw materials, inadequate review of contract documents, lack of coordination at the design phase and lack of cost planning during pre- and post- contract stage have the highest impacts on the performance of project costs from the client’s, consultants’ and contractors’ perspective.

A study on causes of cost overrun in construction industry in Afghanistan Ahady, et al. (2017) showed that, the top ten reasons of causes of cost overrun were found to be: Causes fall in the External related group which is “market inflation/deflation”, Corruption, Shortage of supply of construction material required, Fluctuations in the cost of building materials and other materials, Falls in contractors related group which is “delay in subcontractor's work”, Management related factor that is “lack of pre-contract project ordination” which indicate that fast-track bidding process is not beneficial for the projects, Labor related factor which is a big need in Afghan construction industry that is “lack of skilled labor”, Design related factor that is “improvements to standard drawings during construction stage”, Labor unrest” which leads to a low quality work and rework and “Inadequate & insufficient skill of labor” which is labor related group causing cost overrun.

On the other hand, another researchers Niazi, et al. (2017) also studied on Significant Factors Causing Cost Overruns in the Construction Industry in Afghanistan, They found
of the key critical causes that potentially result in construction cost overruns in Afghanistan are: corruption, delay in progress payment by owner, difficulties in financing project by contractors, security, change the order by the owner during construction and market inflation.

Frimpong (2003) investigated 26 factors causing cost overruns in construction of Ghana groundwater projects and analyzed that the monthly payments difficulties was the most important cost overrun factor according to the contractors and consultants, while owners ranked poor contractor management as the most important factor. Despite some difference in the viewpoints among the three groups surveyed, there exists a high degree of agreement among the participants with respect to their ranking of the factors. On the whole, ranking results indicated the main factors are monthly payment difficulties, poor technical performances, material procurement, poor contractor management and escalation of material prices.

Another study made by Mehamid, et al. (2013) investigated the top five factors affecting cost overrun in building construction projects are: political situation, fluctuation of prices of materials, level of competitors, currency exchange, and economic instability.

In reviewing different literatures S.Mulla, et al. (2015) stated the following major factors:

- The most significant factor causing cost overruns due to client action is “additional work or changes to work”.
- From a contractor’s perspective, the most significant contributor to cost overruns is “time delays”.
- The most significant factor for cost overruns is evident from external factors and that is “material price changes”.

➢
➢ Other common factors listed among contractors, consultants and clients were “poor estimates and material take-off” and “delay in payments”.

In India, a study was conducted by G.V, et al. (2016) found that 10 significant factors result in cost overrun: Delay in preliminary handing over of project, wrong/inappropriate choice of site, inadequate project preparation, increment of material prices due to continuous closures, resources constraint, unpredictable weather conditions, fluctuations in the cost of building materials, equipment allocation problems, lack of cost reports planning/monitoring during pre and post contract stages in the position, and design changes.

A research was carried out by Shah (2016) in different three countries indicated that the top three critical factors found in three different countries are

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<td>1</td>
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<td>2</td>
<td>Methods of construction</td>
<td>Contractor’s poor site management</td>
<td>Underestimating of project cost</td>
</tr>
<tr>
<td>3</td>
<td>Effective ways of monitoring &amp; feedback</td>
<td>Inadequate contractor experience</td>
<td>Underestimating the complexity of projects</td>
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Table: 2.1 top three critical factors (source: Kapur Shah, (2016))

Olawale, et al. (2010) identified 21 major factors causing cost overruns in UK. The major factors are design changes, incorrect evaluation of projects time and cost, risk and uncertainty related with projects, non-performance of subcontractors, conflict between project parties, fluctuation of rates, low skilled manpower, financing and payment, unstable interest rate, complexity of works, lack of proper training and experience of project manager, disagreement in contract documentation, lack of appropriate software,
inflation of prices, contract and specification interpretation disagreement, dependency on imported materials, unpredictable weather condition, projects fraud and corruption, weak regulation and control and unstable government policies.

The research which has studied by Almaktari, et al. (2017) found that: political instability, Poor contract management, Low labor productivity, Delay in progress payments, Risk Management strategies, Poor site management and supervision, Staff training in the skill areas relevant to project, Contractors and Consultant tendering faults, Financing, and payment of completed projects Lack of materials and equipment are highly factors in Yemen.

Jemal (2015) stated that in Addis Ababa road projects the most important causes of cost overrun were found to be: delay in construction, inadequate supply of raw materials and equipment by contractors, design changes, incomplete design at the time of tender.

2.7 Effects of Cost overrun
Effects are the consequences that will be encountered when cost overruns occur on construction project. Fetene (2008) stated that cost overruns have obvious effects for the key stakeholders in particular, and on the construction industry in general. To the client, cost overrun implies added costs over and above those initially agreed upon at the onset, resulting in less returns on investment. To the end user, the added costs are passed on as higher rental or lease costs or prices. To the professionals, cost overrun implies inability to deliver value for money and could well tarnish their reputations and result in loss of confidence reposed in them by clients. To the contractor, it implies loss of profit for non-completion, and defamation that could jeopardize his or her chances of winning further jobs, if at fault. To the industry as a whole, cost overruns could bring about project
abandonment and a drop in building activities, bad reputation, and inability to secure project finance or securing it at higher costs due to added risks.

The study of Fetene (2008) further identified the following as the major effects of cost overruns: delays during construction, supplementary agreement, additional cost, budget short fall, adversarial relationship between participants of the project, loss of reputation to the consultant, the consultant will be viewed as incompetent by project owners, high cost of supervision and contract administration for consultants, delayed payments to contractors, the contractor will suffer from budget short fall of the client and poor quality workmanship. However, Eshofonie (2008) identifies four effects of cost overruns as follows: company or firm liability to insolvency and liability of the companies or firms to bad debt, under-utilization of man-power resources, plants and equipment, increased project cost due to extension of time: Longer project duration means that more resources will need to be allocated to the project, which then increases the project costs and project abandonment.

By reviewed different literatures M.J (2014) found the basic effects of cost overrun that are: extension of project, additional cost, budget short fall, adversarial relationship between participants of the project, delayed payments to contractors, poor quality workmanship and dissatisfaction by project owners and consequently by end users as the major effects of cost overruns. Furthermore, it was observed that time overrun, cost overrun, arbitration, litigation, disputes and total abandonment of projects were the effects of construction projects schedule overruns.

Turkey (2013) indicated that the major effects identified in his research on Federal road constructions are: reduction in planned increase of road network, Damaged professional
relations, Inability to secure project finance/securing it at higher costs, Loss of clients’ confidence in consultants, for professionals - inability to deliver value to clients and Decreased rate of national growth.

More over the most common effects of cost overrun identified by Abubeker (2015) are delay, supplementary agreement, adversarial relations among stakeholders, and budget shortfall of project owners.

Cost overruns in construction projects affect both stakeholders and business environment (Amoa-Abban and Allotey, 2014). These effects are not limited to the project level, but they can spread to the industry level. The effects of cost overrun in industrial level include; time overrun, disputes, arbitration, total abandonment and litigation (Kikwasi, 2012). According to Haseeb, et al. (2011), the effects of cost overrun can lead to slowing down the growth of the construction sector. The implication of these effects is to slow down other development sectors. Therefore, identifying the causes of cost overrun is the primary stage on mitigating the challenges (Tebeje, 2015).

Turkey (2011) listed the following main effects of construction cost overrun by summarizing different literatures:

- Loses of credibility to highway organization/bad reputation
- Loss of clients’ confidence in consultants
- Added investment risks/Funding risk
- For professionals - inability to deliver value to clients
- Discourages sponsors to invest in construction industry
- Less returns on investment for client
- Delay in payment
➢ Loss of profit to the contractor
➢ Abandonment of future projects
➢ Drop in construction activities
➢ Inability to secure project finance/securing it at higher costs
➢ Prevent planned increase in road network
➢ Damage professional relations
➢ Suspension of work
➢ Dispute among parties
➢ Decreased rate of national growth

2.8 Cost overrun in 40/60 saving house construction projects
AASHDE was finished and transferred 1293 houses for beneficiaries (972 for residential and 321 for commercial) in 2017 GC. In addition to that the Enterprise is constructing 38,240 houses in different site of Addis Ababa for the beneficiaries right now. (Capitalethiopia.com, (2018))

In the beginning AASHDE assumed to finish and transfer these houses within maximum of 19 months for beneficiaries. But none of the house transferred within the planned period and the Enterprise had taken around Four years to transfer 1293 (3.27%) houses for the winners with additional cost.

Addis fortune, (2017) also explained the percent and main causes of cost increasing for the house. The Addis Ababa City Administration unveiled the cost revision of middle-class public houses just two days before it announced the raffle winners of 972 residences, raising the cost of all types of apartments by 56% to 4,918 Br a square meter.
By this report the current market prices of infrastructure, labor costs and change of building design were taken into consideration during the revision of the cost. There was also a revision on design especially in size aspect of the houses. When the middle-class public housing project began in 2013, AASHDE set the size of the houses to 55, 75 and 100sqm with a price tag of 2,289 Br, 3,300 Br and 3,860 Br a square meter for one, two and three bedrooms, respectively. The revision, however, altered the sizes of the public houses to 124.97sqm, 149.5sqm and 168.68sqm, for two, three and four bedrooms respectively, omitting the previously planned one-bedroom unit houses. These houses cost 614,602 Br, 735,241 Br and 829,568 Br correspondingly, according to the new cost scheme. (Addis fortune, 2017)

It should be noted that, there are different cause which serve as a driving force to cost overrun in this 40/60 saving house program. From that time overrun is the most significant factor.

Endale (2016) studied about “Identification of the Major Causes to the Delay in the Construction of 40/60 Saving Houses Project in Addis Ababa”. He indicated the delay and main causes by the help of questionnaire and case study. The researcher confirmed that all projects has faced a delay problem and from questionnaire result the ten major causes of delay in the construction of 40/60 saving houses project from were late material supply, financial difficulties faced by the contractor, problem of electric supply, problem of water supply, equipment unavailability, delayed payments to contractors, poor site management, ineffective planning and scheduling, late design review and approval, and slowness in decision making process.
Along with this Endale showed that the following main causes of delay by using desk study: late material supply was mainly caused by the client due to financial shortage, time taking material procurement process, unfair distribution of material, shortage of transport facilities, scarcity of material in the market etc. Financial difficulty faced by the contractors was caused by both the contractors and the client due to the contractors’ poor financial management, and delayed payments to contractors. Problem of electric supply was caused by both the client and the contractors due to frequent power interruption, late maintenance, unsafe construction, unavailability of high capacity stand by generators etc. The other cause of cost overrun in these projects is poor site and material wastage management. The study conducted by Eskedar (2016) showed that, the level of materials waste in 40/60 Condominium construction projects is fairly high in all of the assessed construction materials. The survey result also reveals that cost effect extent up to 10 % of the project cost. And the studied further said material supplying by the client in the construction of 40/60 condominiums has increased the generation of material waste. This was happening by delivering of poor quality materials, particularly for the materials provided by the client.

2.9 Summary of literature review
This literature review has been conducted on identification of the causes leading to cost overrun and its consequential effects in depth. It has better contribution to develop conceptual and contextual basis for the research objectives. Accordingly, this chapter has presented some of the crucial findings in the existing theoretical and empirical literature on cost management construction projects.
Therefore, the first part of this literature review introduces some general ideas, definitions and nature of cost management in construction projects. After having a clear and general idea about the cost, its classifications, management and control, identification and mitigation measures has been discussed in detail. The second part of the literature review has concentrated on identifying the main causes and its magnitude as well as the effects of cost overrun in construction projects in our country and all over the world. The third part of the literature has also concerned about the performance and problem of 40/60 saving house projects. Through this review and desk study on some selected projects 47causes of cost overrun (Project Cost Overrun Variables) and different possible effects were identified and forms the bases on which the questionnaire has been developed.
3. RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction
Cost overrun in construction projects is because of several causes. Each cost overrun causes have different rate of occurrences and impact on the project cost at completion. Some causes may happen frequently but their impacts on cost overrun may be less severe. While some other causes may happen rarely, but their impact may be severe. Therefore, it is necessary to identify cost overrun causes based on both occurrences and their impact, in order to rank their overall effects on cost overrun. This helps to prioritize the factors and, hence to determine the mitigation actions to be taken. In this chapter, the research design and methodology followed to achieve the ultimate goal of the research which is specified previously has been discussed. In addition, data and information sources, research instruments, sample size and method of analysis were presented.

This chapter presents the general approach and specific techniques adopted to address the objectives of the research. The chapter also presents the research design and the methods used in data collection, data analysis and interpretation it begins with the definition of research and research methodology and concludes with a look at the limitations of the methodology employed to conduct the study.

According to Kothari (2004) Research methodology is a way to systematically solve the research problem and research methodology shall identify the research basis, research hypothesis or questions, research design and research analysis, and Kumar (1999) defines research as a process, that is undertaken within a frame work of set of philosophies, uses procedures, methods and techniques that have been tested for their validity and reliability; and designed to be unbiased and objective.
3.2 Method of data collection
The study has evaluated the causes of cost overrun in building construction projects. The research used both primary and secondary sources of data and also both qualitative and quantitative data had been collected by interviews, questionnaires and observations.

3.2.1 Study Area
The study has been conducted on different sites of 40/60 saving house projects that are located on Addis Ababa. However, in order to carry out questionnaires and interviews the focused area for contractor and consultant would be only 5 but massive, which can transfer near future selected sites. In addition to AASHDE’s head office staff members; Ihilnigd, Hintsa-akirabi, Bole ayat 1, Bole bulibula 1 and Bole beshale sites were focused area to select the participants and conduct the questionnaire and interviews.

3.2.2 Data Source and Sampling
The contractors, the consultants and the owner employees who are involved in 40/60 condominium housing construction projects have been considered as a source population. The sampling method used in this research is Non-probability snowball sampling technique. This type of sample is used to identify potential respondents from client, contractors and consultants through referral networks to respond questionnaires accurately.

Thus, the sample size for the questionnaire part was 65 respondents. The researcher believes that this sample size is relatively small to make generalization. However, this sample size was decided based on the time and budget constraints. Not only that but the other and the main reason were all projects are almost similar and the causes also relate one to each other.
This had been investigated on problem identification period. Finally, to increase accuracy, the data is triangulated using different methods of data collection and analysis. Furthermore, according to Fowler (1986) the appropriateness of any sample design feature can be evaluated only in the context of the overall survey objectives. The important point for the researcher is to be aware of the potential costs and benefits of the options and weigh them in terms of the main purpose of the study.

3.2.3 Participants
The selected samples that are; Ihilnigd, Hintsaakirabi, Bole ayat 1, Bole bulibula 1 and Bole beshale sites were focused area to select the participants and conduct the questionnaire and interviews. Beside this by participate the head office workers of AASHDE on questionnaire and structured and unstructured interviews, the research has tried to cover all sites of 40/60 saving house construction projects. Furthermore, for the desk study I have included the two transferred sites which are Sengatara and Crown sites. The study populations would be stratified in to different strata i.e. project manager, General Forman, Resident engineers, Site Engineers, etc.

3.2.4 Data collection procedure
Both quantitative and qualitative data have been collected through structured questionnaire that was consisting of both closed and open-ended questions, by in depth interview and desk study. The data were collected by using the “English” version of the questionnaire. Detailed information about different causes and effects of cost overrun as well as mitigation measurement of cost overrun had been collected through

3.3 Methods of data analysis
A questionnaire of 47 factors was carefully designed from literatures conducted for
40/60 saving house construction projects. It was organized in the form of a priority scaling (1 = not significant, 2 = slightly significant, 3 = moderately significant, 4 = very significant, and 5 = extremely significant).

The procedure used in analyzing the results aimed at establishing the mean score of the various factors responsible for causes of cost overruns. The score for each factor is calculated by summing up scores assigned to it by respondents. Therefore, the level of importance as indicated by the client, consultants and contractors were used to measure the mean score of each factor.

➢ The mean score (MS) for each variable of time and cost overrun is computed by using the following formula;

\[
MS_i = \frac{\sum (f \times s)}{N}
\]

Where:
- S = score given to each cause of delay by the respondents;
- F = frequency of responses to each score for each cause of delay;
- N = total number of responses in the respective cause of delay.

Weighted Average is calculated by using the following formula;

\[
\text{WeightedAvg.} = W_aX_a + W_bX_b + W_cX_c
\]

Where; w = relative weight (%)
- x = mean score and
- a, b & c = represent contractor, consultant and client respectively.

➢ Spearman rank correlation coefficient was used to determine the strength of rankings between two parties i.e. between contractor and consultant, contractor and client, client and consultant.
The Spearman rank correlation coefficient is calculated using the following equation:

\[
r_s = 1 - \frac{6 \sum d^2}{(N^3-N)}
\]

Equation 3.3

Where  \( r_s = \) Spearman rank correlation coefficient;

\( d = \) Difference in ranking between two parties

\( N = \) the number of variables

### 3.4 Research type and procedures

This research can be categorized as explanatory and largely descriptive. Based on the fact that the research tries to describe the current existence and extent of Addis Ababa saving house enterprise with the aim of identifying and explaining the causes and effects of cost overrun in the projects.

The research work has been started with problem identification, which was done through unstructured literature review, formal and informal discussion with different individuals who have direct or indirect relation with saving house projects.

Literature review and desk study has been conducted in parallel to identify the causes and effects of cost overrun in different construction projects.

During the desk study, various documents such as contract documents, claim documents, correspondences, progress reports, completion reports, payment certificates, statements on final account etc. has been critically evaluated and the root factors causing and effects of cost overrun in projects investigated were identified and used in the questionnaire.

Whenever there was unclear primary data or ambiguity during the desk study, further explanation or information has been obtained through interviews with relevant bodies in AASHDE.

The questionnaire/survey has been conducted to observe the understanding of the problem
by all the three main stakeholders/client, contractor and consultant/ and to see the causes and effects of cost overrun in 40/60 housing projects. The questionnaire has both open ended and close ended type questions, close ended for causes and open ended questionnaire for effects of cost overrun. Besides this the document search and interviews has been carried out.
4. DATA ANALYSIS AND DISCUSSION

4.1 Introduction
This chapter describes the results and discussion of desk study and questionnaire survey concerning cause of cost overruns in Addis Ababa saving house construction projects from contractors, consultants and client viewpoints. Finally, the effects of cost overrun in construction on the various stakeholders, on the construction industry, and on the national economy in general have been dealt.

From the desk study 40/60 construction projects in Addis Ababa were surveyed, for the duration of the desk study the contract amount, contract time during signing of the contract, actual cost and actual completion time at completion of the project were investigated.

4.2 Rate and characteristics of respondents
This part mainly designed to provide general information about the respondents in terms of response rate, company type, position and experience.

4.2.1 Questionnaire response rate
The questionnaire was prepared and distributed to three contractual parties i.e. contractors, client and consultants currently working on the 40/60 saving houses project sites having lots through in person contact by going to all the project sites. 60 questionnaires were distributed to the parties based on the relative population size of the parties on the project. To cover all significant causes of sites the number of number of respondents from client, especially from head office were included. The questionnaire response rate is as shown in the Table 4.1.
Contractual Parties | Questionnaire distributed | Questionnaire responded | Response Rate
---|---|---|---
Client | 25 | 22 | 88%
Consultant | 15 | 11 | 73.3%
Contractor | 25 | 19 | 76%
Total | 65 | 52 | 80%

Table: 4.1. Respondent rate

4.2.2 Position and experience of respondents
Table 4.2 shows that the positions of respondents from contractor were project managers, office engineers and site engineers, and the amounts were 3, 8 and 11 respectively. For consultant also: 2, 5 and 12 respectively and finally from contractor: 2, 5 and 5 respectively.

<table>
<thead>
<tr>
<th>Position of Respondent</th>
<th>Client</th>
<th>Contractor</th>
<th>Consultant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project manager/Coordinator</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Office Engineer</td>
<td>8</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Site Engineer</td>
<td>11</td>
<td>12</td>
<td>5</td>
</tr>
</tbody>
</table>

Table: 4.2. Position of respondents

4.2.3 Experience of respondents
The respondent’s working experience data showed that 11 of the respondents have 1-3 years construction site experience, 20 of 3-5, 14 of them 5-10 and 7 of them have more than 10 years’ of experience in any construction. On the other hand, 23 of them 1-3, 21 of 3-5, 7 of 5-10 and 1 of them have more than 10 years’ experience on condominium construction site.

4.3 Main causes of cost overrun based on Questionnaire response
In this part the main causes and responsible body of cost overrun was analyzed based
on the questionnaire response. In order to get better and reliable result, the analysis was done in different ways. These are:

- Analyzing all factors’ significance and selecting the main causes by taking all respondents in on item.
- By Selecting the main causes using weighted average of client, consultant and contractor response rank.
- By categorizing the factors in to six critical aspects of construction projects and by analyzing the significance cause with each category.

### 4.3.1 Merged response analysis

The table below shows that the result of main causes and highly responsible body for each factors based on questionnaire response.

<table>
<thead>
<tr>
<th>No</th>
<th>Factors /causes/</th>
<th>Sum</th>
<th>Ms</th>
<th>Rank</th>
<th>Highly responsible body</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Delay in progress payments by Client</td>
<td>170</td>
<td>3.27</td>
<td>31</td>
<td>Client</td>
</tr>
<tr>
<td>2</td>
<td>Financial difficulties by Contractor</td>
<td>205</td>
<td>3.94</td>
<td>1</td>
<td>Contractor</td>
</tr>
<tr>
<td>3</td>
<td>Market inflation</td>
<td>195</td>
<td>3.75</td>
<td>4</td>
<td>External Factor</td>
</tr>
<tr>
<td>4</td>
<td>Inappropriate type of project bidding and award</td>
<td>166</td>
<td>3.19</td>
<td>36</td>
<td>Client</td>
</tr>
<tr>
<td>5</td>
<td>Incompleteness, Mistakes and discrepancies in design and contract documents at the time of tender</td>
<td>169</td>
<td>3.25</td>
<td>33</td>
<td>Consultant</td>
</tr>
<tr>
<td>6</td>
<td>Lengthy bureaucracy in government entities</td>
<td>185</td>
<td>3.56</td>
<td>10</td>
<td>Client</td>
</tr>
<tr>
<td>7</td>
<td>Design changes and late in approving design documents</td>
<td>182</td>
<td>3.50</td>
<td>14</td>
<td>Consultant</td>
</tr>
<tr>
<td>8</td>
<td>Unpredictable weather conditions</td>
<td>133</td>
<td>2.56</td>
<td>47</td>
<td>External Factor</td>
</tr>
<tr>
<td>9</td>
<td>Lack of coordination at design phase.</td>
<td>181</td>
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<td>17</td>
<td>Consultant</td>
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<tr>
<td>10</td>
<td>Delay in delivering the site to the contractor</td>
<td>161</td>
<td>3.10</td>
<td>41</td>
<td>Client</td>
</tr>
<tr>
<td>11</td>
<td>Unrealistic contract duration</td>
<td>185</td>
<td>3.56</td>
<td>10</td>
<td>Client</td>
</tr>
<tr>
<td></td>
<td>Problem Description</td>
<td>Rating</td>
<td>Position</td>
<td>Responsible Party</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------------------------------------------------------</td>
<td>--------</td>
<td>----------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Poor financial planning, monitoring and controlling mechanisms</td>
<td>3.75</td>
<td>4</td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Work suspension by Clients</td>
<td>3.27</td>
<td>31</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Delay in decision making process</td>
<td>3.73</td>
<td>6</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Owner interference</td>
<td>3.13</td>
<td>38</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Contractual Claims, such as, extension of time with cost claims</td>
<td>2.90</td>
<td>42</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Poor coordination and communication b/t contractor and other parties</td>
<td>3.46</td>
<td>18</td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Poor procurement and delay in supply of raw materials and equipment by Client</td>
<td>3.92</td>
<td>2</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Omissions and errors in the bills of quantities</td>
<td>3.38</td>
<td>24</td>
<td>Consultant</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Delays in costing variations and additional works</td>
<td>3.35</td>
<td>28</td>
<td>Client &amp; Consultant</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Often changing sub-contractors</td>
<td>3.23</td>
<td>34</td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Lack of experience of project type</td>
<td>3.12</td>
<td>40</td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Lack of experience of local regulation</td>
<td>2.88</td>
<td>43</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Inadequate project preparation, planning and implementation</td>
<td>3.56</td>
<td>10</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Delay in construction, poor procurement and supply of raw Materials and equipment by contractors</td>
<td>3.81</td>
<td>3</td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Change in the scope of the project, in government policies</td>
<td>3.15</td>
<td>37</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Resources constraint: funds and associated auxiliaries not ready</td>
<td>3.13</td>
<td>38</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Delays in decisions making by Government, failure of specific coordinating</td>
<td>3.63</td>
<td>7</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Wrong / inappropriate choice of site</td>
<td>2.83</td>
<td>46</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Technical incompetence, poor organizational structure, and failures of the enterprise</td>
<td>3.44</td>
<td>21</td>
<td>Client</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Labor unrest</td>
<td>2.85</td>
<td>45</td>
<td>Contractor</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Lack of experience of technical consultants</td>
<td>3.50</td>
<td>14</td>
<td>Consultant</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Main cause</td>
<td>Score</td>
<td>Rank</td>
<td>Responsible Body</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------------------</td>
<td>-------</td>
<td>------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Inadequate wastage management</td>
<td>176</td>
<td>3.38</td>
<td>24 Contractor</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Mistakes during construction by contractors</td>
<td>173</td>
<td>3.33</td>
<td>30 Contractor</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Poor project experience</td>
<td>177</td>
<td>3.40</td>
<td>23 Contractor</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Poor site management</td>
<td>183</td>
<td>3.52</td>
<td>13 Contractor</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Unsettlement of the local currency in relation to dollar value</td>
<td>182</td>
<td>3.50</td>
<td>14 External Factor</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Shortage of Project materials and monopoly by some suppliers</td>
<td>180</td>
<td>3.46</td>
<td>18 Client</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Lack of sub-Contractor skills</td>
<td>180</td>
<td>3.46</td>
<td>18 Contractor</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>Inadequate quality assurance and quality control plans</td>
<td>175</td>
<td>3.37</td>
<td>26 Contractor</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Low productivity of labor</td>
<td>175</td>
<td>3.37</td>
<td>26 Contractor</td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>Shortage of experienced technical staff</td>
<td>179</td>
<td>3.44</td>
<td>21 Contractor</td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>High cost of labor</td>
<td>150</td>
<td>2.88</td>
<td>43 Contractor</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>Poor material and Equipment handling on site</td>
<td>187</td>
<td>3.60</td>
<td>9 Contractor</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>Laws and regulations changes</td>
<td>168</td>
<td>3.23</td>
<td>34 Client</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>Poor quality of material and equipment</td>
<td>189</td>
<td>3.63</td>
<td>7 Client &amp; Contractor</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Cost underestimation</td>
<td>174</td>
<td>3.35</td>
<td>28 Client</td>
<td></td>
</tr>
</tbody>
</table>

Table: 4.3. Main causes by merged response

From the above questionnaire response and analysis 12 main causes and their responsible body were selected and identified.

4.3.2 Weighted average analysis

In this section the respondents’ responses were categorized by 3 parties that are; client’s response, consultant’s and contractor’s response. Each party had their own rank of significance and finally by using weighted average the main causes were selected. To make generalization and reliability this average weighted method better than the above merged result.
<table>
<thead>
<tr>
<th>No</th>
<th>Factors /causes/</th>
<th>Client</th>
<th>Consultant</th>
<th>Contractor</th>
<th>Weighted Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MS of CL</td>
<td>Rank</td>
<td>MS of CS</td>
<td>Rank</td>
</tr>
<tr>
<td>1</td>
<td>Delay in progress payments by client</td>
<td>3.14</td>
<td>36</td>
<td>3.27</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>Financial difficulties by contractor</td>
<td>3.86</td>
<td>1</td>
<td>4.09</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Market inflation</td>
<td>3.82</td>
<td>4</td>
<td>3.64</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>Inappropriate type of project bidding and award</td>
<td>3.32</td>
<td>25</td>
<td>3.09</td>
<td>36</td>
</tr>
<tr>
<td>5</td>
<td>Incompleteness, Mistakes and discrepancies in design and contract documents at the time of tender</td>
<td>3.23</td>
<td>31</td>
<td>2.73</td>
<td>46</td>
</tr>
<tr>
<td>6</td>
<td>Lengthy bureaucracy in government entities</td>
<td>3.41</td>
<td>17</td>
<td>3.82</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Design changes and late in approving design documents</td>
<td>3.27</td>
<td>28</td>
<td>3.36</td>
<td>26</td>
</tr>
<tr>
<td>8</td>
<td>Unpredictable weather conditions</td>
<td>2.55</td>
<td>47</td>
<td>2.55</td>
<td>47</td>
</tr>
<tr>
<td>9</td>
<td>Lack of coordination at design phase</td>
<td>3.50</td>
<td>13</td>
<td>3.45</td>
<td>17</td>
</tr>
<tr>
<td>10</td>
<td>Delay in delivering the site to the contractor</td>
<td>3.09</td>
<td>38</td>
<td>3.09</td>
<td>36</td>
</tr>
<tr>
<td>11</td>
<td>Unrealistic contract duration</td>
<td>3.50</td>
<td>13</td>
<td>3.73</td>
<td>9</td>
</tr>
<tr>
<td>12</td>
<td>Poor financial planning, monitoring and controlling mechanisms</td>
<td>3.68</td>
<td>5</td>
<td>3.91</td>
<td>3</td>
</tr>
<tr>
<td>13</td>
<td>Work suspension by clients</td>
<td>3.18</td>
<td>32</td>
<td>3.45</td>
<td>17</td>
</tr>
<tr>
<td>14</td>
<td>Delay in decision making process</td>
<td>3.41</td>
<td>17</td>
<td>3.82</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>Owner interference</td>
<td>3.00</td>
<td>41</td>
<td>3.27</td>
<td>30</td>
</tr>
<tr>
<td>16</td>
<td>Contractual claims, such as, extension of time with cost claims</td>
<td>2.86</td>
<td>42</td>
<td>2.82</td>
<td>44</td>
</tr>
<tr>
<td>17</td>
<td>Poor coordination and communication b/t contractor and other parties</td>
<td>3.64</td>
<td>6</td>
<td>3.55</td>
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<td>18</td>
<td>Poor procurement and delay in supply of raw materials and equipment by client</td>
<td>3.86</td>
<td>1</td>
<td>4.09</td>
<td>1</td>
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<tr>
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<td>Values 2</td>
<td>Values 3</td>
<td>Values 4</td>
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</tr>
<tr>
<td>19</td>
<td>Omissions and errors in the bills of quantities</td>
<td>3.18</td>
<td>32</td>
<td>3.45</td>
<td>17</td>
</tr>
<tr>
<td>20</td>
<td>Delays in costing variations and additional works</td>
<td>3.41</td>
<td>17</td>
<td>2.91</td>
<td>41</td>
</tr>
<tr>
<td>21</td>
<td>Often changing subcontractors</td>
<td>3.09</td>
<td>38</td>
<td>3.36</td>
<td>26</td>
</tr>
<tr>
<td>22</td>
<td>Lack of experience of project type</td>
<td>3.05</td>
<td>40</td>
<td>3.18</td>
<td>32</td>
</tr>
<tr>
<td>23</td>
<td>Lack of experience of local regulation</td>
<td>2.86</td>
<td>42</td>
<td>3.00</td>
<td>39</td>
</tr>
<tr>
<td>24</td>
<td>Inadequate project preparation, planning and implementation</td>
<td>3.59</td>
<td>9</td>
<td>3.64</td>
<td>11</td>
</tr>
<tr>
<td>25</td>
<td>Delay in construction, poor procurement and supply of raw Materials and equipment by contractors</td>
<td>3.86</td>
<td>1</td>
<td>3.91</td>
<td>3</td>
</tr>
<tr>
<td>26</td>
<td>Change in the scope of the project, in government policies</td>
<td>3.14</td>
<td>36</td>
<td>3.18</td>
<td>32</td>
</tr>
<tr>
<td>27</td>
<td>Resources constraint: funds and associated auxiliaries not ready</td>
<td>3.18</td>
<td>32</td>
<td>3.00</td>
<td>39</td>
</tr>
<tr>
<td>28</td>
<td>Delays in decisions making by Government, failure of specific coordinating</td>
<td>3.55</td>
<td>11</td>
<td>3.73</td>
<td>9</td>
</tr>
<tr>
<td>29</td>
<td>Wrong / inappropriate choice of site</td>
<td>2.73</td>
<td>46</td>
<td>2.91</td>
<td>41</td>
</tr>
<tr>
<td>30</td>
<td>Technical incompetence, poor organizational structure, and failures of the enterprise</td>
<td>3.36</td>
<td>24</td>
<td>3.45</td>
<td>17</td>
</tr>
<tr>
<td>31</td>
<td>Labor unrest</td>
<td>2.82</td>
<td>44</td>
<td>2.91</td>
<td>41</td>
</tr>
<tr>
<td>32</td>
<td>Lack of experience of technical consultants</td>
<td>3.64</td>
<td>6</td>
<td>3.09</td>
<td>36</td>
</tr>
<tr>
<td>33</td>
<td>Inadequate waste management</td>
<td>3.27</td>
<td>28</td>
<td>3.82</td>
<td>5</td>
</tr>
<tr>
<td>34</td>
<td>Mistakes during construction by contractors</td>
<td>3.41</td>
<td>17</td>
<td>3.45</td>
<td>17</td>
</tr>
<tr>
<td>35</td>
<td>Poor project experience</td>
<td>3.41</td>
<td>17</td>
<td>3.45</td>
<td>17</td>
</tr>
<tr>
<td>36</td>
<td>Poor site management</td>
<td>3.59</td>
<td>9</td>
<td>3.55</td>
<td>14</td>
</tr>
<tr>
<td>37</td>
<td>Unsettlement of the local currency in relation to dollar value</td>
<td>3.50</td>
<td>13</td>
<td>3.45</td>
<td>17</td>
</tr>
</tbody>
</table>
### Table: 4.4. Main causes by weighted average

The above table indicated that the average weighted rank has a little bit differentiation from the above merged result based on table 4.3 the main cause was “financial difficulties by contractors”, but the result showed on table 4.4 the first cause could be “Poor procurement and delay in supply of raw materials and equipment by client”, but most of the main causes were similar to the one above. Therefore, we can say most of the respondents were rational when giving response to the questionnaires. Though, it should be supported by correlation.

#### 4.3.3 Main causes with different aspects

This part is mainly designed to show the main causes of cost overrun in different various ways. In this regard the causes have categorized in to six main aspects and tried to investigate the main causes in each aspect and the main one from the six aspects.
i. **Economic aspect**

![Figure 4.1 Economic aspects for significant factors](image)

Fig: 4.1. Main cause based on Economic aspect  (Source: Own survey, 2018)

The above figure shows that out of 52 respondents, the numbers of respondents that believe market inflation as a significant factor for economic aspects in percentage are 16 (31%). Whereas in the other hand a few number of respondents which are 1(2%) indicated that market inflation is not a significant factor as an economic aspect. The other respondents which are 18(35%) in number believe that resource constraint funds are a very significant factor for economic aspect whereas 2(4%) believe it’s not a significant factor for economic aspects. As for the low productivity of labor; 8 (15%) and 18 (35%) and high cost of labor 5 (10%) and 14 (27%) respondents have agreed that the factors are extremely and very significant for economic aspects respectively. 13 (25%), 11 (21%) and 2 (4%) of respondents indicated that low productivity of labor is moderately, slightly and not significant factor for economic aspects respectively. 11
(21%), 14 (27%) and 8 (15%) of respondents have agreed that high cost of labor is moderately, slightly and not a significant factor for economic aspects respectively.

<table>
<thead>
<tr>
<th>Factors /causes/</th>
<th>CL in %</th>
<th>Rank in CL</th>
<th>CS in %</th>
<th>Rank in CS</th>
<th>CT in %</th>
<th>Rank in CT</th>
<th>EF in %</th>
<th>Rank in EF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market inflation</td>
<td>31</td>
<td>3</td>
<td>8</td>
<td>3</td>
<td>13</td>
<td>5</td>
<td>60</td>
<td>1</td>
</tr>
<tr>
<td>Resources constraint: funds and associated auxiliaries not ready</td>
<td>58</td>
<td>1</td>
<td>13</td>
<td>1</td>
<td>13</td>
<td>5</td>
<td>23</td>
<td>5</td>
</tr>
<tr>
<td>Labor unrest</td>
<td>19</td>
<td>4</td>
<td>13</td>
<td>1</td>
<td>58</td>
<td>2</td>
<td>27</td>
<td>4</td>
</tr>
<tr>
<td>Unsettlement of the local currency in relation to dollar value</td>
<td>17</td>
<td>5</td>
<td>11</td>
<td>2</td>
<td>35</td>
<td>3</td>
<td>44</td>
<td>2</td>
</tr>
<tr>
<td>Shortage of Project materials and monopoly by some suppliers</td>
<td>50</td>
<td>2</td>
<td>11</td>
<td>2</td>
<td>19</td>
<td>4</td>
<td>37</td>
<td>3</td>
</tr>
<tr>
<td>Low productivity of labor</td>
<td>13</td>
<td>6</td>
<td>11</td>
<td>2</td>
<td>67</td>
<td>1</td>
<td>17</td>
<td>6</td>
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<tr>
<td>High cost of labor</td>
<td>17</td>
<td>5</td>
<td>8</td>
<td>3</td>
<td>52</td>
<td>3</td>
<td>27</td>
<td>4</td>
</tr>
</tbody>
</table>

Table: 4.5 Main causes based on Economic aspect (Source: Own survey, 2018)

As illustrated in the above table, 58% of the respondents have indicated that the resources constraint: funds and associated auxiliaries not ready were the first significant factor for economic aspect and the responsible body were the clients, 50% and 31% of respondents have indicated that shortage of project materials and monopoly by some suppliers and market inflation were the second and third Factors /causes/ for economic aspect and the responsible body were the clients respectively. Labor unrest, unsettlement of the local currency in relation to dollar value and high cost of labor, and low productivity of labor were the fourth, fifth and six Factors /causes/ for economic aspects with regarding to the responsible body is the client. For responsible bodies regarding to consultants’ labor unrest and resources constraint: funds and associated auxiliaries not ready were the first
Factors /causes/ for economic aspects. Unsettlement of the local currency in relation to dollar value; shortage of Project materials and monopoly by some suppliers and low productivity of labor were the second Factors /causes/ for economic aspects. Market inflation and high cost of labor were the third Factors /causes/. For responsible bodies regarding to contractor: low productivity of labor and labor unrest were the first and second significant factor. Unsettlement of the local currency in relation to dollar value and high cost of labor were the third Factors /causes/ .For responsible bodies regarding to external factor: market inflation; unsettlement of the local currency in relation to dollar value; and shortage of project materials and monopoly by some suppliers were the first, second and third Factors /causes/ respectively. Labor unrest; resources constraint: funds and associated auxiliaries not ready; and low productivity of labor were the fourth, fifth and sixth Factors /causes/ for economic aspects respectively.

ii. Financial aspect

![Figure 4.2: Financial aspects for significant factor](image)

Fig: 4.2. Main causes based on financial aspect
Figure 4.2 shows that, 3 (6%) and 21 (40%) of respondents have selected that delay in progress payments is extremely and very significant factor for financial aspects, whereas 16 (31%), 11 (21%) and 1 (2%) of respondents indicated that moderately, slightly and not significant factors respectively. This be a sign of majority of the respondents believe that delay in progress payments is a major factor as a financial aspect. For financial difficulties 20 (38%) and 14 (27%) of respondents were agreed that it is extremely and very significant factor for financial aspects, whereas 15 (29%), 1 (2%) and 2 (4%) were agreed that it is moderately, slightly and not significant factors respectively. For Poor financial planning, monitoring and controlling mechanisms 21 (40%) and 12 (23%) of respondents were agreed that it is extremely and very significant factor whereas 7 (13%), 9 (17%) and 3 (6%) were agreed that it is moderately, slightly and not significant factors respectively. For contractual claims, such as, extension of time with cost claims 5 (10%) and 7 (13%) and delays in costing variations and additional works 10 (19%) and 16 (31%) of respondents were agreed that it is extremely and very significant factor respectively whereas 22 (42%), 14 (27%) and 4 (8%) of respondents were agreed that it is moderately, slightly and not significant factors for contractual claims respectively. For cost underestimation issue 11 (21%) and 18 (35%) of respondents were agreed that it is extremely and very significant factor respectively whereas 8 (15%), 8 (15%) and 7 (13%) of respondents were agreed that it is moderately, slightly and not significant factors respectively.
Table 4.6. Main causes based on financial aspect (Source: Own survey, 2018)

As table 4.6 shows that, 79% of the respondents have indicated that delay in progress payments were the first significant factor in financial aspect and the responsible body were client, 58% and 56% of respondents were indicating that cost underestimation and delays in costing variations and additional works were the second and third significant factor in financial aspect and the responsible body were client respectively. Poor financial planning, monitoring and controlling mechanisms, and contractual claims, such as extension of time with cost claims and financial difficulties by contractor were the fourth, fifth and six significant factors in financial aspects with regarding to the responsible body of client.
iii. Technical aspect

Fig: 4.3. Main causes based on technical aspects (Source: Own survey, 2018)

In order to find out technical aspects for significant factor, 18 and 13 of respondents in omission and errors indicate that it is very significant and moderately significant as a technical aspect. Whereas 10 and 4 of respondents indicate that omission and error is extremely significant and moderately significant factors respectively. 4 respondents indicate that delay omission and error is not significant factor as in technical aspect. This indicates that majority of the respondents believe that omission and error is a major factor in technical aspects. On the other hand poor project experience, 15 and 14 of respondents indicate that it is extremely significant and very significant factor in technical aspect. 7 of respondents indicate that poor project experience is moderately significant as a technical
aspect. Whereas 13 and 4 of respondents indicate that poor project experience is slightly significant and not significant factors respectively. 4 respondents indicate that delay omission and error is not significant factor as in technical aspect. This indicates that majority of the respondents believe poor project experience is a major factor in technical aspects

<table>
<thead>
<tr>
<th>Factors /causes/</th>
<th>CL in %</th>
<th>Rank in CL</th>
<th>CS in %</th>
<th>Rank in CS</th>
<th>CT in %</th>
<th>Rank in CT</th>
<th>EF in %</th>
<th>Rank in EF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omissions and errors in the bills of quantities</td>
<td>50</td>
<td>3</td>
<td>58</td>
<td>1</td>
<td>19</td>
<td>10</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Lack of experience of project type</td>
<td>38</td>
<td>5</td>
<td>42</td>
<td>5</td>
<td>60</td>
<td>4</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Lack of experience of local regulation</td>
<td>61</td>
<td>1</td>
<td>42</td>
<td>5</td>
<td>44</td>
<td>8</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Inadequate project preparation, planning and implementation</td>
<td>56</td>
<td>2</td>
<td>48</td>
<td>3</td>
<td>46</td>
<td>7</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Technical incompetence, poor organizational structure, and failures of the enterprise</td>
<td>61</td>
<td>1</td>
<td>17</td>
<td>10</td>
<td>17</td>
<td>11</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>Lack of experience of technical consultants</td>
<td>33</td>
<td>8</td>
<td>48</td>
<td>3</td>
<td>21</td>
<td>9</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Inadequate wastage management</td>
<td>50</td>
<td>3</td>
<td>29</td>
<td>7</td>
<td>58</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Mistakes during construction by contractors</td>
<td>21</td>
<td>11</td>
<td>36</td>
<td>6</td>
<td>67</td>
<td>2</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Poor project experience</td>
<td>35</td>
<td>7</td>
<td>44</td>
<td>4</td>
<td>61</td>
<td>3</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Poor site management</td>
<td>42</td>
<td>4</td>
<td>48</td>
<td>3</td>
<td>58</td>
<td>5</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Lack of sub-contractor skills</td>
<td>23</td>
<td>10</td>
<td>19</td>
<td>9</td>
<td>69</td>
<td>1</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Inadequate quality assurance and quality control plans</td>
<td>36</td>
<td>6</td>
<td>54</td>
<td>2</td>
<td>69</td>
<td>1</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Shortage of experienced technical staff</td>
<td>42</td>
<td>4</td>
<td>58</td>
<td>1</td>
<td>67</td>
<td>2</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Poor material and Equipment handling on site</td>
<td>29</td>
<td>9</td>
<td>23</td>
<td>8</td>
<td>48</td>
<td>6</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

Table: 4.7. Main causes based on technical aspects (Source: Own survey, 2018)
Table 4.8 illustrate that technical incompetence, poor organizational structure, and failures of the enterprise and lack of experience of local regulation were the first Factors /causes/ regarding to responsible body of client on the other hand, inadequate project preparation, planning and implementation; omissions and errors in the bills of quantities and inadequate waste management were the second and third significant factor. Shortage of experienced technical staff and poor site management; lack of experience of project type; inadequate quality assurance and quality control plans were the fourth, fifth and sixth significant factor respectively.

iv. **Procurement aspect**

![Figure 4.5: Procurement aspect for significant factor](image)

Fig: 4.4. Main causes based on Procurement aspect (Source: Own survey, 2018)

As shown in the above figure, lack of coordination at design phase as a significant factor 16 (31%) and 10 (19%) of respondents were agreed on it is extremely and very significant factor respectively whereas 13 (25%), 9 (17%) and 4 (8%) of respondents
were agreed it is moderately, slightly and not significant factor respectively. For poor procurement and delay in supply of raw materials and equipment by client 18 (35%) and 17 (33%) and delay in construction, poor procurement and supply of raw materials and equipment by contractors 17 (33%) and 21 (40%) of respondents were indicate that it is extremely and very significant factor respectively whereas for poor procurement 12 (23%) and 5 (10%) of respondents were agreed on it is slightly and not significant factor respectively and for delay in construction issue 6 (12%), 3 (6%) and 5 (10%) of respondents were agreed on it is moderately, slightly and not significant factor respectively. 4 (8%) and 17 (33%) of respondents were agreed on it is extremely and very significant respectively factor for inappropriate choice of site where as 9 (17%), 10 (19%) and 12 (23%) of respondents were agreed on it is moderately, slightly and not significant factor respectively.

<table>
<thead>
<tr>
<th>No</th>
<th>Factors /causes/</th>
<th>CL in %</th>
<th>Rank in CL</th>
<th>CS in %</th>
<th>Rank in CS</th>
<th>CT in %</th>
<th>Rank in CT</th>
<th>EF in %</th>
<th>Rank in EF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lack of coordination at design phase.</td>
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<td>71</td>
<td>1</td>
<td>19</td>
<td>4</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Poor procurement and delay in supply of raw materials and equipment by client</td>
<td>71</td>
<td>1</td>
<td>35</td>
<td>2</td>
<td>23</td>
<td>3</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Delay in construction, poor procurement and supply of raw Materials and equipment by contractors</td>
<td>23</td>
<td>5</td>
<td>21</td>
<td>4</td>
<td>63</td>
<td>1</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Wrong / inappropriate choice of site</td>
<td>58</td>
<td>2</td>
<td>17</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>33</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Poor quality of material and equipment</td>
<td>48</td>
<td>4</td>
<td>27</td>
<td>3</td>
<td>58</td>
<td>2</td>
<td>52</td>
<td>1</td>
</tr>
</tbody>
</table>

Table: 4.8. Main causes based on procurement aspect (Source: Own survey, 2018)

In table 4.5 it is illustrated that poor procurement and delay in supply of raw materials and equipment by client; wrong / inappropriate choice of site and lack of coordination at
design phase is the first, second and third Factors /causes/ for responsible body of client where as poor quality of material and equipment and delay in construction, poor procurement and supply of raw materials and equipment by contractors were the fourth and fifth Factors /causes/ respectively. For responsible body of consultants lack of coordination at design phase; poor procurement and delay in supply of raw materials and equipment by client; and poor quality of material and equipment are the first, second and third Factors /causes/ whereas delay in construction, poor procurement and supply of raw materials and equipment by contractors and wrong / inappropriate choice of site were the fourth and fifth Factors /causes/. For responsible body of contractor delay in construction, poor procurement and supply of raw materials and equipment by contractors; poor quality of material and equipment; and poor procurement and delay in supply of raw materials and equipment by client were the first, second and third Factors /causes/ respectively whereas lack of coordination at design phase and wrong / inappropriate choice of site were fourth and fifth Factors /causes/. Poor quality of material and equipment and wrong / inappropriate choice of site were the first and second Factors /causes/ where as poor procurement and delay in supply of raw materials and equipment by client; lack of coordination at design phase and delay in construction, poor procurement and supply of raw materials and equipment by contractors are the third and fourth Factors /causes/.
v. Contract management aspect

As can be seen in the above, 12 (23%), 12 (23%), 12 (23%) of the respondents were agreed on inappropriate type of project bidding and award were extremely, moderately and slightly significant factor respectively whereas 10 (19%) and 6 (12%) of the respondents were agreed on it is very and not significant factor respectively. The above figure shows that in this aspect unrealistic contract duration, delay in decision making progress and poor coordination had the highest mark on E.S. by getting 18, 16 and 14 respectively. In V.S. the respondents were selected incompleteness of design, design changes and changing subcontractors by scoring 18, 17 and 17 respectively.

All in all, the top three main causes on this aspect were: delay in decision making, unrealistic contract duration and design changes and late approval.
In contract management aspect, the table above indicated that the client were very responsible for the causes that; change in scope, delay in decision making and in appropriate type of bidding and award. Whereas for incompleteness and mistake of design, design changes and delay in decision making were consultants’ responsibility.

On the one hand contractors were highly responsible for; poor coordination, changing Sub-contractors and delay in decision making, on the other for laws and regulation change, change in scope and owner interference had gone to external factors.

<table>
<thead>
<tr>
<th>No</th>
<th>Factors /causes/</th>
<th>CL in %</th>
<th>Rank in CL</th>
<th>CS in %</th>
<th>Rank in CS</th>
<th>CT in %</th>
<th>Rank in CT</th>
<th>EF in %</th>
<th>Rank in EF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inappropriate type of project bidding and award</td>
<td>67</td>
<td>3</td>
<td>23</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Incompleteness, Mistakes and discrepancies in design and contract documents at the time of tender</td>
<td>27</td>
<td>8</td>
<td>73</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Design changes and late in approving design documents</td>
<td>52</td>
<td>6</td>
<td>60</td>
<td>2</td>
<td>8</td>
<td>6</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Delay in delivering the site to the contractor</td>
<td>67</td>
<td>3</td>
<td>36</td>
<td>5</td>
<td>11</td>
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<td>6</td>
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<td>5</td>
<td>Unrealistic contract duration</td>
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<td>4</td>
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<td>23</td>
<td>3</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Work suspension by clients</td>
<td>67</td>
<td>3</td>
<td>23</td>
<td>15</td>
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<td>Delay in decision making process</td>
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<td>29</td>
<td>2</td>
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<td>4</td>
</tr>
<tr>
<td>8</td>
<td>Owner interference</td>
<td>63</td>
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<td>8</td>
<td>11</td>
<td>5</td>
<td>11</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Poor coordination and communication b/t contractor and other parties</td>
<td>44</td>
<td>7</td>
<td>48</td>
<td>3</td>
<td>63</td>
<td>1</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Often changing sub-contractors</td>
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<td>8</td>
<td>63</td>
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<td>6</td>
<td>5</td>
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<tr>
<td>11</td>
<td>Change in the scope of the project, in government policies</td>
<td>71</td>
<td>1</td>
<td>10</td>
<td>7</td>
<td>8</td>
<td>6</td>
<td>19</td>
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<tr>
<td>12</td>
<td>Laws and regulations changes</td>
<td>56</td>
<td>5</td>
<td>10</td>
<td>7</td>
<td>15</td>
<td>4</td>
<td>46</td>
<td>1</td>
</tr>
</tbody>
</table>

Table: 4.9. Degree of responsibility for causes of contract management aspects
vi. External Factor/majeure/ aspect

Fig: 4.6. Main causes based on external majeure aspect (Source: Own survey, 2018)

As indicated in the figure above from procurement aspect factors, delay in decision making got the maximum percent 28%. While, on the respondents’ experience unpredictable weather condition has not such impact on causes of cost overrun, not only on this aspect but even on general causes. Lengthy Bureaucracy and laws’ and regulations’ change also the factors which have a contribution to causes of cost overrun in external majeure aspect.

| No | Factors /causes/                                      | CL in % | Rank in CL | CS in % | Rank in CS | CT in % | Rank in CT | EF in % | Rank in EF |
|----|-------------------------------------------------------|---------|------------|---------|------------|---------|------------|---------|------------|           |
| 1  | Lengthy bureaucracy in government entities           | 67      | 1          | 21      | 1          | 2       | 4          | 23      | 3          |
| 2  | Unpredictable weather conditions                      | 10      | 4          | 10      | 2          | 10      | 2          | 75      | 1          |
| 3  | Delays in decisions making by Government, failure of specific coordinating | 60      | 2          | 6       | 3          | 6       | 3          | 23      | 3          |
| 4  | Laws and regulations changes                         | 56      | 3          | 10      | 2          | 15      | 1          | 46      | 2          |

Table:4.10. Degree of responsibility for causes of external majeure aspects

As tried to illustrate on the above table 67% of the respondent were selected the client
for the responsibility of lengthy bureaucracy. Not only that but the consultant also somehow responsible for the bureaucratic problem. Even though, it is not convincing, the respondent selected the contractor to responsible for laws and regulation changes. It is obvious that for unpredictable weather condition none of the parties could be responsible, but on the other way they have to predict and plan unpredictable situation on running the construction projects.

4.3.4 Causes of cost overrun based on responsibility
On this study the other main issue should be which party has a great positive impact on causes of cost overrun in 40/60 saving house construction projects? That’s why the questionnaire was designed with including the responsibility questions. The table below shows that the degree of responsibility of parties for all causes.

<table>
<thead>
<tr>
<th>No</th>
<th>Responsible body</th>
<th>Total selected amount</th>
<th>Selected amount by %</th>
<th>Responsibility by %</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Client</td>
<td>1112</td>
<td>45.50</td>
<td>35.84</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Consultant</td>
<td>751</td>
<td>30.73</td>
<td>24.20</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Contractor</td>
<td>846</td>
<td>34.62</td>
<td>27.26</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>External factor</td>
<td>394</td>
<td>16.12</td>
<td>12.70</td>
<td>4</td>
</tr>
</tbody>
</table>

Table: 4.11. Causes of cost overrun based on responsibility

Based on the analysis result which is presented on Table: 4.12.: the client selected 1112 times from 52 respondents for about 47 Factors /causes/. That will be 45.5 % of responsibility from individual result. Contactor, consultant and external factor had got 34.6, 30.73 and 16.12% respectively.

Apart from this, when compute the response with each other (i.e. in among four responsible bodies) form the total 100% of responsibility of the parties Client scored the maximum percentile 35.84. Whereas by getting 27.26, 24.2 and 12.7 the contractor, consultant and external factors will be 2nd, 3rd and 4th in a rank position.
4.3.5 Main causes of cost overrun

i. Main cause from merged result

As indicated in table 4.3 by merging all respondents reply and analyzed the mean score the following main causes of cost overrun have been displayed.

<table>
<thead>
<tr>
<th>No</th>
<th>Factors /causes/</th>
<th>Cumulative result</th>
<th>Mean score</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Financial difficulties by contractor</td>
<td>205</td>
<td>2.49</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Poor procurement and delay in supply of raw materials and equipment by client</td>
<td>204</td>
<td>2.45</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Delay in construction, poor procurement and supply of raw materials and equipment by contractors</td>
<td>198</td>
<td>2.41</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Market inflation</td>
<td>195</td>
<td>2.37</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Poor financial planning, monitoring and controlling mechanisms</td>
<td>195</td>
<td>2.37</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Delay in decision making process</td>
<td>194</td>
<td>2.36</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Poor quality of material and equipment</td>
<td>189</td>
<td>2.29</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>Delays in decisions making by Government, failure of specific coordinating</td>
<td>189</td>
<td>2.29</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>Poor material and Equipment handling on site</td>
<td>187</td>
<td>2.27</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>Unrealistic contract duration</td>
<td>185</td>
<td>2.25</td>
<td>10</td>
</tr>
<tr>
<td>11</td>
<td>Inadequate project preparation, planning and implementation</td>
<td>185</td>
<td>2.25</td>
<td>10</td>
</tr>
<tr>
<td>12</td>
<td>Lengthy bureaucracy in government entities</td>
<td>185</td>
<td>2.25</td>
<td>10</td>
</tr>
</tbody>
</table>

Table: 4.12. Main causes of cost overrun based on merged result

The above table justified that financial capacity of the contractor is selected as the main factor for cost overrun in 40/60 saving house projects. However it is not ranked on number one, on the weighted average and desk study analysis it is indicated as major factor of cost overrun. More over poor procurement and delay of materials by client and also by contractor, market inflation and poor planning, monitoring and controlling mechanisms are the core problems which would be the cause of cost overrun on these projects.
ii. **Main causes of cost overrun based on weighted average analysis**

The table below has shown the main causes of cost overrun in 40/60 saving house construction projects by analyzing the three main parties’ responses. Conducting mean score for each stakeholder’s responses and then calculating the average mean score was the process which has been used to found the result.

<table>
<thead>
<tr>
<th>No</th>
<th>Factors/causes/</th>
<th>Client</th>
<th>Consultant</th>
<th>Contractor</th>
<th>Weighted Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MS of</td>
<td>MS of</td>
<td>MS of</td>
<td>Average</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CL</td>
<td>CS</td>
<td>CT</td>
<td>MS</td>
</tr>
<tr>
<td>1</td>
<td>Poor procurement &amp; delay in supply of materials</td>
<td>3.86</td>
<td>4.09</td>
<td>3.95</td>
<td>3.97</td>
</tr>
<tr>
<td></td>
<td>and equipment by client</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Financial difficulties by contractor</td>
<td>3.86</td>
<td>4.09</td>
<td>3.74</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Delay in construction, poor procurement and supply</td>
<td>3.86</td>
<td>3.91</td>
<td>3.68</td>
<td>3.82</td>
</tr>
<tr>
<td></td>
<td>of Materials &amp; equipment by contractors</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Poor financial planning, monitoring and controlling</td>
<td>3.68</td>
<td>3.91</td>
<td>3.74</td>
<td>3.78</td>
</tr>
<tr>
<td></td>
<td>mechanisms</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Delay in decision making process</td>
<td>3.41</td>
<td>3.82</td>
<td>4.05</td>
<td>3.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Market inflation</td>
<td>3.82</td>
<td>3.64</td>
<td>3.74</td>
<td>3.73</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>9</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Delays in decisions making by Government, failure</td>
<td>3.55</td>
<td>3.73</td>
<td>3.68</td>
<td>3.65</td>
</tr>
<tr>
<td></td>
<td>of specific coordinating</td>
<td>7</td>
<td>8</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Poor quality of material and equipment</td>
<td>3.64</td>
<td>3.64</td>
<td>3.63</td>
<td>3.63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>9</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Poor material and Equipment handling on site</td>
<td>3.55</td>
<td>3.82</td>
<td>3.53</td>
<td>3.63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>5</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Lengthy bureaucracy in government entities</td>
<td>3.41</td>
<td>3.82</td>
<td>3.58</td>
<td>3.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>5</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Table: 4.13. Main causes of cost overrun based on weighted average analysis

When relate the average weighted result with the merged one, it seems the average result could be better and come closer to the truth of the main causes of the project.

Poor procurement and delay of materials on the client side and lack of financial capabilities has been the basic problem of 40/60 saving house construction projects.
Besides this delay in construction, poor procurement and delay of materials supply and also the other major factors of cost overrun which are selected by questionnaire respondent.

4.3.4 Spearman’s Rank Correlation Coefficient (rₜ)

As stated on chapter 3; equation 3.3 the Spearman rank correlation coefficient is used to determine whether the correlation of result of the two parties is strong or not. The value of the Spearman rank correlation coefficient will always be between +1 and -1. If ranges answer will be +1: perfect positive correlation, if its 0: no correlation and to −1: perfect negative correlation. The results of the correlation shown in Table 4.14: between client vs. consultant, client vs. contractor, and consultant vs. contractor would be 0.77, 0.78 and 0.65 respectively. These values show that there is very strong link between the rankings of client vs. contractor. Even the correlation of rankings between client vs. consultant and consultant vs. contractor is also strong.

<table>
<thead>
<tr>
<th>Respondent parties</th>
<th>Client vs. Consultant</th>
<th>Client vs. Contractor</th>
<th>Consultant vs. Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>rₜ = \frac{1}{N^3 - N} \sum d^2</td>
<td>0.77</td>
<td>0.78</td>
<td>0.65</td>
</tr>
<tr>
<td>Link /Correlation/</td>
<td>Strong</td>
<td>Strong</td>
<td>Strong</td>
</tr>
</tbody>
</table>

Table: 4.14. Spearman’s Rank Correlation Coefficient result

4.3.5 Main cause of cost overrun form desk study

The first design of Addis Ababa saving house 40/60 was prepared by ETG Consulting and approved by MOWUD. But the first design was not interrelated to strategic plan of AASHDE. Therefore, it was be obliged to revise the design. In the design review, supervision and contract administration, ten class-1 and class-2 consulting groups have participated. A total of 153 Grade 1 up to 3 contractors have participated for the
construction until now. Different suppliers and Micro and small enterprises have also participated in construction projects. MSE involves in production, loading and unloading, and installation works.

However, the project has a lot of advantages for the community, the stakeholders that are participating on the project and the construction industry as a whole; the delay and cost overrun have been challenged the projects.

I have tried to support the questionnaire response through interview and desk study. 6 professionals were participating in the interview session, 2 participants from contractor, 2 from consultant and the other 2 of from AASHDE. As usual almost the entire participant had a tendency to push the cause to other parties. To maintain the interview answer, the desk study was conducted. On the desk study, different report claims, magazine, etc. were included. To Sum it up the following causes are the main causes which is summarized from interviews and desk study

1. Budget scarcity by client
2. Financial difficulties by contractor
3. Poor Procurement and late delivery of materials
4. Time overrun
5. Poor cost estimation, planning, monitoring and controlling
6. Poor site and waste management
7. Infrastructure problem (especially Electric power and water supply)
8. Late payment from client (to contractor, suppliers and MSE)
9. Market inflation
10. Late design review and approval
In construction projects, not only on 40/60 projects most of the factors are used as a consequence to the other. In fact, if there is financial shortage there would be shortage of material supply, and also if there is no sufficient material supply time overrun of construction will be expected.

### 4.4 Magnitude of cost overrun

In order to calculate the magnitude of cost overrun, it was really difficult getting the final payment of the buildings. Because of that, the AASHDE has not been paid the final payment for any contractor due to various reasons. Even though there was no final payment for buildings, the following payment table shows that the magnitudes of cost overrun in different Blocks of the buildings.

<table>
<thead>
<tr>
<th>No</th>
<th>Contractor</th>
<th>Typology</th>
<th>No. of Blocks</th>
<th>Site</th>
<th>Main Con. Amount/ with vat</th>
<th>Paid Amount /To date/</th>
<th>Cost Variation</th>
<th>Magnitude of cost overrun</th>
<th>Pay. period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TNT Contn</td>
<td>2B+ G+12</td>
<td>1</td>
<td>Sengatera</td>
<td>18,577,193.39</td>
<td>27,712,105.57</td>
<td>9,134,912.18</td>
<td>49.17%</td>
<td>17th</td>
</tr>
<tr>
<td>2</td>
<td>Data Contn</td>
<td>2B+ G+12</td>
<td>1</td>
<td>Sengatera</td>
<td>18,577,193.39</td>
<td>27,707,465.40</td>
<td>9,130,272.01</td>
<td>49.15%</td>
<td>19th</td>
</tr>
<tr>
<td>3</td>
<td>Equater Contn</td>
<td>2B+ G+12</td>
<td>1</td>
<td>Sengatera</td>
<td>18,577,193.39</td>
<td>28,115,044.38</td>
<td>9,537,850.99</td>
<td>51.34%</td>
<td>11th</td>
</tr>
<tr>
<td>4</td>
<td>Bereka Contn</td>
<td>B+ G+12</td>
<td>1</td>
<td>Sengatera</td>
<td>18,577,193.39</td>
<td>26,769,663.02</td>
<td>8,192,469.63</td>
<td>44.10%</td>
<td>16th</td>
</tr>
<tr>
<td>5</td>
<td>FE Contn</td>
<td>B+ G+12</td>
<td>1</td>
<td>Crown</td>
<td>26,958,090.49</td>
<td>31,209,518.93</td>
<td>12,632,325.54</td>
<td>68.00%</td>
<td>6th</td>
</tr>
<tr>
<td>6</td>
<td>Flintston Contn</td>
<td>B+G+9</td>
<td>2</td>
<td>Crown</td>
<td>26,958,090.49</td>
<td>4,428,495.52</td>
<td>16.43%</td>
<td>13th</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Tayam Engineering</td>
<td>B+G+9</td>
<td>2</td>
<td>Crown</td>
<td>26,958,090.49</td>
<td>231,890.70</td>
<td>0.86%</td>
<td>14th</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Wegen Contn</td>
<td>B+G+9</td>
<td>2</td>
<td>Crown</td>
<td>26,958,090.49</td>
<td>28,693,717.84</td>
<td>1,735,627.35</td>
<td>6.44%</td>
<td>14th</td>
</tr>
<tr>
<td>9</td>
<td>FE Contn</td>
<td>B+G+9</td>
<td>2</td>
<td>Crown</td>
<td>26,958,090.49</td>
<td>3,101,011.48</td>
<td>11.50%</td>
<td>7th</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Filahun Abebe B.C</td>
<td>B+G+9</td>
<td>2</td>
<td>Crown</td>
<td>26,958,090.49</td>
<td>4,537,892.83</td>
<td>16.83%</td>
<td>8th</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Muraza leja B.C</td>
<td>B+G+9</td>
<td>2</td>
<td>Crown</td>
<td>26,958,090.49</td>
<td>-6,504,764.43</td>
<td>-24.13%</td>
<td>8th</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Bokra Contn</td>
<td>B+G+9</td>
<td>2</td>
<td>Crown</td>
<td>26,958,090.49</td>
<td>31,888,963.80</td>
<td>4,930,873.31</td>
<td>18.29%</td>
<td>13th</td>
</tr>
</tbody>
</table>

Table: 4.15. Magnitude of cost overrun based on payment certificate

The table indicated that until now the maximum magnitude of cost overrun reaches to
68% and the minimum is -24%. But as stated above it couldn’t indicate the minimum magnitude of cost overrun.

To investigate the final magnitude of cost overrun in 40/60 saving house construction projects it is better to use the final payment which was paid by the previous lottery winners at Sengatera and Crown sites. In two sites the floor area of the houses also increased from the forecasted and strategic plan of AASDE. That’s why design changes have been done for the rest of undergoing construction projects. Thus areas of the rooms have been minimized for the next winners and which is close to the planned area.

The other dispute of this project was on the number of bed rooms. AASHDE skipped over the designed one bed rooms, and include unplanned four bed rooms on the lottery. The desk study and interviews showed that there was a communication barrier between the design team and AASHDE. The design team had designed one maid’s room for each bed room that was not considered as bed room. But finally AASHDE decided the maid’s room should be considered as one bed room, therefore the number of bed rooms had raised by one.

<table>
<thead>
<tr>
<th>No</th>
<th>No of Bedroom</th>
<th>Forecasted area</th>
<th>Actual area</th>
<th>Estimated cost Br/m²</th>
<th>Actual Cost Br/m²</th>
<th>Variation in %</th>
<th>Total amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>One</td>
<td>55 Omitted</td>
<td>2,289</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Two</td>
<td>75 124.97</td>
<td>3,300</td>
<td>4,880.00</td>
<td>48%</td>
<td>609,800.00</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Three</td>
<td>100 149.5</td>
<td>3,860</td>
<td>4935.00</td>
<td>28%</td>
<td>737,700.00</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Four unplanned</td>
<td>168.68</td>
<td>4900.00</td>
<td></td>
<td></td>
<td>826,200.00</td>
<td></td>
</tr>
</tbody>
</table>

Table 4:16 cost overrun per m² without CBE interest rate

<table>
<thead>
<tr>
<th>No</th>
<th>No of room</th>
<th>Area /m²</th>
<th>Current cost</th>
<th>Actual cost</th>
<th>CBE Interest rate</th>
<th>Total amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>One</td>
<td>Omitted</td>
<td>609,800.00</td>
<td>Omitted</td>
<td>Omitted</td>
<td>701,270.00</td>
</tr>
<tr>
<td>2</td>
<td>Two</td>
<td>124.97</td>
<td>91,470.00</td>
<td>110,650.00</td>
<td></td>
<td>848,350.00</td>
</tr>
<tr>
<td>3</td>
<td>Three</td>
<td>149.5</td>
<td>826,200.00</td>
<td>124,000.00</td>
<td></td>
<td>950,200.00</td>
</tr>
</tbody>
</table>

Table 4:17 cost overrun per m² with CBE interest rate
4.5 Effects of cost overrun

When distributing the Questionnaire the open ended questionnaire type was prepared to investigate the effects of cost overrun in 40/60 saving house construction projects. Most of the respondents were not voluntary to write and give opinions for the effects of cost overrun. I think the reason behind was that; they were unwilling to point out their defects as well as they have not been analyzing such type of investigation on their work environment. Based on this limitation, it is true that I couldn’t get better result for the study. Therefore I had to support by using interview questions.

4.5.4 Effects of cost overrun based on Questionnaire responses

Significant effects of cost overrun which have been collected through open ended questionnaires are:

i. Delay of payment from client
ii. Shortage of materials occurred
iii. Dispute among parties
iv. Construction projects will be delayed
v. Financial scarcity on client and contractor

4.5.5 Effects of cost overrun based on desk study

Unfortunately, based on desk study the most significant effects of cost overrun have appeared on occupants. To get residential house from AASHDE Registration for the middle-class public housing scheme started on August 12, 2013. Since then, close to 165,000 citizens have registered, and currently, there are more than 136,000 people regularly saving and waiting for the next draw to come and from these, and 11,088 peoples already paid their due payment in full after saving for more than 18 months. It is
important to note that, the registered peoples were initiated by the promise of Government to be the owner of residential house within 2 years from the registration date. If somebody has registered on two bed room scheme and paid full payment on registered period, he has obligated to pay 250,000.00 Birr. In regard to that I interviewed one person who registered and paid the estimated payment on the date of registration. He is doing different jobs, mainly buying and selling used cars. He said if that money was on his hand he can gain 10,000.00 average profits per month, in fact by using simple calculation within 6 years his profit would have been 720,000.00. Conversely, he is now paying money for rent for about four extra years. Finally if he will be the lottery winner of this program, he would be obligated to pay the revised 848,350.00 Birr (if the cost will be similar to the previously transferred houses) included CBE interest rate (even he paid full payment on the first day). In this case time value of money also should be considered. Thereof we can safely assume that the effect of cost overrun will go largely to registered peoples.

Not only the dwellers have been affected by cost overrun but also the contractor, client and consultant are affected by cost overrun in various ways.

To make a long story short, the following effects have been summarized from desk study and interviews from 6 participants (described above at analysis of causes):

i. Effects on stakeholders

➢ Dispute among construction teams
➢ Minimize and even loss of profit for the contractor
➢ Destruction of professional relations
➢ Finance shortage for client
➢ Finance shortage for contractor
➢ Affect the quality of the construction (poor workmanship & quality of materials)
➢ Loss of client’s confidence on consultant

ii. Effects on construction industry
➢ Reduced competitiveness of the economy
➢ The industry may include in high risk investment
➢ Discouraged sponsors from investing in construction
➢ Delays in construction project

iii. Effects on end user and Government
➢ End users pay an additional unplanned payment
➢ Some registered peoples may discontinue saving the money
➢ Affects good governance
➢ Lack of trust on the Government
➢ The sector contribution rate for the GDP will be decreased

4.6 Mitigation measures
Based on the findings from interviews and desk study; the following points should be take in to account by main stakeholders to minimize the cost overrun.

i. Client/ AASHDE/

The client should do the following:
➢ Enforce the government to allocate sufficient budget for the projects with relating to the demand and enhance financial management of the enterprise to pay the payments on time.
➢ Prepare appropriate resource plan and road map which is used to accomplish the goal of the enterprise.

➢ Ensure that the plan in compliance with the actual resource and demand to minimize over ambitious tendency when planning the project.

➢ The human resource should recruit competent technical staff as much as possible.

➢ Facilitate strong coordination among stakeholders, especially with consultants, contractors, suppliers and SMEs throughout the process of the construction.

➢ Proper cost estimation method should be applied to minimize cost variation between actual cost and planned cost.

➢ Implement the necessary measures to reduce construction cost, since construction cost reduction is one way of reducing potential cost overrun.

➢ Quality control and quality assurance system should be well organized to approve and use the right supply of materials and equipments based on specifications.

➢ Planning and controlling mechanisms should be get better to avoid wastage of time and materials.

➢ Method of recruitment and delivery of materials should be well organized and hence the contractor can get and use the right material at the right time.

ii. Consultants

The Consultants should do the following:

➢ Allocate sufficient time and budget to design phase in order to avoid or minimize frequent design changes.
➢ Adopt efficient and direct communication system; hence different information can transfer from one party to the other.

➢ Provide comprehensive information required for easier interpretation of the drawings and setting out of the works.

➢ Implement good Planning coordinating and controlling techniques to assure the quality of materials, equipments and building at all the entire process of the construction.

➢ Organize clear and standardize Specifications as much as possible for ease of understanding by project participants; ensure adequate and realistic specifications of materials and methods are stated in the contract documents.

iii. Contractors

The Contractors should do the following:

➢ Allocate sufficient budget based on proper cost estimation to avoid delay and hence to avoid cost overrun due to delay.

➢ Control and minimize wastage of materials by using appropriate method; as far as I can see, applying KAIZEN is the best method to solve these types of problems.

➢ Procure construction materials and other items in collaboration with the client and consultants ahead of time.

➢ Solve problems and propose solutions on construction projects proactively.

➢ Minimize adversarial relations with stakeholders on construction projects.

➢ Ensure efficient time management through proper resource planning, duration estimation, and schedule development and control.
iv. Government

Even though the final beneficiaries would be the community, the client of the 40/60 construction is the government itself. It is important to note that AASHDE also part of governmental organization, but it’s better to look at each one separately for this paper.

Therefore the government should do the following:

➢ The government should explore its own financial capacity when making a decision to carry out such type of sensitive construction projects.
➢ Release the required budget on time to avoid the construction from delay and cost overrun
➢ Create suitable environment for local industries production of construction materials to be produced from local materials and production of enough quantity and quality of construction materials in the local market, this will curtail excessive price fluctuations associated with imported construction materials.
➢ Carry on capacity building programs for professionals especially for MSEs on the construction industry. There must be training programs for institutional strengthening and man power development in the areas of construction project management
➢ Facilitate main infrastructures around construction project sites to pick up the pace of construction process.

4.7 Summary of findings
Identification of causes of cost overrun is a prerequisite to minimize or to avoid cost overrun in the construction industry. The main objective of this research is, therefore, to
identify and investigate the main causes and effects of cost overrun on Addis Ababa saving house construction projects. Desk study and interviews were used to identify the existence and extent of cost overrun on 40/60 saving house construction projects. Questionnaire survey was also used to identify the causes and effects of cost overrun. Clients, consultants and contractors were asked to identify the variables of cost overrun in this construction projects.

Budget scarcity or financial difficulties by client and also by contractor has been found the main causes of cost overrun in 46/60 construction projects. It se well known the consequence of financial difficulties in construction industries would be time over. If there is delay in construction process, the cost would be the next affected main resource in the project in addition with poor financial management. Poor procurement process by client and contractor, delay in delivery and excessive wastage of materials, poor site management, and lack of good planning coordinating controlling mechanisms, delay in decision method and design change, market inflation and infrastructure problems were main causes that found from this thesis.

Cost overrun does not affect only those parties that are involved directly in the construction of a project, but its effects pass to the construction industry as a whole and consequently to the national economy of the country.

One of the common effects of cost overrun is delay; this in turn affects client, consultants and contractors as well as the community. Furthermore, extended delays increase cost overruns in an extreme way. Excessive cost overrun requires additional budget, this in turn eat up the scarce financial resources of the country, which lead to further budget short fall for construction projects. Cost overrun will also be a source of dispute among
stakeholders and it will lead to adversarial relationship among project participants. The clients will lose confidence on consultant and on professionals in general. To the industry as a whole, cost overruns could bring about a drop in building activities, bad reputation, and inability to secure project finance easily form public authorities in the future.

All stakeholders in the construction industry have to work for improving to sustain a healthy growth of the construction industry and to satisfy the needs of community by providing better quality of buildings with the planned time and budget. Especially consultants, contractors and clients have to use a holistic approach for solving problems in the construction industry; they have to familiarize themselves to the latest technology and methods to solve problems and look for solution proactively.
5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions
In this rapidly increasing construction sector, cost of the project is very much important from the feasibility point of view. Now-a-days, due to labor problems, market slowdowns, budget scarcity and changing business environment certain parameters are necessary to be considered for success of project Thus, it is essential to understand it’s fundamentals towards success of project.

In this paper, we have studied different causes and effects of 40/60 saving house construction projects. In order to accomplish the research objectives, we can justify the following results based on questionnaire survey and desk study

1. The questionnaire analysis result proved that poor procurement and delay supply of raw materials, Financial difficulties by contractor, Delay in construction, poor procurement and supply of raw Materials and equipment by contractors, Poor financial planning, monitoring and controlling mechanisms, Delay in decision making process, Market inflation, Delays in decisions making by Government, failure of specific coordinating, Poor quality of material and equipment, Poor material and Equipment handling on site and Lengthy bureaucracy in government entities are the main causes of cost overrun in 40/60 saving house projects

2. Main causes of cost overrun based on interviews and desk study are: Budget scarcity by client, Financial difficulties by contractor, Poor Procurement and late delivery of materials, Time overrun, Poor cost estimation, planning, monitoring and controlling, Poor site and waste management, Infrastructure problem
(especially Electric power and water supply), Late payment from client (to contractor, suppliers and MSE), Market inflation, Late design review and approval.

3. When analyzing the correlation of the response within the parties, the link between any two parties is strong.

4. From selected four (i.e. Client, consultant, contractor and external factor) main responsible bodies for cost overrun, the respondents gave a highest score to client. Relate to the other responsibilities the percentage of client is 35.84%. On the other way the result shows that external factors have a little impact (12%) on cost overrun. Contractor and consultant have got 27.6% and 24.2% respectively.

5. To know the magnitude of cost overrun, the researcher obligated to refer the lottery winners’ payment only. Because different reasons AASHDE haven’t paid full payment for any contractor. Even the transferred sites. So it was better to know the magnitude of cost overrun by computing the planned amount and the actual payment that the 40/60 lottery winners had to pay for CBE. Therefore, the magnitude of cost overrun was from 30% to 51% of the planned value. From the desk study it is assumed that there will be another additional cost on the 40/60 lottery winners.

6. Based on the questionnaire survey the main effects of cost overrun were: Delay of payment from client, Shortage of materials occurred, Dispute among parties, Construction projects being delayed and financial scarcity from the client and contractor.

7. Based on the desk study; the most affected party was the end user. Whatever the
reason could be, if there is cost escalation the end user will have to pay the actual amount of the house. Beyond this the main and other stakeholders, the construction industry and even the government also affected by cost overrun in 40/60 saving house construction projects.

5.2 Recommendations

Based on the findings of the following points are recommended for the future to avoid or minimize the causes and effects of cost overrun in 40/60 saving house projects and even the other public construction projects

1. Sufficient time should be given for preparing feasibility studies, planning, design, information documentation and tender submission. This helps avoiding or minimizing late changes.

2. More communication and coordination between project participants during all project phases.

3. Total cost should be carefully evaluated before undertaking a construction project Contract. Inaccurate estimates and design changes at the time of construction may directly affect the cost found initially

4. Tight and systematic control of any construction project can limit variation in works during construction, and this is absolutely necessary for successful financial outcomes of project

5. Top management must react positively to political and environmental changes by means of managerial and financial policies

6. Material prices and labor rates should be updated continuously.

7. Progress payment should be paid on time.
8. It is necessary that the project management team has a good forecasting technique to know the future business environment. This will help the owner or agency to take decision regarding procurement of materials.

9. The government should assign the right and technical person on managerial and top levels of such type of construction projects. Besides, training courses and workshops should be conducted to improve managerial skills of project participants.
6. REFERENCES


Swapnil P Wanjari and Gaurav Dobariya, “Identifying factors causing cost overrun of the construction projects in India”, Sadhana, June 2016, Vol. 41, No. 6, pp. 679–69

The constructor.org (2018)
https://theconstructor.org/construction/construction-project-costs-direct-indirect-costs/7677/

Wikipedia: last edited on 24 April 2018, at 09:07 (UTC).
https://en.wikipedia.org/wiki/Indirect_costs


Dear Participant

I am working the research on the Title of ‘Cost overrun in Addis Ababa Saving House construction Projects’ right now. This thesis is used for the partial fulfillment of the requirement for MBA in Construction Management at Addis Ababa Science and Technology University. The main objective of this research is to identify the major causes and effects of cost overrun in the 40/60 scheme project. To meet this research objective, it is necessary to have the response of contractors, client and consultants currently working on the scheme project and that’s why you are one of the stakeholders recruited to respond this questionnaire. Accuracy in answering the questions included in the questionnaire is very essential to accomplish the objective of the thesis. Moreover, your immediate responses also help me to finish the research in a planned time. Finally you can be sure for that your response will be kept confidential and will be used only for the purpose of this research

Looking forward to your soonest response

With Regards

Girum Moges  T/Haimanot

Advisor: - Teklu Kasu (Phd)

If you have any question or look for clarification on the questionnaire, please contact me on Mob:-09-11-33-09-08 or09-34-42-72-27
E-mail:- girumrsrah@gmail.com

QUESTNAIRE FOR RESEARCH THESIS
SECTION A: GENERAL ORGANIZATION INFORMATION

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<table>
<thead>
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<tbody>
<tr>
<td>1.</td>
<td>Name of organization:- __________________________</td>
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<tr>
<td>2.</td>
<td>Type of organization:- Client [ ] Consultant [ ] Contractor [ ]</td>
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<tr>
<td>3.</td>
<td>Respondent’s education level: Diploma [ ] BSC [ ] MSC [ ] PHD [ ]</td>
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<tr>
<td>4.</td>
<td>Respondent’s designation: - Owner of organization [ ] Project manager [ ] Site Engineer [ ] Office Engineer [ ] Other ___________________</td>
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<tr>
<td>5.</td>
<td>Relevant working experience in Construction sites (Years): 1-3 Yrs. [ ] 3-5 Yrs. [ ] 5-10 Yrs. [ ] &gt;10 Yrs. [ ]</td>
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<td>6.</td>
<td>Relevant working experience in Condominium sites (Years): 1-3 Yrs. [ ] 3-5 Yrs. [ ] 5-10 Yrs. [ ]</td>
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<td>7.</td>
<td>Location of organization: ______________________________________________________</td>
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</tbody>
</table>

Appendices

Appendix I- Questionnaire
1. Please indicate the main each factor by ticking the appropriate boxes. Add any remarks relating to each factor on the last column e.g. as to the reasons, the critical factors or the solutions.

**Significant factors:-**

E.S. = extremely significant (%100); V.S. = very significant (%75); M.S. = moderately significant (%50); S.S. = slightly significant (%25); N.S. = not significant (0)

**Responsible body: (You can thick more than one)**

CL = Client  CS = Consultant  CT = Contractor  EF = External factor

<table>
<thead>
<tr>
<th>No</th>
<th>Factors /causes/</th>
<th>Significant factors</th>
<th>Responsible body</th>
<th>Remarks</th>
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<tr>
<td></td>
<td></td>
<td>E.S. 100%</td>
<td>V.S. 75%</td>
<td>M.S. 50%</td>
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<tr>
<td>1</td>
<td>Delay in progress payments by client</td>
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<td>2</td>
<td>Financial difficulties by contractor</td>
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<td>3</td>
<td>Market inflation</td>
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<td>4</td>
<td>Inappropriate type of project bidding and award</td>
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<td>5</td>
<td>Incompleteness, Mistakes and discrepancies in design and contract documents at the time of tender</td>
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<td>6</td>
<td>Lengthy bureaucracy in government entities</td>
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<td>7</td>
<td>Design changes and late in approving design documents</td>
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<td>8</td>
<td>Unpredictable weather conditions</td>
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<td>9</td>
<td>Lack of coordination at design phase.</td>
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<td>10</td>
<td>Delay in delivering the site to the contractor</td>
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<td>11</td>
<td>Unrealistic contract duration</td>
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<td>12</td>
<td>Poor financial planning, monitoring and controlling mechanisms</td>
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<td>13</td>
<td>Work suspension by clients</td>
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<td>14</td>
<td>Delay in decision making process</td>
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<td>15</td>
<td>Owner interference</td>
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<td>16</td>
<td>Contractual claims, such as, extension of time with cost claims</td>
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<td>17</td>
<td>Poor coordination and communication b/t contractor and other parties</td>
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<td>18</td>
<td>Poor procurement and delay in supply of raw materials and equipment by client</td>
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<td>19</td>
<td>Omissions and errors in the bills of quantities</td>
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<td>20</td>
<td>Delays in costing variations and additional works</td>
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<td>21</td>
<td>Often changing sub-contractors</td>
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<td>22</td>
<td>Lack of experience of project type</td>
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</table>
23. Lack of experience of local regulation
24. Inadequate project preparation, planning and implementation
25. Delay in construction, poor procurement and supply of raw Materials and equipment by contractors
26. Change in the scope of the project, in government policies
27. Resources constraint: funds and associated auxiliaries not ready
28. Delays in decisions making by Government, failure of specific coordinating
29. Wrong / inappropriate choice of site
30. Technical incompetence, poor organizational structure, and failures of the enterprise
31. Labor unrest
32. Lack of experience of technical consultants
33. Inadequate wastage management
34. Mistakes during construction by contractors
35. Poor project experience
36. Poor site management
37. Unsettlement of the local currency in relation to dollar value
38. Shortage of Project materials and monopoly by some suppliers
39. Lack of sub-contractor skills
40. Inadequate quality assurance and quality control plans
41. Low productivity of labor
42. Shortage of experienced technical staff
43. High cost of labor
44. Poor material and Equipment handling on site
45. Laws and regulations changes
46. Poor quality of material and equipment
47. Cost underestimation

2. Please write the effects of cost overrun in your organization.
   i. ________________________________________________________________
   ii. ______________________________________________________________
   iii. ______________________________________________________________
   iv. ______________________________________________________________
   v.  ______________________________________________________________

THANK YOU!!