ST. MARY'S UNIVERSITY

FACTORS AFFECTING TIME AND COST OVERRUNS IN HOUSING CONSTRUCTION: THE CASE OF ADDIS KETEMA SUB CITY HOUSING DEVELOPMENT PROJECT

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ADDIS ABABA, ETHIOPIA

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DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Dr. Alula Tessema. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

Student's Name	Signature

St. Mary's University, Addis Ababa **June, 2017**

ENDORSEMENT

This thesis has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a university advisor.

Advisor's Name	Signature

St. Mary's University, Addis Ababa **June, 2017**

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ACRONYMS

AAHDPO	Addis Ababa Housing Development Project Office
AKSCHDPO	Addis Ketema Sub City Housing Development Office
CBE	Commercial Bank of Ethiopia
CCM	Critical Chain Method
CPM	Critical Path Method
CSA	Central Statistical Agency
E.C	Ethiopian calendar
ETB	Ethiopian Birr
FPC	Finite Population Correction
GDP	Growth Domestic Product
GTP	Growth and Transformation Plan
HDPO	Housing Development Project Office
IHDP	Integrated Housing Development Programme
MDG	Millennium Development Goal
MSE	Micro and Small Enterprise
PMI	Project Management Institute
RII	Relative Important Index
SPSS	Statistical Package for the social sciences
UN-HABITAT	United Nations Human Settlements Programme

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ABSTRACT

A construction project is commonly acknowledged as successful when the aim of the project is achieved in terms of predetermined scheduled time, within budget, standard quality and specifications to meet stakeholders' satisfaction. In Ethiopia, the number of housing construction projects is increasing from time to time. However, it becomes difficult to complete projects in the allocated cost and time. Many projects experience time and cost overruns and thereby exceed initial contract time and budget. It is therefore, this research was conducted to identify factors that cause time and cost overruns for condominium house construction project at Addis Ketema sub city housing development project office. A comprehensive literature review was reviewed to generate a set of factors believed to affect project time and cost overruns. A total of 55 questionnaires were distributed to three key groups of project participants; namely owner, consultant and contractors. The survey focused on identifying and ranking in order of importance the main factors causing project delay and cost overruns and their effects on housing projects in the sub city. The data from the questionnaire was analyzed statistically. Relative important index method was used to foundout the most significant factors affecting time and cost overruns. Spearman's correlation coefficient analysis was also used to evaluate the degree of agreement /disagreement of the respondents on the causes of time and cost overruns. The result of the study revealed that the main causes of delay and cost overruns in construction of condominium house projects were financial problem during construction, inadequate funding of project, delay in payment for completed works, incomplete drawings and documents, slowness of decision making, costs underestimation, delay in delivery of construction materials, slowness in giving instructions, unrealistic contract durations and project scope definition for time overrun and shortage of materials, cost underestimation, inaccurate material specifications, lack of financial management and planning, high transportation cost, lack of experienced project managers, lack of experienced consultants and unavailability of competent staffs, dependency on imported construction materials, suspension of works and different consultants for design, supervision and contract administration works for cost overruns. The most common identified effects of project time and cost overruns were time claim, cost claim, frustration on stakeholders, the incompetency of project participants, dispute among stakeholders, arbitration, total abandonment of the project, litigation, weakens the growth of the construction industry and affects, in a negative way, the rate of national socio- economic development of the country.

Keywords: *Time overrun, Cost Overrun, Construction Industry, condominium house, cause, effect.*

CHAPTER ONE: INTRODUCTION OF THE STUDY

1.1. Background of the study

Construction industry plays an important role in the physical development of countries to facilitate other social economic developments. This industry is considered as a locomotive of the national economy (Naveenkumar and Prabhu, 2016). It has economic development importance not in terms of its very high employment and income generation potential for a large number of people, but also making availability of the major construction material locally, improving the industry, commerce, social service and agriculture economy. The more resources, engineering, labour, materials, equipment, and market exchange are provided from within the national economy, the higher the factor of the extent of self reliance (Rathi and Khandve, 2013). Construction activities have become a significant market due to the fact that this industry procures products and materials from other business in other sectors (Arcila, 2012). This implies that construction industry can assist to achieve a more equitable distribution of the benefits of economic growth and thereby help to alleviate some of the problems associated with uneven income distribution. Therefore, the construction industry plays a crucial role not only in contributing national economy growth, but also has a significant effect on the efficiency and productivity of other sectors.

In addition services provided by construction industry serve as an input for other sectors of the economy. One cannot think of widespread investment in manufacturing, agriculture, or service sectors unless the construction results of infrastructure facilities are in place (Mustafa, 2015). It is believed that the availability of adequate quality infrastructure such as roads, hospitals, schools, residential and business buildings, etc, improves the life standards of the people.

The government of Ethiopia liberalized the economy with a shift from a state controlled to a more market oriented economy since 1991. In line with this policy, the country designed various policies and strategies to turn the nation in to a middle income country by 2025. One of the plans the country has developed, GTP, is aimed at bringing a speedy economic development which helps to transfer the nation to the desired higher level of economy (Construction contractors association of Ethiopia, 2013). Since 1991 large scale development activities are taking place in Ethiopia. These includes housing, road, railways, dams, airports, universities, schools and hospitals constructions, and also water supply and sewerage, electricity and telephone lines. The contribution of construction industry to employment, growth and sustainable development is now widely acknowledged by the Ethiopian

government. Its promotion and development has significant effects on the efficiency and productivity of other industry sectors.

All in all a large number of building projects and new infrastructures are being built on a great scale since 1991. Housing development projects are one of the projects that are taking place in different towns of the country in Ethiopia. Since 2005 Ethiopia has been implementing an ambitious government-led low-and middle-income housing programme: The Integrated Housing Development Programme (United Nations Human Settlements Programme [UN-HABITAT], 2011). The report added that in 2005, the Council of Ministers of the Federal Democratic Republic of Ethiopia formulated and approved a consolidated Urban Development Policy to link together the small-scale efforts made by regional governments and cities since 2000.

In conclusion the purpose of this study is to critically review and identify the applicability of past studies on determining the factors causing time and cost overruns in current projects. This study therefore, attempts to identify the major factors of time and cost overruns in housing construction practice of Addis Ababa Housing Development Project Office (AAHDPO) in general and in Addis Ketema Sub City Housing Development Project Branch Office in particular; and forward reliable and timely possible solutions as a set of recommendations for future activities.

1.2. Statement of the Problem

Construction industry is considered as one of the most important industry that provides a significant contribution to the development of national economy. The construction industry serves as a locomotive of the national economy performing physical infrastructure development (Naveenkumar and Prabhu. 2016). This depicts that construction industry is a vital element of the economy and has a significant effect on the efficiency and productivity of other industry sectors.

The successful execution of construction projects and keeping them within estimated cost and prescribed schedules depend on a methodology that requires sound engineering judgment (Al-Najjar, 2008). Delay and cost overrun are inherent part of most projects despite the much acquired knowledge in project management. Cost, time, and quality are used to measure the project performance and success.

Large and small scale development activities are taking place in Ethiopia via construction industry which brings about a significant contribution to the national economy by means of construction of residential houses, irrigation dams, roads and bridges, airports and railways; as well as creating

employment opportunity in the country. Since 2005 Ethiopia has been implementing an ambitious government-led low- and middle- income integrated housing development programme (UN-HABITANT, 2011). The Addis Ababa Integrated Housing Development Programme is a strategy for urban poverty reduction and sustainable socio-economic transformation. The programme is a large-scale approach to addressing the current housing deficit, the poor quality of the existing housing stock, and the future housing needs due to continued urbanization.

Like other construction projects, the Ethiopian housing project is facing a serious issue of time and cost overruns. Housing construction in Addis Ababa were not completed on time, they exhibited delays because of many factors as indicated on Appendix F, HDPO unpublished report on 2016. Improving construction efficiency by means of cost-effectiveness and timeliness would certainly contribute to cost savings for the project expenditures. However, there are still delays and cost overrun in housing projects that is a bottle neck to project success. Therefore, the purpose of this study is to assess factors contributing to time and cost overruns and their effects on housing construction project; and to provide possible recommendations for minimizing delay and over expenditure to Addis Ketema Sub City Housing Development Project Office.

1.3. Research questions

The following are the basic research questions.

:

1. What are the major factors that contribute to time and cost overruns in Addis Ketema sub city housing construction projects?
2. How and to what extent does time and cost overruns have an effect on Addis Ketema sub city housing construction?

1.4. Objectives of the Study

This study has the following general and specific objectives:

1.4.1. General Objective

The general objective of this study is aimed to identify and examine the major factors that contribute to construction time and cost overruns, their negative effects and possible solutions in Addis Ketema Sub City Housing Development Project Office.

1.4.2 Specific Objectives

The specific objectives of the research are to:

- Identify the major factors influencing time and cost overruns in Addis Ketema sub city housing construction projects,
- Assess by what extent does time and cost overruns have an effect on Addis Ketema sub city housing construction?
- Provide the possible necessary and reliable recommendations to reduce the underlying effects.

1.5. Significances of the study

The study is felt to be significant for the following reasons. It has greater importance for the organization, which is under study, to identify factors and solutions contributing to construction delays and cost overrun to realize organization objectives. As well, the study is felt to be important for it may help those who make an in-depth study in this particular and related case. It can also provide the necessary information to policy makers for policy option.

1.6. Definition of key terms

Windapo (2013) defined the following terms and concepts:

- **Management** is the direction and supervision of resources towards the achievement of a defined goal within a time scale.
- **Construction** is the act of series actions undertaken by construction companies and consultants, which produces or alters buildings and infrastructure.
- **Construction management** is the management of the physical construction process within the built environment and includes the coordination, administration and management of resources.
- **The construction manager** is a professional who manages the building construction process – prepare production documents, involved with the day to day management of construction projects, have responsibility for supervising people and reports to the client and senior management.
- **Construction team** is a formal group of individuals who work together on a permanent basis to undertake specialist construction, and the essential machines and equipment the team uses.
- **Performance variability** is a measure of the range of performance achieved by a construction team.

1.7. Scope or delimitation of the Study

There are so many public construction projects underway by Addis Ababa Administrative Office. However, due to time and financial constraints this research is delimited only to assess factors that contribute to time and cost overruns in Addis Ketema sub city housing construction development projects. Although, considering the whole population in the study, the researcher was restricted to collect data from an appropriate sample size from client, contractors and consultants who are directly involved in the housing construction project activities of the study area.

1.8. Organization of the Research Report

The research report consists of five chapters. The first chapter contains background of the study, basic research questions, objectives of the study, definition of terms, and significance of the study and scope of the study. The literature review related to time and cost overruns is presented in chapter two. The third chapter of the study includes type of research approach, research design, sample and sampling techniques, source of instruments of data collections, procedure of data collection and methods of data analysis. The fourth chapter deals with data analysis and discussions of survey findings. The fifth chapter covers three sections, which include summary of findings, conclusion of the study, limitation of the study and recommendations to the project key stakeholders.

CHAPTER TWO: REVIEW OF RELATED LITRATURE

2.1. Overview of construction project time and cost overruns

This chapter discusses about the literatures under the following heads: definition of time and cost overrun, types of delay, causes of time and cost overruns, effects of time and cost overruns, delay responsibility, project time and cost and their managements, measurements to control time and cost overruns, project overrun and its impacts on socio-economic development of Ethiopia, data analysis and inference from literature survey.

The problem of time and cost overruns in construction industry is an international phenomenon, although the situation varies from nations to nations. The rate of variation is influenced by lots of factors based on general economy and construction environments in those nations. Overruns to construction project could be multi-faceted ranging from cost, time, etc.

Every activity within the project has its own time and cost estimates with different process differentiating the type work undertaken to accomplish these activities. All differ and affected by different risk factors that might have a major impact on one and slightly affect the other. Project success can be defined as meeting goals and objectives as prescribed in the project plan. A successful project means that the project has accomplished its technical performance, maintained its schedule, and remained within budgetary costs (Frimpong, Oluwoye and Crawford, 2003). One of the most important problems in the construction industry is time and cost overruns. Delay and cost overrun are inherent part of most projects despite the much acquired knowledge in project management. Although some may argue that this is negligible. However, several studies have addressed many different factors that cause overruns in different types of construction projects. Generally Construction delay is considered to be one of the most recurring problems in the construction industry (Naveenkumar and Prabhu, 2016). Time and cost overruns in the construction industry is common phenomenon in projects worldwide. Time and cost overruns occur in every construction project and the magnitude of these delays and cost overruns varies considerably from project to project (Al-Najjar, 2008). The inability to complete projects on time and within budget increases project delays and cost overruns and brings economic and political problems.

It is common to see construction projects failing to achieve their mission within the specified cost and time. Because of construction delays and cost overruns, less and less work is performed despite the increase in construction budgets (Mustafa, 2015). Mustafa added that the unfortunate part is that very

few projects get delivered in time and on cost since construction projects are exposed to a lot of uncertainties.

Construction projects in developing countries like Ethiopia often suffer with problems of time and cost overruns due to many factors. The problem of overruns in construction industry is an international phenomenon and the rate of variation of time and cost is influenced by lots of factors based on general economy and construction environments worldwide (Odediran, Abeyinka and Eghenure, n.d). As the construction industry continuously grow in size and complexity, so do planning and budgeting problems. These complexities of projects make the management of costs difficult in a construction project and also project size matters to cost escalation.

Many factors are responsible for the constructions time and cost `overruns such as underestimation of costs to make the projects more viable, addition of scope during later stages of project planning and even during construction, changed conditions, etc. So, it is essential to define the actual causes of time and cost overruns to minimize or totally eliminate delays and cost overruns in the operational process of any construction project. The following paragraphs discuss the major issues of time and cost overruns.

2.2. Definitions of time and cost overruns

2.2.1. Definitions of Time Overruns

One of the most important problems in the construction industry is time overrun. Time overrun occur in every construction project and the magnitude of these delays varies considerably from project to project. So it is essential to define the actual causes of time overrun in order to minimize and avoid delays in any construction project.

Construction works that are not completed on time are referred to as projects that have undergone time overrun. Time overrun is defined as the extension of time beyond planned completion dates traceable to the contractors (Naveenkumar and Prabhu, 2016). Further they defined time overrun as the difference between the actual completion time and the estimated completion time. It was measured in number of days. Time overrun occur when projects is not completed within the time the project plan specifies. This can occur due to many reasons. Raykar and Ghadge (2016) represented time overrun mathematically as follows in equations 2.1 and 2.2.

Net duration = Date of project commencement – Date of project approval …… equation 2.1

Time overrun = Net duration – Project duration ……..…… equation 2.2

2.2.2. Definitions of Cost Overruns

Cost overruns are very common in the construction Industry. Hardly few projects get completed within original cost. Cost overrun is the amount by which actual costs exceed the baseline or approved costs. Cost overrun is defined as excess of actual cost budget – it is sometimes called as cost escalation, cost increase, or budget overrun (Shanmugapriya and Subramanian, 2013). Cost overrun is defined as the positive difference between the final or actual cost of a construction project at completion and the contract amount agreed by the client and the contractor during signing of the contract (Mustafa, 2015).

Cost overrun is defined as 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 (Al-Najjar, 2008). According to AL-Najjar the cost overruns is expressed mathematically in this formula and calculation can be converted to a percentage for ease of comparison as indicated in equation 2.3.

$$\text{Cost overrun} = \frac{\text{Final Contract Amount} - \text{Original Contract Amount}}{\text{Original Contract Amount}} \times 100 \quad \text{…… equation 2.3}$$

2.3. Types of delay

In construction projects, where the projects are to be executed according to the schedule to work the plan, delays are bound to happen most of the time. Delays can be classified in to two different categories with respect to liability: excusable and non-excusable delays (Raykar and Ghadge, 2016). These two main categories of delays can be further classified into six, compensable, non-compensable, concurrent, non-concurrent, critical and non-critical. Figure 2 presents sequential relationships of various categories of delays (Vidalis et al, 2002 as cited in Al-Najjar, 2008).

The types of delays have internal or external sources on project process. Internal causes of delay include causes that come from the owner, designers, contractors, and consultants. External causes of delays are originated from outside of construction projects such as utility companies, government, subcontractors, suppliers, labor unions, nature, etc.

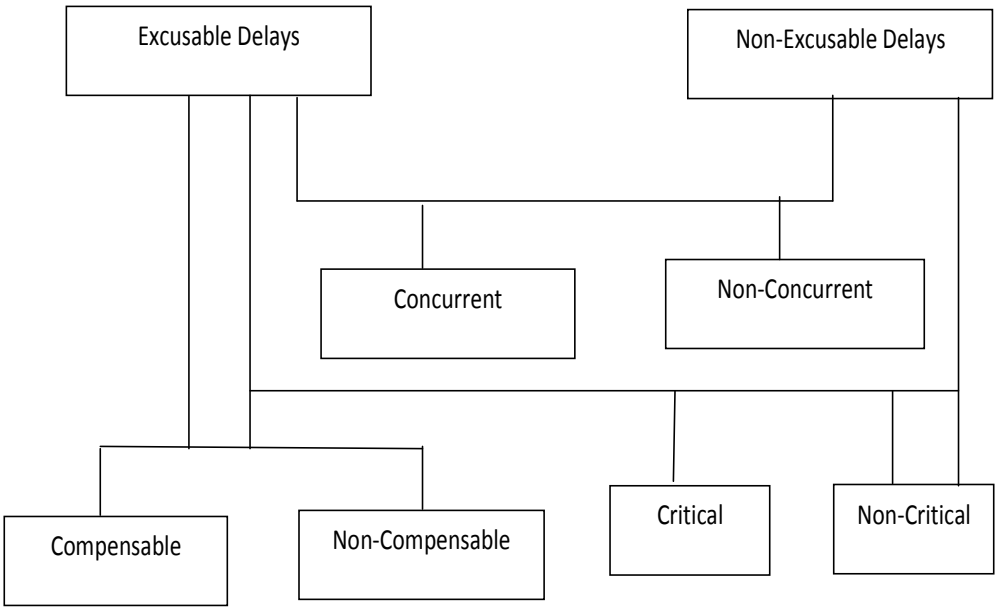


Figure 1: Sequential relationships of various categories of delays

2.3.1. Excusable and non-excusable delays

All delays are either excusable or non-excusable. An excusable delay is a delay that is due to an unforeseeable event beyond the contractor's or the subcontractor's control. They are broken down further into compensable or non-compensable delays. If the delay is considered compensable, then the contractor is entitled to additional financial compensation as well as extra project time.

Under certain circumstances where non-compensated excusable delays occur, the contractor receives extra time but not extra money for the additional completed work. Excusable delays are known as "force majeure" delays, and commonly called "acts of God" because they are not the responsibility or fault of any particular party. Most contracts allow for the contractor to obtain an extension of time for excusable delays, but not additional money. According to Mustafa (2008) excusable delays resulting from the following events are listed below:

- General labor strikes
- Fires
- Acts of God (floods, landslides, volcanic eruptions, …)
- Owner-directed changes
- Differing site conditions or concealed conditions

- Unusually severe weather
- Intervention by outside agencies
- Lack of action by government bodies, such as building inspection

Non-excusable delays are events that are within the contractor's control or that are foreseeable. These are some examples of non-excusable delays (Al- Gahtani and Mohan, 2007):

- Late performance of sub-contractors
- Untimely performance by suppliers
- Faulty workmanship by the contractor or sub-contractors
- A project-specific labor strike caused by either the contractor's unwillingness to meet with labor representative or by unfair labor practices

2.3.2. Compensable and non-compensable delays

Excusable delay can be further divided into compensable and non-compensable delay. Compensable delays are unforeseeable beyond the control of contractor, but the contractor is entitled to both time extensions and additional compensation. It can be caused by the government, direct changes, work suspension, constructive changes and owner's failure to grant site access, changes in scope of work (Raykar and Ghadge, 2016). Non-compensable delays mean that although an excusable delay may have occurred, the contractor is not entitled to any added compensation resulting from the excusable delay. In non-compensable delay, neither the owner nor the contractor is responsible for delay. Contractor is given time extension; however, he is not entitled to any additional monetary compensation such as in case of severe weather and acts of God (Raykar and Ghadge, 2016).

2.3.3. Concurrent and non-concurrent delays

If only one factor is delaying construction, it is usually fairly easy to calculate both the time and money resulting from that single issue. A more complicated – but also more typical – situation is one in which more than one factor delays the project at the same time or in overlapping periods of time. These are called concurrent delays (Alaghabari et al, 2007). Concurrent delay occurs when two or more delays take place or overlap during the same time period, either of which occurring alone would affect the ultimate project completion date. These delays occur when both owner and the contractor are responsible for the delay.

Concurrent delays arise when one event causes a delay simultaneously with another event. For example, if an owner denies access to a project site for two weeks, and a severe storm prevents a

contractor from working on the project for one of two weeks as well, there will be a concurrent delay of one week. The contractor will be able to recover for delay damages for one week, as a severe storm is not a cause of delay that is compensable and would have prevented the contractor from performing event if the owner did not deny access to the site (Mustafa, 2015).

2.3.4. Critical and non-critical delays

Critical delays are delay claims that affect the progress, time, and compensation. Non-critical delays do not affect the completion date of the project. They affect the succeeding activities that are not on the critical path of the schedule. These can set back activities if they do not have a float in the schedule (Abdul-Rahman et al, 2006).

2.4. Causes of time and cost overruns

2.4.1. Causes of Time Overruns

Causes of time overrun are factors that lead to construction projects not being finished according to the planned scheduled time at the inception of projects. Several studies have addressed many different factors that cause overruns in different types of construction projects. Generally; construction delay is considered to be one of the most recurring problems in the construction industry and it has an adverse effect on project success in terms of time, cost, quality, and safety (Sweis G.J., 2013). The causes and effects of delay factors in construction industry vary from country to country due to environmental, topographical and technological constraints.

Odeh and Battaineh (2002) used only two points of view, namely contractors and consultants, to determine the causes of project delays in Jordan. The results showed that contractors believed that ‘poor labour productivity’, ‘owner interference’ and ‘inadequate contractor experience’ were the three most important causes of delays. The consultants, however, indicated ‘inadequate contractor experience’, ‘late payment of completed work’ and ‘poor subcontracting’ to be the main causes of delay. The inclusion of ‘late payment of completed work’ as a cause for delay referred to the result of late payment on continuing site activities and contractors halting work unless payment for completed work had been processed after the agreed date.

The highest ranked contributors to time delays on projects are concentrated around client actions, namely ‘incomplete designs’, ‘design changes’, ‘slow decision-making’ and ‘late issue of instructions’. For the contractor category the ‘shortage of skills’ proved to be the most significant delay factor, followed by ‘poor planning’ and ‘labour problems’. The most significant external factor was ‘unforeseen soil conditions’, ranked eighth (Baloyi and Bekker, 2011). Among the various factors that

causes time overrun, ‘inadequate fund for the project’, ‘inadequate planning of project before take-off’, ‘inadequate tools and equipment’, ‘delay in delivery of materials’, ‘subcontractors’ incompetency’ and ‘design changes during project execution’ top the list (Ameh and Osegbo, 2011).

Koushki et al. (2005) conducted a study in Kuwait to study the causes of time and cost overrun in construction projects. They concluded that the three main causes of delays are change orders, owners’ financial constraints, and owners’ lack of experience. There is a lot of time overrun factors over which consultants has control. But those factors included in owners control. Design changes, poor labor productivity, inadequate planning and resource shortages are the predominant factors influencing time overruns.

Delays occur from internal as well as external factors. The internal factors of delay include causes arising from three parties involved in the project activities. These project parties are: project owner, contractors and consultants. Other delays, which do not arise from these three parties, occur from the external factors these are government’s act, material suppliers, weather conditions, etc. In addition, contractors working in developing economies work under special constraints due to the technological and skilled manpower differences with developed countries. These differences can be causes for time overruns.

Aibinu and Jagboro (2002), in their study of the growing problem of construction delay in Nigeria, examined the effects of delays on the delivery of construction projects in Nigeria. Utilizing a questionnaire survey of 61 construction projects, the authors identified, and assessed the impact of delays on the delivery of construction projects. Time and cost overruns were found to be frequent effects of delay.

Shanmugapriya and Subramanian (2013) in their study found that five most significant factors causing time overruns in India are material market rate, contract modification, high level of quality requirements, project location and depends on the fresher’s to bear the whole responsibility.

The comprehensive study to identify the factors influencing time and cost overruns in construction projects in India was carried out by Naveennkumar and Prabhu. The study results have shown that the factor of "low productivity of labour" has been ranked in the first position in the contractor’s responsibility. This result indicates the high importance of production for the progress of project. "Slowness in giving instruction" factor has been ranked as the major factor by consultant in this group. This result indicates the high importance of each party to perform required work. "Delaying in bill

settlement" has been ranked in first position by owners at this group. Payments are considered as the first priority to complete the project on time, as any delay of freeing contractor payments, it will affect contractor's financial obligations. “Poor procurement programming of materials” has been ranked as the most important factor at material’s group. "Lack of maintenance for the equipment" has been ranked in the first position at Equipment and Labour’s group, by the respondents."Strikes, riots and other external forces" has been ranked in the first position at external factor by the respondents. This result indicates the high effects of construction industry (Naveennkumar and Prabhu, 2016).

The construction project overruns is a great concern to clients, professionals and other stakeholders. In Nigeria, the highest significant factors influencing time overruns of construction projects at construction stage was associated with unexpected site condition, increase in project scope, lack of timely progress payment and inadequate planning. Others include poor project design and implementation, underestimating of project costs, inadequate funding of project, inclement weather, poor working relationship between client and contractor (Odediraa, Abeyinka and Eghenure, n.d.). Sweis (2013) observed that in pubic construction projects in Jordan, three factors affect construction time overruns. These factors were poor qualification of consultants, engineers and staff assigned to the project; poor planning and scheduling of the project by the contractor and severe weather conditions of the job site.

2.4.2. Causes of Cost Overruns

Since the 1980s various studies have investigated the causes and effects for project cost overruns on construction projects in different countries. There is no action without a cause. Cost overruns do not just occur naturally, there are a number of factors during the construction process that when not managed properly can lead to cost overruns. Shnmugapriya and Subramanian (2013), who found reasons for cost overruns, were high transportation cost, change in material specification, and escalation of materials price, frequent breakdown of construction plants and equipments and rework.

Top 12 factors affecting cost overruns identified by shreenaath, Arunmozhi and sivagamasundari are escalation of material prices, poor quality of materials and unreliable suppliers, poor site management and supervision, unqualified/inexperienced labour, shortage and slow mobilization of equipment, suspension of work by owner and delay in payment, delay due to natural disasters like flood, rain, and incorrect planning and scheduling by contractors, improvements to standard drawings during construction stage, inappropriate construction methods adopted by contractors, conflict between consultant and engineers, and delay in obtaining permits from municipality (shreenaath, Arunmozhi and sivagamasundari, 2014).

Top three most significant factors causing cost overruns in large construction projects in Malaysia ranked by overall respondents are fluctuation of prices of material, cash flow and financial difficulties faced by contractors and poor site management and supervision (Abdul Rahman, Memon and Abd.Karim, 2013).

According to the study conducted in Nigerian telecommunication projects, indicated that the dominant factors that result in cost overruns were included: frequent design changes, fraudulent practices and kickbacks, additional works, poor contract management, inadequate labour availability, duration of contract period and contractual procedure (Ameh, Soyingbe and Odusami, 2010).

In another study, conducted by Ramabodu and Verster (2010), they established that construction cost overruns in the Free State Province based on the perceptions of respondents who are resident in the region. Furthermore, their research divided the factors on cost overruns into three categories: very critical factors, moderately critical factors and less critical factors. Of those categories, five factors were considered to be very critical contributors, four were considered to be moderate and five were considered to be less critical to the manifestation of cost overruns. Ramabodu and Verster (2010) reported the main five very critical causes of cost overruns on public projects as (i) changes in scope of work on site, (ii) incomplete design at time of tender, (iii) contractual claim, that is, extension of time with cost claims, (iv) lack of planning and monitoring of funds and (v) delays in costing variations and additional work. The survey findings were exclusively based on responses from twenty five practicing professionals. Notably, the Ramabodu and Verster (2010) survey focused on the final phase of the project development cycle, whereas, cost overrun factors affect the whole project development cycle beginning with the conception/planning phase to the completion/ commissioning phase.

Nega (2008) affirmed in his study that parties blamed each other for encountered cost project escalations in the Ethiopian construction industry. Nega (2008) then suggests that it was important to identify the stakeholders who are responsible for causing cost overruns in public building construction projects in order to take corrective measures. He reported that there were claims made by clients concerning issues related to design, specifications and contract documentation.

In the South African construction context, Baloyi and Bekker (2011) identify the causes of cost overrun related to the stadia built or refurbished for the 2010 FIFA World Cup. The top ten causes in the order of importance include: Increase in material cost, inaccurate material estimates, shortage of skilled labour, client's late contract award, project complexity, increase in labour cost, inaccurate quantity take-off, difference between selected bid and the consultants estimate, change orders by client during construction, and manpower shortage.

Monyane (2013) also conducted an investigation that analyzed the causes of cost overruns and effective cost control measures of public projects in the Free State Province, South Africa. He found that additional work at owner's request as the most frequent cause of cost overrun at construction stage. In addition, poor workmanship by the contractor, as the following most rated cost of cost overrun in public projects in the state.

In another study carried out in Czech top 10 factors caused deviation in the cost of projects were identified. The top 10 factors included: change orders by owner, rising prices, accepting lowest offers, shortage of important materials, inaccurate estimates, poor management, delay cash flows by owners, complexity of the project, ineffective planning of project and change functional programme (Ahmed, Dlask and Hasan, 2014).

A study identified and analyzed causes of cost overrun in construction industry in Pune region, India. It was observed the factors for cost overrun were the material shortage, shortage of labour, late delivery of materials and equipment, unavailability of competent staff, low productivity level of labours, quality of equipment and raw material (Tejale, Khandekar and Patil, 2015). The comprehensive study to identify the factors affecting construction cost in Mara large projects was carried out. Study was carried out in two phases. In first phase, through a comprehensive literature 24 most frequent factors affecting construction cost were identified and a survey was conducted amongst the selected 18 senior personnel involved in construction to verify and rank the factor. Results show that cash flow and financial difficulties faced by contractors, contractor's poor site management and supervision, inadequate contractor experience, shortage of site workers and incorrect planning and scheduling by contractors were more significant factors affecting construction cost (Memon et al, 2010).

Other findings also reveal that all projects suffer from cost deviation; it is found that 76% of projects have cost under-estimates and 24% have cost over-estimates. The deviation between estimated and actual cost has an average of 14.6%, ranging from 39.3% to 98%. The results show that cost under-estimates are more common than cost over-estimates in road construction projects implemented in the West Bank regardless the project category (Mahamid and Bruland, 2012).

As Enshassi, Mohamed and Abushaban (2009l), study observed the most important factors agreed by the owners, consultants, and contractors affecting the performance of construction projects in the Gaza Strip were: escalation of material prices, availability of resources as planned through project duration, average delay because of closures leading to materials shortage, availability of personnel with a high

experience and qualifications, quality of equipment and raw materials in project, and leadership skills for project managers.

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

Time and Cost overruns is a severe problems faced by large construction industries in India. It was found that five most significant factors causing cost overrun in Indian construction are high transport cost, change in material specification, escalation of material price, frequent breakdown of construction plants and equipments and rework (Shanmugapriya and Subramanian, 2013).

In another study on construction projects conducted by Naveenkumar and Prabhu (2016), the following top 10 causes of cost overrun have been identified in the order of its rank. 1) delay in preliminary handing over of project, 2) wrong/inappropriate choice of site, 3) inadequate project preparation, 4) increment of material prices due to continuous closures, 5) resources constraints, 6) unpredictable weather conditions, 7) fluctuations in the cost of building materials, 8) equipment allocation problems, 9) lack of cost reports planning/monitoring during pre and post contract stage in the position, and 10) design changes

Al-Najjar (2008) identified a total of 42 factors that cause cost overruns and ranked the top ten causes as follows: Technical incompetence, poor organizational structure, and failures of the enterprise, lack of cost reports during construction stage, inadequate project preparation, planning and implementation, delays in issuing information to the contractor during construction stage, lack of coordination at design phase, change in the scope of the project or in government policies, Some tendering maneuvers by contractors, such as front- loading of rates, incomplete design at the time of tender, bad allocation of labour inside the site and delays in decisions making by government were ranked the top ten causes of cost overruns. In another survey conducted on the 22 building projects in Indonesian building construction showed that the most critical risk factors affecting both project time and cost were: high

inflation/increased price, design change by owner, defective design, and delayed payments on contract, weather condition and defective construction work (Wiguna and Scott, 2005).

2.5. Delay responsibility

As the construction industry continues to grow in size and complexity, there exists planning and budgeting problems. As many researchers' findings showed that it is common for projects not to be completed on a given time and within the prescribed budget. This mostly happed due to the presence of various interest groups on the project activities. These interest groups include project owner, contractors, consultants, financers, suppliers, end users, government and the like. Internal causes of delay include the causes arising from three parties involved in the project. These parties include the owner, contractors and consultants. Other delays, which do not arise from these three parties, are based on external causes. Theses external causes are material suppliers, government, financers and weather condition. Many researchers have categorized the reasons for project delays are internal and external factors caused by different stakeholders.

2.5.1. Owner's responsibility

The owner is the individual or organization for whom a project is to be built under a contract. A public sector project generally involves more changes, thus inducing delays in the process of implementing the project. The public sector owner in general, is less active in pushing project progress when compared with a private sector owner. There is a lack of skill in controlling construction programming. The bureaucracy exists in all procedures that a public sector project has to go through, which further induces progress delay. A public sector owner has to work with many governmental departments when changes to a project occur. Hence, the factor that related to owner's responsibility are lack of working knowledge, slowness in making decisions, lack of coordination with contractors, contract modification (replacement and addition of new work to the project and change in specification), and financial problems (delayed payments, financial difficulties, and economic problems) (Al-Najjar, 2008).

2.5.2. Consultant's responsibility

Consultant is a type of organization the combines both designer/Architect and supervisor engineering. Architect is an individual who plans and design buildings and their associated landscaping. Engineer usually refers to an individual engaged in the design or other work associated with the design or construction. The consultant engaged in a building project can affect the progress of construction programming through various monitoring measures such as issuing certificates, and endorsing the satisfaction of certain activities in the construction process. Progress delay can happen if these

monitoring measures are not implemented properly. Consultants are given the authority to endorse the satisfaction of certain procedures such as designing, piling, steel fixing, the quality of key materials, before the construction programming can proceed forward. Therefore, the factors that related to consultant's responsibility are absence of consultant's site staff, lack of experience on the part of the consultant, lack of experience on the part of the consultant's site staff, (managerial and supervisory personnel), delayed and slow supervision in making decisions, incomplete documents, slowness in giving instructions and insufficient or incorrect design data is a major reason contributing to project delays (Al-Najjar, 2008).

2.5.3. Contractor's responsibility

The contractor is any person or legal entity entering into contract with the client for the execution of works or part thereof (Windapo, 2013). The contractor is responsible for implementing – actually building – the project. There are many ways in which a contractor's performance can delay a construction project. For typical examples, main contractors often have various disputes with subcontractors and materials suppliers, which can cause major delays. In fact, such disputes are considered a major cause for project delay. Other factors, such as the contractor's insufficient financial resources, mistakes in making decisions on progress control and the overall inability when performing management functions, are also possible reasons for causing project delays. It is interesting to note that, a main contractor will sometimes deliberately demand an unreasonably short contract period although the contractor understands that the completion on contract time is impossible. So the factors related to contractor's responsibility are, delay in delivery of materials to site, shortage of materials on site, construction mistakes and defective work, poor skills and experience of labour, shortage of site labour, low productivity of labour, financial problems, coordination problems with others, lack of subcontractor's skills, lack of site contractor's staff, poor site management, and equipments and tool shortage on site (Al-Najjar, 2008).

2.5.4. External factors of time and cost overruns

The situations that contributed to external factors are; lack of materials on the market, lack of equipment and tools on the market, poor weather conditions, poor site conditions (location, ground, etc.), poor economic conditions (currency, inflation rate, etc.), changes in laws and regulations, transportation delays, and external work of public agencies such as roads, utilities and public services (Alghbari et al, 2007).

2.6. Experiences of developed and developing countries on project time and cost overruns

Construction is an industry that involves complex and dynamic processes. It consists of successful coordination of multiple discrete business entities. The infrastructure development play vital role in order to improve the development and progress of the country. Construction projects impact on a nation's economy. Successful completion of construction projects leads to wealth creation; socio-economic growth and improved standards of living (Memon, et al 2011 and Sweis et al, 2008 cited in Sunjke and Jacob, 2013). Apart from the economic aspects, the speed with which the construction activities are carried out is a factor. Delays in the completion of construction projects is one of the most recurring problems in the construction industry and it is a common global phenomenon, although the situation is varies from nations to nations. The rate of variation is influenced by lots of factors based on general economy, topography, technological and construction environments in those nations. All differ and affected by different risk factors that might have a major impact on one and slightly affect the other. Even with today's technology and management's understanding of project management techniques, construction projects continue to suffer delay and project completion dates still get pushed back (Aibinu and Odeyinka, 2006 cited in Sunjke and Jacob, 2013). These delays are experienced both in the public and private sector projects.

2.6.1. Developing countries experiences on project time and cost overruns

Time and cost increase is common phenomenon in projects worldwide. Many factors are responsible for the construction time and cost overruns in both developed and developing countries. Construction projects in developing countries often suffer with problems of time and cost overruns compared to developed countries. Nations are evaluated as developed and developing based on the quantity and quality of completed construction projects in their domain. One of the most pressing concerns is the alarming rate of project delay and cost escalations in the construction industry for most developing countries. Such trends have adversely affected infrastructure provision in sub-Saharan Africa countries with specific reference to Nigeria ana Ghana. In Nigeria 60% of the total national investment goes into construction projects (Dlakwa and Culpin, 1990 cited in Sunjke and Jacob, 2013). The continuous rise of inflation rate in Nigeria increased the cost of implementing of the master plan in Niger Delta region (Sunjka and Jacob, 2013). Delays in the execution of infrastructural projects in the Niger Delta could also affected oil exploration and caused negative impacts on the socio-economic activities of the Nigerian state.

There are several important factors underlying causes of delay and cost overruns in groundwater construction projects in developing countries such as Ghana. The five most important factors agreed by

the owners, contractors and consultants, as the main causes were monthly payment difficulties from agencies, poor contractor management, material procurement, poor technical performances, and escalation of material prices (Frimpong, Oluwoye and Crawford, 2003). .

As Pakistan is developing country, many construction projects have been facing serious problems due to which construction projects cannot be completed in time (Shaikh, Muree and Soomro, 2010 cited in Haq, Rashid and Aslam, 2014). In the same line, (Sambasivan, and Soon, 2007) conducted study in Malaysia and concluded that cost overrun is ranked at second number in the overall effects of construction delays.

The construction sector in developing countries generally operates with severe limitations, and is unable to meet local demands. Hence, a great deal of effort is required to co-ordinate the wide range of activities that are undertaken.

2.6.2. Experiences of developed counties on project time and cost overruns

Delays still occur in construction projects even in developed countries. According to Naimi, Elhag and Fenn (2008) report the average time overrun for UK government construction projects for period 1993-1994 was 23.2%. On time completion of project is an indicator of country's efficiency. Time overruns and cost overruns has been a major issue in many Indian construction projects. Government data suggest that a majority of projects close to 60 per cent are overwhelmed by time and cost overruns (Shanmugapriya and Subramanian, 2013).

Table 1 below shows further examples of significant cost overruns in some of developed countries (Annual IMIA Conference, 2016).

Table 1: Examples of cost overrun as a percentage of the original estimated contract price

Project	**Countries**	**Cost overruns (% in comparable prices)**
Humber Bridge	UK	175
Railway,	Boston – Washington – New York (USA)	130
Big Belt railway tunnel	Denmark	110
Chapel-en-le-Frith Motorway	UK	100
Channel Tunnel	UK / France	80
Metro line	Mexico	60
Oeresund line	Denmark	70

Source: Annual IMIA Conference, 2016

In conclusion, the issue of cost overrun is clearly an issue for the construction industry and one that needs addressing at all levels of the project chain in both developing and developed countries.

2.7. Effects of time and cost overruns on construction projects

Effects are the consequences that will be encountered when cost overruns occur on a construction project. Time and cost overruns is a severe problems faced by construction industries in developed and developing countries. Many factors related to time and cost overruns vary along with types of projects, location, size and scope of project. Time and cost increase is common phenomenon in projects worldwide. However, these are especially severe in developing countries. Project delays are those that cause the project completion date to be delayed. Delays are incidents that impact a project's progress and postpone project activities. Project delays occur as a result of project activities that have both external and internal causes and effect relationship. Generally, construction delay is considered to be one of the most recurring problems in the construction industry.

The construction industry is a very important sector for the development and economic growth of the countries. In construction industry, construction delay refers to the time overrun in the delivery of the construction project. This makes projects expensive for the parties involved in construction especially for contractors and clients. For the client, construction delay refers to the loss of revenue, lack of productivity, dependency on existing facilities, lack of rentable facilities, etc (Naveenkumar and

Prabhu, 2016). The same holds for contractors. Impact of project time overrun or delays for contractors include increased costs, reduced profit margin and battered reputation.

Arcila (2012) explained that construction has been considered as a dynamic industry which is constantly facing uncertainties in its budgets, process and technology. These uncertainties, the complexity of projects and the increase of stakeholders make the management of costs difficult in a construction project. Even though there have been improvements in the management of construction projects, the problems of cost and time overruns are still a critical issue in the construction industry.

Underestimation of project costs is identified as the most significant factor causing time and cost overruns in construction projects. Underestimating the costs of a given project leads to a falsely high benefit-cost ratio for that project, which in turn leads to two problems. First, the project may be started despite the fact that it is not economically viable. Or, secondly, it may be started instead of another project that would have yielded higher returns had the actual costs of both projects been known (Ramabodu and Verster, 2010). According to Raykar and Ghadge (2016) cost overrun occurs when the expenses required completing a project, or one aspect of a project, exceeds the amount which is budgeted. This cost overrun is common in construction projects and can happen for any number of reasons. Any delay in completion of project makes the initial cost estimates obsolete leading to cost overruns. If budget overruns are not under control it can inhibit the desired growth thereby adversely affect the project completion. Time and cost overruns results in conflicts and mistrust among stakeholders, create cash flow problems, defects of works, increased resources resulted with, less quality of works, slow progress of project activities, financial deficiencies both for the client or contractor. If project cost and time exceeds their planned targets, client satisfaction would be compromised.

Nega (2008) states that cost overruns have obvious effects for the key stakeholders in particular, and for 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 a 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. This study further identified the following as the major effects of cost overruns: delays

during construction, supplementary agreement, and 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 budget short fall of the client and poor quality workmanship. Generally the effects of cost overrun are not confined to the construction industry but are reflected in the state of the overall economy of a country.

Time overruns affects the project owners, contractors and other project participants. Project owners may be affected through lost benefits that could have accrued from the completed facility, while contractors may have to spend more on labour and plant, pay penalties as per the contract or even lose other profitable contracts because for the next job are tied up on delayed projects (Ameh and Osegbo, 2011). Longer project duration means that more resources will need to be allocated to the project, which then increases the project costs and project abandonment. Effects of schedule overruns are the consequences that will occur when the causes of these schedule overruns are not identified and worked on effectively. Claims are one of the effects of delays in construction projects.

Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in Nigeria construction industry. The five effects of delay identified were: cost overrun, dispute, arbitration, total abandonment, and litigation.

2.8. Housing policy in Ethiopia

Housing is the second essential human needs, next to food and water, however, the existing housing stock is of a very low physical quality in Addis Ababa city (UN-HABITANT, 2011). The housing sector has been subject to a variety of interventions over the last 30 years, which provide important lessons to any effort that aims at drafting an appropriate and coherent housing policy. The development of human settlements in the country has neither been adequate nor sustainable for both urban and rural areas. Urban areas suffer from inadequate housing stock and poor infrastructure. These issues shall be resolved through implementation of the National Human Settlement Development Policy (Ministry of urban development and construction, 2012). The objective of this policy is to support the provision of adequate human settlements in Ethiopia. Ministry of urban development and construction (2012), construction industry policy first draft document stated the following policy directions.

1. The government and the private sector shall co-operate in supporting the development of sustainable human settlements.

2. Promote the optimum use of low cost and local building materials, innovative technologies and practices.
3. Facilitate self-help initiative and informal sector activities for adequate shelter delivery particularly through provision of building designs and construction practice guidelines.
4. Ensure that the design, construction and refurbishment of buildings shall take into account the special needs of the aged and disabled.

The realization of Vision 2025 partly depends on the existence of a reliable and competitive local construction industry that is capable of delivering quality services. The industry has important contributions to the Ethiopian economy, as demonstrated by its share in the GDP.

2.8.1. Housing Targets

Housing and Slum Upgrading Targets has four fundamental objectives as follows (Ministry of urban development and construction, 2013).

1. Construct of 500,000 housing units
2. Create 400,000 Job opportunity (housing sector)
3. Reduce the number of slum dwellers by half (60% to 30%)
4. Fostering the construction sector

2.8.2. Housing construction strategy in Ethiopia

According to the national human settlement development policy in the country the government of Ethiopia drafted and launched the integrated housing development program in 2004. It was a strategy for urban poverty reduction and sustainable socio-economic transformation. Integrated housing development strategies are:

1. To guide the government intervention and participation of stakeholders in the sector.
2. To Integrate and coordinate efforts to enable access to housing by the poor and mid income level households.
3. To integrate the sector with employment creation.
4. To encourage saving and arrange financial schemes

2.9. Addis Ababa Integrated Housing Development Programme

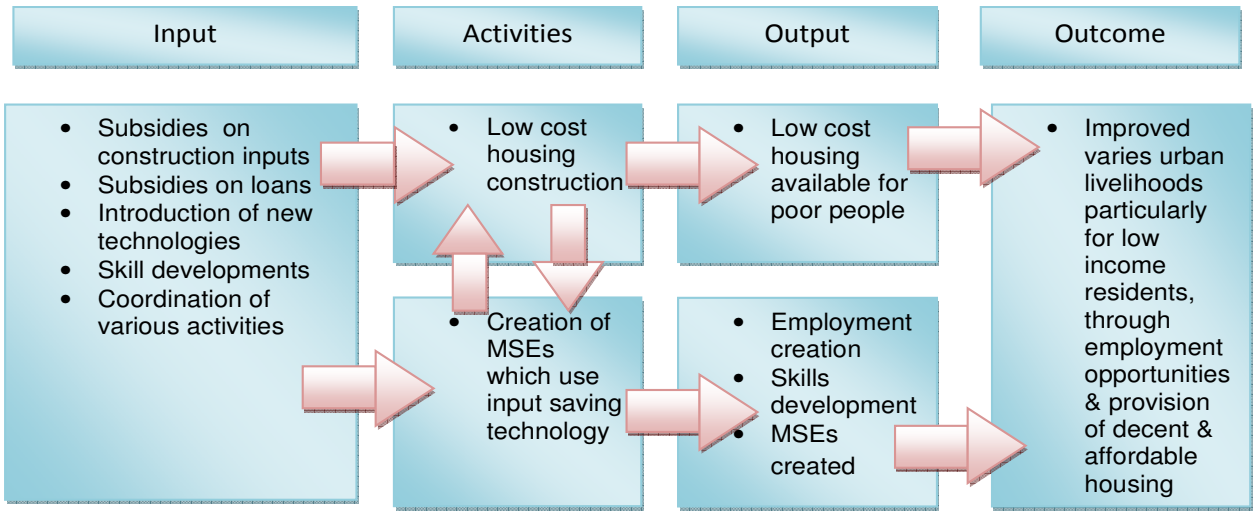
Addis Ababa is relatively young having been established about one hundred and twenty five years ago. Addis Ababa is the diplomatic center for Africa and the political and economic junction of the whole of Ethiopia. It is also the seat of African Union (AU), the United Nation Economic Commission for Africa (ECA), more than ninety Embassies and consulate. Besides several other international organizations have their headquarters and branch offices in Addis Ababa. According to Central Statistical Authority CSA (2012) report Addis Ababa has an estimated population size of 3,061,404.

The existing housing stock in Addis Ababa city is of a very low physical quality in the city (UN-HABITANT, 2011). Using the UN-HABITAT (2011) slum definition, 80 percent of Addis Ababa is a slum and 70 per cent of this comprising government owned rental housing. The majority of low-income Ethiopians reside in rented *kebele* housing. UN-HABITANT further indicated that almost 50 percent of these slums dwellers live below the poverty line. The quality of *kebele* housing stock is low: typically constructed of mud, wood, and/ or discarded materials with inhuman and unhygienic conditions. Another point is that *kebele* houses are old, having been constructed many decades ago and little to no maintenance has been carried out. Some houses remain with no access to water and electricity, and many do not maintain minimum standards of sanitation. Government inactivity in *kebele* housing maintenance as well as the low rents is the major reasons why the *kebele* housing stock is of such a low quality. Although they are relatively low quality, owner occupied houses are of a higher standard than *kebele* housing. They are less deteriorated due to age and have greater attention to maintenance as revealed in appendix G. According to Addis Ababa city administration study conducted in 2003 the housing deficit in the city was about 350,000. This demand stems from both the current housing deficit and the poor quality of the existing *kebele* housing stock that is beyond repair.

Addis Ababa Integrated Housing Development Program: A strategy for Urban Poverty Reduction and Sustainable Socio-Economic Transformation was launched in 2004 by Dr. Arkebe Oqubay, former Mayor of Addis Ababa. The mandate of the IHDP is to reduce slum areas in the city by 50 percent to meet international standards and improve the unemployment percentage in the capital by creating job opportunities in the construction sector within five years. Following this strategy Housing Development Project Office (HDPO) was set up to ensure the successful delivery of the three main processes in the IHDP in Addis Ababa: the ‘design’, the ‘construction’, and the ‘housing transfer and administration.

The IHDP has been successful in many respects such as constructing of huge number of housing units, creation of jobs, upgrading contractors and consultants capacities, etc. On the contrary the large-scale programme has not met all of its original targets; it has built a total of 176,065 housing units from 2004 till 2015 and transferred to the beneficiaries a significant achievement considering the previously limited capacity of the Ethiopian housing sector. Since 2015 more than 92,081 condominium housing units are under construction in different project sites the details are showed in appendix F. For this reasons the programme has greatly increased the number of homeowners that would never otherwise have owned a home within their lifetime, and, in parallel, has benefited the housing market by increasing the supply of owner occupied housing and rental units. The programme has also built the capacity of the construction sector, addressed the existing slums and been a significant generator of employment opportunities as indicated in appendix G. In all a significant number of housing projects are being built on a great scale in different sub cities of Addis Ababa to meet the Millennium Development Goal, MDG "Cities without slump by 2020", which contributes to the economic growth of the country.

Housing considered as the major development task to reduce urban poverty and improve the lives of slum dwellers and to bring sustainable socio-economic transformation. The Housing Development Project was designed to enhance the capacity of micro and small scale enterprises by making them participant in the programme and promoting effective use of the scares resources. The following figure 2 illustrated that how the construction works are executed, distribution of major inputs, human resources and financial managements, expansion of construction capacity.



Source: AAHDPO

Figure 2: Construction project work flow

The Integrated Housing Development Programme is entirely financed by public resources. The programme was originally funded by the city government's own account. The Addis Ababa city government funded to the housing project ETB 7,815,624,292.72 from 2004 till 2009. After five years, however, it became necessary to consider a new strategy. The new approach came in the form of the regional and city administration purchasing bonds from the Commercial Bank of Ethiopia, secured under a Bond Agreement and paying them back over five years. Presently, CBE is the only independent financial resource for the housing programme in Ethiopia and has provided ETB 22 billion in bonds to the government from 2010 till 2014. Up to this date, the housing programme has not received any donor funding. The IHDP is solely financed by CBE bonds and the city administration's own budget. A proportion of the Addis Ababa city budget is allocated to condominium building construction costs, labour costs, and infrastructure costs. (The infrastructure works include the water supply, the electricity, the roads and the drainage system). Project financial performance is showed in appendix F.

2.10. Contributions of housing construction to the socio-economic development of Ethiopia

The construction industry is one that has a special role in our country's quest for development. We can say that there is no development sector into which construction does not enter. The construction industry plays a key role in building economic infrastructure like roads, railways etc; in expanding social infrastructure like schools, hospitals, etc; and in expanding factories. To bring about fast growth in any economic sector, a strong and efficient construction industry is called for. The Construction Industry can be described as the sum of all economic activities related to civil and building works. Construction is widely acknowledged as the most important single constituent in a country's investment program. Because of such a high contribution, the construction industry has a major influence on the economic growth of a country.

Ethiopian Economic Association [EEA], (2008) reported that construction industry makes significant contributions to the socio-economic development process of a country. Its importance emanates largely from the direct and indirect impact it has on all economic activities. It contributes to the national output and stimulates the growth of other sectors through a complex system of linkages. The contribution of the industrial sector to the overall economic development of a country is significant. One of the main indicators of socio-economic and technological development of a country is the level of the progress scored in this sector. Industry plays a leading role in the realization of the objectives of the country. This is because of its economic and technological contribution in supplying inputs such as raw materials, machinery, hand tools, spare parts, components, construction materials as well as in

expanding infrastructure and providing materials and technical services for agriculture, and other economic sectors. In addition to this, the sector has got a decisive role in the economic development process of the country in strengthening linkages, interdependence and in attaining a balanced regional development.

The construction industry in Ethiopia is the backbone of all other industries availing infrastructure services. There is a close intersectional relationship between construction and other economic and social sectors. Building works require high input. For instance, they require different metal products, clay works, and cement and cement products, etc. As such, the growth of these industries will surely follow the growth of the construction industry. Similarly, when the construction and maintenance of housing increase, the demand for household furniture will be increased; thereby, indirectly, opening the door for the growth of the furniture industry. In addition, as the intensive construction in Ethiopia today becomes more complex, the demand for project management services also increases. It contributes to employment and creates income for the population and has multiplier effects on the economy. The following are major contribution to the national development of Ethiopia.

2.10.1. Contribution to the national income

The construction industry has important contributions to the Ethiopian economy, as demonstrated by its share in the GDP. For instance, the share of the sector in the total GDP averaged at about 5.2 percent in the period 2002/03- 2006/07. Over this period, there has been increased investment on the development and expansion of various infrastructure projects like roads, airports and residential and non-residential housing units (EEA, 2008).

2.10.2. Contribution to the employment

The role of the construction industry in terms of creating employment opportunities especially in urban areas is becoming visible. The contribution of the industry in terms of creating employment has slightly improved over the years.

2.10.3. Contribution to the government revenue

The construction industry also contributes to the generation of revenue for the government. Though there are many other direct and indirect revenues that are generated from the construction industry. Construction generates tax revenues, both for regional and federal governments (EEA, 2008).

Apart from the economics aspects, the speed with which construction is carried out is also an important factor. In the construction industry, the aim of project control is to insure that projects finish on time in line with budget, quality and scheduled time (shreenaath, Arunmozhi and Sivagamasundari, 2014).

But due to the dynamic nature of the sector time and cost overruns are common in construction projects in Ethiopia. However, the magnitude and causes behind time and cost overruns and their mitigation measures remain understudied.

Construction industry in Ethiopia is still characterized by inadequate capital base, old and limited numbers of equipment, low levels of equipment availability and utilization, deficiencies in technical, managerial, financial and entrepreneurial skills, limited experience and participation of the private sectors in construction and consultation works, and insufficient and ineffective use of labor-based construction and maintenance technology. These factors are responsible for the constructions time and cost overruns to occur. Hence time and cost overruns is a severe problems faced by construction industry in Ethiopia. Project overruns make projects very expensive. The effects of project overruns are not confined only to the construction industry but are reflected in the overall economy of the country.

Time and cost overruns have significant implication from an economic as well as political point of view (Shannugapriya and Subramanian, 2013). Mulla and waghmare (2015) explained that time and cost overruns reduce the Gross Domestic Product (GDP) or productivity of available economic resources, edge the development potential and diminish the effectiveness of the economy. Therefore, improving construction efficiency cost effectively and on time would certainly contribute to save the scarce resources for the country.

2.11. Measures to control time and cost overruns

2.11.1. Measures to control time overruns

Aibinu and jagboro (2002) examined the effects of delay on the delivery of construction projects in Nigeria and they recommended that acceleration of site activities coupled with improved owner's project management procedures and inclusion of an appropriate contingency allowance in the pre-contract estimate were as a means of minimizing the adverse effects of construction delay in Nigeria.

It is important to improve the estimated activity duration according to the actual skill levels, unexpected events, efficiency of work time, and mistakes and misunderstandings. Mitigation efforts are necessary to minimize losses. It is also important to predict and identify the problems in the early stages of construction and diagnose the cause to find and implement the most appropriate and economical solutions (Abdul-Rahman et al 2006).

It was indicated from the survey findings derived from different levels of management that the major causes of delay are due to financial problems followed by manpower shortage and changes in the project requirements. All parties involved in the project also agreed that delay occurs mostly during the construction phase. Therefore, in resolving those problems, the units of analysis suggested to increase the construction productivity, followed by increase the expertise and skill of human resources, and conducted site meetings more frequently. A strategic view of solving delay problems should consider the importance of the management aspects, the effects of knowledge and information flow between the organization levels, and the importance of top management contribution in solving the problems (Al-Najjar, 2008). As Raykar and Ghadge (2016) suggested that the interference in project due to time and cost overruns can be minimized by adopting few "A Use of Project Management Techniques". Project management techniques such as fishbone diagram, effective material management, resource smoothing and leveling, monitoring and scheduling, proper coordination between the parties can be used for the satisfactory completion of a project. Apart from this, it is necessary to give adequate training to consultants and project engineers to minimize time overruns in regulating company policy.

2.11.2. Measures to control cost overruns

It may be seen that most of the factors causing cost overruns emanate from actions and omissions by both the client and the professional team. In this regard the first step towards minimizing cost overruns may be to deal with the human factors first. The factors that were studied make it difficult to control cost overruns during the construction stage alone. Instead, there should be sufficient planning of the project at the inception stage (Ramabodu and Verster, 2010). Drawings and other tender documents should be well detailed before the commencement of the construction activities. The detailed design of a project is used to assess the quantities of materials required and the actual construction work involved in implementing a project. Drawings and lists of quantities are then used to produce detailed project costs and to establish an implementation timetable. If this cannot be clearly done, the risk of cost overruns and even project failure will happen. Other measures to be taken to minimizing the project overruns are:

- Secure adequate project funds
- Allocate sufficient time and money to the project
- Select a competent and reliable consultant and contractor to undertake the construction of the project.
- Conduct timely project site handover to the contractor.

According to Mustafa (2015) the different measures recommended for problems of cost overruns include: proper project costing and financing, competent personnel, appropriate scope definition, proper cost control, risk management during project execution, appropriate contractual framework, increase supply of materials, realistic cost estimation and efficient management.

2.11.3. Proper use of project management tools and techniques

Although delay and cost overrun may seem very inherent in most projects, the good news is that it can be reduce or totally eliminated using a proper project management system that will integrate all the key activities of each phase of the project. According to Project Management Institute [PMI] (2013) definition project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. The project owner and the project manager should be able to clear define the management success and product success so that the project team has clear knowledge of its objectives. This application of knowledge requires the effective management of the project management processes. For any given project, the project manager, in collaboration with the project team, is always responsible for determining which processes are appropriate, and the appropriate degree of rigor for each process. Project managers and their teams should carefully address each process and its inputs and outputs and determine which are applicable to the project they are working on. If one word could describe the essence of project management it is responsibility (Benator and Thumann, 2003). The project manager is responsible personnel to a project owner for the overall planning, control and coordinating of a project and for ensuring that a project is completed within time, on budget and that it satisfies the project owner's specifications. This ensures that problems can be identified quickly and measures taken to mitigate them.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1. Introduction

The purpose of the study was to establish the factors causing time and cost overruns and to evaluate the influence these factors have on time and cost overruns. Review of literature was carried out to establish those factors influencing overruns of construction projects. This chapter presents the research methodology of the study and the main topics included in this chapter are research approach, research design, sample and sample techniques, instruments of data collection, procedure of data collection, and methods of data analysis and research ethical consideration.

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3.2. Research approach

Dawson (2003) defined that the research methodology is the philosophy or general principle which guides the research. Furthermore qualitative and quantitative research methodologies are defined as follows by Dawson. Qualitative research explores attitudes, behavior and experiences through such methods as interviews or focus groups. As it is attitudes, behavior and experiences which are important, fewer people take part in the research, but the contact with these people tends to last a lot longer. Quantitative research generates statistics through the use of large – scale survey research, using methods such as questionnaires or structured interviews.

Even though each methodology represents a different approach to evaluation, in this thesis, a mixed approach is used which incorporates both quantitative and qualitative research methodologies to achieve the desired objectives of the study. According to Creswell (2009, 4) definition "Mixed methods research is an approach to inquiry that combines or associates both qualitative and quantitative forms." Therefore, in this study a quantitative approach was used to understand the perception of owners, contractors and consultants and qualitative approach was used to gain insights and to understand the attitudes of individuals or groups towards factors influencing time and cost overruns at government condominium housing construction projects in Addis Ketema sub city administration.

3.3. Research Design

Research design refers to the plan or organization of scientific investigation, designing of a study involves the development of a plan that will guide the collection and analyses of data. "Research designs are plans and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis" (Creswell, 2009, 3).

In order to carry out this research with desired quality, there was a need to design a questionnaire survey to identify significant factors affecting time overruns and cost overruns in Addis Ketema Housing Development Project. To identify time and cost overruns factors in the construction industry, related literatures were thoroughly reviewed and identified more than 120 major overruns factors. For this study the researcher developed questionnaire based on 41 factors for time overruns and 17 factors for cost overruns and grouped in to 5 and 4 major groups respectively with the consultation of engineers, who have experiences on similar housing projects.

To achieve the main objectives of the study, the proposed research area was Addis Ketema Sub City Housing Development Project, where a large number of condominium housing construction activities were undertaken since 2005. In order to evaluate and analyze the causes of delay and cost overruns in condominium housing construction activities, owner, contractors and consultant were targeted.

This research consists of six phases; the first phase includes the research proposal for identifying and defining the problems and establishment of the objectives of the study and development of research plan. The second phase of the research includes literature review; in this phase literatures related to time and cost overruns factors were thoroughly reviewed. The third phase of the research was the questionnaire design. The fourth phase of the research was questionnaire distribution to a sample of owner's project team, contractors and consultant staffs. The fifth phase of the research focused on data analysis and discussion which includes questionnaire validity and reliability; statistical package for the social sciences SPSS v 20 used to perform the required data analysis and discussions. The six phase of the research includes conclusion, limitations of the study and recommendations. Research design flowchart is shown below in figure 3.

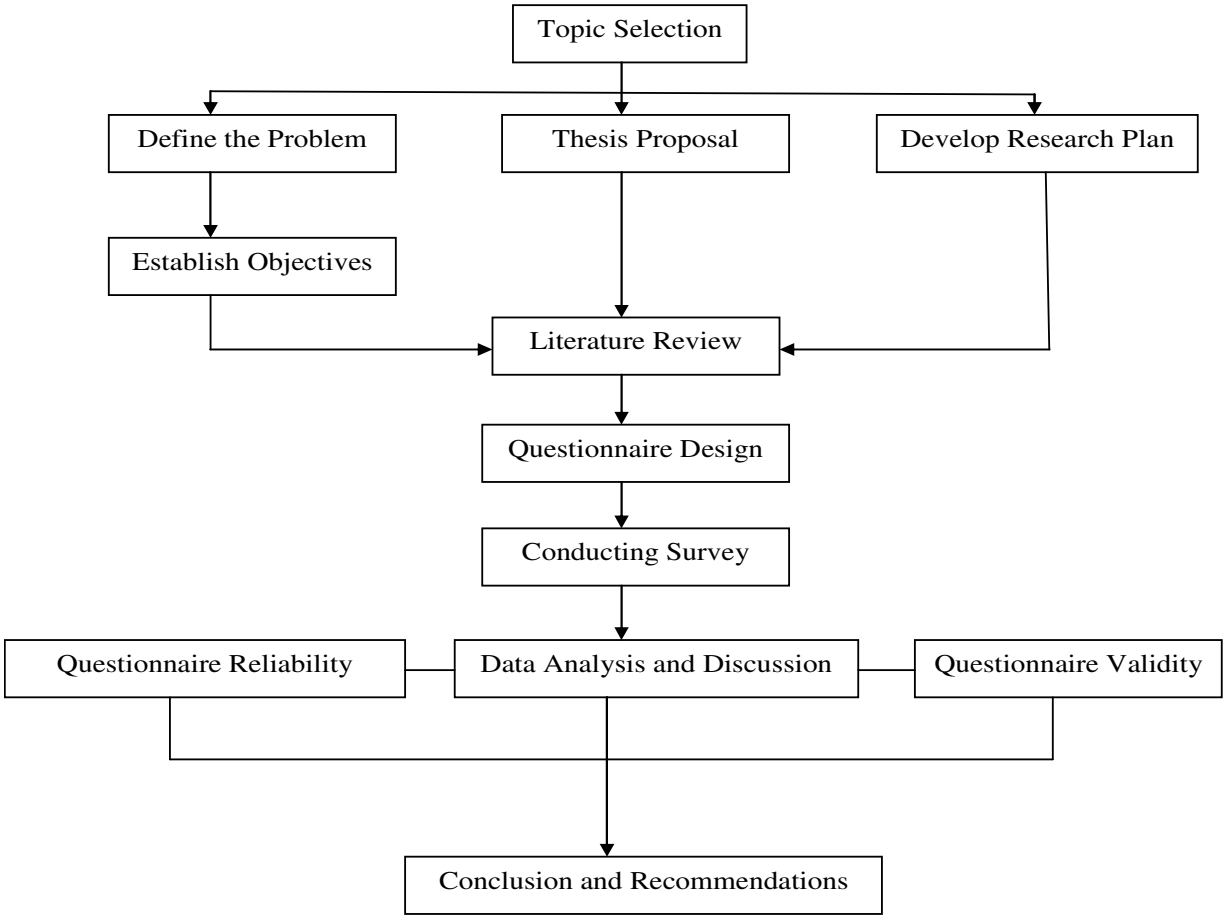

Figure 3: Research design flowchart

3.4. Sample and Sampling Techniques

The population of this research included owner of the project, contractors and consultant.. Currently there are 16 housing projects in Addis Ababa, in order to carry out the research purposive sampling method is used to select Addis Ketema sub city housing project and quota sampling procedure were also applied to select the representative of the owner's and consultant's population in the sub city, since there are one project owner and one consultant firm on the project. Contractors who were agreed and entered the agreement with the owner of the projects to perform their construction works were taken as a population. As the size of contractors' population was big the representative samples were determined. A simple random selecting procedure was applied to represent the population of contractors, in which each individual in the contractors' population has an equal probability of being selected. Appropriate statistical equations were applied in order to calculate the representative sample size of contractors' population. With randomization, a representative sample from a population provides the ability to generalize to a population.

3.5. Sample size determination

A sample is a small proportion of a population selected for observation and analysis. So to calculate the sample size for contracting companies based on the sample required estimating a proportion the following statistical equations 3.1 and 3.2 were used (Smith, n.d.). These equations are used by Al-Najjar, 2008 and Mustafe, 2015 to determine the sample size in their respective studies.

$$SS = \frac{Z^2 * P * (1-P)}{C^2} \quad \text{..... equation 3.1.}$$

Where,

SS = sample size without considering the finite population correction, fpc, factor

Z = Z value

P = percentage picking a choice, expressed as a decimal

C = margin of error ranges from 0 to 1.

For this study, the variables are taken as follows.

Z = 1.96 for 95 confidence level

P = 0.50 where P is not known

C = 0.05

Therefore, the sample size determined using the above equation 3.1.

$$SS = \frac{(1.96)^2 * 0.5 * (1 - 0.5)}{(0.05)^2} = \underline{384.16}$$

The next step is sample size determination using the finite population correction (Smith, n.d.). When the sample represents a significant (e.g. over 5%) proportion of the population, a Finite Population Correction, FPC, factor can be applied. Applying the FPC factor results in the actual sample size SSa computed as in equation 3.2.

$$SSa = \frac{SS}{1 + \frac{SS - 1}{N}} \quad \text{..... equation 3.2.}$$

Where

SSa = the adjusted sample size

SS = the original sample size without considering FPC factor

N = population size. (N for contractors)

Using the above equation 3.2 the actual sample size is determined as follows.

N is the population of contractors = 47

$$SSa = \frac{384.16}{1 + \frac{384.16 - 1}{47}} = 41.97 \approx 42$$

Hence forty five (45) questionnaires were distributed for contracting firms. Since the client is assigned one consultant for the project no need of calculation for determining sample sizes for both parties (owner and consultant). Simply ten questionnaires were distributed, five questionnaires for each offices, owner's and consultant offices.

3.6. Source of data

For this study the primary data was collected through questionnaires, structured interviews, and researcher's personal observations during site and office visiting as well as secondary data from published and unpublished documents such as: related books, research papers, Journal articles, and reports from completed projects, thesis and other related websites.

3.7. Procedure of data collection

With the intention of achieving the desired objectives; well framed survey design - questionnaires and structured interviews – were carefully designed in light of getting high response rate from respondents. This research used survey questions, structured face - to - face interviews, document review and observations to collect data from sample respondents. A survey design provides quantitative or numeric description of trends, attitudes, or opinions of a population which can generalize to make claims about the population (Creswell, 2009).

Factors influencing time and cost overruns in housing construction in Addis Ketema sub city was first examined and identified through relevant literature reviews. The questionnaire was contained five point Likert's scale as well as questions regarding to planning and controlling of time and cost of construction projects and associated problems faced during construction activities were discussed in

detail during face – to – face interviews with key project staffs from owner, consultant and contractors. Observation of ongoing activities at project sites and offices was done during survey and interview. Each types of measure have specific type of issues that need to be addressed to make the measurement meaningfully accurate and efficient.

The answers of the questionnaire were based on Likert's scale of five point's ordinal measures of agreement towards each statement from 1 for "not significant" to 5 for "extremely significant". The reasons for adopting this simple scale were to provide simplicity for the respondents to answer and make evaluation of collected data easier for researcher. A Likert's scale is important to know respondents' feeling or attitudes about something. The respondents therefore, indicated how closely their feelings matched with the questions or statements provided on rating scale. Questionnaire also contains both open ended and close ended questions.

3.8. Methods of data analysis

Both descriptive and inferential statistics were employed in the data analysis methods. The analysis depends on both primary and secondary data that was collected through questionnaires, structured interviews, reviewing relevant literatures and reports and observations. The questionnaires were collected and analyzed using statistical software package, SPSS v 20. The data were entered into computer spreadsheet, SPSS programme, which is used to analyze the data. A five point weighing scale "w" was used to indicate the relative importance of contributor "i" in a construction delay and cost overrun, where "5" represented "extremely significant", "4" "very significant", "3" moderately significant", "2" "slightly significant" and "1" "not significant". A factor rated "4" and "5" interpreted as a significant contributor of construction time and cost overruns, the one rated "1" and "2" interpreted as insignificant contributor of time and cost overruns. A factor rated with a "3" was taken as uncertain. The results obtain were used to compare the opinions of the key respondents of owner, contractors and consultant about the factors affecting time and cost overruns in the construction activities. The relative importance index, RII, which indicated the relative importance of a contributing factor "i" to the construction delay and cost overrun calculated based on the following equation 3.3. Sambasivan and Soon (2007) used this equation to study the causes and effects of delay in Malaysia construction industry. Enshassi et al, 2009: Baloyi and Bekker, 2011: Al-Najjare, 2008: Tejale et al, 2015: Abdul Rahaman, 2013: Mulla and Waghmare, 2015: Shanmugapriya and Subramanian, 2013: Olawale and Sun, 2010 and Shreenaath et al, 2014 also used this equation for their own studies.

$$RII = \frac{\sum W_i}{A*N} \qquad \text{……..……equation 3.3.}$$

Where

W = Weighting given to each factor by the respondents and ranges from 1 to 5 where '1' is 'not significant' and '5' is 'extremely significant',

i = Response category index (frequency of response given for each cause)

A = Highest weight (i.e. 5 in this case);

N = total number of respondents.

To study the strength of relationship between two sets of ranking, the Spearman rank correlation coefficient was determined. The Spearman rank correlation coefficient is used for measuring the differences in ranking between two groups of respondents scoring for various factors (i.e. clients versus consultants, clients versus contractors, and consultants versus contractors). The Spearman rank correlation coefficient is calculated using the following equation 3.4.

$$rs = 1 - \frac{6\sum d^2}{N(N^2-1)} \qquad \text{……..…… equation 3.4.}$$

Where,

rs = Spearman rank correlation coefficient; ($-1 \leq rs \leq 1$)

d = Difference in ranking between the groups, and

N = the number of variables. Or number of causes or groups

The reliability test depicted the consistency degree of the data collected. The Cronbach's alpha coefficients used to measure of the inner or internal consistency that was, how closely related a set of items were as a group. Technically speaking, Cronbach's alpha is not a statistical test-it is a coefficient of reliability or consistency. Cronbach's alpha values ranged from 0 to 1 according to the correlations between the items. Values above 0.70 are considered "acceptable" in most social science research situations.

3.9. Data measurement

In this research, ordinal scales were used. Ordinal scale is a ranking or a rating data that normally used integers in ascending or descending order. The number assigned to the degree of influence did not indicate that the intervals between scales are equal nor did they indicate absolute quantities. They are merely numerical labels. A scale of 1 – 5 was used, with higher scores indicating that the factor is extremely significant and lower score indicating that the factor is not significant. Respondents were indicated their level of agreement on each evaluative statement about construction project time and cost overruns on a 5 – point's Likert scale. Based on Likert's scale this study applied the following format as indicated in table 2. A Likert's scale is assumed to be an interval scale, although the item scores are discrete values.

Table 2: Data measurement using Likert's scale

Item	Extremely significant (E.S.)	Very significant (V.S.)	Moderately significant (M.S.)	Slightly significant (S.S.)	Not Significant (N.S.)
Scale	5	4	3	2	1

3.10. Research ethical consideration

Participation of respondents was at their will and could stop at any time when they felt uncomfortable. Researcher was respected and protected the rights and dignity of participants as well as gave assurance to be liable for any harm occurred on them because of their participation in this study.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1. Introduction

This part of the research deals with the analysis and discussion of the data gathered from the desk study, questionnaire survey, interview and observation concerning time and cost overruns from contractors, consultant and owner viewpoints in Housing Development Projects of Addis Ketema sub city. It includes the identification of the existence and extent of time and cost overruns, main causes of time and cost overruns, effects of time and cost overruns on the final or total cost of the project in the sub city.

From the desk study twelve housing construction projects in Addis Ketema sub city were surveyed. During the desk study the contract time during signing of the contract and actual completion time of the project were investigated. This process helped the researcher to know whether there is time and cost overrun exist or not, and to investigate how the actual time at completion deviates from the contract period. Finally, the effects of time and cost overruns on the various stakeholders were dealt.

4.2. Data analysis techniques

The purpose of these data analysis was to establish the factors causing time and cost overruns and to evaluate the adverse influence these factors have on time and cost overruns. Two types of data were collected, secondary data from various related literature review and primary data using a survey conducted with project parties in the Addis Ketema housing construction projects; as well as structural interview discussions with the staffs of the owner, consultant and contractors. A total of 55 questionnaires were distributed to owner, contractors and consultant involved in the housing construction project sits. Out of 55 distributed questionnaires 87% (48) completed set were received back.

The procedure used in analyzing the results was aimed at establishing the relative importance of the various factors responsible for time and cost overruns and their effects. The questionnaire gave each respondent an opportunity to identify the factor that was likely to cause time and cost overruns by giving the response “Extremely significant”, “Very significant”, “Moderately significant”, “Slightly significant” and “Not significant”; effects of time and cost overruns variables on the final cost of the projects; and their impacts on socio-economic development of the country. For each variable of time and cost overruns, the percentages of respondents’ response were ranked for analysis purpose. On the basis of the ranking of the variables by the various groups, it was possible to identify the most

important factors that influenced time and cost overruns in housing construction projects in Addis Ketema housing development projects. The presentation of the data is by means of graphs, pie-charts and tables. The information relating to the background of the respondents, their length of working experience in the sector, the response rate to questionnaires and responses are provided.

4.3. Questionnaire response rate

Detailed question````aire was designed and distributed for the assessment of time and cost overruns on housing construction projects in Addis Ketema housing development projects, for this purpose the questionnaires were distributed to project parties; these are contractors, consultant and project owner. To make the analysis more comprehensive a total of 55 questionnaire sets were distributed to contractors, consultant, and project owner out of which 48 questionnaires were filled and returned. Table 3 shows the number of questionnaires distributed to contractors, consultant and project owner and the number of questionnaires returned from these project parties including their percentage response rate.

Table 3: Number and percentage of questionnaires distributed, returned and response rate

No.	Respondents	Questionnaire distributed		Questionnaire returned		Response rate
		No.	%	No.	%	%
1	Contractor	45	82	42	87.50	87.50
2	Consultants	5	9	3	6.25	60.00
3	Owner	5	9	3	6.25	60.00
Total/Average		55	100	48	100.00	87.00

Source: Primary data

4.4. Results of desks study

The first step in this research is to investigate and understand the type of construction contracts agreed between owner and contractors to construct housing construction at different project sites in Addis Ketema sub city. A contract is a mutual business agreement recognized by law under which one party undertakes to do work or provide a service for another party for a consideration. From this intensive study I understood that the type of construction contract in Addis Ketema Housing Development Project is not similar to the conventional one. In the conventional construction contract agreement the contractors obliged to supply all construction materials, labours and equipments to the project but in theses construction contract agreements both the owner and the contractors supplying construction materials to the projects. Construction materials supplied by owner are cement, reinforcement bars,

crushed stone, hollow concrete blocks for walls and slabs, precast beams, electrical and sanitary fixtures and fittings but other construction materials like stone, sand, selected soil from quarry, forms, nails, are supplied by contractors. In addition, the contractors were supplying machineries and equipments; and manpower to the project. These shared responsibilities are created complex relationships among the projects stakeholders: owner, contractors, consultant, micro and small enterprises, vendors, etc, to manage the project effectively and efficiently. The essence of effective project management is to manage the technical, schedule and financial elements of a project to a successful conclusion.

Addis Ketema sub city is one of the tenth sub cities of Addis Ababa city administration. This sub city is engaged in constructing condominium houses in different project sites in the sub city and the periphery of the city outside its boundary since 2005. Condominium houses constructed by the sub city from 2005 till 2015 are listed in the table 4 and houses under construction since 2015 are shown in table 5 below.

The sub city's expenses for the construction of condominium houses in annual basis are shown in table 6. A proportion of the expenses are distributed to building construction costs, labour and material costs, consultant fees, infrastructure costs and other expenses. (The infrastructure works include the water supply, the electricity, the roads and the drainage system).

Table 4: Completed and transferred housing units to the beneficiaries at different sites from 2005 up to 2015

Project site	Bo. of block	Housing units						Year E.C.
		Studio	One bed room	Two bed rooms	Three bed rooms	Shops	Total	
Tsehay Gibat 1	8	140	136			12	288	1997 - 1999
Tsehay Gibat 2	1		16	8		6	30	1997 - 1999
18 Mazoria	3	56	56			6	118	1997 - 1999
Dilachn	3	52	52			12	116	1997 - 1999
Gebs Meda	2	10	10	40	10		70	1997 - 1999
Amanual	6	49	65	175	29	11	329	1997 - 1999
Mesalemia	2	10	10	40	10		70	1997 - 1999
Adiis Ktema 1	6	36	36	12			84	1999 - 2002
Gofa	13	69	174	126	35		404	1999 - 2001
Gofa	167	1,024	1,973	1,482	168	354	5,001	1999 - 2003
Kilinto	289	4,346	1446	755	440	308	7,295	2004 – 2009
Total	500	5,792	3,974	2,638	722	709	13,805	1997 - 2009

Table 5: Housing units under construction at Koye Fiche site since 2015

Project site	Bo. of block	Housing units						Year E.C.
		Studio	One bed room	Two bed rooms	Three bed rooms	Shops	Total	
Koye Fiche	121	335	2,966	1,520	1,464	4	6,289	2006 -

Source: Addis Ketema HDPO

Table 6: Construction costs and other expenses of HDP

Budget year	Contractors payment	MSEs payment	Material expenses	Consultant fees	Salary and recurrent budget	Total
1997	1,554,086.00	522,956.45	16,437,346.49		1,815,662.02	20,330,051.00
1998	6,365,128.19	196,079.82	2,985,676.03		1,380,493.43	10,927,377.47
1999	11,015,137.19	1,686,560.40	1,723,848.30		1,579,616.80	16,005,162.69
2000	15,845,331.29	5,274,404.94	5,756,020.34		1,974,539.36	28,850,295.93
2001	46,890,791.72	41,989,015.27	19,288,685.84		6,933,107.43	115,101,600.26
2002	29,691,722.04	11,313,805.44	5,844,636.37		3,687,463.94	50,537,627.79
2003	5,678,663.47	3,097,944.64	1,160,366.26		2,128,481.35	12,065,455.72
2005	108,749,252.36	15,610,903.94	16,410,539.17		21,280,071.69	162,050,767.16
2006	113,763,428.08	35,456,042.55	24,618,500.00		38,330,209.41	212,168,180.04
2007	28,344,031.39	16,374,943.92	4,369,357.37	998,534.21	11,891,311.34	61,978,178.23
2008	15,553,732.12	9,733,358.43	6,073,931.55	6,869,772.98	6,869,772.98	45,100,568.06
Total	383,451,303.85	141,256,015.80	104,668,907.72	7,868,307.19	97,870,729.75	735,115,264.35

Source: Addis Ketema HDPO

The second step in this research is to check whether time and cost overruns exist or not in the projects. During desk study twelve projects are evaluated their estimated completion times; and actual completion date then calculated the rate of time overruns. The data was collected via reviewing project documents. On the basis of data gathered from the desk study, the whole projects evaluated in desk study registered time and cost overruns. The rate of time overrun ranges from a minimum of 50% to the maximum of 100% of the contract time. Based on the results found in desk study, table 7 shows the project's name, contract time and actual time at completions, and rate of time overruns for each project from 2005 to 2015. From the table 7 it can be seen that the rate of time overruns are significantly high.

Table 7: Contract time and actual completed time of housing construction Projects

No.	Project's name	Contract time (months)	Actual time (months)	Time overruns (months)	Rate of time overrun (%)
1	Tsehay Gibat 1	24	36	12	50
2	Tsehay Gibat 2	24	36	12	50
3	18 Mazoria	24	36	12	50
4	Dilachn	24	36	12	50
5	Gebs Meda	24	36	12	50
6	Amanual	24	36	12	50
7	Mesalemia	24	36	12	50
8	Adiis Ktema 1	24	36	12	50
9	Gofa	24	36	12	50
10	Gofa	24	36	12	50
11	Kilinto	24	48	24	100

Source: Addis Ketema sub city construction section

Even though there is cost overrun in housing construction projects in the sub city, it was very difficult to obtain recorded data about the rate of cost overruns for the completed projects in both AAHDP and sub city levels. The main problems identified during desk study are 1) no proper records for each individual projects and 2) no proper transfer of information to newly assigned persons. According to the unpublished report of Addis Ababa housing development project office (2016), some of the main causes of cost overruns in these projects are (Attached in appendix F):

Owner related factors

1. Shortage of manpower (expertise and skilled manpower)
2. Poor communication and management
3. Financial problem
4. Infrastructure problems like water, access road and electricity.
5. Delay in delivery of construction materials, and
6. Corruption

Contractors related factors

1. Poor capacity and site management
2. Poor planning and scheduling
3. Poor performances
4. Poor coordination with sub contractors
5. Shortage of and use low skilled labours, and
6. Unethical behaviors

Subcontractors and suppliers (Micro and small enterprises) related factors

1. Poor capacity and incompetency
2. Absence from work place
3. Material wastage
4. Poor attitudes, and
5. Unethical problem

4.5. Information of interview

The third step interview was conducted using a qualitative – structured interview. The aim is to explore the topical issues revealed after analysis of the questionnaire survey and experiences of practitioners in greater depth. The same population used for the quantitative stage of the research was used. A total of four practitioners, who are involved in housing construction, presented for interviews.

The first question was directed towards the establishment of whether construction time and cost overruns are seen as a problem in the housing construction in Addis Ketema housing development projects. All, 100%, respondents agreed time and cost overruns in the construction projects are major problems that need to be addressed soon.

Table 8 provides more information on each of the interviewees. As can be seen from the table the interviewees were a mix of contractors, owner and consultant with similar kind of housing project experiences.

Table 8: Information of interviewees

Organization type	Roles	Experience (years)	Interview duration (in min.)
Owner	Project manager	10	30
Consultant	Resident engineer	12	30
Contractor	Project manager	25	30
Contractor	Site engineer	4	30

Table 8 indicates that interviewed respondents had experiences in handling housing construction projects ranging from 4 years to 25 years. All respondents agreed that the housing construction projects took long to be executed; they required more time and incurred more cost. The most critical problems mentioned by the respondents are financial, material and manpower (skilled and experienced labour and manager) problems. Even if there is overruns to the projects at present time there is no special methods or systems to measure the overruns factors and minimize their effects on the projects. These overruns problems are overwhelming the whole project activities and incurred an additional cost to the projects. These overruns also bring long term effects to the sub city in specific and the city as a whole. Some of these problems agreed by the respondents are:

1. **Economical problem** - When the project time increases consequently project cost increases. As a result of this the project budget constraint practically observed.
2. **Social problem** – due to delays the transfer of houses for the beneficiaries it creates loose of trusts and hopes on city government.
3. **Political problem** – Because of project overruns rent seeking and lack of good governance take the lead and finally brings social unrest like strike and other problems.

According the participants responses there are interventions from Addis Ababa Housing Development Project Office (AAHDPO) in an attempt to reduce the project overruns in housing construction projects. Some of the interventions made by AAHDPO are listed below.

1. Secure and allocate funds to the sub cities
2. Recruiting and assigning professional workers in different housing construction projects,

3. Selecting contractors and consultants and assigning them to the construction projects,
4. Arranging and providing training to stakeholders at all levels,
5. Purchasing and distributing construction materials to the project sites, and
6. Applying direct control management system on construction projects.

4.6. Observation during site and office visiting

In this research one of the data collection methods was observation. The researcher visited the construction activities at *Koyefiche* project site during survey and interviews. Some of the problems that were observed during the site and office visiting are listed hereunder.

4.6.1. Contractors' related problems

- Poor handling of construction materials on the site
- Wastage of materials – due to improper handling of materials
- Poor documentation system
- No planning and scheduling – due to this project completion time increases
- No required number of staffs to administer and manage the construction works
- No well organized offices and facilities

4.6.2. Consultant's related problems

- No required number of staffs to supervise and control the construction activities
- Frequent absences of staffs from the work place
- Poor documentation system - data could not found easily
- No proper planning and scheduling to control project time and cost
- No well organized offices and facilities
- Week supervision and quality control systems

4.6.3. Owner's related problems

- Poor coordination system
- Poor recording system
- No detail planning and scheduling – due to this project completion time increases
- Managing two construction sites at a time

4.7. Results of survey for causes of time and cost overruns

The causes of time and cost overruns from the questionnaire survey are identified based on respondents' response on each variable of time and cost overruns. To identify the most common

factors causing of time and cost overruns, it is important first to identify the causes of time and cost overruns for Addis Ketema housing construction projects, and then discover their relative importance index to rank them. And hence investigate the overruns effect on the final cost of the project.

4.8. Population characteristics

This part mainly designed to provide general information about the respondent's profile in terms of the type of organization, respondents' sex, educational levels, and field of studies, positions and work experiences, and the application of software packages in the organization to control time and cost of the projects. The questionnaires were distributed to owner, consultant and contractors of housing construction projects in Addis Ketema housing development project.

4.8.1. Respondents' demographic profile

Demography of the respondents was assessed to see the factual data of respondents involved in the data collection. The respondents represented three categories of the personnel with 6.25% (3) respondents from owner category, 6.25% (3) respondents from consultant category and 87.5% (42) respondents from contractor category. These findings are presented in figure 4.

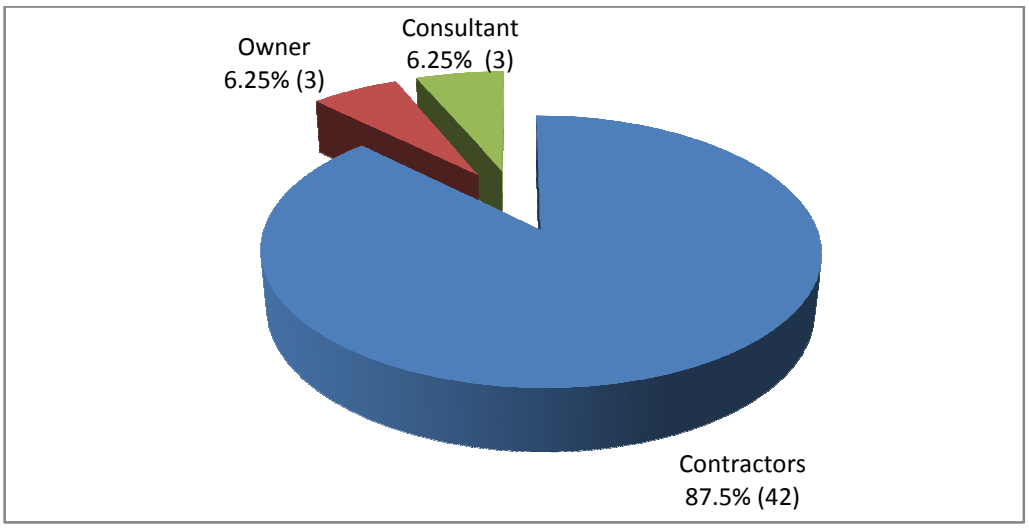

Figure 4: Respondents' demographic profile in percent

4.8.2. Types of respondent's organizations

In this study, 42 contracting companies, project owner, and 1 consulting firm participated in the survey as shown at figure 5. The total number of organization participated for this particular study was 44.

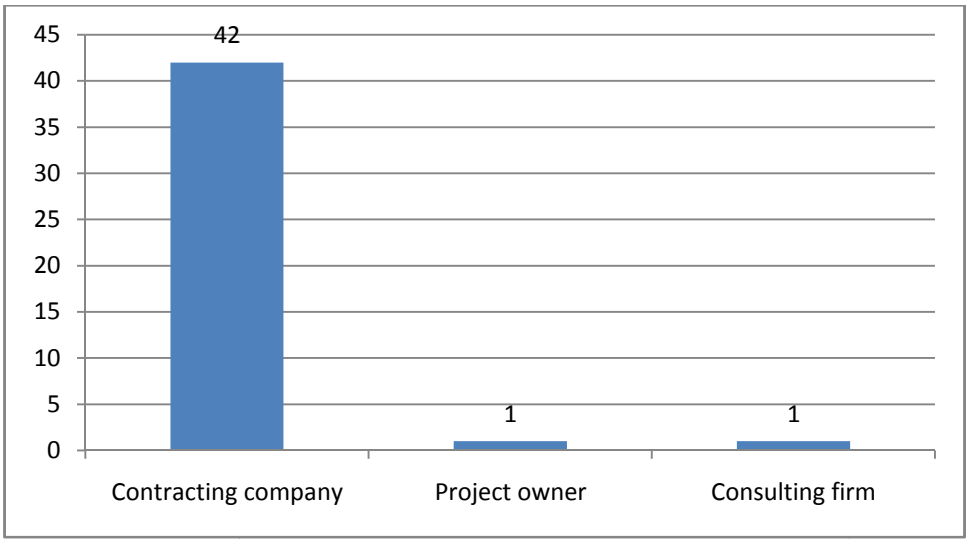

Figure 5: Respondents' Organization type

4.8.3. Respondent's sex

The study observed that out of 48 respondents engaged in the housing construction projects there were more males than female. 98% of respondents were males, whereas only 2% were females. Figure 6 below shows the percentage of males and females who returned back the questionnaires.

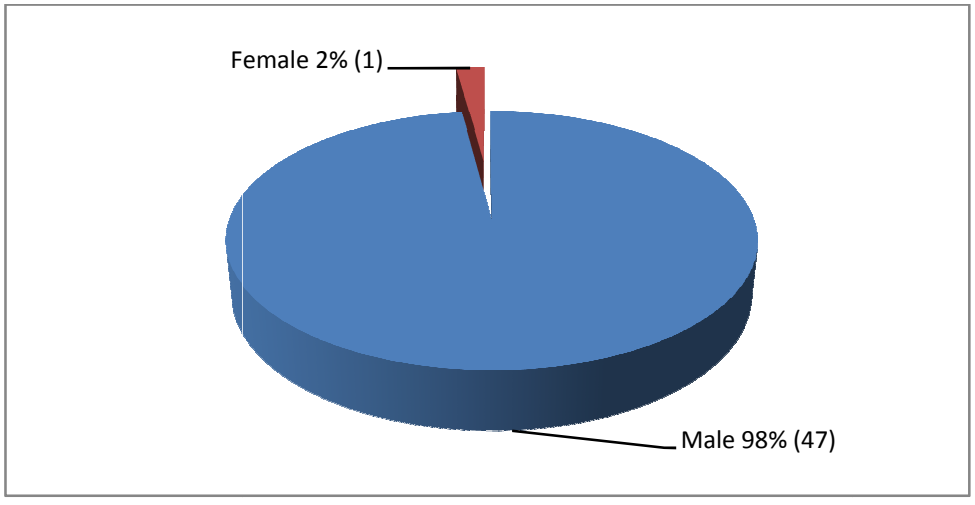

Figure 6: Respondent's sex

4.8.4. Respondent's educational level

From figure 7 it can be seen that most of the respondents involved in the survey were holding bachelor degree in term of educational qualification with the highest percentage 68.75% (33), with those having

diploma qualifications accounting for 18.75% (9). Others respondents are holding master holders with the lowest percentage 12.50% (6) and no respondents holding P

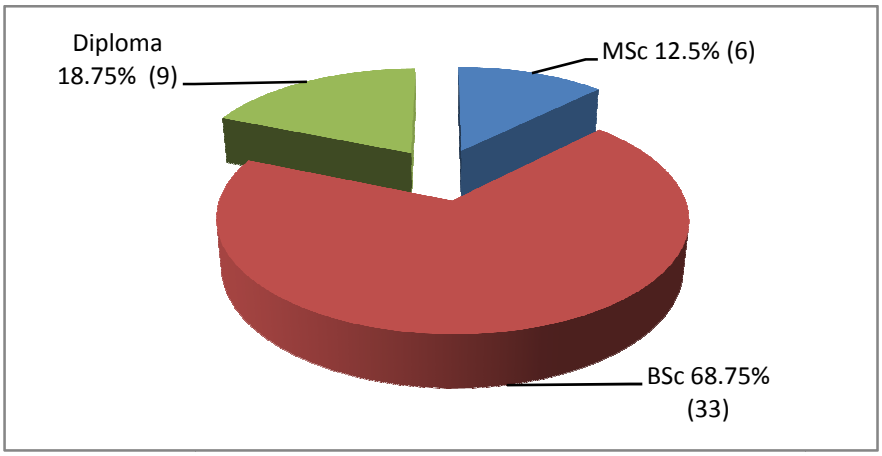

Figure 7: Respondent's educational level

4.8.5. Respondent's field of study

From the figure 8 it can be seen that out of 48 respondents 95.8% (46) respondents involved in the survey were civil engineers. While 4.2% of respondents have studied other fields; other than civil engineering field of study that is in management professions.

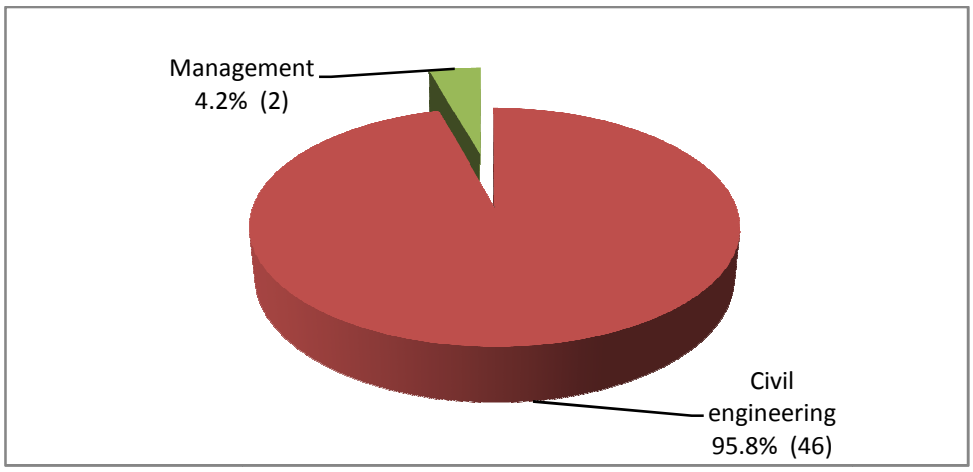

Figure 8 Respondent's field of study

4.8.6. Respondent's designation

Figure 9 shows that 50 % (24) of respondents were site engineers, 25 % (12) of respondents were projects engineers and 18.75 % (9) were projects managers. It has been founded that project

coordinator accounts for 2.09% and other designations, project contract administration and personnel administration accounts for about 4.16% (2 respondents).

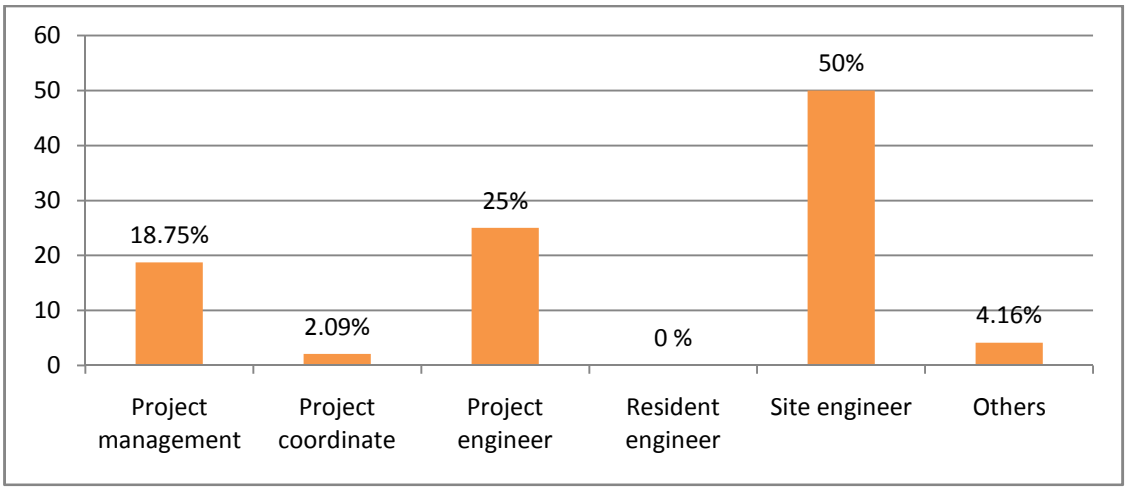

Figure 9: Respondent designation

4.8.7. Work experience of respondents

Figure 10 shows that 47.9 % (23) of the respondents firm have experience between 1 to 4 years at construction works and the 25% (12) of respondents who have experience more between 4 to 8 years, 12.5 % (6) respondents have experience from 8 to 12 years, and 14.6 % (7) have experience above twelve years.

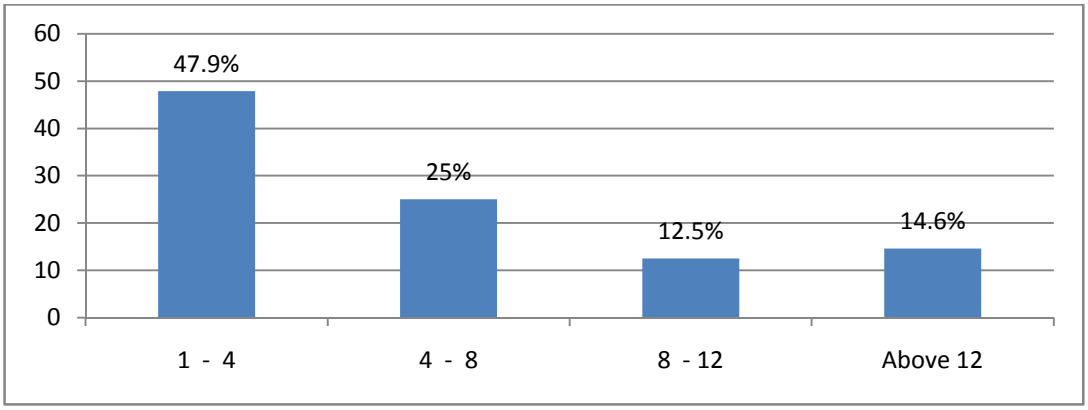

Figure 10: Work experience of respondents

4.8.8. Usage of software packages in the organization.

The importance of time and cost control is widely recognized by construction professionals in practice. The questionnaire survey of this study revealed that only 20.8 % (10) of respondents always apply time controls in the project but others do not apply time control during their projects as shown in figures 11.

Microsoft project is used by 6.3% of the respondents and excel spreadsheet used by 18.8% of the respondents. Others 74.9% of the respondents do not use software packages totally to control project time as shown in figures 12 below.

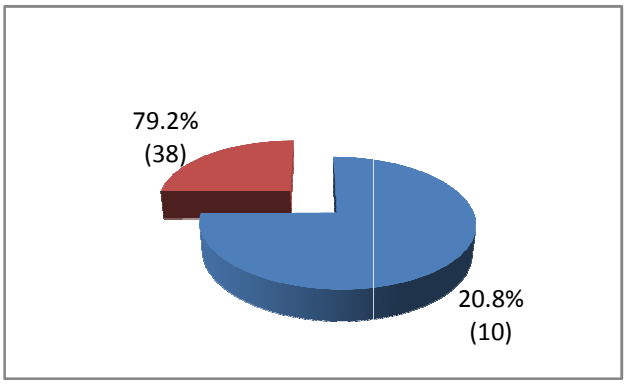

Figure 11: Application of software packages to control project time

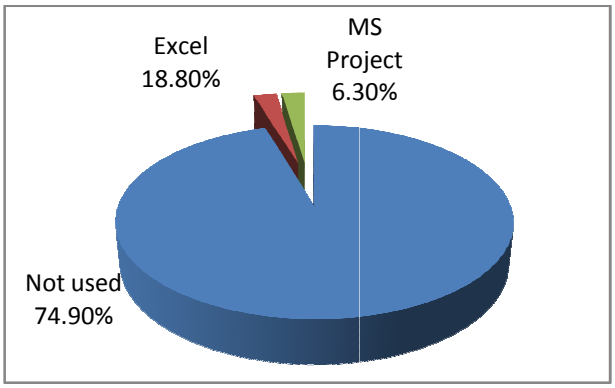

Figure 12: Types of software package used to control project time

The application of cost control is more neglected by the respondents during their projects. Very few (10.4%) of respondents used the software packages to control cost and others 89.6% (43) did not use as indicated in figure 13. Microsoft project is used by 2.1% of the respondents and excel spreadsheet used by 6.3% of the respondents others 91.6% do not apply cost control during their projects as shown in figure 14.

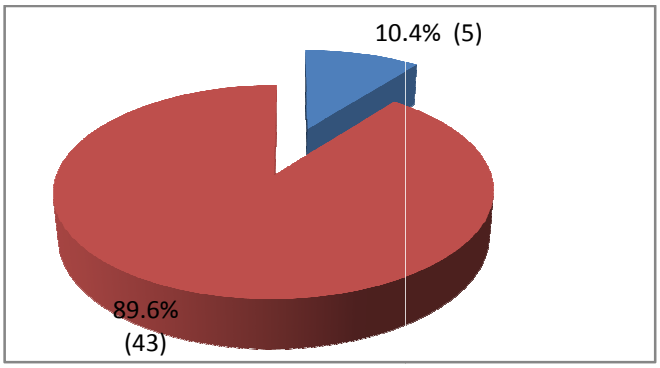

Figure 13: Application of software packages to control project cost

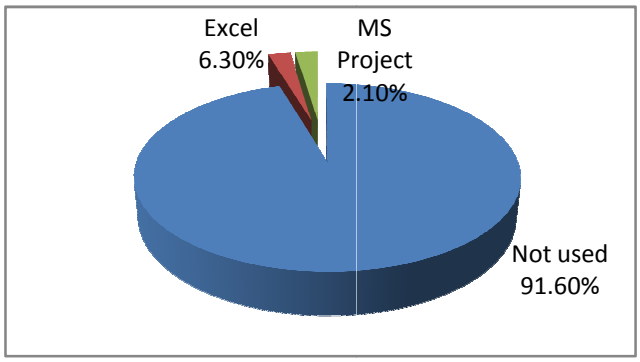

Figure 14: Types of software packages used to control project cost

4.9. Reliability analysis for time and cost overruns

The reliability test is conducted to check the stability and consistency of data by using Cronbach's alpha method that is widely adopted. The Cronbach's alpha coefficients is a measure of the inner or internal consistency, that is, how closely related a set of items are as a group. Technically speaking, Cronbach's alpha is not a statistical test-it is a coefficient of reliability or consistency. Cronbach's

alpha values ranged from 0 to 1 according to the correlations between the items. Values above 0.70 are considered "acceptable" in most social science research situations. In this study, Cronbach alpha was calculated using statistical software SPSS version 20 as shown in table 9 and table 10. Cronbach's alpha can be written as a function of the number of test items and the average inter-correlation among the items. The values of Cronbach's coefficient alpha for the categories of both time and cost overruns factors and for the entire data are more than 0.70. Therefore the higher value reflects a higher degree of internal consistency.

Table 9: Reliability test for time overruns factors

Category of time overruns Factors	Cronbach's alpha value
Project's related factors	0.709
Owner's related factors	0.723
Contractors' related factors	0.828
Consultant's related factors	0.833
External factors	0.722
Overall Cronbach's alpha value	0.884

Table 10: Reliability test for cost overruns factors

Category of cost overruns Factors	Cronbach's alpha value
Material related factors	0.702
Financial related factors	0.716
Labour and equipment related factors	0.855
Contract management related factors	0.711
Overall Cronbach's alpha value	0.814

4.10. Relative Important Index (RII)

This part consists of results and discussion of factors that influence time and cost overruns. The questionnaires were collected and analyzed using statistical software package SPSS version 20. The ranking of factors was calculated based on Relative Importance Index as shown in equation 3.3.

4.11. Ranking of causes of time overrun

Hierarchal assessment of factors was carried out to determine ranking of the factors based on level of significance. On the basis of ranking of the factors by the various groups it was possible to identify the most important factors that influenced project time overruns. It was assessed based on RII value and calculated for each group of respondent's i.e. contractor, consultant and owner and also the overall respondents. A summary of all the factors causing time overruns in housing construction projects in relative importance index, ranking by the groups, and overall ranking as identified by all groups is presented in appendix D.

The results show that, there are several important factors underlying causes of time overruns in housing construction projects in Addis Ketema sub city. Appendix D gives the overall and group-wise RII of the factors that are considered by practitioners as affecting their ability to control time of construction projects. The factors have been assigned rank in relation to their overall RII. In total 41 factors were analyzed, with the top ten factors contributing more than 83 % of the causes of delay. The ten most important factors of time overruns ranked by overall respondents or agreed by the owners, contractors and consultants, are shown in table 11 below.

Table 11: Top ten factors causing time overruns on housing construction projects

Factors of time overruns	Overall rank		Owner		Contractor		Consultant		Category
	RII	Rank	RII	Rank	RII	Rank	RII	Rank	
Financial or cash problems during constriction	0.896	1	0.800	3	0.910	1	0.867	2	Contractor related Factors
Inadequate funding of project or financial constraints	0.892	2	0.933	1	0.886	2	0.933	1	Owner Related Factors
Delays in payment for completed works	0.871	3	0.867	2	0.881	3	0.733	4	Owner Related Factors
Incomplete drawings and documents	0.833	4	0.933	1	0.833	6	0.733	4	Consultant related Factors
Slowness of decision making process	0.825	5	0.733	4	0.857	4	0.800	3	Owner Related Factors
Under-estimation of costs	0.825	5	0.800	3	0.838	5	0.667	5	Consultants related Factors
Delays in delivery of materials	0.813	6	0.733	4	0.810	8	0.733	4	Owner Related Factors
Slowness in giving instructions	0.808	7	0.867	2	0.824	7	0.533	7	Consultant related Factors
Unrealistic contract duration or project time estimation	0.808	7	0.800	3	0.824	7	0.600	6	Consultant related Factors
Project scope definition	0.800	8	0.800	3	0.810	8	0.667	5	Project related factors

Table 11 above illustrates the top 10 significant factors affecting time overruns of housing construction projects. It can be inferred from this table that 3 most important factors affecting time overruns according to the perception of owner, consultant, and contractor are: inadequate funding of project or financial constraints, financial or cash problems during constriction and delays in payment for completed works. Owner and consultant ranked the "inadequate funding of project or financial constraints" first whereas the contractor ranked it second. The contractors ranked the "financial or cash problems during constriction" first, the consultant ranked it second and the owner ranked it third. The other factor ranked second, third and fourth by owner, contractors and consultant respectively is "delays in payment for completed works". Cash problem is more critical issue for contractor than owner and consultant because it is negatively affects the rate of work progress. Inadequate funding and payment for completed works is more important for owner than for contractors and consultants as these factors affects owner project finance or budget. This problem may be due to financial constraints existing in the construction industry. According to owner, consultant, and contractors, it seems that the average delay because of "inadequate funding of project or financial constraints" was the most important performance factor as it has the highest rank among all factors with RII = 0.933 for owner, 0.933 for consultant, and 0.886 for contractors. This agreement between all target groups is traced to the difficult situation of financial management and planning from which the housing construction project suffers. Local construction projects suffer from a number of problems because of financial constraints. These problems can be considered as an obstacle for time performance of projects.

The finding of this study agrees with similar studies in other developing countries. For example, Frimpong et al. (2003) found that financial problem was the main factor that cause delay in the construction of groundwater projects in Ghana. Odeh and Battaineh (2002) study in Jordan indicated that the late payment for completed work, slow decision making and late issue of instruction were the main factors causing delay. Ameh and Osegbo (2011) studied the cause of delay in Nigeria and concluded that inadequate funding of projects and delays in delivery of materials were the leading causes of construction delay. Naveenkumar and prabhu (2016) study in India pointed out that slowness in giving instruction was the key factor of construction time overruns. Sweis (2013) studied the factors causing time overruns in public construction project in Jordan and concluded that slow decision making and delay in progress payment by owners were the main factors that influencing project time overrun. Koushki et al. (2005) conducted a study in Kuwait to study the causes of time and cost overrun in construction projects. They concluded that the main causes of delays were owners' financial constraints and owners' lack of experience.

4.12. Ranking of causes of cost overrun

Table 13 shows the rank of all factors of cost overruns that have been investigated in this research. On the basis of ranking of the factors by the various groups it was possible to identify the most significant factors from contractor, consultant and client viewpoints that influenced project cost overruns. A total of 17 factors identified from literature which highly influence cost overruns in construction sector have been studied and discussed. The study respondents were required to rank these 17 factors according to their influence on cost overrun on construction projects. The ranking was therefore based on the perception of the respondents which are grouped in to three: owner, consultant and contractors. It was assessed based on RII value and calculated for each group of respondent's and the overall respondents. The RII and rank of cost factors in group wise as well as overall are summarized in appendix E.

Appendix E gives the overall and group-wise RII of the factors that are considered by practitioners as affecting their ability to control and manage costs of construction projects. The factors have been assigned rank in relation to their overall RII. In total 17 factors were analyzed, with the top ten factors contributing more than 73% of the causes of cost overruns. The ten most important factors of cost overruns ranked by overall respondents or agreed by the owners, contractors and consultants, are indicated in table 12 below.

Table 12: Top ten factors causing cost overruns on housing construction projects

Factors of cost overruns	Overall rank		Owner		Contractor		Consultant		Category
	RII	Rank	RII	Rank	RII	Rank	RII	Rank	
Shortage of materials	0.842	1	0.867	1	0.838	1	0.867	1	Material Related Factors
Cost underestimation	0.800	2	0.867	1	0.805	2	0.667	3	Financial Related Factors
Inaccurate material estimate	0.788	3	0.733	3	0.800	3	0.667	3	Material Related Factors
Lack of financial management and planning	0.750	4	0.667	4	0.757	4	0.733	2	Financial Related Factors
High transportation costs	0.729	5	0.733	3	0.743	5	0.533	5	Labour and Equipment Related Factors
Lack of experiences of project managers	0.713	6	0.800	2	0.710	6	0.667	3	Contract management Related Factors
Lack of experienced consultants or unavailability of competent staffs	0.688	7	0.800	2	0.681	8	0.667	3	Contract management Related Factors
Dependency on imported construction materials	0.667	8	0.733	3	0.671	9	0.533	5	Material Related Factors
Suspension of works	0.667	8	0.733	3	0.690	7	0.667	3	Contract management Related Factors
Different consultants for design, supervision and contract administration	0.667	8	0.867	1	0.671	9	0.400	6	Contract management Related Factors

Table 12 above illustrates the top 10 significant factors affecting cost overruns of housing construction projects. It can be inferred from this table that 3 most important factors affecting cost overruns according to the perception of owner, consultant, and contractor are: shortage of materials, cost underestimation and inaccurate material estimation.

Shortage of materials has been ranked by the owner's, contractors' consultant's respondents in the first position. It is observed that this factor is more important for all of them because shortage of materials affects owners' liquidity and project budget and the progress rate of the work of contractors. Unplanned procurements of construction materials lead to shortage of construction materials and escalation of construction material prices. Cost underestimation has been ranked by the owner's respondents in the first position. It has been ranked by the contractors' respondents in the second position and by the consultants' respondents in the third position. It is not surprising to find out cost underestimation is more important for owner and contractors than for consultants because this factor affects owner project finance or budget and contractors' cash flow and cost performance. Inaccurate material estimate of a project has been ranked by the owner's, contractors' and consultant's respondents in the third position. Material is one of the project components that affects project budget and rate of progress of the works.

The survey finding also agrees with similar studies in other developing countries. For example, Enshassi, Mohamed and Abushaban (2009l), study observed that most important factors affecting the cost performance of construction projects in the Gaza Strip were materials shortage, availability of personnel with a high experience and qualifications, and leadership skills for project managers. Shanmugapriya and Subramanian (2013) study reported that time and cost overruns is a severe problems faced by large construction industries in India. The report identified the most factors causing cost overruns were high transport cost and change in material specification. According to study conducted by Baloyi and Bekker (2011), the most significant factors that caused cost overruns at the various 2010 FIFA World Cup stadia construction in South Africa were inaccuracy of material estimates and shortage of skilled labour. Tejale, Khandekar and Patil (2015) study identified and analyzed causes of cost overrun in construction industry in Pune region, India. It was observed the factors for cost overrun were the material shortage, shortage of labour, late delivery of materials, and unavailability of competent staff. In another study carried out in Czech by Ahmed, Dlask and Hasan (2014) the main factors caused deviation in the cost of project were identified. These factors include rising prices, shortage important materials, inaccurate estimates and poor management.

4.13. Test for agreements on causes of time and cost overruns

One of the purposes of this thesis is to investigate whether there is agreement or not on the attitudes of stakeholders towards the causes of time and cost overrun on housing construction projects in Addis Ketema sub city. Hence in this section respondents' response will be tested for correlation using Spearman rank correlation coefficients, to see if there is difference in ranking between two groups of respondents; these are Owner versus Contractors; Contractors versus Consultant; and Owner versus Consultant, on the variables of time and cost overruns and their rate of occurrence. The purpose of a hypothesis test is to avoid being deceived by chance occurrences. The tests also helped to evaluate whether consensus of opinions exist among respondents.

4.13.1. Test for agreements on causes of time overrun

The Null Hypothesis (H_0): There is no agreement in the ranking of causes of time overrun between two groups of respondents,

The Alternative Hypothesis (H_a): There is an agreement in the ranking of causes of time overrun between two groups of respondents

Spearman rank correlation coefficient is used to determine whether there is evidence of a linear relationship between two ordinal variables, or, if both variables are interval and the normality requirement may not be satisfied.

The spearman correlation coefficient 'rs' is calculated using Equation 3.4 and tabulated as shown below in Table 15 for time overruns. In order to decide whether to accept or reject the null hypothesis, the level of significance 95% (P = 0.05) is used. This allows to state whether or not there is "agreement" between respondents response.

If the calculated value of 'rs' is greater than the critical value 'r', H_0 is rejected, and there is evidence of a statistically significant agreement between the groups. If the calculated value of 'rs' is less than the critical value 'r', H_0 is accepted**,** and i.e. there is no evidence of a statistically significant agreement between the two groups (owner Vs contractor, Owner Vs consultant or Contractor Vs consultant).

Table 13: Summary of correlation test on the ranking of causes of time overrun

Respondents	rs value	Critical value of r (Appendix C)	Significance for P < 0.05	Reject or accept the null hypothesis
Client Vs Contractor	0.2256	0.2611	Not Significant	Accept
Contractor Vs Consultant	0.4427	0.2611	Significant	Reject
Client Vs Consultant	0.9667	0.2611	Significant	Reject

The result showed that the degree of association or correlation between the attitudes of the respondents in the two groups' client and consultant is strong where as the degree of association or correlation between the attitudes of the respondents in the two groups' contractor and consultant is moderate. The degree of association or correlation between the attitudes of the respondents in the two groups' client and contractor is low as indicated table 15.

In this case, with a significance level of 95% (P = 0.05), the calculated value of 'rs' for the two group cases (Client Vs Consultant and Contractor Vs Consultant) are greater than the critical values of 'r', so the hypothesis that there is no significant agreement between the respondents is rejected i.e. the null hypothesis is rejected. In another case of Client Vs Contractor respondents, with a significance level of 95% (P = 0.05), the calculated value of 'rs' is less than the critical values of 'r', so the null hypothesis that there is no significant agreement between the respondents is accepted. There is no evidence of a statistically significant agreement between the two groups. Therefore, concluded that there is no a significant degree of agreement between the perception of respondents in client and contractors with respect to how they rank the factors. This means that some of the respondents have no the same perceptions about causes of time overruns.

4.13.2. Test for agreements on causes of cost overrun

In a similar way correlation test is done for cost overrun as shown below in the following section. The hypothesis test for the cost overrun is also helped us to evaluate whether consensus of opinions exist among respondents.

The Null Hypothesis (H_0): There is no agreement in the ranking of causes of cost overrun between two groups of respondents,

The Alternative Hypothesis (H_a): There is an agreement in the ranking of causes of cost overrun between two groups of respondents

The spearman correlation coefficient 'rs' is calculated using Equation 3.4 and tabulated as shown below in Table 16 for cost overruns.

Table 14: Summary of correlation test on the ranking of causes of cost overrun

Respondents	rs value	Critical value of r (Appendix C)	Significance for P < 0.05	Reject or accept the null hypothesis
Client Vs Contractor	0.2831	0.4142	Not Significant	Accept
Contractor Vs Consultant	0.4877	0.4142	Significant	Reject
Client Vs Consultant	0.8934	0.4142	Significant	Reject

The result again showed that the degree of association or correlation between the attitudes of the respondents in the two groups' client and consultant is strong where as the degree of association or correlation between the attitudes of the respondents in the two groups' contractor and consultant is moderate. The degree of association or correlation between the attitudes of the respondents in the two groups' client and contractor is low as indicated table 16.

Similar to the above result, with a significance level of 95% (P = 0.05), the calculated value of 'rs' for the two group cases (Client Vs Consultant and Contractor Vs Consultant) are greater than the critical values of 'r', so the hypothesis that there is no significant agreement between the respondents is rejected i.e. the null hypothesis is rejected. In the other case of Client Vs Contractor respondents, with a significance level of 95% (P = 0.05), the calculated value of 'rs' is less than the critical values of 'r', so the null hypothesis that there is no significant agreement between the respondents is accepted. There is no evidence of a statistically significant agreement between the two groups. Therefore, here also concluded that there is no a significant degree of agreement between the perception of respondents in client and contractors with respect to how they rank the factors. As the result of this conclusion some of the respondents have no the same perceptions about causes of cost overruns.

4.14. Effects of project delay

From the desk study and interviews results all projects delayed and incurred additional cost from estimated project amount. The degree of effects of construction delays varies on the stakeholders in the housing construction project. All respondents agreed on the severity of the effects of project delays on their respective sides that means the parties involved directly in project activities are affected by

project delays in different degrees. The first victim of project delays would be the project owner, since the objective of the owner not realized within the given project time and cost. It requires additional budget for the project, this in turn affects the scarce financial resources of the project. Secondly project delays influence negatively on the contractors' performance and incurred an additional cost due to idle manpower and idle equipments. Thirdly the consultant viewed as incompetent by the project owner and contractors; and loss of reputation and confidence due to project delays. However, project delay does not affect only those parties that are involved directly in the construction of housing project, but the effects of project delay passes to construction industry and consequently to the national economy of the country as a whole.

Aibinu and Jagboro (2002) studied the effects of construction of delay on project delivery in Nigeria construction industry. The six effects of delay that were identified includes: time overrun, cost overrun, dispute, arbitration, total abandonment and litigation. Nega (2008) study identified 20 effects of cost overruns on public construction projects in Ethiopia. Additional cost of the project, delayed payments to the contractors for the completed works, adversarial relationship between participants of the projects and weakens the growth of the construction industry; and creates frustration on stakeholders are among them. All these effects undermine the viability and sustainability of the construction industry and these in turn affects, in a negative way, the rate of national socio- economic development of the country.

From the survey result the researcher identified the following four major effects of project delays as shown in the figure 15 below.

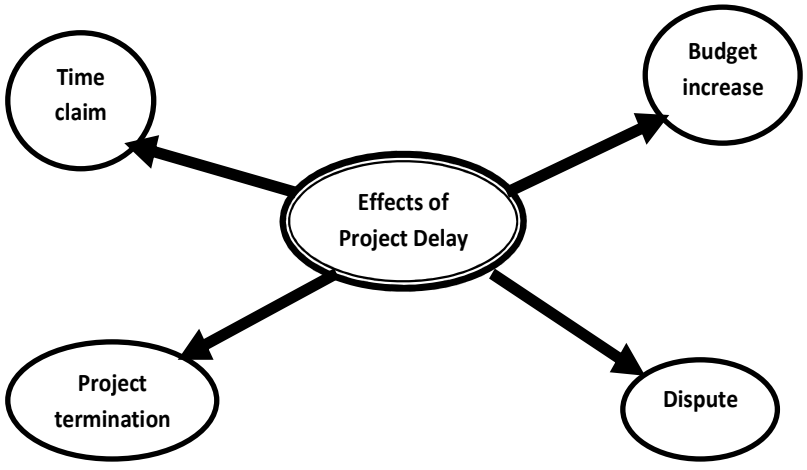

Figure 15: Effects of project delay

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary of major findings

Construction industry is considered to be dynamic industry which is constantly facing uncertainties that make the management of time and cost difficult and consequently, causes time and cost overruns. Time and cost overruns are severe problems faced by construction projects. It is resulted from various factors which had been identified in this study. A total of 48 samples were found as valid and analyzed statistically using relative importance index method on 41 and 17 factors on time and cost overruns. A questionnaire-based survey was used to obtain the attitude of owners, consultants, and contractors towards factors affecting the project overrun of construction projects in Addis Ketema sub city. 55 questionnaires were distributed as follows: 5 to owners, 5 to consultants and 45 to contractors. 48 questionnaires (87%) were returned as follows: 3 from owners, 3 from consultants, and 42 from contractors as respondents. The respondents were asked to indicate the level of importance of each of the 58 factors of project overruns (time and cost overruns) in Addis Ketema sub city as not significant, slightly significant, moderately significant, very significant, and extremely significant. In addition interview and observation of data collection methods are used in order to get necessary and reliable data from the respondents.

The result of this study identified ten most significant factors causing time and cost overruns in the housing construction projects respectively. Financial or cash problem during construction, inadequate funding of project or financial constraint, delay in payment for completed works, incomplete drawings and documents, slowness of decision making, costs underestimation, delay in delivery of construction materials, slowness in giving instructions, unrealistic contract durations or project time estimation and project scope definition for time overrun and shortage of materials, cost underestimation, inaccurate material specifications, lack of financial management and planning, high transportation cost, lack of experienced project managers, lack of experienced consultants and unavailability of competent staffs, dependency on imported construction materials, suspension of works and different consultants for design, supervision and contract administration works for cost overruns. So this implies that a need of urgent attention is to be put on these factors to avoid time and cost overruns and effects of these overruns on the housing construction projects in particular and on construction industry in general.

Spearman's correlation coefficient is used to determine, whether there is a degree of agreement among overrun factors for owner, consultant and contractors. The result showed that the degree of association

or correlation between the attitudes of the respondents in the two groups' client and consultant is strong where as the degree of association or correlation between the attitudes of the respondents in the two groups' contractor and consultant is moderate. The degree of association or correlation between the attitudes of the respondents in the two groups' client and contractor is low in both, time and cost overruns.

In this study, with a significance level of 95% (P = 0.05), the calculated value of 'rs' for the two group cases (Client Vs Consultant and Contractor Vs Consultant) are greater than the critical values of 'r', so the hypothesis that there is no significant agreement between the respondents is rejected i.e. the null hypothesis is rejected in both, time and cost overruns. In the case of Client Vs Contractor respondents, with a significance level of 95% (P = 0.05), the calculated value of 'rs' is less than the critical values of 'r', so the null hypothesis that there is no significant agreement between the respondents is accepted. There is no evidence of a statistically significant agreement between the two groups in time and cost overruns. Therefore, concluded that there is no a significant degree of agreement between the perception of respondents in client and contractors with respect to how they rank the factors. This means that some of the respondents have no the same perceptions about causes of time and cost overruns in this case. The degree of effects of construction delays varies with different stakeholders of the housing construction project. The following are some of the major effects of project overruns in their order of severity:

1. Time claim – requires additional time to complete the project
2. Cost claim – require additional budget for the project
3. Dispute among stakeholders, and
4. Project terminations

5.2. Conclusion of the study

A construction project is commonly acknowledged as successful when the aim of the project is achieved in terms of predetermined objectives that are mainly completed the project on time, within budget and specified quality in accordance with the specifications and to stakeholders' satisfaction. In Ethiopia, the number of housing construction projects is increasing from time to time. However, it becomes difficult to complete projects in the allocated cost and time. Many projects experienced time and cost overruns and thereby exceed initial contract time and amount. Time and cost overruns is a severe problems faced by large construction industries in Ethiopia. It is resulted from various factors

which had been identified in this study. So this implies that a need of urgent attention is to be put on these factors to avoid time and cost overruns; and their effects on projects.

The main survey of contractors, owner and consultant as discussed in this paper relates to the construction of housing projects in AKSC. The survey focused on identifying the main factors causing project delay and cost overruns and ranking these factors in order of their relative importance index. Identification of causes of time and cost overruns are prerequisite to avoid time and cost overruns in the construction industry in general and in the housing construction projects in particular. A comprehensive literature review was reviewed to generate a set of factors believed to affect project overruns. A total of 48 questionnaires were filled and returned from three key groups of project participants; namely owner, consultant and contractors. The research result showed that the main causes of delay and cost overruns in construction of housing projects in Addis Ketema sub city are originated from poor resources management (human, technical and material). So this implies that a need of urgent attention is to be put on these factors to avoid time and cost overruns. The study also identified the most common effects of project overruns in the housing construction project. In practice, this phenomenon is expected to continue unless actions are taken to control these causes right away from the planning to the implementation and management stages. Therefore, good practice in planning, coordinating, controlling and monitoring procedures needs to be recognized.

5.3. Limitation of the study

The unavailability of adequate literatures on time and cost overruns on Ethiopian experiences, and time and financial resources were the major constraints of this study. The second constraint was unwillingness of the project staffs to provide necessary and reliable information to the researcher. The third critical constraint was the respondents' careless responses to the questionnaires. Although the above mentioned limitations had made the researcher to endure during this research progress, however, the researcher confirms that to the best of his knowledge, all the output of this research is not influenced by the aforementioned limitations. This is due to the researcher's careful handling of all these issues wisely and diligently.

5.4. Recommendations

Most of the construction projects in all countries of the world including Ethiopia are subject to time and cost overruns. All stakeholders in the construction industry have to work for improving the out puts and to sustain a healthy growth of the industry. 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. Institutions and academicians in the construction industry have to work hand-in-hand with practitioners in the industry. A combined effort of stakeholders is necessary to apply the results of researches conduct in the construction industry.

This research identified the most important factors causing these overruns in housing construction projects in Addis Ketema sub city. In order to alleviate project overruns and meet the targets of integrated housing development program, the researcher recommended the following main points from the research findings that could help for the solutions of the problems encountered by the housing construction projects.

5.4.1. Recommendations for the project owner

Project owner, AKSCHDPO, is one of the most important parties who finance for realization of housing construction projects, and it is the key role players throughout the lifecycle of the project. The following actions should be taken by project owner to minimize or eliminate project overruns and their effects on projects.

1. Revise the bid documents such as specifications, quantity take-off, drawings and the design of the project in an organized way. This is because any discrepancy in bid documents will lead to disputes between projects parties and so delay may occur in the projects.
2. Make the required budget available on time for the projects.
3. Allocate sufficient time for the project
4. Progress payment must be paid to the contractors on time in order to overcome delay, disputes and claims and also assist the contractors in financial management.
5. Develop human resources in the construction projects through proper and continuous training programs about construction projects performance. The different skill improvement training can help the owner to have competent Project Managers and staffs who are capable to manage

the different stages of any project and can assist them to be more familiar with project management techniques and improve management processes.

6. Develop a group decision making and participatory leadership philosophy
7. All managerial levels should participate in important decision – making processes.
8. Continuous coordination and communication with stakeholders are required throughout the project life cycle for solving the exiting project overruns
9. Select competitive and experienced consultants and contractors to the projects
10. Establish effective and efficient material procurement system as material procurement has the potential to cause major delays to construction projects.
11. Establish checkpoints and milestones to insure that the project is kept on track and completed within budget.
12. Carry out timely project site handover to the contractors and closeout the completed projects on time. The post execution phase (closure) of a project contains potential factors that can lead to delays and cost overrun.

5.4.2. Recommendations for Consultant

Consultants are one of the key role players in construction projects that translate the clients' needs and ideas into plans and drawings and supervise the translation of these plans and drawings into visible physical structures. Therefore, the researcher provides the following recommendations from the findings of this research for future improvements of the services.

1. Drawings and other contract documents should be well detailed and approved before the commencement of the construction activities
2. Prepare and facilitate timely payments of contractor to avoid any delay that can create cost overruns to the project.
3. Hire a qualified and professional staffs to manage the project and to overcome any technical or management problems that happen.
4. Improve the efficiency of project staffs through short training programmes that covers project planning, scheduling, time and cost control, and the information systems.
5. Establish a programme of continuous coordination and direct communication with contractors and clients to get timely correction on design discrepancies and errors as well as omissions in

design. This also provides an opportunity to review the contract documents thoroughly to eliminate change orders or variations due to discrepancy in contract documents.

6. Detailed and comprehensive site investigation should be done at the design phase to avoid variations and late changes during the construction phase.
7. Strongly apply project management tools and techniques in order to take the necessary measures to reduce construction cost - since construction cost reduction is one way of reducing cost overrun.
8. Prepare a detailed and realistic schedule and project cost. This schedule must list key phases, tasks and milestones.

5.4.3. Recommendations for Contractors

Contractors among other stakeholders' play a major role for an efficient and effective completion of construction works. Hence the following recommendations are forwarded based on the research findings.

1. Hire a qualified engineers and skilled technical staff to manage and administer the project site.
2. Procure the required quantity and quality of construction materials and other items based on the specifications on time.
3. Plan and secure enough cash before beginning the project to avoid the financial problems.
4. Ensure efficient time management through proper resource planning and good site management system for the different activities of the project
5. Establish continuous coordination and direct communication with consultants and clients
6. Accelerate construction activities and increase productivity
7. Use project management tools and techniques systematically for efficient planning and controlling the project activities.

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APPENDIX A: RESEARCH QUESTIONNAIRES

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

FACULTY OF BUSINESS

Dear respondents,

The purpose of this study is to obtain information from key informants regarding factors that cause project time and cost overruns at Addis Ketema sub city housing construction projects as well as its consequences and possible recommendation as a requirement for the completion of master's degree in project management. Your voluntary contribution by providing accurate and reliable information is vital for the success of this study. The information will be kept confidential and the researcher will be liable for any harms or injury occurred due to your participation.

Thank you for your participation

Sincerely,

Bekele Bezarede

FACTORS AFFECTING TIME AND COST OVERRUNS

SECTION A: DEMOGRAPHIC CHARACTERISTICS AND ORGANIZATION INFORMATION

1. State respondent organization/company type.

Client ☐ Contractor ☐ Consultant ☐

2. Respondent's sex: Male ☐ Female ☐

3. Respondent's designation:

Project manager ☐ Project coordinator ☐ Project engineer ☐

Resident engineer ☐ Site Engineer ☐ Other ☐ Specify _____

4. Respondents' educational level

PhD ☐ Masters degree ☐ Bachelor degree ☐

Diploma ☐

5. Respondents' field of study

Civil engineering ☐ Architecture ☐ Other ☐ Specify_____

6. Relevant work experience (Years):

1 - 4 ☐ 4 - 8 ☐ 8 - 12 ☐ > 12 ☐

7. Do you use software packages for project planning and time control?

Yes ☐ No ☐

If yes mention the name(s): _____

_____

8. Do you use software packages for project cost control?

Yes ☐ No ☐

If yes mention the name(s): _____

_____

SECTION B: FACTORS INFLUENCING TIME OVERRUNS OF CONSTRUCTION PROJECTS IN ADDIS ABABA HOUSING DEVELOPMENT PROJECTS.

Note: E.S. = Extremely Significant (5); V.S. = Very Significant (4); M.S. = Moderately Significant (3); S.S. = Slightly Significant (2); N.S. = Not Significant (1)

No.	Time overrun factors	E.S. (5)	V.S. (4)	M.S. (3)	S.S. (2)	N.S. (1)
	Project Related Factors					
1	Project size					
2	Project location					
3	Project scope definition					
4	Manpower and equipment shortage					
	Owner's Related Factors					
5	Inadequate funding of project or financial constraints					
6	Frequent design change					
7	Increase in project scope					
8	Subcontractors' incompetents					
9	Delays in delivery of materials					
10	Inadequate managerial skills and experiences					
11	Slowness of decision making process					
12	Delays in payment for completed works					
13	Delays in contractors' claim settlements					
14	Poor communication and coordination systems					
15	Owner interference					
	Contractors related Factors					
16	Financial or cash problems during constriction					
17	Unstable interest rate and inflationary increase in material prices					
18	Poor site management					
19	Inadequate planning and scheduling					

No.	Time overrun factors	E.S. (5)	V.S. (4)	M.S. (3)	S.S. (2)	N.S. (1)
20	Poor performances of subcontractors					
21	Delay in work progress and poor labour productivity					
22	Shortage and low skilled labour					
23	Mistake during construction/ reworks					
24	Inadequate contractors experiences					
25	Poor communication and misunderstandings					
26	Unethical behavior					
	Consultants related Factors					
27	Incomplete drawings and documents					
28	Slowness in giving instructions					
29	Depends on the fresher's to bear the whole responsibility					
30	Under-estimation of costs					
31	Unrealistic contract duration or project time estimation					
32	Inadequate quality control procedures					
33	Poor contract management					
34	Luck of communication and coordination					
35	Delays payment preparations					
36	Delays in material approval					
	External Factors					
37	Unavailability or insufficient of water and electricity					
38	Unpredictable weather conditions					
39	Government regulations and control					
40	Bad site conditions (location, soil, etc)					
41	Labour strikes					

For your additional comments: _____

_____

_____

_____

SECTION C: FACTORS INFLUENCING COST OVERRUNS OF CONSTRUCTION PROJECTS IN ADDIS ABABA HOUSING DEVELOPMENT PROJECTS.

No.	Cost overrun factors	E.S. (5)	V.S. (4)	M.S. (3)	S.S. (2)	N.S. (1)
	Material Related Factors					
1	Change in materials specification					
2	Escalation of materials price					
3	Shortage of materials					
4	Inaccurate material estimate					
5	Dependency on imported construction materials					
	Financial Related Factors					
6	Cost underestimation					
7	Fluctuation in money exchange rate					
8	Lack of financial management and planning					
	Labour and Equipment Related Factors					
9	High transportation costs					
10	Frequent breakdown of machineries					
11	High maintenance cost of machinery					
12	High cost of machinery					
	Contract management Related Factors					
13	Change in scope of work on site					
14	Suspension of works					
15	Lack of experiences of project managers					
16	Lack of experienced consultants or unavailability of competent staffs					
17	Different consultants for design, supervision and contract administration					

For your additional comments: _____

_____

APPENDIX B: STRUCTURED INTERVIEW

1. Are there time overruns and cost overruns in Addis Ketema sub city housing construction projects? Yes ☐ No ☐

   If yes, please answer the following questions.

2. What are the major factors that contribute to time and cost overruns?
3. How these factors are measured and evaluated?
4. How and what extent does time and cost overruns affects the projects?
5. Do you think that project delays have an effect on the socio-economic development of Ethiopia?
6. What actions have been taken by the project owner to alleviate time and cost overruns and their effects?
7. What are the measure intervention strategies of the project management office at head office level?
8. What can you recommend to project key stakeholders - owner, consultant and contractors – regarding project delays and cost overruns minimization strategies?

APPENDIX C: SPEARMAN'S RANK TABLE

Sample size (n)	P = 0.05	p = 0.025	P = 0.01
4	1.0000	-	-
5	0.9000	1.0000	1.0000
6	0.2860	0.8857	0.9429
7	0.7143	0.7857	0.8929
8	0.6429	0.7381	0.8333
9	0.6000	0.7000	0.7833
10	0.5636	0.6485	0.7455
11	0.5364	0.6182	0.7091
12	0.5035	0.5874	0.6783
13	0.4825	0.5604	0.6484
14	0.4637	0.5385	0.6264
15	0.4464	0.5214	0.6036
16	0.4294	0.5029	0.5824
17	0.4142	0.4877	0.5662
18	0.4014	0.4716	0.5501
19	0.3912	0.4596	0.5351
20	0.3805	0.4466	0.5218
21	0.3701	0.4364	0.5091
22	0.3608	0.4252	0.4975
23	0.3528	0.4160	0.4862
24	0.3443	0.4070	0.4757
25	0.3369	0.3977	0.4662
26	0.3306	0.3901	0.4571
27	0.3242	0.3828	0.4487
28	0.3180	0.3755	0.4401
29	0.3118	0.3685	0.4325
30	0.3063	0.3624	0.4251
40	0.2640	0.3128	0.3681
50	0.2353	0.2791	0.3293
60	0.2144	0.2545	0.3005
70	0.1982	0.2354	0.2782
80	0.1852	0.2201	0.2602
90	0.1745	0.2074	0.2453
100	0.1654	0.1967	0.2327

APPENDIX D: RANKING OF FACTORS CAUSING TIME OVERRUNS

Factors of time overruns	Overall rank		Owner		Contractor		Consultant	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Project related factors								
Project size	0.654	22	0.867	2	0.638	22	0.400	9
Project location	0.650	23	0.800	3	0.638	22	0.600	6
Project scope definition	0.800	8	0.800	3	0.810	8	0.667	5
Manpower and equipment shortage	0.729	16	0.933	1	0.724	16	0.667	5
Owners Related Factors								
Inadequate funding of project or financial constraints	0.892	2	0.933	1	0.886	2	0.933	1
Frequent design change	0.771	11	0.867	2	0.762	11	0.800	3
Increase in project scope	0.704	18	0.733	4	0.705	17	0.667	5
Subcontractors' incompetents	0.617	26	0.667	5	0.624	23	0.467	8
Delays in delivery of materials	0.813	6	0.733	4	0.810	8	0.733	4
Inadequate managerial skills and experiences	0.758	12	0.733	4	0.767	10	0.667	5
Slowness of decision making process	0.825	5	0.733	4	0.857	4	0.800	3
Delays in payment for completed works	0.871	3	0.867	2	0.881	3	0.733	4
Delays in contractors' claim settlements	0.729	16	0.733	4	0.733	15	0.667	5
Poor communication and coordination systems	0.721	17	0.667	5	0.733	15	0.600	6
Owner interference	0.625	24	0.467	7	0.638	22	0.600	6
Contractors related Factors								
Financial or cash problems during constriction	0.896	1	0.800	3	0.910	1	0.867	2
Unstable interest rate and inflationary increase in material prices	0.546	29	0.467	7	0.562	27	0.333	7

Factors of time overruns	Overall rank		Owner		Contractor		Consultant	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Poor site management	0.650	23	0.733	4	0.643	21	0.667	5
Inadequate planning and scheduling	0.754	13	0.867	2	0.748	13	0.733	4
Poor performances of subcontractors	0.592	26	0.733	4	0.586	26	0.533	7
Delay in work progress and poor labour productivity	0.683	19	0.867	2	0.671	19	0.667	5
Shortage and low skilled labour	0.683	19	0.800	3	0.676	18	0.667	5
Mistake during construction/ reworks	0.575	27	0.733	4	0.562	27	0.533	7
Inadequate contractors experiences	0.671	20	0.800	3	0.676	18	0.533	7
Poor communication and misunderstandings	0.621	25	0.800	3	0.610	24	0.600	6
Unethical behavior	0.500	32	0.733	4	0.476	31	0.600	6
Consultants related Factors								
Incomplete drawings and documents	0.833	4	0.933	1	0.833	6	0.733	4
Slowness in giving instructions	0.808	7	0.867	2	0.824	7	0.533	7
Depends on the fresher's to bear the whole responsibility	0.729	16	0.733	4	0.738	14	0.600	6
Under-estimation of costs	0.825	5	0.800	3	0.838	5	0.667	5
Unrealistic contract duration or project time estimation	0.808	7	0.800	3	0.824	7	0.600	6
Inadequate quality control procedures	0.667	21	0.800	3	0.667	20	0.533	7
Poor contract administration	0.792	10	0.733	4	0.800	9	0.733	4
Luck of communication and coordination	0.733	15	0.933	1	0.738	14	0.467	8
Delays payment preparations	0.798	9	0.867	2	0.762	11	0.600	6
Delays in material approval	0.729	16	0.867	2	0.738	14	0.467	8

Factors of time overruns	Overall rank		Owner		Contractor		Consultant	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
External Factors								
Unavailability or insufficient of water and electricity	0.558	28	0.867	2	0.538	28	0.533	7
Unpredictable weather conditions	0.513	30	0.600	6	0.510	30	0.467	8
Government regulations and control	0.592	26	0.600	6	0.595	25	0.533	7
Bad site conditions (location, soil)	0.738	14	0.667	5	0.757	12	0.533	7
Labour strikes	0.508	31	0.600	6	0.514	29	0.333	10

Source: Research findings

APPENDIX E: RANKING OF FACTORS CAUSING COST OVERRUNS

Factors of cost overruns	Overall rank		Owner		Contractor		Consultant	
	RII	Rank	RII	Rank	RII	Rank	RII	Rank
Material Related Factors								
Change in materials specification	0.663	9	0.600	5	0.662	11	0.333	7
Escalation of materials price	0.638	11	0.467	6	0.667	10	0.400	6
Shortage of materials	0.842	1	0.867	1	0.838	1	0.867	1
Inaccurate material estimate	0.788	3	0.733	3	0.800	3	0.667	3
Dependency on imported construction materials	0.667	8	0.733	3	0.671	9	0.533	5
Financial Related Factors								
Cost underestimation	0.800	2	0.867	1	0.805	2	0.667	3
Fluctuation in money exchange rate	0.608	13	0.733	3	0.605	14	0.533	5
Lack of financial management and planning	0.750	4	0.667	4	0.757	4	0.733	2
Labour and Equipment Related Factors								
High transportation costs	0.729	5	0.733	3	0.743	5	0.533	5
Frequent breakdown of machineries	0.600	14	0.467	6	0.614	13	0.533	5
High maintenance cost of machinery	0.583	15	0.467	6	0.595	15	0.533	5
High cost of machinery	0.650	10	0.333	7	0.667	10	0.600	4
Contract management Related Factors								
Change in scope of work on site	0.613	12	0.800	2	0.619	12	0.333	7
Suspension of works	0.667	8	0.733	3	0.690	7	0.667	3
Lack of experiences of project managers	0.713	6	0.800	2	0.710	6	0.667	3
Lack of experienced consultants or unavailability of competent staffs	0.688	7	0.800	2	0.681	8	0.667	3
Different consultants for design, supervision and contract administration	0.667	8	0.867	1	0.671	9	0.400	6

Source: Research findings

APPENDIX F: AAHDPO REPORT, 2016

የአዲስ አበባ ቤቶች ልማት ፕሮጀክት ጽ/ቤት ራዕይ፤ ተልዕኮና ዕሴቶች

ራዕይ

አዲስ አበባ በ2017 ዝቅተኛና መካከለኛ ገቢ ላላቸው ነዋሪዎቿ ጥራትና ደረጃቸውን የጠበቁ በዋጋ ተደራሽ የጋራ መኖሪያ ቤቶችን በመገንባት የቤት ባለቤት ማድረግ፡፡

ተልዕኮ

በአዲስ አበባ ከተማ የሚታየውን የመኖሪያ ቤት ዕጥረት ለመቅረፍ ቅንጅታዊ አሰራርን በማሳደግ፤ የሥራ ተቋራጮችን፤ አማካሪዎችንና ጥቃቅንና አነስተኛ ኢንተርፕራይዞችን በማሳተፍ እና የግንባታውን ኢንዱስትሪ በማጠናከር ወጪ ቆጣቢ የጋራ መኖሪያ ቤቶችን ገንብቶ የቤት ባለቤት ማድረግ፡፡

ዕሴቶች

- **ግልፅነት**
- **ተጠያቂነት**
- **የላቀ አገልግሎት መስጠት**
- **በዕውቀትና በዕምነት መመራት**
- **ለለውጥ ዝግጁነት**
- **ጥራትና ወጪ ቆጣቢነት**
- **ፍትሃዊ የሃብት ስርጭት**

በአዲስ አበባ ቤቶች ግንባታ ፕሮጀክት ጽ/ቤት ከ 1996 እስከ 2008 በጀት ዓመት የተከናወነ የቤቶች ግንባታ ማጠቃለያ ሰንጠረዥ

ተ. ቁ.	የተገነቡ የቤቶች ዓይነት በሚኖራቸው ክፍል ብዛት	መለኪያ	ተገንብተው የተላለፉ ቤቶች ብዛት						
			1996/1998	1999/2000	2001/2002	2003	2004	2005	የተገነቡ የቤቶች ጠቅላላ ድምር
1	ስቱዲዮ	በቁጥር	5,918	4,844	2,202	2,074	6,507	25,418	
2	ባ 1 መኝታ ቤት	በቁጥር	11,084	11,195	9,108	7,768	17,629	4,015	
3	ባለ 2 መኝታ ቤት	በቁጥር	11,737	7,067	4,430	4,876	10,392	1,990	
4	ባለ 3 መኝታ ቤት	በቁጥር	1,770	2,132	3,184	1,804	6,831	1,345	
5	ሱቅ/ ንግድ ቤት	በቁጥር	1,727	2,468	1,430	665	3,517	958	
	ድምር	**በቁጥር**	**32,216**	**27,706**	**20,354**	**17,187**	**44,876**	**33,726**	**176,065**

ከ1996 እስከ 2008 በጀት ዓመት አጠቃላይ የቤቶች ግንባታ መረጃ ሰንጠረዥ

ተገንብተው የተላለፉ ቤቶች	በግንባታ ላይ ያሉ ቤቶች ብዛት		ጠቅላላ ድምር
ከ 1996 እስከ 2008	በ 2006/07 የተጀመሩ	በ 2007/08 የተጀመሩ	ከ 1996 እስከ 2008 በጀት ዓመት የተገነቡ
176,065	52,245	39,836	268,146

ምንጭ፡ አዲስ አበባ ቤቶች ልማት ፕሮጀክት ጽ/ቤት

ከ 1997 እስከ 2002 በጀት ዓመት የቤቶች ልማት ፕሮጀክት ጽ/ቤት የፋይናንስ አጠቃቀም መረጃ ሰንጠረዥ

በጀት ዓመት	የፀደቀ በጀት	ለደሞዝና ለሥራ ማስኬጃ	ለግንባታ	ለመሰረተ ልማት	ለካሳ ክፍያ	አጠቃላይ ወጪ
1997	913,844,303.00	27,266,866.32	639,655,933.04	17,540,907.58	16,031,877.03	700,495,583.97
1998	684,030,710.00	30,275,431.56	636,063,849.66	17,183,783.70	107,645.13	683,630,710.05
1999	822,088,101.00	52,212,485.16	630,132,265.38	23,296,370.60	16,703,745.48	722,344,866.62
2000	1,429,057,704.00	68,027,124.92	1,308,448,632.91	22,448,152.00	10,133,794.19	1,409,057,704.02
2001	2,584,630,136.00	130,191,076.12	2,171,073,614.31	194,449,232.50	29,388,112.24	2,525,102,035.17
2002	1,500,000,000.00	68,400,134.01	1,481,377,143.00	174,486,115.88	50,730,000.00	1,774,993,392.89
ድምር	**7,933,650,954.00**	**376,373,118.09**	**6,866,751,438.30**	**449,404,562.26**	**123,095,174.07**	**7,815,624,292.72**

ከ 2003 እስከ 2007 በጀት ዓመት የቤቶች ልማት ፕሮጀክት ጽ/ቤት የፋይናንስ አጠቃቀም መረጃ ሰንጠረዥ

የበጀት ዓመት	ከትራዥሪ የተመደበ በጀት		ከቦንድ ብድር የተመደበ በጀት አጠቃቀም	ጠቅላላ ከትራዥሪና ከቦንድ ብድር የተመደበ በጀት	የተሰበሰበ የቫት ተመላሽ
	ጠቅላላ ደሞዝና ሥራ ማስኬጃ	መሠረት ልማት ድርሻ			
2003	460,000,000.00	141,000,000.00	1,750,000,000.00	2,210,000,000.00	289,881,025.00
2004	328,000,000.00		3,950,000,000.00	4,278,000,000.00	
2005	689,400,000.00	482,000,000.00	4,750,000,000.00	5,439,400,000.00	
2006	1,606,000,000.00	1,370,000,000.00	5,250,000,000.00	6,856,000,000.00	40,118,975.00
2007	1,236,500,000.00	841,000,000	6,325,000,000.00	7,561,500,000.00	190,323,388.00
ድምር	**4,319,900,000.00**	**2,834,000,000.00**	**22,025,000,000.00**	**26,344,900,000.00**	**520,323,388.00**

ምንጭ፡ አዲስ አበባ ቤቶች ልማት ፕሮጀክት ጽ/ቤት

5. የዘርፉ ዋና ዋና ማነቆዎች

በዕቅድ ዘመኑ የግንባታ ሥራው በሚፈለገው ፍጥነትና ጥራት እንዳይካሄድ የደረጉ በርካታ ማነቆዎች አጋጥመው የነበረ ሲሆን እነዚህን ማነቆዎች ለመፍታት በርካታ ተግባራትን በማከናወን ችግሮቹን ለመፍታት ጥረት የተደረገ ሲሆን በዕቅድ ዘመኑ ካጋጠሙ ማነቆዎች ዋና ዋናዎቹ ቀጥሎ ባለው መልኩ እንዲቀርቡ ተደርጓል፡፡

5.1. በፕሮጀክት ጽ/ቤት በግንባታ ሥራው ወቅት በርካታ ውስጣዊ የሆኑ ማነቆዎች አጋጥመው የነበረ ሲሆን ከነዚህ ውስጥ ዋነኞቹ፡-

- የለማ መሬት በወቅቱ በበቂ ሁኔታ አለመቅረብ፤
- አሁንም አደረጃጀቱ እየተካሄደ ካለው ግንባታ ቁጥር አንፃር በቂ የሰው ኃይል የሌለው በመሆኑ ለማስፈፀም አዳጋች መሆኑ፤
- በመፈፀም አቅም ያለው የፕሮጀክት ማኔጅመንት ክህሎት እጥረት የሚታይበት መሆኑ፤
- ለግንባት ሥራ የሚያስፈልገው ግብዓት መጠን (BOQ) በሚያስፈልገው ልክ ማዘጋጀት አለመቻሉ፤ በዚህ ምክንያት ግብዓት በወቅቱ ማቅረብ አለመቻል፤
- የግብዓት ዕጥረት በሚታይበት ወቅት ሌሎች ሥራዎችን በአማራጭነት ለመሥራት የሚያስችል ሁኔታ አለመኖር፤
- አሰራሩ ዘመናዊነት ያልተላበሰ አብዛኛው በማንዋል የሚፈጸም መሆኑ፤
- የመረጃ ልውውጥ ሥርዓቱ ዘመናዊ አለመሆን፡
- በመልካም አስተዳደር ያሉ ማነቆዎች ለይቶ ያለማውጣት፤
- የካይዘን አሰራር በተሟላ ደረጃ በሁሉም ቦታ በተግባር ላይ አለማዋል፤
- የጥቃቅንና አነስተኛ ማህበራትን ባግባቡ አለመምራት በዚህም በተለይ በማጠናቀቂያ ሥራ ያሉ በአሰራር ያሉ የጥራት ጉድለቶችን ማስተካከል አለመቻል፤
- የኪራይ ሰብሳቢነትና የሥነ ምግባር ችግር የሚታይባቸው ባለሙያዎች መኖር የጥራት ጉድለት እያለ እንዳላዩ ማለፍ፤ ከተቋራጭ ጋር በክፍያ መደራደር ያልተሠራ ሥራ እንደተሠራ አካቶ ማቅረብ፤ ወዘተ መታየቱ ተጠቃሽ ናቸው፡፡

5.2. በሥራ ተቋራጮች የታዩ ማነቆዎች

- አንድ አንድ ተቋራጮች ሥራውን ለማግኘት ያላቸው ጉጉት እና ሥራውን አተናቆ ለማስረከብ የሚታይባቸው ተነሳሽነት ክፍተት ልዩነት የሚስተዋልበት መሆኑ፤
- በተለያዩ ቦታዎች ሥራ ወስደው አቅማቸውን የሚበትኑና ሥራዎችን በወቅቱ የማየጠናቀቅበት ሁኔታ መታየቱ፤

- ያልተገባ ጥቅም ለማግኘት ሲባል ያልተሠራ ሥራ እንደተሠራ ማቅረብ በተለይ ከመሬት በታች ባሉ ሥራዎች ላይ፤
- የማስፈፀም አቅም እጥረት መታየት በተለይ ባለሙያተኛ ያልሆኑ ሥራ ተቋራጮች፤
- የሚያስፈልገውን የሠለጠነ ባለሙያም ሆነ በተቋራጩ መቅረብ ያለበት ማቴርያል በወቅቱ ያለማቅረብ ችግር፤
- በዕቅድ የመመራት ክፍተትና የአቅም ውስንነት መኖር፤
- በግንባታ ሳይት ያለመገኘትና ሥራውን ከተረከበ በኋላ በውክልና የሚያሰራ መኖር፤
- የሥነ ምግባር ችግር ያለባቸው የሥራ ተቋራጭ መኖር፤ሥራ ወስዶ advance ተቀብሎ የሚጠፋ፤ክፍያ ወስዶ የሚጠፋ መኖር፤
- ለሰራተኞች ክፍያ የማይፈፅም፤ ጥራት የጎደለው ሥራ የሚሰራ፤ ያልተሰራ ሥራ ከባለሙያ ተደራድሮ ተጠቃሚ መሆን የሚፈልግ ተቋራጭ መኖር፤
- ከመንግስት የሚሰጡ ንብረቶችን በአግባቡ የማይዝ፤ የሚያባክን፤ አልፎ አልፎ ከሰራተኞች ጋር በመመሳጠር በመስረቅ ተግባር የሚሰማራ መኖር፤
- ግንባታን በአጭር ጊዜ መጨረስ ላይ ያለው የተዛባ አመለካከት ያልተቀረፈ መሆን፤ በተመሳሳይ በጥራት ላይ ያለው አስተሳሰብ የተዛባ መሆን፤
- በአንዳንድ ጊዜ ሥራዎችን በፍጥነት የሚሰሩ ሥራ ተቋራጮች መልካም እንቅስቃሴ በበጎ የማይመለከቱና ከነሱ ለመማር ዝግጅት የሌላቸው መኖር፤
- የተሰጣቸውን ሥራ ሳይጨርሱ ተጨማሪ ሥራ እንዲሰጣቸው የሚጎተጉቱ መኖር፤
- ከጥቃቅንና አነስተኛ ማህበራት ጋር ተደጋግፎና አግዞ ያለመስራት፤ ንብረት አለማስረከብ፤ ክፍያቸው እንዲዘገይ ሥራው እንዲዘገይ ጊዜ የሚሰጡ መኖራቸው ዋና ዋናዎቹ ተጠቃሽ ማነቆዎች ናቸው።

5.3. በጥቃቅንና አነስተኛ ተቋማት የታዩ ማነቆዎች

- ሥራዎችን ለመስራት የሚያስችል በቂ ክህሎት ያለመኖር
- በአንድ ቦታ ሥራ በመውሰድ አቅማቸውን አሟጠው ሥራውን መሥራት ሲገባቸው በተለያዩ ቦታ ሥራ ወስደው በወቅቱ ያለማጠናቀቅና የመበተን፤
- የሚሰጡ ግብዓቶችን በአግባቡ ሥራ ላይ አለማዋል ማባከን አልፎ አልፎ መስረቅ፤
- ሥራዎችን በጥራት ሰርቶ ከማስረከብ ይልቅ ለሌሎች አሳልፎ በመስጠት የጥራት ጉድለት እንዲኖር ምክንያት መሆን፤
- አላግበብ ትርፍ ለማግኘት ከባለሙያ ጋር መደራደር ጥራት የጎደለው ምርት ማስረከብ፤
- አንዳንድ ማህበራት የጥራት ፍተሻ እንዲደረግባቸው ፈቃደኛ ያለመሆን፤
- በተደጋጋሚ የዋጋ ክለሳ ጥያቄ ማንሳት፤

- ሥራዎች በተቀመጠው ጊዜ አለመጠናቀቅ፤ ከሥራ በመጥፋት፤ በተሟላ ሰው ኃይል አለመሥራት፤
- ከሥራ ተቋራጭ ጋር ተቀናጅቶ ያለመስራት በዚህም ለግንባታ ሥራው መዘግየት ምክንያት መሆን፤
- ጥገኛ ከሆነ አስተሳሰብ አለመላቀቅ፤ በሥራ ባህሉ ያለ ጉዳዩ እየተሻሻለ ቢመጣም አሁንም ያልተቀረፈ መሆን ዋናዎቹ ተጠቃሽ ማነቆዎች ናቸው።

5.4. በመሰረተ ልማት ዝርጋታ የታዩ ዋና ዋና ችግሮች

- የውሃ አቅርቦት በተቆራረጠ መልኩ በመቅረብና ርቀት መኖሩ ምክንያት ግንባትውን በተያዘለት የአፈጻጸም ሰሌዳ መሰረት እንዲካሄድ ማድረግ አለመቻል፤
- የመንገድ ሥራዎች በመንገዶች ባለስልጣን እየተሰራ መሆኑ የሚበረታታ ቢሆንም በወቅቱ አለመጠናቀቃቸው ተቋራጩ የሥራ ማቴርያል በማንገዝ ወደ ሥራ በፍጥነት እንዳይገባ እንቅፋት መሆን፤
- በመብራት አቅርቦት አለመሟላት ምክንያት የተሰሩ የጥቃቅን ሼዶች ወደ ተግባር ባለመግባታቸው ግብዓት በርቀት በሚገኝ ቦታ እንዲመረት በመደረጉ ምክንያት በመንገዝ ለተጨማሪ ወጪ መዳረጉ፤

5.5. የፋይናንስና የግብዓት አቅርቦት ዋና ዋና ችግሮች

- የግንባታ ሂደቱን ለማሳካት በቦንድ ብድር ከኢትጵያ ብሔራዊ ባንክ የሚፈቀደው ብድር በወቅቱ የማይለቀቅ በመሆኑ በግንባታ አፈፃፀም ላይ አሉታዊ ተጽእኖ ማሳደሩ፤
- የውጭ ምንዛሬ አቅርቦት እጥረት መኖር፤
- የማጠናቀቂያ ዕቃዎች ችግር የብዙዎቹ ከቅርብ ጊዜ ወዲህ እየተፈታ ቢሆንም በተለይ የ PVC መስኮትና የሴራሚክ እጥረት ችግር ሊቀረፍ አለመቻሉ የግንባታ አፈጻጸም ላይ ጉልህ ድርሻ ያለው መሆኑ፤
- በፌደራል ግዢዎች እና እቃ አቅርቦቶች ላይ በአንድ ወቅት የሳኒተሪ ዕቃ ለአንድ አቅራቢ አሸናፊ በመሰጡ ሴራሚክስ በሁሉም ቅርንጫፍ ለማዳረስ አለመቻሉ የጥራት ችግር መፈጠሩ፤ ሌሎች ተመሳሳይ ሳኒተሪ ዕቃዎች በቀረበው specification መሰረት ባለማቅረባቸው በግብዓት ዕጥረት ግንባታው አፈፃጸሙ ችግር መኖር፤
- በተመሳሳይ ሁኔታ ፕሮጀክቱ ማቅረብ የሚገባውን ሌሎች ግብዓቶች በወቅቱ ባለማቅረቡ ግንባታው እንዲጓተት ምክንያት ሆኗል፤
- የጠጠር አቅርቦት ከፍላጎታችን ጋር የተመጣጠነ አለመሆኑ እስከ 100 ኪ.ሜ. ርቀት ድረስ የጠጠር ማፈላለግ እና ውል የተያዘ ቢሆንም የማምረት አቅማቸው ከመብራት አቅርቦት ችግር ጋር ተያይዞ በቂ ያለመሆን፤

- ግንባታው በስፋት የተገባበት በመሆኑ የትራንስፖርት አቅራቢ ድርጅቶች የግንባታ ግብዓት ለማጓጓዝ በበቂ ሁኔታ ለማግኘት አለመቻል፤
- የሥራ ተቋራጭ የፋይናንስ አቅም ችግር የግንባታ ሥራውን በዕቅዱ መሰረት ለመምራት አሉታዊ ተዕዕኖ ማሳደሩ የሚሉት ናቸው፡፡

6. የክትትልና የግምገማ አግባብ

6.1. የሪፖርት ግምገማና ግብረ-መልስ ሥርዓት

በፕሮጀክት ጽ/ቤቱ እየተከናወነ ያለውን መጠነ ሰፊ የሆነ የግንባታ ሥራ ውጤታማ ለማድረግ አፈፃፀሙን ቋሚ ጊዜ በማስቀመጥ ወጥነት ባለው መልኩ ቅርንጫፍ ፕሮጅቶቶችን በመከታተልና የመደገፍ ሥራ ተከናውኗል፡፡ ከቅርንጫፍ ፕሮጀክት ጽ/ቤቶች በሚቀርበው የአፈፃፀም ሪፖርት በመርሃ ግብሩ በተቀመጠው ጊዜ መሰረት እየተገመገሙ ተገቢው ግብረ መልስ የሚሰጥበት ሥርዓት ተፈፃሚ እንዲሆን ክትትል ተደርጓል፡፡ በተጨማሪም በቋሚነት የመረጃ ልውውጥ ሥርዓት ተግባራዊ የሚደረግ የአሰራር ሥርዓት ተዘርግቶ በየደረጃው ባለ አመራር አካላት ተፈፃሚ ለማድረግ ተሞክሯል፡፡

በዚህም፡-

- በመስክ ግምገማ ወቅት ስለታዩ ውጤቶች በተለይም የታዩ ማነቆዎችን አስመልክቶ ከሚመለከታቸው አካላት ጋር ችግሩ በሚፈታበት ሁኔታ ዙሪያ ውይይት የማድረግና መፍትሄ እንዲያገኝ ማድረግ፤ በተጨማሪም የተሰጡ የመፍትሄ አቅጣጫዎች በትክክል እየተተገበሩና ውጤታማ መሆናቸውን የመከታተልና የማረጋገጥ ሥራ ተሰርቷል፤
- የፕሮሰስ ካውንስል አባላት የቅርንጫፍ ፕሮጀክት ጽ/ቤቶችን በመከፋፈል ቋሚ ጊዜ ተወስኖ ሳይት ድረስ በአካል በመሄድ ድጋፍና ግብረ መልስ የማድረግ ተግባሩን በተጠናከረ መልኩ ተግባራዊ ተደርጓል፤
- ሁሉም ቅ/ፕ/ጽ/ቤቶችና የሥራ ክፍሎች በበጀት ዓመቱ በዕቅድ የተያዙ ተግባራትን አፈፃጸም አስመልክቶ የዕቅድና ሪፖርት ሥራዎችን በማጠቃለል ሪፖርቶች ወቅቱን ጠብቀው እንዲቀርቡ ተደርጓል፤
- ከቅ/ፕ/ጽ/ቤቶችና ከየሥራ ክፍሉ የሚቀርቡ ሪፖርቶችን በማጠቃለል ለሚመለከታቸው አካላት እንዲተላለፍ ተደርጓል፤ ግብረ መልስ በማዘጋጀት ሁሉም አካላት እንዲያውቁትና በተሰጠው ግብረ መልስ መሰረት እንዲስተካከሉ ክትትል የማድረግ ሥራ ተሰርቷል፡፡

6.2. በዕቅድ ዘመን የተለዩ ጥንካሬና ድክመቶች

6.2.1. ጠንካራ ጎን

- የግንባታ ሥራው እንዳይጓተት ዕቅደ በማዘጋጀት ተገቢው ክትትልና ድጋፍ መደረጉና የግብዓት አቅርቦት በበቂ ሁኔታ ለማቅረብ በትኩረት መሰራቱ፤
- በክረምት ወቅት ለሰሩ የሚችሉ ሥራዎች እንዲለዩ በማድረግ የግንባታ ሥራው በክረምት ምክንያት ሳይቋረጥ እንዲቀጥል መቻሉ፤
- በየአመቱ የሚኖረውን አፈፃፀም ማዕከል ባደረገ መልኩ የሥራ ክፍሎችን ግልጽ በሆነ መስፈርት በመመዘን የማበረታቻ ሽልማት መስጠት፤
- መንገድና ሌሎች የመሰረተ ልማት አቅርቦቶች በግንባታው ሥራ ላይ ተጽዕኖ እንዲያሳድሩ የታዩ ማነቆዎችን ለመቅረፍ ጥረት በመደረግ ለግንባታው ድጋፍ መደረጉ፤
- የማጠቃለያና የቅድመ ዝግጅት ምዕራፍ ዕቅድ ተዘጋጅቶ የተጠናቀቀውን ዓመት አፈፃፀም የመገምገም የአዲሱን ዓመት ዕቅድ እንዲዘጋጅ በማድረግ አመራሩን ፈፃሚውንና ሌሎች ባለድርሻ አካላትን ባሳተፈ ሁኔታ የዕቅድ አረንቴሽን ሥራ በተጠናከረ ሁኔታ መፈፀም መቻሉ
- የግንባታውን ሂደት ለመከታተልና ለመደገፍ በሚያስችል መልኩ ከማዕከል እስከ ቅርንጫፍ ወጥነት ያለው ዕቅድ በማዘጋጀት ሳይት ድረስ በአካል በመገኘት ድጋፍ መደረጉ፤
- የግንባታ ግብዓት አቅርቦት ሥራውን ውጤታማ ለማድረግ በሚያስችል መልኩ ከአቅራቢ ድርጅቶች ጋር የውይይት መድረክ መዘጋጀቱና አቅራቢዎች በቂ ግንዛቤ እንዲኖራቸው ማድረግ መቻሉ፤
- ተከታታይ ግምገማዎችን በማካሄድ ለችግሮች የመፍትሄ አቅጣጫዎችን በማስቀመጥ ግንባታውን ለመምራት የተደረገ ጥረቶች በጥንካሬ የሚጠቀሱ ናቸው።

6.2.2. ደካማ ጎን

- የተጠናቀቁ ቤቶችን ለማስተላለፍ የሳይት ሥራዎችና የመሰረተ ልማት አቅርቦት ሥራዎች በሚፈለገው ፍጥነት የማይጠናቀቁ መሆን፤
- በግብዓት አቅርቦት ዙሪያ የሚታዩ ችግሮችን ለመቅረፍ የሚያስችል የቅድመ ዝግጅት ሥራ በመሥራት ችግሩን በተወሰነ ደረጃ ለማቃለል የተሞከረ ቢሆንም ችግሩን ሙሉ ለሙሉ መቅረፍ አለመቻሉ፤
- የአማካሪ ድርጅቶችና ሥራ ተቋራጮች ባለሙያዎች ተሟልተውና ለሥራው የሚያስፈልጉ ቅድመ ዝግጅቶችን አሟልቶ በጥብቅ ዲሲፕሊን ሥራውን አለመከታተል ተጠቃሽ ድክመቶች ናቸው።

APPENDIX G: ADDIS ABABA CITY MAP AND PHOTOGRAPHS

SUB CITY

1. *Gullele*
2. *Kolfe Keranyo*
3. *Addis Ketema*
4. *Arada*
5. *Lideta*
6. *Kirkos*
7. *Yeka*
8. *Nifas Silk Lafto*
9. *Bole*
10. *Akaki Kaliti*

Addis Ababa city map

Slum area of Addis Ababa before rehabilitation

Source: UN-HABITAT

Newly developed area

Source: AAHDPO

Condominium houses under construction

Source: AAHDPO

MSE on precast beams production

Source: AAHDPO