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ASSESSMENT OF FACTORS THAT CAUSE THE DELAY OF 40/60 HOUSING DEVELOPMENT: A CASE STUDY ON 40/60 CONSTRUCTION PROJECTS IN ADDIS ABABA

By: Melen Kassu

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Advisor: - Abebe Dinku, Prof. (Dr.-Ing)

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Certification

The undersigned have examined the thesis entitled "**Assessment On The Factors That Cause The Delay Of 40/60 Housing Project Constructions In Addis Ababa: A Case Study of Ayat Condominium Project**" and hereby recommend for acceptance by the Addis Ababa University in partial fulfillment of the requirements for the degree of Master of Science.

_____

Abebe Dinku, Prof. (Dr.–Ing.) (Advisor)

_____

Date

_____

Ato Fasil Tebeje. (Co-Advisor)

_____

Date

Addis Ababa University

Addis Ababa Institute of Technology

School of Civil and Environmental Engineering

Construction Technology and Management Stream

ASSESSMENT ON THE FACTORS THAT CAUSE THE DELAY OF 40/60 HOUSING PROJECT CONSTRUCTIONS IN ADDIS ABABA: A CASE OF AYAT CONDOMINUM SITE

By

Melen Kassu Chaka

Approved by Board of Examiners

Abebe Dinku ,Prof.(Dr.-Ing)	Abebe Dinku	07/08/23
Advisor	Signature	Date
[illegible]	[illegible]	07/15/23
Internal Examiner	Signature	Date
Asregedew Kassa	[illegible]	July 19, 2023
External Examiner	Signature	Date
Abrham Gebre (Dr.) Dean, School of Civil & Environmental Engineering		
Chair person	Signature	Date

Abstract

In search of a greater standard of living , a big population is currently moving from the rural area to the urban city. The expense of life and price of land have consequently increased significantly. As a result, the government has started constructing affordable homes for those with low and intermediate incomes.Nevertheless, despite having a contract duration of 730 calendar days, a total of 33,316 homes are still being built (AAHDC, 2021), despite an average of 5000 days having passed since the anticipated completion date. Accordingly,due to the rising rate of inflation and price increases, as well as the time that could be used to build other types of public infrastructure, this delay causes a major loss for both the government and the end users. Hence, the primary goal of this study is to identify the elements that influence the timely completion of 40/60 housing projects by taking Addis Ababa's Ayat condominium site as case study. In particular, the study examines the link between the dependent variable (time overrun) and the independent variables (such as labor skill, monitoring & control subcontractor/ speciality scarcity, communication problems payment delays and subcontracto r negligence).This was studied using a control,subcontractor/speciality scarcity, communication problems, payment delays, and subcontractor negligence). This was studied using a mixed-methods approach (quantitative and qualitative), with a casual and explanatory research design. Professionals from contractors, consultants, and clients of ongoing 40/60 condominium housing developments Ayat site in Addis Ababa are the study target groups. A total of eighty (80) samples were taken from which sixty three (63) were collected. A stratified sample technique was used to choose respondents. Both descriptive and inferential statistics were used to determine the variables influencing the timely completion of the housing projects. In the case study, manpower skill, monitoring and control, subcontractor shortage, communication problems, payment delays, and subcontractor negligence were found to be statistically significant after analysing the data using SPSS.As a result, it is anticipated that the results of this study will be of great significance to the housing development program and its stakeholders, enabling them to better understand the factors that influence the timely construction of housing and to identify measures and solutions that will improve the provision of housing in the required quantity and quality. Additionally, it will help home-owners and end users decide what elements to take into account when choosing affordable housing.

Keywords: Housing Construction, Timely Completion, Delay, Condominium

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ACRONYMS

AACA	Addis Ababa City Administration
AAHDPO	Addis Ababa Housing Development Project Office
AAIHDP	Addis Ababa Integrated Housing Development Program
GDP	Gross Domestic Product
ICT	Information and Communications Technology
IHDP	Integrated Housing Development Program
MUDHC	Ministry of Urban Development Housing and Construction
PMI	Project Management Institute
SRS	Simple Random Sampling
UN	United Nations
UN-Habitat	United Nations Human Settlement

CHAPTER 1

INTRODUCTION

1.1 Background

The construction industry is largely involved in the construction of buildings and engineering projects, and is one of the most important and rapidly increasing businesses. Of the many projects done by this industry one of the main projects are residential houses which are planned to satisfy the rising need of housing especially in developing countries. However, the constructions of these projects are observed to be highly affected by delay. Due to this, the present rate of construction in developing countries is generally sufficient to meet the needs of only 10% of the net increase in population per year. As a result, the rise in shortage of housing especially for the low-income population is becoming out of control (Waziri B.et al. 2013). The rising housing shortage in Ethiopia, has led the Government to come up with a program called the Addis Ababa Integrated Housing Development Program in 2004 which has three programs, namely the 10/90, 20/80 and 40/60 projects for the low and middle income population with extremely low income group having an income of Birr (300-600), the low income group(600-1200), the medium income group (1200-1800) and the lower-middle income group above Birr 1800. The 40/60 housing program which was planned to be constructed for middle income population groups was developed in 2005 G.C with each of the construction having contract time ranging from 670-900 calendar days (Addis Ababa Housing Development Corporation, Contract Agreement).

However, as per the stated data above only 29,386 houses had been transferred to their respective residents up until now from the total planned to be constructed, which shows that the time taken for the construction has been majorly affected and is requiring excessive amount of time. Furthermore, quality issues with the constructions as well as the finishing are visible on the completed residences. This, along with other major problems, is the key reason why the program's long-term viability is in peril. This in turn is also creating frustration to the end users which implies that stronger quality as well as time management is required to ensure that every cent of public money is spent on the intended purposes and the construction is completed within the shortest possible time. Thus, this study aims to identify the main factors for the delay in the 40/60

housing development program so that an appropriate measure can be taken to either minimize or permanently resolve the problem

1.2 Statement of the Problem

At present a large population is migrating from the rural area to the urban city in search of a higher living standard. As a result, the cost of living and land price has risen dramatically. Accordingly, the government has turned to building low cost houses for the low and middle income population such as 10/90, 20/80 and 40/60 housing .However,all of the building sites for the 40/60 house project are taking more than five years to complete all project operations, and this extra time lost during construction is greater than 150% longer than the original contract duration. Due to this significant construction delay, the project cost also increased significantly Takele M.(2020).

Accordingly, the project is taking longer to finish the remaining work and decades to fully distribute the dwellings to the registered public under the 40/60 housing program if construction continues at the current pace. The project's cost greatly increased (a large amount of public money was wasted), the desired quality of the dwellings was jeopardized, and the delay and its results failed to meet the society's need for shelter in a timely manner. Additionally, the money registered citizens save for housing by deducting it from their basic means of subsistence is locked up in the bank and eventually loses its purchasing power.

Consequently, the elements causing time delay must be correctly identified so that appropriate measures may be taken to minimize or permanently resolve the problem.

1.3 Objective of the study

- To identify the factors that affect the timely performance of Addis Ababa's 40/60 housing construction projects

1.4 Significance of the Study

Housing delivery in Addis Ababa is mostly reliant on the AAIHDP (Addis Ababa integrated housing development project), which has provided thousands of youths with job opportunities

and is the city's primary source of low-cost housing. As a result, the findings of this study is expected to be of great importance to the housing development program& stakeholders so that they gain insight on the factors that affect the timely construction of the housings and to define measures/solutions that will enhance the provision of the housings within the required time and quality. In addition, it will assist home owners/ end users on determining what factors to consider when choosing low-cost housings.

Furthermore, because the construction industry is the country's primary source of economic development, boosting project parties' performance will aid the sector's growth, which will in turn aid the country's economic growth. It will also assist the AAIHDP Program in meeting its goal of delivering low cost houses with better quality on time. It will also assist similar program that are currently being implemented or that are planned to be implemented in the future. In addition, the study will aid as a foundation for researches for further study.

Generally, this study will have the following significance

- Increase understanding of the issues that affects the timely delivery of low-cost housings.
- Provide a method or solution for solving the factors that negatively affect the time and quality of low-cost housing constructions.

1.5 Scope of the Study

This research primarily focuses on identifying the elements that influence the time and quality of low-cost constructions particularly that of 40/60 projects in Addis Ababa.

1.6 Limitation of the Study

The study has some limitations which are listed below.

- Only the client, contractor, consultant and end users were the ones who participated in the research.
- The study was conducted solely in Addis Ababa, where all of the 40/60 housing construction projects had been implemented.

1.7 Organization of the Thesis

Chapter 1 provides a brief introduction and objectives of this study. The need for housings as well as the problem, the aim and objectives, scope and limitation of this study and overall structure of the thesis is also outlined in this chapter.

Chapter 2 is a literature review of relevant concepts of previous studies done, like factors that contribute to the delay and loss of quality of building constructions, and that of low-cost housing projects are reviewed.

Chapter 3 covers the research methodology. The methodological approach consists of the overall research strategy; the research design, the analysis of the data and writing of the research paper.

Chapter 4 contains the discussion and analysis part. It contains the findings on the factors that affect the time and quality of low-cost housing constructions in the case of 40/60 projects, based on data collected from questionnaires, interviews as well as observations.

Chapter 5 presents research conclusions and recommendations. This will serve as an action guideline to all stakeholders and the Addis Ababa Housing Development Program. Presents research conclusions, and recommendations.

CHAPTER 2

LITERATURE REVIEW

By reviewing prior studies on the subject, this chapter attempts to analyse the elements that contribute to building project delays. It will also attempt to cover related literatures on the topic, which is an examination of the elements that influence the timely construction of low-cost and middle income housing construction in Ethiopia.

This study is designed to address the gap found in the literatures done on international as well as Ethiopian building projects, notably condominium housing projects, by demonstrati ng the factors that affect the project construction time.

2.1 Review on Causes of Delay

The term delay in construction has been defined by various researchers in different ways .Sunjika, B.P.& Jacob,U.(2013) defined delay as the time during which some part of the construction project has been extended or not executed owing to a.On the other hand, Mohd(2018) defined delay as the time overrun or extension of time to complete the project or the situation when the actual progress of a construction project is slower than the planned schedule.According to Abdurezak & Neway(2019) delay is slowing down of work without stopping construction entirely and that can lead to time overrun either beyond the contract date or beyond the date that the parties have agreed upon for the delivery of the project.

Generally,construction delays are typically characterized as a time lag between the completion of activities and the contract's specified completion time, or as late completion or late commencement of activities relative to the baseline timetable, which has a direct impact on the contract's stipulated cost. As a result, time extensions will be required, resulting in fines, increased costs owing to inflation, contract termination, etc…all of the combination which could result in damage to the participants.Construction delays are frequently the result of a mismanaged event or events, and they can be viewed as a risk for projects and its participants. As a result,it is essential to identify the main contributing

factors for the delay in a construction project especially that of low-cost housing projects in order to solve the problem of a the delay from the root.

2.2 Causes of Delays

Delays in building projects are one of the most typical issues, with a variety of negative consequences for the project and its participants. As a result, identifying the underlying reasons of delay is critical in order to reduce or eliminate it.

2.2.1 Causes of Delay during Pre-construction Stage

According to Dykstra A.(2018), the pre-construction phase is the stage from the time the project starts to the time the construction of the building starts. It is during this stage, a strategic plan is developed, a budget and time frame are agreed upon, a project design is started and completed, a permit is obtained, and labor and resources are procured.

Dolage & Perera (2009) identified the main causes of delay in the pre- construction stage as follows:

- ✓ Inclusion of detailed program for the design process.
- ✓ Client studying the project brief
- ✓ Client's endorsement of architectural drawing prior to structural design phase
- ✓ Assessment of constraints in the client's brief
- ✓ Submission of alternative conceptual proposals
- ✓ Description of scope of work of consultants
- ✓ Indication of estimated cost in the final brief
- ✓ Submission of most suitable conceptual proposal
- ✓ Assessment of availability of services
- ✓ Concurrent preparation of structural and service drawings
- ✓ Preparation of tender documents including bill of quantity
- ✓ Detailed feasibility study which includes preliminary site investigation.
- ✓ Assessment of challenges and constraints

2.2.2 Causes of Delays During Construction Stage

2.2.2.1 General

A construction delay is defined as additional time necessary or incurred after the set completion date or after the date agreed upon by project stakeholders for project

completion. The ability of all project stakeholders to complete the project on time reflects their efficiency, but the building process is subject to a range of factors and unforeseen conditions that might occur from a variety of sources Azim (2011) identified and listed the main reasons behind the delay in a construction as change in project scope, project complexity, inadequate planning and scheduling design variation, inaccurate engineering estimate, inefficient material and equipment management and improper post execution phase management.

2.2.2.2 Delays Caused by the Client

At out (2021), looked into the causes of delays caused by the client which allow the contractor to request for a time extension and listed them as; failure by the consultant team to provide information, delay on the part of a nominated sub-contractor, failure by the client to supply materials or goods. Delay in giving the contractor possession of the site.

2.2.2.3 Delays Caused by the Contractor

As stated by Atout (2021) contractor's delay is the result of a contractor's mistake.which he /she is not entitled to time extension or compensation for lost time or if he or she causes a delay, insufficient experience, bad site management, issues with subcontractors and supplie rs, material, labor and money shortages, poor project planning and mistakes during constru ction.

2.2.2.4 Delays caused by the consultant

Takele (2021) through his study investigated that consultant delays are caused by difficulti es such as design faults, late acceptance of tests and drawings, and inadequate project management. The contractor is entitled to time extension or cash compensation because the consultant is the client's agent and oversees the contractor, whereas the client is not entitled to liquidate damages.

2.2.2.5 Delays caused by Neutral events/ External Factors

Takele (2021) also stated that delays caused by neutral accidents are not the fault of either party and may result in a time extension but not monetary reimbursement for the contractor. Extremely poor weather, civil upheaval or terrorism, statutory undertaker work, and Force Majeure are all examples of Force Majeure. External reasons include natural disasters such as floods and earthquakes, national strikes, changes in statutory

requirements, delays in getting permissions that the contractor took reasonable efforts to avoid, a major accident, or the contractor's unanticipated significant sickness.

2.2.2.6 International and Local Practices in Low Cost Housing Constructions

It is commonly known that varied approaches exist in the construction of low-cost housing projects all throughout the world. However, the cases differ between developed and developing countries; developed countries are more advanced and are able to identify and solve problems even when they are faced with them, whereas developing countries still face challenges in building the required number of low-cost housings and delivering them on time and with the required quality, implying that the severity is much greater in developing countries. The following is a general discussion of the practices of few countries which have approximately the same economic development with that of Ethiopia like Kenya and the top developed countries practices that have effectively implemented the low cost housing program after facing some challenges such as Ethiopia.

2.2.2.7 Kenya's Practice

As per an article written by Mayo S.et.al (1987), the provision of affordable housing remains a problem, for all countries. The rapid increase in urban population, high cost of construction, finance costs, and escalating prices of urban land are hurdles in most developing countries including Kenya. Accordingly, the affordable Housing Program (AHP) was launched by the Kenyan Government in December 2017, as one of its four pillars of economic growth, together with promoting agriculture and manufacturing, and providing universal health care. The AHP is the responsibility of the State Department of Housing and Urban Infrastructure Development within the Ministry of Transport, Infrastructure, and Housing and Urban Development. The housing backlog was estimated to be 1.85 million units and the government projects that it was needed to facilitate the provision of 200,000 units a year to progressively cater for the shortfall and house new entrants into urban areas with an ambitious target of delivering 500,000 houses within five years.

In the early and mid-2000s Kenya's government proposed a raft of tax incentives to stimulate supply and demand for housing. However, demand continued to exceed supply. Only 50,000 housing units were constructed annually in Kenya's urban centres against the

annual need of 250,000. Out of these only 2% target lower income families. The main challenge behind this are listed as follows:

Funding: Housing and real estate development is a highly capital-intensive venture and funds are in short supply**.**

S**hortage of land for development**: The project requires land which is serviced with infrastructure and in good locations. But such land is in short supply in Kenya, and therefore expensive.

Cost of construction: Design,materials and labor make up 50-70% of housing development cost.

Bureaucracy: Many agencies are involved in the approval and licensing of housing development proposals and this makes the process lengthy, costly and complicated.

Poor physical and social infrastructure: Infrastructure is lacking in many urban centres in Kenya and developers often transfer the costs of infrastructure to end buyers.

2.3 Developed Countries Practices

2.3.1 South Korea's Practice

In Korea, public housing is defined as housing built with the assistance of public housing funds. There are two forms of public housing tenure: public for-sale and public renting. For low-income people, public rental housing is typically thought to be the best option. However, only a small amount of public rental housing has been made available. Until 1980, public rental housing was almost non-existent. Between 1971 and 1980, 64,947 flats for public rental housing were built. This accounted for only 3.5 percent of all dwellings built during the same time period. Furthermore, they were fairly short-term rental houses: after a one- or two-year required rental period, the inhabitants were sold off. The government began to expand public rental housing during the 1980s. Between 1982 and 1994, all 634,559 flats were built for public rental housing, accounting for 11.6 percent of all residences built during the same time period. They included time-limited rental apartments, permanent rental units, and company-owned rental apartments. However, true public rental housing, akin to social housing in Europe, was only available in a limited number of locations. In Korea, only Permanent Rental Housing and National Rental Housing are considered social housing. The previous government created National Rental

Housing in 1998. Initially, there were two types: twenty-year rental housing for households earning the lowest 20% of the income and ten-year rental housing for those earning the lowest 40%. The current government reorganized the entire program: it reclassified National Rental Housing into three types based on housing sizes, each with different eligibility criteria and levels of government subsidies; it extended the rental period for all types to 30 years; it reaffirmed its strong commitment to building one million units by 2012, and it also formulated a plan to have private developers build half a million units of 10-year public renunciation. This will be the first massive program to provide low-cost housing.

As previously stated, providing long-term rental housing places a significant financial strain on the government and public providers. Until the mid-1980s, Korea's public sector did not supply a considerable amount of public rental housing; instead, it mostly provided for-sale housing, especially for low-income households. Household heads who have lived in the same administrative region as the place where new housing is supplied and have been statutorily homeless for one or more years at the time of the initial advertisement for the sale of new dwellings are eligible for public for-sale housing. Priority is given to people who have saved through the Housing Subscription Savings program, in order of the amount and length of time they have saved.

The Korea National Housing Corporation (KNHC) is the country's main public housing organization. The way KNHC operates demonstrates the process through which public housing is delivered. In 1962, the military administration founded KNHC. The government put money into KNHC and structured it such that it could continue to build housing for low-income families without depreciating the capital. It was built to operate like a private housing developer in terms of funding. This meant that KNHC had to rely on private finances for housing development, primarily payments from property purchasers. The NHF loans will be repaid by home buyers over a twenty-year period. By the time of occupancy, KNHC's capital will have been recovered. As a result, the majority of construction costs are financed by home-buyers. In other words, despite its status as a government body, the KNHC must operate on the same principles as private businesses. In essence, it was a system of speculative development. Due to the same financial constraints, KNHC was

unable to provide public rental housing in bigger quantities, and instead focused on the development of small-scale yet for-sale flats. The government supplied KNHC with financial and institutional support to compensate for the un-profitability of low-income housing.

The interest rates for NHF loans were ten percent for for-sale housing and three percent for public rental housing toward the end of the 1990s, whereas commercial loans to households ranged from 14 to 16 percent (10.5 and 12.5 percent before the economic crisis in 1997) During the 1970s, NHF loans were available for apartments with a floor area of 85m2 or less. As the 1980s progressed, the size of the target housing for public financial assistance was reduced: the NHF generally funded the construction of apartments of 60m2 or less, but the KHB Funds were used to build houses with a floor space of up to 85m2. The average dwelling size (in floor space) of KNHC housing is 59m2, and KNHC housing has been mostly funded by NHF loans; however, until the 1990s, people's savings were a major source of funding for KNHC housing development. This means that KNHC's financial performance was influenced by market conditions rather than government funding. Second, when KNHC creates housing for low-income households, it is given the authority to expropriate land.

As a result, KNHC was able to purchase land at prices determined by approved authorities rather than landowners' prices, which were frequently monopoly prices. KNHC has been forced to construct primarily small-scale dwellings, which is extremely unprofitable. Smaller dwellings are more expensive to build than larger ones in terms of unit building costs. The unit construction cost of a two-bedroom unit in a high-rise apartment is 6.5 percent greater than that of a three-bedroom unit, according to KNHC data. Larger units with more than three bedrooms are expected to be substantially less expensive.

The government, on the other hand, set the normal construction cost8 for small flats with three bedrooms or less at four percent or less than that for larger units (KNHC, 1997). It's because low-income households are expected to be provided with smaller homes. Furthermore, KNHC was frequently forced to create houses across the country based on regional housing needs rather than actual housing need. KNHC's housing development became even more unprofitable as a result of this. In fact, KNHC has lost money on a

number of housing building projects in small provincial communities where low-income families' financial resources are limited.

KNHC made up for the shortfall by profiting from housing projects for middle-income households in metropolitan cities where housing demand is often high, as well as the development of huge housing estates or New Towns where it may sell commercial land and buildings at market rates. KNHC, for example, built 30 housing developments in 1997. It made up for losses in 13 housing developments by making profits in ten others. In seven projects, the corporation had a positive balance. To put it another way, KNHC has been able to manage the business of low-income housing development through inter-regional and inter-income-class cross-subsidy.

Until the mid-1970s, KNHC only built a few thousand units per year of public housing by private developers. The government attempted to compensate for the lack of public investment in housing by encouraging private companies to build public housing. The state had enough power in the 1960s and 1970s to affect the entire process of national development. It provided a government guarantee for the repayment of foreign loans. It also oversaw commercial banking and the distribution of domestic loans, as well as setting price and income policies. Two-thirds of all national investment was controlled by the government. It used political patronage, discriminatory tax, credit, and pricing practices, and other methods to regulate huge businesses. The government even reserved the right to appoint corporations to specific projects. Harris (Harris, 1983). The government could control private house developers and the housing market in the same way.

The Housing Construction Promotion Act (HCPA), Korea's basic law governing housing policy, established rules for the management of public housing money and the approval of housing construction projects. The entire development process, from site planning to the selling of finished homes, must be approved by the appropriate authorities. This housing development approval mechanism has given the government a legal basis to interfere in the housing providing process. As a result, the Korean public housing system was supposed to be based on private investment and speculative housing building, but it was guided by administrative rather than economic principles. Its success has been determined by the power balance between those in need of housing and the dominant entrepreneurial groups

that controlled the government and were interested in mobilizing all available resources for their businesses. Seo-hwan Lim (2006).

2.3.2 Sweden's Practice

In the late 1930s, 41% of Stockholm households had only one room or less on average, and a significant portion of the population became homeless. The Swedish government responded by enacting a variety of housing laws, some of which are still in existence today. The government's responsibility for developing a long-term country housing development plan, adopting a positive land policy to reduce housing development costs and increase housing construction, monitoring price changes in the housing market between reasonable levels, and providing a variety of tax and financial support for subsidy or direct subsidy to low-income and retires were at the heart of these policies. The government has been working on the ambitious 'Million Program (Mijion programmet)' since the 1960s, with the goal of building one million new homes for diverse categories of people. A well-known government program effectively addressed the socio-economic problem of "short of housing supply" from 1965 to 1974. Following this time, government measures aimed to improve housing quality and create a more pleasant living environment Lin, J. (2011).

2.3.3 Singapore Practice

Singapore is the third most prosperous country in the Asian Pacific Rim, behind Japan and Brunei, and it possesses the world's second busiest port (Castells et al., 1990). The effectiveness of its public housing program has been crucial. With 85 percent of the population living in government apartments and 70 percent owning their homes, Singapore has the most extensive public housing scheme of any capitalist metropolis (Castells et al., 1990). The First Five-Year Program, the Second Five-Year Program, and the post-1970s period are the three significant periods in Singapore's housing policy.

The First Five-Year Program (1960-1966)

Singapore's housing scarcity and general housing conditions were appalling when the People's Action Party came to power in 1959. Housing reform was prioritized, and public housing initiatives were to be integrated into national development policies. The Housing Development Board (HDB), a public institution with extensive powers, was entrusted with

the national housing program in 1960. Clearing land, redeveloping the urban area, and planning, administering, and producing houses were all tasks assigned to the HDB. (Castells and colleagues, 1990). It was granted a great deal of latitude in carrying out the government's policies

The HDB promptly launched the First Five-Year Building Program to supply basic rental units to low-income residents. To overcome the housing crisis and fulfil the requirements of the fast-rising population, the strategy was to build as many housing units as feasible as quickly and cheaply as possible. The quality of housing has been sacrificed. As a result, space standards were poor, layouts were monotonous, architectural design was unimaginative, and support facilities were lacking. In the 1960s, slab apartment buildings were built up to twelve stories and point blocks up to twenty-five floors to maximize site utilization (Hyde, 1989). The worst of the housing crisis was over after five years.

The Home Ownership Scheme was founded in 1964 to encourage private ownership and to provide housing for low-income people (Siew-Eng,1989). The four criteria used to determine eligibility were citizenship, non-ownership of private property, income, and family formation. First-come, first-served housing units were and are still being assigned. Previously, a registered household could select the type of flat and wide housing zone in which it wished to reside, but not the exact block or floor. The ultimate distribution was decided via a ballot. Applicants are now asked to choose their preferred flat type and zone from a list of possibilities rather than voting (Hyde, 1989).

The Second Five-Year Program (1966-1970)

Quality and convenience were prioritized over speed and efficiency in the Second Five-Year Program, which began in 1966. New housing estates were better designed, with larger and less homogeneous apartments, more generous open space distribution, and more landscaping. In housing estates, sports centres and other specialized facilities improved the quality of life. In 1968, as part of the Home Ownership Scheme, an innovative home finance system was devised to shift housing from a public benefit to a commodity.

Citizens who met the HDB eligibility standards could use a portion of their CPF savings to cover the down payment and monthly instalment payments on their HDB property. By

1970, public housing accounted for 35.9% of Singaporeans, while private housing accounted for 9%.

The 1970s Onwards

The concept of the "new town" was born in the early 1970s, when massive HDB estates were built using the same design principles as the first self-contained HDB estates. Larger populations in high-rise, high-density new towns might support a bigger choice of services, giving planners more alternatives when it comes to community facility planning. The precinct was formed a few years later as a new planning concept in response to the excessively broad neighbourhoods of new towns that inhibited social contact (Hyde, 1989). These precincts were defined by an emphasis on the human scale of the environment, as well as the concentration of community facilities at a focal point within six to eight blocks.

As an incentive to encourage flat-dwellers to upgrade to larger apartments and promote home-ownership, the HDB allowed home-owners to sell their units on the open market after five years in 1971(Lim, 1983). To deter speculation, people who sold their unit on the open market were barred from applying for public housing for two and a half years.

Prior to 1973, the HDB constructed exclusively for low-income people, while private developers catered to the middle and upper classes. The Housing and Urban Development Company (HUDC) was founded in 1974 to provide middle-income housing in response to the surge in the cost of private housing in the early 1970s. The HDB gradually incorporated the HUDC role, and such units became completely integrated into HDB estate planning and development (Castells et al., 1990). As a result, there was a shift toward larger and more aesthetically constructed flats to fulfill the desires of a more affluent set of home-seekers.

2.3.4. Ethiopia

The Ethiopian government's IHDP, according to Weldesilassie et al. (2016), is a large-scale project aimed at tackling the country's current housing deficit, the poor condition of existing housing stock, and future housing demands as a result of prolonged fast urbanization. The effort was largely aimed at addressing the housing needs of low- and lower-middle-income urban households, many of whom are in insecure situations. By

offering low-cost housing units, the IHDP aims to considerably improve the living conditions and tenure security of low-income households.

The key goals of the housing policy were to expand the market for low-income households who were not covered by the private housing market by increasing the supply of affordable low-cost housing. In many developing countries, the vast majority of low-income households are unable to afford the cheapest homes on the market. This is especially troublesome in developing countries, as in-migration from rural households, who frequently lack the financial means to participate in official property markets, drives urban growth. In the current Ethiopian setting, only households earning above the 95th percentile of the income distribution may afford to buy a home in the formal private housing market due to current housing prices and financing mechanisms. Most low-income households in such economies have no alternative except to rent under unstable and unclear lease terms, double up with relatives, or construct some type of housing in forbidden areas, which exacerbates the spread of slum regions. As a result, low-income families not only live in substandard housing, but also have limited access to basic public services and financial services because they are often deemed creditworthy due to their employment, which is often in the informal economy, or a lack of collateral for mortgage lending when it is available. Second, the housing strategy attempted to stabilize rental markets in urban Ethiopia by boosting both the general housing stock and the construction of low-cost housing units aimed at lower-income households. Ethiopia's present housing gap in metropolitan areas is projected to be around a million units, with only 30% of the current housing stock in "fair" condition and the remaining 70% in need of complete replacement. The housing shortage is significantly worse in major cities like Addis Ababa, where the need is expected to worsen as the population grows rapidly. As a result, the demand for rental property in urban areas has increased significantly, pushing rental costs higher and posing economic issues for working-class people. The restricted rental housing options for renters are causing housing affordability problems in the private sector. To keep rental housing costs constant and affordable, the supply of new housing stock must increase to keep up with the rapidly growing urban housing demand.

The low-cost housing program aimed to provide low-cost housing to those households whose requirements cannot be addressed through traditional real-estate markets. Low-cost

housing typically includes the bare minimum of home amenities as well as other essential community amenities and services. Low-cost housing tends to be made up of smaller dwelling units that are generally located in areas with low commercial values in order to keep costs down. These elements were less appealing to higher-income households, but they are acceptable to low-income households, whose housing budget is often constrained by other fundamental expenses such as food, education, and healthcare. Each condominium block is designed differently, resulting in a variety of typologies. The design emphasizes vertical expansion and concentration in multi-story structures in order to accommodate more households per hectare. To encourage a diversity of income levels, the unit types are dispersed evenly across each story, rather than having only one kind each story. The condominium units were designed to ensure both compound and neighbourhood mixed income levels. Land is allocated by the government for the development of condominium units, common space within the compound, and space for community and social reasons. Despite certain differences from one site to the next, the low-cost housing program encourages low-cost condominium housing units that share the following characteristics:

Standardized design – Except for minor project site specific alterations, practically all housing projects and housing units have a standardized design that allows for duplication and mass manufacture.

Only basic amenities - Each apartment has a separate kitchen, piped water, sewerage, and power connections, as well as a bathroom with a shower, flush-toilet, and basin.

Government contracted and highly subsidized – since the IHDP targets low income households who cannot afford to buy houses at the formal real estate market, the government has been the sole provider of low cost and highly subsidized condominium units.

Unit sizes – there are four-unit typologies incorporated into each condominium block: a Studio, One Bedroom, Two Bedroom, and Three Bedroom unit types with different sizes. The unit sizes have varied over the years the program has been active, with a discernible tendency to increase the average size of units. For example, recently built condominium units have for the most part been relatively large, with the largest unit type – a Three Bedroom unit – exceeding sometimes well over 100 m^2

The initiative planned to produce houses in three schemes based on the down payment required to acquire a home: 10/90, 20/80, and 40/60. Beneficiaries will pay 10%, 20%, and 40% of the house price for houses built under the 10/90, 20/80, and 40/60 program schemes, respectively, with the remainder paid in 25 years for the 10/90 scheme and 15 years for the other schemes, with the exception of studios under the 20/80 scheme, which will be paid in 20 years. Other projects offer studios, one-bedroom apartments, two-bedroom apartments, and three-bedroom apartments, however the 10/90 scheme only offers a studio. Studio houses are looking for people with an average monthly salary of 0-300 ETB. One-bedroom houses were targeted for beneficiaries with an average monthly income of 301-600 ETB, while two-bedroom and three-bedroom houses were targeted for beneficiaries with an average monthly income of 601-1200 ETB and >1200 ETB, respectively. "The program is primarily directed towards residents in the following income levels in terms of income classifications. Half of the city's residents are in the extremely low-income groups, with monthly incomes of less than Birr 300 (equivalent to 23 USD at the start of the program). The extremely low-income group (Birr 300–600), the low-income group (Birr 600–1200), the medium income group (Birr 1200– 1800), and the lower middle-income group (above Birr 1800) make up 30%, 10%, 6%, and 4% of the city, respectively. As a result, 40 percent, 30 percent, and 20 percent of the total residences built were designed for studio, one-bedroom, two – or three – bedrooms, respectively. The houses were moved to the extremely low-income group, the very low-income group, and the low middle-income group, respectively, under this arrangement. The remaining ten percent was intended for commercial use." (Weldesilassie et al., 2016)

The initial desire set by the Government for the IHDP for 2006-2010 was to construct 400,000 housing units, to create 200,000 jobs and thereby contribute significantly to the national target of reducing urban unemployment by half, to promote the development of 10,000 small enterprises on a sustainable basis in the construction industry, to deliver 6,000 hectares of serviced land per annum for housing and other investments, to enhance and build the capacity of contractors, consultants, engineers and foremen as well as suppliers of construction materials, to support the private sector to produce 125,000 housing units per annum through the provision of land and infrastructure and a conducive legal and policy framework Mollaye T. (2020).

The first prototype condominium housing project, which featured 750 residential housing units, was located in the Bole Gerji district. The project was supervised on behalf of the Addis Ababa city government by Germany Technical Corporation (GTZ), and it was a major success in terms of timely delivery and cost control. GTZ, on the other hand, opted for a consultative role rather than continuing to be actively involved in project design and operation. The GTZ advised establishing the Addis Ababa Housing Development Project Office (AAHDPO) to manage the program's implementation in 2005. It was designed to ensure that the IHDP's three major operations in Addis Ababa were completed successfully: "design," "construction," and "housing transfer and administration (UN-HABITAT, 2011).

According to the integrated housing development program, housing has the potential to stimulate the economy, create jobs, and increase the construction and banking sectors' capacity. Prefabricated concrete elements such as pre-cast beams, Agro-stone, and hollow concrete blocks (HCB) were also employed in the program to save construction costs by up to 30% compared to traditional techniques, speed up construction, and let small and medium businesses create construction parts. (Human Settlements Program of the United Nations, 2011). However, the program falls short of the anticipated goal of providing affordable housing in a timely manner. The cost of housing is not affordable for poor and middle-income citizens because all housing developments are excessively delayed.

To summarize, while time delays, cost overruns, and quality loss are all typical in construction projects, they can be mitigated or eliminated by creating an effective performance monitoring and control system that is integrated with all of the project's essential features and operations.

Table 1 summary of low cost housing practices of different countries

Country	Finding	Challenges	Pros	Cons
Kenya	Raft tax incentive was created, but demand continued to	Funding Shortage of land for development Construction cost		Due to the challenges faced the methodology couldn’t be

	exceed supply	Bereaucrcy Poor physical & social infrastructure		used and the housing demand still exceeds supply
South Korea	KNHC was made to operate like a private housing developer in-terms of funding	Financial constraints	The method was successful in equalizing the supply and demand	Gives the government interference a legal basis in providing housing
sweden	Million Program		Effectively addressed the shortage of housing supply	
singapore	The first five year program, The second five year program and post 1970s	While trying to build housings quickly quality was compromised at first	It was able to satisfy the housing requirement	
Ethiopia	IHDP	Hasn't yet satisfied the supply and demand and is taking more time than the requirement	Tries to fulfil the housing demand	The delay is frustrating the end users

2.4 International Studies on Factors that Cause Delay in Construction Projects

As explained before it is essential to identify factors that cause a delay in building projects especially low-cost housing projects so as to provide the houses to the end users on time and to avoid unnecessary damages to the stakeholders. Due to this, different researchers have tried to investigate the causes for delays. According to Theodore T. (2009) the causes of delay are grouped into 8 which are listed as follows: Delay caused by client which are Delay in progress payment by owner, Delay in approving drawings and materials, slowness in decision making, conflicts between joint ownership and change orders during

construction. Delay caused by the consultant which are inadequate experience, Delay in approving works data collection and survey before design, Delay in producing design documents, Errors and discrepancies in the design document and poor communication and coordination, Delay caused by contractor which are Difficulty in financing the project, re work due to errors during construction, Poor qualification of the contractor's technical staff, improper construction methods, Frequent change of subcontractor, Ineffective planning and scheduling of the project, Conflicts between the contractor and the other parties improper construction methods, Frequent cha methods, Frequent change of subcontractor, Delay in site mobilization and the poor communication and coordination and the other parties, Delay in site mobilization and poor communication and coordination, causes of delay by material which are shortage of construction materials in the market, Change in material type and specification, Delay in material delivery, Late procurement of materials and Delay in manufacturing special building materials, Causes of delay by equipment, Causes of delay by equipment which are equipment breakdown, shortage of equipment, low level of equipment operation skill, Low productivity and efficiency of equipment, Lack of high technology mechanical equipment, Causes of delay by labors which are shortage of labors, low productivity level of labors and personal conflicts among labors, Causes of delay caused by external factors which are effects of subsurface condition, delay in obtaining permit from the municipality, Hot weather effect on construction activities, Accident during construction, Changes in government regulations and laws, Delay in providing services from utilities such as water and electricity and delay in performing final inspection and certification by a third party.

As per the study done by Asim, M., Deep, S., & Ahmad, S. A. (2017), the top five causes of delay are Referral of bids to the lowest price, financial difficulties, and contractor failure to regulate the cash flow, delay of payments, unavailability of required equipment, change orders during construction, mistakes during the construction stage, disputes, lack of productivity, an increase in cost and lack of revenue.

Ahmed, Azher, Castillo & Kappagantula (2002) also classified causes of delay into four groups as Contractor's Factor, Consultant Factor, Client Factors and External Factors. As per the study Client related factors are delayed payments, change orders, slow decision making, bid award for lowest price and contract scope change, Factors that are caused by

consultant are provision of incomplete design, poor supervision, slow instruction giving and lack of experience, whereas external factors are shortage of material, poor site conditions and lack of equipment and tools in the market or in the country.

Musuya Joseph (2004) summarized the causes for inexcusable delays after studying projects that are undertaken by both citizens and non- citizens of Malawi. The following were the major factors that occurred at both projects: Poor management, Late procurement of materials and inadequate labor on site, poor supervision, poor workmanship resulting in re-do, contractor's cash flow problem, poor financial management, Lack of construction knowledge, inadequate equipment. Even though these factors occurred at both projects the citizens were the ones that were severely affected.

Shruthi Sivaprakasam.et. al (2017), also grouped causes of delay as the following: Owner's contribution, contractor's contribution, due to consultant's, material factors, equipment, labor and other external factors as the major contribution factors for the delay of a construction project.

2.5 Local Studies on Factors that Cause Delay in Construction Projects & Low Cost Housings

In case of Ethiopia, it is known that there is a major housing problem due to the problem of housing price and affordability. In order to solve this issue a development program called the Integrated Housing Development Program (IHDP) was established. The IHDP is a government-led and financed housing delivery program for low-and middle-income households in Ethiopia. The program was initiated and launched in 2004 for solving the low-income housing challenge. IHDP was also adopted pre-cast concrete elements like pre-cast beam and hollow concrete blocks (HCB) for the purpose of reduction of construction costs (by up to 30 percent) compared with conventional systems by improving the speed of construction. However, the program failed to meet the desired objective in terms of providing affordable houses within a planned time Takele M. (2021). Researches have been done here in Ethiopia regarding the causes for the delay of a construction project including low cost housings some of which are summarized as follows: Shewafraw T.(2016), as per his study on public building construction indicated that the potential causes of delay due to the consultant's responsibility are unclear and incomplete design drawings, poor site supervision, frequent design change, poor contract management and

change in material type during construction, whereas due to the contractor's responsibility the causes for the delay are inefficient planning and scheduling, late procurement of materials, low labour productivity, delay in material delivery, low labour productivity, inappropriate cost estimation and improper construction methods.

Tassew,T (2018), on his study stated that the major factors for the causes of the delay in an 40/60 project were client related, material related, labour related and corruption were the main contributing factors that prevent the timely delivery of low-cost housing projects. However, the study found out that the consultant related factors were insignificant as compared to the others, whereas contractor, client and corruption related causes were the main factors that caused a delay on the project.

Takele M.(2020), in his study on 40/60 projects identified late delivery of materials by the client, difficulties in financing the project by the contractor, improper contractor selection, slow decision making by the client and obsolete technology used by contractors, time taking procurement process, inaccurate estimation of quantity in procurement planning, lack of integration and coordination, lack of qualified personnel to handle resources in the logistics, low productivity level of micro and small enterprises, bureaucratic process, misuse of advance payment by the contractors, serious corruption practice, lack of professionalism, lack of capacity and experience of decision makers, frequent design change as the main or root causes of delay in 40/60 low-cost housing construction projects.

To summarize, all of the literatures have got similarities in categorizing the main factors that affect the time it takes to complete a project on time. As viewed from the literatures, the main causes of delay are Client caused delay, Consultant caused delay, Contractor caused delay, delay caused by equipment, materials and external factors all of which have subdivisions inside them are the root causes for a delay in construction.

Table 1 below summarizes the international studies and local studies done by different researchers on Delay factors.

Table 2 Summary of International and Local Studies on Delay Factors

International Studies				
Author	**Year (G.C)**	**Country**	**Scope**	**Factors**
Aside& Ahmad	2017	India	Delay Factors	-Financial difficulties -Delay of payments -Mistakes during Construction -Lack of productivity -Contractor failure to regulate cash flow
Ahmed,Azher, Castillo& Kappagantula	2002	Florida	Delay Factors	-Contractor's factor, -Client's factor, Consultant's factor and External Factors
Musuya Joseph	2004	Pretoria	Delay Factors	-Poor Management -Late procurement of material and inadequate labor on site, poor supervision, Lack of constructio n Knowledge
Shruthi Sivaprakasam.et. al	2017	India	Delay Factors	Owner's contribution,Contractor 's contribution, Consultant's con tribution, material, labor, equipm ent and other external factors

Local Studies				
Author	**Year(G.C)**	**Country**	**Scope**	**Factors**
Shewaferaw T	2016	Ethiopia	Delay Factors	-Incomplete design, poor site supervision, frequent design change, Poor planning, poor contract management, change in material type, delay in material delivery, low labor productivity, improper construction methods

Tassew,T	2018	Ethiopia	Delay Factors	-Client related, material related, labor related and corruption
Takele M	2020	Ethiopia	Delay Factors	-Difficulty in financing, late delivery of material, slow decisi on making, lack of qualified per sonnel, lack of integration and c oordination improper contractor selection

2.6 Summary

The term delay in construction has been defined by various researchers in different ways. As the time during which some part of the construction project has been extended or not executed owing to an unexpected event. Many studies were done on the issue of delay and quality in the construction of buildings. As construction projects are a balance between cost, time and quality, It is possible to have high quality and low cost, the expense of time, and conversely have a high quality and fast project, but at a cost, whereas if both time and money are restricted, quality is likely to suffer.

Due to urbanization and migration from the countryside, Ethiopia is currently experiencing a significant population boom. As a result, it is confronting numerous issues like a high rate of unemployment and housing shortages especially for the poor. In order to solve this problem, the government created a housing development program called the Integrated Housing Development Program (IHDP), which is a government-led and supported housing supply program. The mandate of the IHDP is to reduce slum areas in the city by 50 per cent and address and improve the unemployment percentage in the capital within five years, through the building of nearly 400,000 new units nationally. However, the program is observed to be affected by factors that affect the time and quality of the construction.

As per the studies done on construction delays the type of delays have been identified and grouped into the following categories: Client caused delay, Consultant caused delay, Contractor caused delay, delay caused by equipment, materials and external factors all of which have subdivisions inside them that are the primary causes for a delay in the construction.

2.7 Gap Identification

As seen from above, lots of studies have been conducted in order to identify delay and its causes in construction projects. However, the following issues haven't been given emphasis while studying the causes for the delay, especially in 40/60 middle income housing projects.

- The performance of subcontractors as the main cause of delay in the construction

CHAPTER THREE

METHODOLOGY

Although there have been delays in projects for a variety of causes, Addis Ababa's housing crisis continues to be a major worry. In order to address the issue, this research aims to pinpoint the main reasons behind the project's delay.

This chapter's goal is to outline the research's techniques for sampling, gathering data, and data analysis. Introduction, population and sample size, sampling strategy, data collection techniques, and data analysis techniques are all covered in this chapter.

3.1 Introduction

The goal of this applied research project is to identify the main factors contributing to the delay in the construction of the 40/60 saving projects in Addis Ababa in order to find a solution to the problem (Fellows & Liu, 2007). It is also descriptive research because it seeks to identify the issue through client, consultant, and contractor responses.

3.2 Population and sample size

Professionals from the three parties (Contractors, Consultants, and Client) who are now working on the 40/60 saving houses project in the Ayat Project site 3 make up the research's population. Therefore, the client, consultant, and contractors are the three organizations with which the target populations are engaged, and the Ayat site 3 is the population target area.

The sample size is calculated using the statistical formula given below, taking into account the population and confidence level, in order to estimate the number of questionnaires that should be distributed to respondents, taking the response rate into account.

The sample size is determined using the following formula by solvin (1960)

$$n = \frac{N}{(1 + N(e)^2)}$$ >>> (Eq. 3.1)

Where:

n = Desired sample size

N =Total population size and

e = (the accepted error limit of value 0.05) with 95% confidence level.

3.3 Sampling Method

In this study, a stratified sampling methodology was utilized as a sampling strategy to find potential responders among clients, contractors, and consultants in order to ensure that questionnaire responses were correct (Fellows& Liu, 2007).

3.3.1 End users/Residents

A non-probabilistic method of sampling called convenience sampling was used from the part of the population/ residents that were close to hand. A face-to-face meeting with a structured interview was used with the end users in order to acquire the right information from these respondents. The interview undertaken for this thesis was based on study of the problems. The semi-structured approach to the interviews and the open-ended questions were chosen because they would allow the individuals to discuss and share their own opinions, while the researcher will adapt the questions to the interviewee's relative level of understanding of the investigated topic.

3.4 Type of data

Two types of data namely Primary and Secondary kind of data were used

3.4.1PrimaryData

The primary data was collected through interview, questionnaire, and observations in 40/60 building project located here in Addis Ababa Ayat Area. The primary data was collected through interviews, questionnaires and observations in selected 40/60 building projects located here in Addis Ababa. Experts as well as thoughts of end users from the primary data was collected through interviews, questionnaires and observations in Ayat 40/60 building project in-terms of the timely construction of the housings, as well as obstacles and the causes of any problems that have arisen were gathered.

3.4.2 Secondary Data

Secondary data was gathered from existing sources such as journal articles, dissertations, newspapers, unpublished theses, books, and internet and conference papers. All of them were chosen based on their relevance to the research.

In order to identify the respondent's view on the topic of this study, Likert's-scale was used with a scale ordinal measure of (From 1-5).

Likert scale is used to measure attitudes, opinions and perceptions of a person or group of people about social phenomena. To get an answer, an instrument is made that is linked to a form of statement or attitude support that is expressed by a specific word or indicator. Riduwan (2003), states that Likert scale is used to measure attitudes, opinions, or groups about social events or symptoms. For analysis purposes, the answers were given scores, as follows:

- ✓ Very high influence =5
- ✓ High influence =4
- ✓ Medium influence =3
- ✓ Low influence =2
- ✓ Very low influence =1

3. Data Collection strategies

In order to acquire quantitative and qualitative data, the researcher used both primary and secondary sources and In-depth information was gathered via questionnaires. The questionnaire was prepared in English and it was intentionally kept short and to the point to encourage meaningful engagement from respondents.

3.6 Direct Observations

Direct observations were conducted on the selected sites with two main objectives. The first one being to identify the types of quality issues related with the construction and the second one being the methodology used for the construction as compared to the given methodology by the consultant or the contractor himself. This observation was done after questioning and reviewing the quality standards that need to be met and the methodologies that should be followed during construction from the offices of each site. Photographs and notes were taken as data recording mechanisms.

3.6.1 Interview

The researcher began by introducing herself and the purpose of the study to the interviewees, who are the end users. The researcher taped and took notes on the conversation. Whenever there were additional questions or clarification needed, the researcher made direct contact with the interviewees. This gave the interviewees the chance to go outside of the investigators line of questions, if they felt the need to come across information, they weren't directly asked for. Structured interview questions were made for each interview, which is attached in the appendix.

3.6.2 Questionnaire and interview response statistics

3.6.2.1 Expert's Response

Based on Solvin's (1960) sample size determination formula, it is possible to determine the sample size, at 95 % confidence level and 0.05 precision levels.

$n = N / 1 + N (e)^2$

Where: n is number of respondents

N = population size =100

e = sampling error/level of precision = 0.05

The total sample size of respondents based on the above sample size determination is 93.3.

The questionnaire was distributed to a total of 100 respondents from all parties which are the contractor, consultant and client from the 100 questionnaires only 80 were collected i.e 60(85.7%) from the contractor, 8(80%) from the consultant and 12 (60%) from the client's representatives. Table 3 summarizes the number of responses and the response rate in percentage given by each party.

Table 3 Summary of Responses rates given by each party

S.No	Contractual parties	Distributed Questionnaires	Collected Questionnaires	Response Rate
1	Contractor	50	40	80%
2	Consultant	20	15	75%
3	Client	10	8	75%
4	Total	80	63	78.75%

Source: Field Survey (November, 2022)

3.7 Method of Data Analysis

After the collection the data was analyzed using statistical package for Statistical Package for Social Science (SPSS) using multiple linear regression analysis to establish relationship between the independent variables and the dependent variables.

The regression formula used was as follows

$Y=\beta 0+\beta 1X1+\beta 2X2+\beta 3X3+\beta 4X4 \ldots+\epsilon$ Where:

Y= Delay (Dependent Variable)

X1- X4=Independent Variables

X1= Lack of Skill of the Subcontractor's Manpower

X2= Poor monitoring and control of the consultant & client representatives

X3= Shortage of Sub Contractor's Manpower

X4= Poor Communication of contractor and Subcontractor

X5= Payment delay to the Subcontractor

X6= Negligence of the Subcontractor

β 0 = The constant

β 1 – β4 = Coefficients

ϵ = Error Term

3.8 Validity & Reliability

3.8.1 Validity

Validity is concerned with whether the findings are really about what they appear to be about (Sounders et. al., 2003). Validity defined as the extent to which data collection method or methods accurately measure what they were intended to measure (Sounders et. al., 2003). Numbers of different steps are taken to ensure the validity of the study:

- Data is collected from the reliable sources, from respondents who had experience in housing construction.
- Survey question are made based on literature

3.8.2 Reliabilty

The reliability of the data can be referred to the consistency or dependability of a measure over time,over questionnaire items or over observers/ raters (Allen and Bennett 2010). The Cronbach coefficient is a measure of the inner consistency. The reliability test depicts the consistency degree of the data collected. The data collected (total respondents and contributing factors) in this study was analyzed with SPSS version 20 to calculate the value of Cronbach's alpha of the survey results.

Table 4 Cronbach Alpha Coefficient for all variable

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.757	**.761**	**7**

Source: Field Survey (November, 2022)

Table 5 Cronbach Alpha coefficient for all variables

	No of Items	Cronbach Alpha (Total Sample)
Lack of subcontractor manpower skill	63	0.745
Poor monitoring and control	63	0.73
Shortage of subcontractor's manpower	63	0.75
Poor communication	63	0.752
Payment delay to the subcontractor	63	0.789
Negligence of the subcontractor	63	0.83
Timely Completion	63	0.876

Source: SPSS computed data (November, 2022)

3.9 Data Analysis methods

Data analysis methods used in this research include Cronbach's alpha (α) coefficient, Relative Importance Index(RII), Spearman rank correlation coefficient and analysis of variance, as discussed hereunder. The Statistical Package for the Social Sciences Program (SPSS) was used to analyze all of the data reliability, correlation and overall significance whereas the relative importance was calculated on excel.

3.9.1 Spearman's Correlation coefficient index

The Spearman rank correlation coefficient was determined to assess the strength of relationship between the two parties of ranking. The value of the Spearman rank correlation coefficient range from+1 (perfect correlation), to 0 (no correlation), 1(perfect negative correlation. The values show whether there is a strong correlation between the rankings of the contractor and consultant, the consultant, the consultant and the client and the client and the contractor.

3.9.2 Reliability test

Researchers must test the level of Reliability of a research instrument in order to assess its level of validity. According to Azwar (2010), Reliability refers to the consistency of measuring results, or the degree of measurement precision. In this case, reality means that

repeating measurements on the same subject or object can yield similar findings (consistent). If the measurement yields results that are drastically different, then the measurement is unreliable.

The Cronbach Alpha coefficient method in SPSS is used to examine the reliability of research instruments (questionnaires). The following are the criteria for determining if a questionnaire is reliable: a. if the Alpha coefficient findings have a significance level of 0.6 or more, the questionnaire is reliable; b. if the Alpha coefficient results are less than 0.6, the questionnaire is not reliable. Arikunto (2010)

3.9.3 Multi Collinearity test

The purpose of the multicollinearity test is to see if the regression model revealed a strong or perfect correlation between the independent variables (Ghozali, 2009). There's a difficulty with multicollinearity if there's a correlation. There is no correlation between the independent and dependent variables in a good regression model.

SPSS was used to conduct the study's multicollinearity test. According to Ghozali (2009), the existence or absence of multicollinearity symptoms can be determined by looking at the value of the correlation matrix generated during data processing, as well as the values of VIF (Variance Inflation Factor) and Tolerance. It can be said that the data will be evaluated regardless of the symptoms of multicollinearity if there is no correlation matrix value more than 0.05. If the VIF value is greater than 10 and the Tolerance value is close to 1, the regression model is said not to have a multicollinearity problem.

3.9.4 F-Statistic Test (ANOVA)

ANOVA is used to determine the significance of agreement among the parties in their rankings or to test the null hypothesis that there is no difference between the means of the client, consultant, and contractor, i.e. 0=CT=CS=CL, where CT, CS, and CL are the means of the contractor, consultant, and client, respectively. The F statistic is used to test this hypothesis, which assumes a normal distribution. If P Value > 0.005, the null hypothesis is rejected (critical value). If this is the case, the only conclusion is that at least one population mean differs from at least one other population mean, as the ANOVA does not indicate which population means

differ from which. The three groups can be regarded random samples from the same population if the hypothesis is accepted. (Dai, 2006; Heron, 2006)

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter is divided into three sections, the first one deal with the findings and their analysis. In the second, the assumptions were verified, and in the third, the regression analysis's key findings were presented.

The primary focus of the study was on factors affecting timely completion of the 40/60 housing project at Ayat Project site 3. Therefore, this chapter presents the analysis of responses that were received via questionnaires distributed to professionals of the three main project participants namely the client, consultant and contractors and interview with the end users. A total of 80 questionnaires were personally distributed to the respondents, who also received careful monitoring and assistance as they filled them out of the total respondents 63 completed the surveys in a proper manner.

4.1.1 Delay clause on the Contract agreement

According to GCC 19, if the contractor fails to executed the works in accordance with the contract or is persistently neglecting to carry out his obligations under the contract, The engineer shall evaluate at several times in the project period the progress of the contractor and calculate the delayed time in days subtracting the time lost due to reasons that are beyond the responsibility of the contractor. If the calculated days reached 15 days a first warning notice shall be issued so that the contractor can expedite the work as per the master schedule by maintaining the rate of the work progress.

However, if these delayed days extend further and reach 21 days a second warning notice is issued so that the contractor can take the necessary step and respond accordingly. Eventually if the rate of the progress doesn’t show any kind of improvement and the delayed days reach 28 days, the engineer is entitled to recommend to the employer the possible termination of the contract with the necessary steps to follow.

In addition to this, any steps taken by the contractor under this clause that involves the employer in additional supervision costs shall be covered by the contractor. The percentage of the work not completed representing the public body's additional cost for completing the works is 15%. Other than this the clause that states about the quality of the construction is Clause 88.6 and 88.7, on which it is stated that the normal wear and tear shall be corrected by the contractor during the defect's liability period, which is 365 days.

However, the projects are still under way with an average elapsed time of 80 months from the contract signing date and haven't yet been transferred to the end users as planned, which have created a major disappointment to the end users. Accordingly questionnaires were distributed and collected in order to understand the factors that are affecting the time and quality of the constructions. The questionnaire response rates and number rates were summarized as follows.

4.1.2 Background Information about the respondent

The background information about the respondents is described below on Table 5

Table 6 Background information

No	Background Information		Number	Percentage (%)
1	Age	< 30	2	3.17%
		31-40	35	55.56%
		41-50	25	39.68%
		> 50	1	1.59%
2	Education level	Diploma	1	1.59%
		Degree	50	79.4%
		Master's degree	12	19.05%
3	Work experience	<3 years	0	0%
		3-5 years	5	7.94%
		5-10 years	35	55.56%
		10-15 years	12	19.04%
		> 15years	1	1.59%
4	Employment type	Contractor	40	63.5%
		Consultant	15	23.8%
		Client	8	12.7%

Source: Field Survey (November, 2022)

4.2.2.1 Age, Number and Ownership of the Residents

The number of end users/ residents that were interviewed and their age was summarized on Table 5 below which shows that 20% are below 30, 40% are between 31-40, 32% are between 41-50 and the rest 8% are greater than 50.As for the ownership, 60% are occupants and the rest 30% were owners of the houses as shown on Table 6 below.

S.No	Age of the Respondents	No of the Respondents	Percentage
1	Less than 30	5	20%
2	31-40	10	40%
3	40-50	8	32%
4	Greater than 50	2	8%
	Total	**25**	**100%**

Table 7 Summary of Resident Respondents Number and Age

TS.No	Ownership of the Respondents	No of the Respondents	Percentage
1	Occupants	15	60%
2	Owners	10	40%
	Total	**25**	**100%**

Table 8 Summary of Respondents Ownership and Number

Source: Field Survey (November, 2022)

4.2.2.2 Residents Interview Response Regarding Quality

According to the interview response given from the residents there are many types of problems related with the housing construction. The problems that they have faced are listed as follows according to the rank given by the respondents. The major issues that they have faced were the problems faced with sanitary works. They emphasized that the due to the problem in the waste disposal mechanism the waste water line gets clogged and will be hard to remove the waste, which in turn causes bad smell in the house. In addition to this, the residents' main complaint was the problem of water shortage, which is causing them to face the challenge of removing waste as well as cleaning and cooking problems. The other major problems stated by the residents were, cracks in the walls on the floors and roofs which are caused by the poor construction methodology. The other main complain stated by the residents was the problem of sound coming from neighbours. Sounds coming either from next door or upstairs was the major issue raised by the residents since it highly disturbs the peace that they want to have in their house. The other major cause of disappointment to the dwellers was the poorly fixed accessories like door locks, shower heads, kitchen and bathroom accessories as well as floor finishes like ceramics in the bathroom that are broken or cracked and easily get off. The final problem pointed out by the residents, was water leaking from the roof. Due to this the roof and walls get wet and change their colour to black due to the moisture. Hence, due to the above problems the residents were forced to have the house maintained, which leads them to an additional and unexpected cost.

4.3 Identifying the Major factors that affect the time and quality of the Low-Cost Housing constructions

Descriptive Statistics

Table 9 Mean and Standard Deviation

Variables	Mean	Std. Deviation	N
TIMELY COMPLETION	1.4921	0.56434	63
SUBCONTRACTOR SKILL	2.9841	0.69959	63
MONITORING AND CONTROL	3.0317	0.76368	63
SHORTAGE OF MANPOWER	3.0040	0.79754	63
POOR COMMUNICATION	3.0397	0.68716	63
PAYMENT DELAY	3.0794	1.07840	63
NEGLIGENCE OF SUBCONTRACTOR	3.0423	0.67067	63

Source: SPSS computed own data, 2022

In order to do analysis, mean scores and standard deviations of the respondents' responses were generated as descriptive statistics (mean and standard deviations). In the example of the Ayat condominium in Addis Ababa, the means and standard deviation values are used to compare the many factors that affect the timely completion of the 40/60 housing project. The standard deviation of 0.564, which represents the data' moderate heterogeneity in terms of timely completion, confirms this. Additionally, according to the data, every component of on-time completion was rated as being above satisfactory.

According to the mean values, the following factors have relatively significant effects on timely completion: subcontractor skill (mean of 2.98), Monitoring and Control (mean of 3.032), shortage of manpower (mean of 3.004), and poor communication (mean of 3.04), Payment delay (3.08) and Negligence of subcontractor (3.042). As seen from the above all explanatory
variables are essential for the project's timely completion at the Ayat 40/60 site.

4.3.2 Correlation Analysis

The Subcontractor's Manpower skill, Poor Monitoring and Control of the subcontractor, shortage of the subcontractor's manpower, Poor communication of Contractor and subcontractor, Payment delay to the subcontractor & Negligence of subcontractor were all independent variables that were tested using the Pearson correlation method based on the surveys that the Ayat 40/60 housing project's professionals were chosen to complete.

The table below displays the findings of the correlation study between these variables.

Table 10 Correlation Analysis

		Timely Completion	**Subcontractor's manpower skill**	**Poor Monitoring and control of the subcontractor**	**Shortage of subcontractor's manpower**	**Poor Communication of Contractor & subcontractor**	**Payment delay to the subcontractor**	**Negligence of subcontractor**
Timely Completion	Pearson Correlation	1.000						
	N	63						
	Sig. (1-tailed)	0.000						

Subcontractor's manpower skill	Pearson Correlation	0.75	1.000					
	Sig. (1-tailed)	0.000	0.000					
	N	63	63					
Poor Monitoring and control of the subcontractor	Pearson Correlation	0.82	0.43	1.000				
	Sig. (1-tailed)	0.000	0.000	0.000				
	N	63	63	63				
Shortage of subcontractor's manpower	Pearson Correlation	0.846	0.332	0.325	1.000			
	Sig. (1-tailed)	0.000	0.000	0.000	0.000			
	N	63	63	63	63			
Poor Communication of Contractor	Pearson Correlation	0.854	0.30	0.314	0.288	1.000		
	Sig. (1-	0.000	0.000	0.000	0.000	0.000		

& subcontractor	tailed)							
	N	63	63	63	63	63		
Payment delay to the subcontractor	Pearson Correlation	0.798	0.289	0.274	0.268	0.273	1.000	
	Sig. (1-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	
	N	63	63	63	63	63	63	
Negligence of subcontractor	Pearson Correlation	0.765	0.276	0.264	0.242	0.269	0.243	1.000
	Sig. (1-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	N	63	63	63	63	63	63	63

Source: SPSS computed own data, 2022

As the results shown in Table 9, the independent variables (The Subcontractor's Manpower skill, Poor Monitoring and Control of the subcontractor, shortage of the subcontractor's manpower, Poor communication of Contractor and subcontractor, Payment delay to the Subcontractor, Negligence of the Subcontractor are positively correlated with the dependent variable The Subcontractor's manpower skill (Pearson Correlation = 0.750, p<0.001), Poor Monitoring and Control of the subcontractor (Pearson Correlation = 0.820, p<0.001), Shortage of the subcontractor's manpower (Pearson Correlation = 0.846, p<0.001), Poor communication of Contractor and subcontractor (Pearson Correlation = 0.854, p<0.001), Payment delay to the subcontractor (Pearson Correlation = 0.798, p<0.001), Negligence of the Subcontractor (Pearson Correlation = 0.765, p<0.001). The finding on table 7 above further indicates that the highest significant relationship is found between good communication between client, consultant and contractors and timely completion (Pearson Correlation =.854, p< 0.01), however the lowest statistically significant relationship is found between planning and scheduling influence and timely completion (Pearson Correlation = .750, P < 0.01).

4.3.3 ANOVA Test

Table 11 ANOVA Table

ANOVA

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	52.084	6	13.021	46.89	.000[b]
	Residual	22.940	56	0.283		
	Total	75.023	62			

a. Dependent Variable: Timely comp

b. Predictors: (Constant), subcontract negligence, subcontractor shortage, Payment Delay, monitoring control, communication problem, manpower Skill

According to the ANOVA table's significance level, the set of factors strongly predicts the dependent variable. Specifically, the F-ratio denotes the ratio of the improvements in prediction that result from fitting the model, relative to the inaccuracy that still exists in the model, in an ANOVA that evaluates whether the model is significantly better at predicting the outcome than using the mean as a best guess. F is 46.89 for this data, which, at p0.001, is significant. By chance

alone, there is less than a 0.1% probability that an F-ratio of more than one will occur, according to this conclusion. As a result, the regression model produces noticeably higher predictions of timely completion.

4.3.4. Multiple Regressions Analysis

A regression model was utilized to determine how the variables affect the project's timely completion. The coefficient of determination, or R2, measures the proportion of the variance of dependent variables about their mean that is explained by independent or predictor variables.It is done to assess the independent variable's impact on the dependent variable and establish its relative significance; i.e Independent variable (The subcontractor's manpower skill, Poor monitoring and Control of the subcontractor, shortage of the subcontractor's manpower, Poor communication of Contractor and subcontractor, payment delay to the subcontractor negligence of the subcontractor to the dependent variable i.e. timely completion of the 40/60 housing project in the case of Ayat Condominium. Greater explanatory power of the regression equation is represented by a higher R2 value. Multiple regression analysis was employed to test the suggested hypothesis . The following table shows the regression analysis's findings.

Model		Unstandardised Coefficients		Standardized Coefficients	t	Sig
		B	Std.Error	Beta		
1	(Constant)	1.784	.121		.769	0.000
	Manpower Skill	.041	.113	.450	9.54	0.040
	Monitoring &control	.082	.171	.198	1.417	0.046
	Subcontractor shortage	.053	.294	.124	.179	0.038
	Communication problem	.283	.103	.083	.604	0.056
	Payment Delay	.190	.179	.545	10.057	0.042
	Subcontract negligence	.037	.240	.24	.155	0.021

Table 12 Regression coefficient analysis of the model

H1: Manpower skill affects the timely completion of the housing project.

The result of multiple regression analysis of the above table clearly indicates that the Manpower skill has significant influence on timely completion ($p<0.05$). Besides, the value of beta in Manpower skill ($\beta=.45$) shows the positive effect of on timely completion. This implies that a one unit increases in Manpower skill results in 0.45 unit increases in timely completion housing project. Thus, the above proposed hypothesis is accepted.

H2: Monitoring and control affects the timely completion of the housing project.

The result of multiple regression analysis of the above table clearly indicates that the Monitoring and Control has significant influence on timely completion ($p<0.05$). Besides, the value of beta in Monitoring and Control ($\beta=.198$) shows the positive effect of on timely completion. This implies that a one unit increases in Monitoring and Control results in 0.198 unit increases in timely completion housing project. Thus, the above proposed hypothesis is accepted.

H3: Subcontractor shortage affects the timely completion of the housing project.

The result of multiple regression analysis of the above table clearly indicates that the Subcontractor shortage has significant influence on timely completion ($p<0.05$). Besides, the value of beta in Subcontractor shortage ($\beta=.124$) shows the positive effect of on timely completion. This implies that a one unit increases in Subcontractor shortage results in 0.124 unit increases in timely completion housing project. Thus, the above proposed hypothesis is accepted.

H4: Communication problem affects the timely completion of the housing project.

The result of multiple regression analysis of the above table clearly indicates that the Communication Problem has significant influence on timely completion ($p<0.05$). Besides, the value of beta in Communication Problem ($\beta=.083$) shows the positive effect of on timely completion. This implies that a one unit increases in Communication Problem results in 0.083 unit increases in timely completion housing project. Thus, the above proposed hypothesis is accepted.

H5: Payment Delay affects the timely completion of the housing project.

The result of multiple regression analysis of the above table clearly indicates that the Payment delay has significant influence on timely completion ($p<0.05$). Besides, the value of beta in Payment delay ($\beta=.545$) shows the positive effect of on timely completion. This implies that a one unit increases in Subcontractor shortage results in 0.545 unit increases in timely completion housing project. Thus, the above proposed hypothesis is accepted.

H6: Subcontractor negligence affects the timely completion of the housing project.

The result of multiple regression analysis of the above table clearly indicates that the Subcontractor negligence has significant influence on timely completion ($p<0.05$). Besides, the value of beta in Payment delay ($\beta=.24$) shows the positive effect of on timely completion. This implies that a one unit increases in Subcontractor shortage results in 0.24 unit increases in timely completion housing project. Thus, the above proposed hypothesis is accepted.

Table 13 Model summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.833[a]	.694	.667	0.50827	.694	46.89	6	56	.000

a. Predictors: (Constant), subcontractor negligence, subcontractor shortage, Payment Delay, monitoring &control, communication problem, manpower Skill

b. Dependent Variable: Timely comp

Overall, the given table revealed that all independent variables accounted for about 69.4% of the contribution for timely completion (adjusted R^2 = 0.667). Thus, 66.7% of the variation in timely completion can be explained by six factors. From the above finding the study can develop the following regression model

$TC = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + \beta 6X6 + \varepsilon$

$TC = 1.784 + 0.45X1 + 0.198X2 + 0.124X3 + 0.083X4 + 0.545X5 + 0.24X6 + \varepsilon$ Where, TC= Timely Completion, α =Constant, β=Coefficient of estimate,

X1 = Manpower skill

X2 = Monitoring and control

X3=Subcontractor Shortage

X4=Communication problem

X5=Payment delay

X6= Subcontractor negligence

4.4. Finding

Manpower Skill

Manpower skill has a positive link with timely completion of the 40/60 housing project at the Ayat site, according to the regression results, with a coefficient estimate of 0.45. This indicates that, as one percent of Manpower Skill increases, it improves timely completion by 45.0%, and the Manpower Skill p value of 0.040 indicates that it is statistically significant at the 5% level of significance. Thus, the outcome is consistent with the working hypothesis that Manpower Skill has a significant impact and a statistically significant effect on timely completion.

Monitoring and Control

Monitoring and control, according to the regression's findings, have a positive link with the 40/60 housing project at the Ayat site's timely completion, with a coefficient estimate of 0.124 Holding all other independent variables constant, this means that when Monitoring and Control is increased by 1%, timely completion improves by 12.4%. Monitoring and Control's p value of 0.046 indicates that this improvement is statistically significant at the 5% level of significance. As a result, the finding is consistent with the working hypothesis that monitoring and control have a significant impact and a statistically significant effect on timely completion.

Subcontractor Shortage

Subcontractor shortage has a positive correlation with on-time completion of the 40/60 housing project at Ayat site, with a coefficient estimate of 0.198, according to the regression results. This means that when Subcontractor Shortage increases by 1%, timely completion improves by 19.8% when controlling for other independent factors and the

Subcontractor Shortage p value of 0.038 indicates that it is statistically significant at the 5% level of significance. As a result, the finding is consistent with the working hypothesis that subcontractor shortage has a s impact on timely completion and a statistically significant effect.

Communication problem

Communication issues have a positive correlation with on-time completion of the 40/60 housing project at the Ayat site, according to the regression results, with a coefficient estimate of0.083.Holding all other independent variables constant, this means that when Communication Problem increases by 1%, timely completion improves by 8.3%. The Communication Problem's p value of 0.056 indicates that this improvement is statistically significant at the 5% level of significance. As a result, the outcome is consistent with the working hypothesis that communication issues have a positive impact and a statistically significant impact on timely completion.

Payment Delay

Payment delay has a positive correlation with on-time completion of the 40/60 housing project at the Ayat site, according to the regression results, with a coefficient estimate of 0.545. Accordingly when Payment delay increases by 1% while all other independent variables remain constant, timely completion improves by 54.5%, and the fact that Payment delay has a p value of 0.04 indicates that it is statistically significant at the 5% level of significance. In light of this, the outcome is consistent with the working hypothesis that payment delay has a positive impact and a statistically significant impact on timely completion.

Subcontractor negligence

According to the regression analysis, there is a positive correlation between timely completion of the 40/60 housing project at the Ayat site and subcontractor negligence, with a coefficient estimate of 0.24. This indicates that, while maintaining other independent
variables at their original levels, a 1% increase in subcontractor negligence will result in a 24% improvement on timely completion, and 0.021 P value for Subcontractor Neglige

nce indicates that it is statistically significant at the 5% level of significance. In light of this, the outcome is consistent with the working hypothesis that subcontractor negligence has a positive impact on timely completion and a statistically significant impact.

4.5 Case study analysis

This topic deals with an assessment of the reasons for and consequences for delays at two chosen 40/60 project project sites namely Ayat site 2 & site 4, which was done through project document scanning, interviews, and observation which made it easy to get detailed information about the reasons behind the causes of delays at the project sites run by Branch-2 and Branch-4.

4.5.1 Branch-Four Ayat site 2 & Ayat site 4 40/60 housing project site

The project's location is in Ayat's neighbourhood the now called Lemi kura sub-city.Out of the total number of building blocks,24 are B+G+8 typology, 8 are B+G+10 typology,34 are 2B+G+13 typology, and the final 34 are 2B+G+15 type. There are 1,640 housings with one bedroom, 4,080 with two bedrooms, and 2,144 with three bedrooms.For a total of each number of beds 2,732 stores are also present. This branch project site has a total of 10,596 houses in total, including businesses areas .The project has two phases and the first phase of this project was started on May 2013 and the second phase was started on May 2015 the original contract period of the project was 395 calendar days for B+G+8 typology, 473 calendar days for B+G+10 typology, 670 calendar days for 2B+G+13 typology and 730 calendar days for the construction of 2B+G+15 typology building blocks. According to the original contract, the phase one project should have been completed on March 2015, and the phase two project sites should have been completed on May 2017 taking the maximum number of contract date. However, The first phase's current elapsed time equals to 3591 days whereas the time elapsed for the second phase equals to 2861 days with the maximum progress in percent being 90% and the minimum progress being 70%.

Even-though the delay has many causes, one of the main causes of delay are caused by subcontractors. A total of 8 subcontractors were analysed on this case study from the total subcontractors.

4.5.1.1 Manpower skill of the subcontractor

During the construction of the 40/60 Condominiums project, one of the major challenges faced by the contractors was a shortage of skilled subcontractor manpower. The contractors had to rely on local subcontractors who had limited experience and skills in the construction industry.For e.g. as per my informal interview with the subcontractors and my observation most of the subcontractors don't have the knowledge about the standard requirement of mortar in between the HCB and do not have a consistent measurement mechanism of the thickness of mortar.Furthermore, their know how on keeping horizontal and vertical alignment was also limited (don't have the required skill) which resulted in many reworks.The same goes for plastering work, which resulted in a rework due to the poor skilled manpower assigned on this specific task.As a result, the quality of work done by the subcontractors was not up to the requirement, leading to delays in the project time line and additional costs to fix errors made by the subcontractors. As per the informal interview I did with the workers, one of the main cause of shortage of skilled manpower is the amount of daily wage paid to the skilled manpower that cause a disagreement and the delay of payment effeted to them.Table 13 below shows the delay in percent of the some of the blocks and the cause for the delay.

Table 14 Delay caused due to skilled manpower of subcontractor

S.N	Project Location	Work Description	Project Size	Cause for the delay	Delay in % of the described work
1	Ayat site 2 (Block 15 & 35)	HCB Work	B+G+7 & 2B+G+9	Unskilled subcontractor	40%
2	Ayat site 2 (Block 15)	Plastering work	B+G+7	Unskilled subcontractor	25%

3	Ayat site 4(Block 23)	Plastering work	2B+G+13	Unskilled subcontractor	20%

Source: Own survey(March, 2023)

The findings revealed that most subcontractors lacked adequate training and experience in construction work, resulting in poor quality workmanship which in turn resulted in rework and delay of the work.

4.5.1.2 Manpower shortage of the subcontractor

The shortage of skilled subcontractor manpower also led to delays in the construction process. The contractors were forced to rely on a small number of subcontractors, who were overburdened with work, leading to delays in completing certain tasks. This led to a cascading effect where other tasks were delayed as well, ultimately causing the overall construction time-line to be extended.As per my informal interview with the subcontractors as well as the supervisors Lack of skilled manpower for the specific task has led to the overall progress of the blocks. For e.g. even though the requirement for HCB Work is one subcontractor with 4 masons and assistants some of the blocks were seen to be done by 2 masons due to the shortage of skilled masons as per my informal interview with them this happened due to the disagreement in the amount of daily wage to the skilled workers and payment delay. Due to this, the work could not be performed as per the required speed as well as quality.

Table 15 Delay caused by shortage of manpower caused by the subcontractor

S.N	Project Location	Work Description	Project Size	Cause for the delay	Delay in % of the described work
1	Ayat site 2 (Block 20)	HCB Work	2B+G+9	Shortage of manpower	25%
2	Ayat site 4 (Block 29)	HCB Work	B+G+7	Shortage of manpower	30%

Source: Own survey(March, 2023)

Due to the shortage of workers on the project, the HCB work delayed the total progress by 25% and 30 % respectively relative to the other causes for delay as shown on Table 14 above.

4.5.1.3 Subcontractor monitoring & control

One of the ways that the contractors attempted to mitigate the challenges posed by the shortage of skilled subcontractor manpower was through monitoring and controlling their work. However, due to the high number of subcontractors involved in the project, this was a difficult task to accomplish effectively. The contractors relied on site supervisors to monitor the work of the subcontractors, but this was not always successful as the site engineers were also overburdened with work.Due to this,the subcontractor manpower was observed to do the work negligently without keeping the standard requirement and quality. Furthermore, some of them were observed even sitting down and chatting instead of doing their work. This is one of the main causes for the delay on the progress of the work as well as loss in quality since the required supervision or control of the work is limited. Furthermore the HCB production for Block 20 was not being adequately done due to material supply shortage and manpower shortage which caused some part of the delay.

Table 16 Delay caused by the Inadequate monitoring and control of the Work

S.N	Project Location	Work Description	Project Size	Cause for the delay	Delay in % of the described work
1	Ayat site 2 (Block 20)	HCB Production	2B+G+9	Inadequate monitoring and control of the work	32%
2	Ayat site 4 (Block 28)	Plastering work	B+G+7	Inadequate monitoring and control of the work	26%

4.5.1.4 Negligence of Subcontractor

Due to the negligence of subcontractors manpower in achieving the work with the required schedule the work was delayed.As discussed on the above subtopic, the workers were observed doing the work negligently without keeping the standard requirement and quality. Furthermore, some of them were observed even sitting down and chatting instead of doing their work .This happened as a result of the poor monitoring and control of the manpower. Furthermore, the workers were observed to be negligent towards their work due to the fact that the payments were mostly delayed and they were forced to work with a lower daily wage since they couldn't find any other work that can help them keep up with their daily cost of living. This has caused them to lose interest(motivation) in doing their work.

Table 17 Delay caused by Negligence of subcontractor

S.N	Work Description	Project Size	Cause for the delay	Delay in % of the described work
1	Plastering work	B+G+7	Negligence of subcontractor	26%
2	HCB work	2B+G+13	Negligence of subcontractor	18%

4.5.1.5 Poor communication of contractor and Subcontractor

Another challenge faced by the contractors was poor communication between themselves and the subcontractors. This was due to language barriers as well as a lack of formal communication channels. This led to misunderstandings between the contractors and subcontractors, leading to delays and errors in the construction process.Furthermore, the lack of communication has caused mistakes to occur and some tasks to be missed or duplicated. Furthermore due to the poor communication there were misunderstandings about the project

time line, budget and expectations. Due to this reworks and additional time was required to complete the work which in turn caused delay on the whole project.

Table 18 Delay caused by Poor communication

S.N	Project Location	Work Description	Project Size	Cause for the delay	Delay in % of the described work
1	Ayat site 2 (Block 14)	HCB work	2B+G+9	Poor communication	30%
2	Ayat site 4 (Block 39)	HCB work	2B+G+13	Poor communication	20%

4.5.1.6 Payment delay

The other main challenge faced by the subcontractor was Payment delays to subcontractors.This led to a lack of motivation and productivity on the part of the subcontractor as well as the manpower that caused negligence towards the work. This in turn caused a slower work progress and missed deadlines due to absences of the manpower which ultimately caused a delay on the project completion.

Table 19 Delay caused by Payment delay

S.N	Project Location	Work Description	Project Size	Cause for the delay	Delay in % of the described work
1	Ayat site 2 (Block 28)	HCB work & plastering work	B+G+7	Payment delay	40%
2	Ayat site 4 (Block 39)	HCB work	2B+G+13	Payment delay	40%

Generally, Poor communication of contractor and Subcontractor,negligence of Subcontractor, Subcontractor monitoring & control,Manpower shortage,skilled manpower shortage and payment delay were all part of the cause for the delay.Hence, these issues need to be addressed early and as soon as possible in-order to minimize their impacts on the project time-line in general.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The major objective of this study was to investigate the variables influencing the 40/60 housing project's timely completion in the context of the Ayat condominium site in Addis Ababa. The study used 80 samples and issued questionnaires to experts who are the client, consultant, and contractors of the 40/60 Ayat site.From the participants only 63 of the 80 respondents who received the questionnaires fully filed and responded for the study. Using the responses from the questionnaires a regression model was done for evaluating the hypothesis.Accordingly,the results from the analysis concluded that timely completion(Depe ndent variable) is positively and significantly impacted by manpower skill, monitoring and control, subcontractor shortage, communication issues, payment delays, and subcontractor negligence (the independent variables).Furthermore, a case study was done on the above points inorder to know how much it has affected the work progress in general.

Additionally, interview with the end users was done to identify the major quality problems associated with the construction so that the factors that contributed to the loss in quality can be identified. The following is an overview of the findings:

1. Manpower skill has a positive impact on the progress of the work by causing many reworks to be done and due to the skill inadequacy causing slow work progress.
2. Subcontractor shortage affects the work progress because the contractors were forced to rely on a small number of subcontractors, who were overburdened with work, leading to delays in completing tasks within the required time line.
3. Communication issues were also the main cause for delay due to misunderstandings about the project time line, budget and expectations that were caused due to the poor communications.
4. Subcontractor negligence was the cause for a delay due to the fact that there mostly were payment delay issues that caused lack of motivation to work and doing the work negligently.
5. Payment delay was also interrelated with the subcontractor negligence to work in causing a delay on the general work progress.

6. Monitoring and control was the main issue as it causes the workers to do their work negligently and not keeping it according to the standard requirement, budget and time line due to the poor supervision of the contractor or the consultant. This has caused reworks and delay on the general work progress.

7. The time it takes to transfer the residences to the clients has caused a loss of hope and interest on the part of the end users.

8. In addition to the delay, the end users are highly affected by the loss in quality of the construction as they are faced with additional maintenance costs every now and then.

5.2 Recommendations

Based on the findings of the study the following recommendations were given:

The study's conclusions demonstrated that crucial elements for timely completion include Manpower skill, monitoring and control, subcontractor shortage, communication problems, payment delays, and subcontractor negligence. Therefore, concentrating on these and taking the appropriate action on these variables could increase the likelihood that the influence on timely completion will be contained. The researcher has made the following recommendations in light of his findings.

1. Manpower skill has a positive and significant effect on timely completion hence, the required manpower skill shall carefully be deployed on the site in order to achieve timely completion of the project.
2. From the analysis it was observed that Monitoring and control has a positive impact on timely completion of the project. Hence, monitoring and control by the consulta nt as well as the contractor himself shall be done regularly so that the subcontracto r can work responsibly.
3. The finding explained that subcontractor manpower shortage has positive and significant effect on timely completion. Consequently, increasing the required number of subcontractor manpower should be the first task in achieving the timely completion of the project.
4. The other major finding regarding the timely completion of the project was communication problem between the contractor, subcontractor, consultant and client. Hence, better communication between these parties will aid in achieving the timely completion.
5. The finding also concludes that payment delay is the major impact in delaying the timely completion. Hence, improving the delay on payment to the contractor by preparing payment timely will enhance the timely completion of the project.
6. The last finding was subcontractor negligence. This can be corrected by either replacing the subcontractor with that of a responsible one or try to resolve the negligence of the subcontractor by giving incentives or warnings and effecting payment on time as per the requirement.

5.2.1 Recommendations For future research

Further studies shall be made on the effect of subcontractor in achieving the timely completion of the project by taking other factors into consideration.

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Appendix- I

Questionnaire Survey

Addis Ababa University Institute of Technology

Master of Science in Construction Technology and Management

Title: Assessment of Factors that affect the time and Quality of some selected 40/60 Housing Projects in Addis Ababa

Objective of the Questionnaire

My name is ***Melen Kassu***. I am currently doing research for the completion of my Master's degree in Construction Technology and management from Addis Ababa Institute of Technology. I am conducting academic research entitled **"*Assessment on the factors that cause the delay of 40/60 housing project constructions in Addis Ababa: A case of Ayat Condominum site*"** for the partial fulfillment of the MSc Program. The main goal of this study is to identify the major elements that influence the completion of low cost housing construction projects ahead of time and to give scientific suggestions/recommendations based on the findings.

As **a** result, this questionnaire is designed to collect information from relevant informants using a structured questionnaire solely for academic purposes. Your response is extremely valuable and contributes to the research's success and solutions for newly built low-cost housings. Furthermore, the names of the institutions and professionals who took part will be kept confidential and anonymous.

Due to the research's time limitation, I humbly request that you complete and return the questionnaire within a week so that I can carry out the research on time.

Thank you so much for your time and cooperation!!!

Melen Kassu

Addis Ababa University, Addis Ababa Institute of Technology, Msc Student in Construction Technology and Management

Phone No: +251-913-95-40-88

Email: melen.kassu@gmail.com

Appendix I Questionnaire Survey

Section I -General Information

Dear Respondent

I would like to thank you in advance for your time and cooperation**.** The purpose of this questionnaire is to collect data for the requirement of MSc in Construction Technology and Management. The researcher requests that you answer the question completely and truthfully. The information you provide will be kept confidential and will not be used for any other purpose other than the intended research. So, please respond as honestly and objectively as possible.

- **It is not necessary to write your name**
- **Please encircle your choice**

1. What is your highest level of education??

   1.High school diploma 2. TVET certificate 3. College diploma 4. University degree 5. Others.....

2. What is your position in the company?

   1. Project Manager 2. Contract Administration 3. Site Engineer 4. Project Coordinator 5. Office Engineer 6. Supervisor/Consultant 7. Subcontractor 8. If it is other, please specify_____

3. For How many years have you/your company been involved in low-cost housing building projects?

   1.< 2 year 2. 2-3 years 3. 3-4 years 4. 4-5 years 5. > 5 years

4. What type of organization is your company?

   1. General Contractor (GC) 2. Building Contractor (BC)

   3. Consulting Firm 4. Sub contract

Section II: Information on Factors Contributing to the delay in the construction of 40/6 0 housing projects.

The following are the factors that might cause a delay in a construction project. Therefore, based on your experience please indicate the extent to which you agree with the following statements.

Very High Influence (5), High Influence (4), Neutral (3); Low Influence (2), Very Low Influence (1);

Factor	***1***	***2***	***3***	***4***	***5***
LACK OF SUBCONTRACTOR'S MANPOWER SKILL					
Does the Subcontractor 'S manpower have the required Skill					
Has the manpower Skill been evaluated by the consultant during execution of work					
Does the contractor evaluate its Subcontractor's manpower Skill regularly					
Are measures taken for lack of Skill of the Subcontractor by the contractor					
Are measures taken for lack of Skill by the consultant					

Factor	***1***	***2***	***3***	***4***	***5***
POOR MONITORING AND CONTROL OF THE SUBCONTRACTOR					
Is there any performance evaluation of the Subcontractor					
Are measures taken for the poor performance of the Subcontractor by the consultant and client					

representatives					
Are there properly Set controlling mechanisms of the Subcontractor by the consultant and client representatives					
Factor	***1***	***2***	***3***	***4***	***5***
SHORTAGE OF SUBCONTRACTOR'S MANPOWER					
Does the Subcontractor always deploy the required number of manpower for the work					
Is the work daily evaluated as per the required output of the Subcontractor's manpower					
Are there any measures taken by the contractor if the required number of manpower is not deployed					
Are there any measures taken by the consultant if the required number of manpower is not deployed					
Factor	***1***	***2***	***3***	***4***	***5***
POOR COMMUNICATION					
Do the contractor and Subcontractor communicate regularly					
Are there any measures taken regarding communication					
Is there an appropriate information distribution and project status reporting system between the contractor and subcontractor					
Is the relationship among the contractor and subcontractor properly managed					

Factor	***1***	***2***	***3***	***4***	***5***
PAYMENT DELAY TO THE SUBCONTRACTOR					
Is the payment regularly paid to the Subcontractor as per the agreement					
Is there no problem of payment delay to the Subcontractor					
Factor	***1***	***2***	***3***	***4***	***5***
NEGLIGENCE THE SUBCONTRACTOR					
Does the Subcontractor work efficiently and effectively as per the requirement					
Has the Subcontractor ever been observed to be negligent on his work					
Does he deliver his work at the required time					
How do you rate the timely completion of the 40/60 project					

TIMELY COMPLETION	***1***	***2***	***3***	***4***	***5***
1= Very much delayed 2= Significantly delayed 3=Moderately delayed 4=Completed on time 5= Completed before schedule					

If there are others, please specify_____

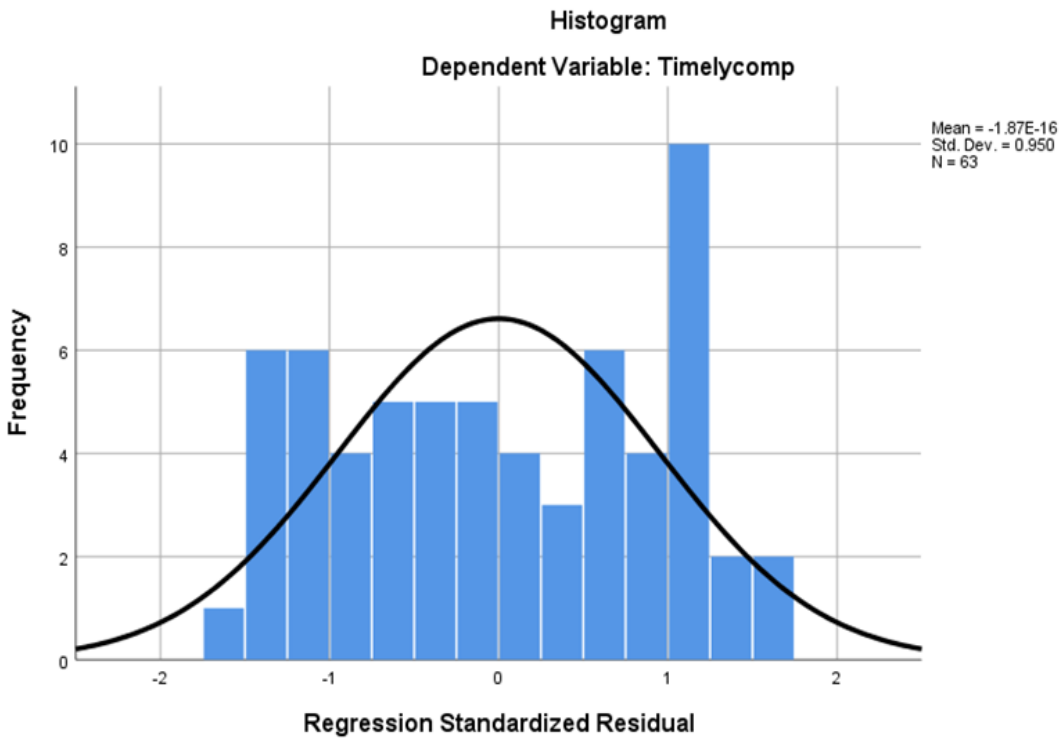

Figure 1 Frequency distribution of standardized residual

Test of linearity

It is desired that points will be located in a substantially straight diagonal line from bottom left to top right in the Normal Probability Plot. This would imply that there are no notable departures from normality. To assess for linearity, the study used a Normal P-P Plot of Regression Standardized Residual (See Figure I). A linearity pattern was seen because the points were symmetrically distributed along a diagonal line. As a result, linearity was achieved, as seen by the straight line relationship between the residuals and the projected dependent variable scores.

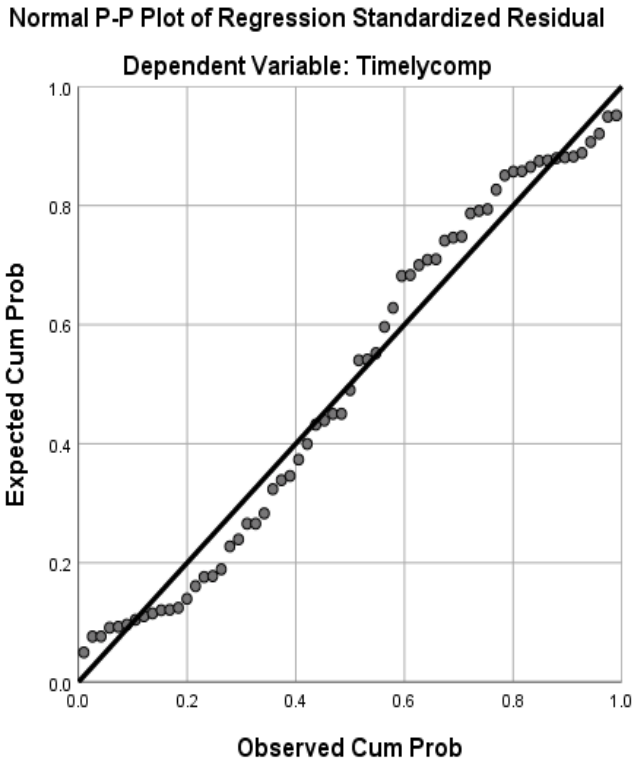

Figure 2 Normal point plot of standardized residual

Appendix II: Interview for the End users about the quality of the Houses

ለ40/60 የ ጋራ መኖሪያ ቤት ነ ዋሪዎች የ ተዘ ጋጀ ቃለ ማጠይቅ

በመጀመርያ ስለተባበራችሁኝ ላመሰግናችሁ እወዳለሁ፡ ፡

የ ዚ ቃለ ማጠይቅ ዋና አላማ በ 40/60 የ ጋራ መኖርያ ቤቶች ላይ የ ሚከተዋሉ የ አሰራር ግድፈቶች ዙርያ ጥና ት ለ ማካሄድ ሲሆን ይህንን ማከ ረት በ ሚድረግ ሊሻሻሉ የ ሚ ቡ ጉዳዮችን ለ መለየ ት እና በ ሚጨ ሻም የ መጭትሄ ሀሳቦችን ለ ማቅረብ ነ ው፡ ፡ ስለሆነ ምየ ዚ ጥና ት ወጤ እርስዎ በ ሚሰጡ ሚ ጃ ላይ ያተኮረ ይሆና ል፡ ፡

<u>የ ግል ሚ ጃ</u>

1.እድሜ

1)ከ 30 በ ታች 2)30-39 3)40-49 4)50-59 5) ከ60 በ ላይ

2› የ ትምህርት ደረ ጃ

1) ማን በብና ማ ፍ የ ሚች ል 2)ሰር ተፍኬት 3) እስከ 10ኛ ክፍል 4) እስከ 12ኛ ክፍል

5) ዲፕሎማ 6)ዲግሪ 7) ሁለ ተኛ ዲግሪ እና ከዚያ በ ላይ

3› የ ቤት ባለ ቤትነ ት ሁኔ ታ

1) የ ራስ ቤት 2) ተከራይ

4. በቤቱ ወስ ጥ እስከዛ ሬ ድረስ ምን ያህል ጊዜ ቆይተዋል?

1) ከ 1 አመት በ ታች 2) 1-3 አመት 3)3-6 አመት 4)6 አመት እና ከዚያ በ ላይ

ክፍልሀለት፡ በኮንዶሚየም ቤቶች ላይ የሚተዋሉ የህንፃ አሰራር ግድፈት ዝርዝር መረጃ

የሚከተሉት ዓረፍተ ነገሮች በኮንዶሚየም ቤቶች ላይ የሚታዩ የህንፃ አሰራር ግድፈቶችን ይመለከታሉ፡፡ እርሶም የተዘረዘሩት ዓረፍተ ነገሮችን ማነረት በሚድረግ እርሶ በሚኖሩበት የጋራ መኖሪያ ቤቶች ላይ የሚታዩ የህንፃ አሰራር ግድፈቶችን ከዚህ በታችከ 1 እስከ 5 ከተሰጠው አማራጮች ደረጃ በማስጠት የችግሩን ማጠን ይግለጹ፡፡

1= የለም 2= በጥቂቱ አለ 3=አለ 4= በጣም 5= እጅግ በጣምአለ

ተ.ቁ.	የግድፈቶች ዝርዝር	1	2	3	4	5
		የለም	በጥቂቱ አለ	አለ	በጣምአለ	እጅግ በጣምአለ
1	**የጣራ ስራ ግድፈቶች**					
2	የጎረንዳዮ እና አሸንዳ ወሃ ልክ መላባት እና ወሀ መቋጠር					
3	የጎረንዳዮ እና አሸንዳ በትክክል አለመጠምእና ብልሽት					
4	የጣርያ ወሃ ማፍሰስ እና መላላሽት					
5	**የግድግዳ ስራ ግድፈቶች**					
6	የግድግዳ መሰነ ጣጠቅና ወጣገባ የሆነ ግድግዳ					
7	የግድግዳዉየቀለምመቀየርና ሻጋታ ማሳየት					
8	የግድግዳ እርጥበት ማሳየት					
9	**የወለል ስራ ግድፈቶች**					
10	የወለል ንጣፍ ችግር/የወሃ ልክ መላላሽት					
1	የወለል መሰነ ጣጠቅ					

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12	የሴራሚክ መሳሳት እና መፈነ ቃቀል					
13	**የ ወሃ መሸሚ ግድፈቶች**					
14	የ ወሀ መሸሚ ቱቦዎች የ አገ ጣጠም እና የ ማንጠበጠበ ችግር					
15	የ ፍሳሽ መሸሚ ቱቦዎች የ ጥራት ፡ የ ማፍሰስ ችግር እና የ መጀፈን ችግር					
16	የ ፍሳሽ መሸሚ ዝርጋታ ችግር					
17	የ ኪችን እና የ ሻወር ቤት ገ ጠሞዎች ችግር					
18	**የ ኤሌክትሪክ መሸሚ ግድፈቶች**					
18	የ ኤሌክትሪክ መሸሚ ዝርጋታ ችግር					
19	የ ኤሌክትሪክ መሸሚ ብልሽት እና ጥራት ችግር					
20	በ አግባቡ ያልተሸፈኑ የ ኤሌክትሪክ መሸሚዎች					
21	**የ በር እና የ መስኮት ግድፈቶች**					
22	የ ተሰበሩ በር እና መስኮቶች					
23	የ በር እና መስኮቶች የ አገ ጣጠም ችግር					
24	የ ተሰበሩ እና የ ወለቁ የ በር እና የ መስኮት መቆለፊያ ዎች እና መዝጊያ ዎች					
25	በ በር እና መስኮቶች በ ኩል የ ሚ ባ ወሀ መኖር					

26	የተገጠመበር እና ማሽኮቶች ላይ የሚተዋል ክፍተት					

ከላይ ከተገለፁት ግድፈቶች ወጪተጨማሪ ግድፈቶች _____