St. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES

PROJECT QUALITY ASSESSMENT OF ADDIS ABABA CONDOMINIUM HOUSING CONSTRUCTION PROJECTS, THE CASE OF PROJECT 13, 14 AND BOLE AYAT.

BY

ABRAHAM HAILE

MAY, 2017

ADDIS ABABA, ETHIOPIA

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ID NO. SGS/0326.

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APPROVED BY BOARD OF EXAMINERS

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LIST OF ACRONYMS

AAHDP:	Addis Ababa Housing Development Program
BRE:	Building Research Establishment
CQM:	Construction Quality Management
GDP:	Gross Domestic Product
ICT:	Information Communication Technology
ISO:	International Organization for Standardization
LCH:	Low Cost Housing
PMBOK:	Project Management Body of Knowledge areas
QC:	Quality Control
QMS:	Quality Management System
SME's:	Small and Medium Size Enterprises
SWOT:	Strength Weakness Opportunity Trait
UN:	United Nation

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ABSTRACT

The construction industry in developing countries faces challenges of different kinds. Most of them are characterized by time delay, cost overrun and poor quality construction mainly because of poor performance of the contractor. Now a day Ethiopia has engaged in construction revolution through conducting different mega construction projects. The AAHDP is also one of the mega projects which government has engaged to solve city dwellers house problem. However, the project had faced multi-dimensional quality problems. Most of the houses transferred to house occupants could be witness for these quality defects of the house. Regarding to the issue many local Media had given coverage recently. Also most of the resident have grievance on the quality of the house. This research initiated to assess the overall quality performances of the houses in the case of project 13, 14 and Bole Ayat sites. To come up the study completed, the research had set four basic research questions and objectives. And also the research applied different types of data collection methods and methodology. Distributing 196 sample questionnaires to selected respondents from house occupant, in-depth interview with three project consultants and observation were the major data collection methods applied by this study. Then the study reveals that most of the quality defects of the projects are related to finishing work problems and however the structure and design work of the project does not have any quality defects. Water leakage, poor roofing and rain disposal, poor finishing work, poor design related to difficulty to move in the house for children, elders and disabled people are major quality defects of the project. The research had also found the major causes for these quality defects of the project. Poor workmanship, delay of project material supply, delay of the project, low project budget and poor contractor's performance are major causes of quality defects of the projects. In general most of these research participants are not satisfied with project quality.

Key Words: House Construction, Project Quality, Project Quality Performance

CHAPTER ONE

INTRODUCTION

1.1. BACKGROUND OF THE STUDY

Housing is one of the major challenges of the city of Addis Ababa due to rapid increase of population and high rate of urbanization. It is an acute problem especially for low-income households that account for over 80 percent of the city's population. It is stated that more than 70 percent of the population of Addis Ababa lives in slums with inhuman and unhygienic conditions (UN HABITAT, 2008).

Likewise, Quality is a fundamental term in the construction industry. The non-achievement of such a crucial aspect of construction can result in the failure of a construction project and in the dissatisfaction of clients and/or building occupants. Furthermore, the non-achievement of quality can result in delays in building projects and the need for rework, which can result in a significant financial loss. Quality focuses on eliminating defects and variations and seeks to avoid waste of time, materials, and financial resources due to rework (Love, Edward & Smith, 2005).

In the case of low-income houses, Carmona & Gallent (2003) contend that poor-quality housing, whether poorly planned in the wider sense, or badly designed, has been the hallmark of a commodity culture whereby housing is viewed as merely a 'demand good' to be thrown up wherever the price is right. According to Carmona *et al*. (2003), quality should be provided with the end-user in mind in order to create a healthy and safe living environment. However, the features of inadequate housing quality include:

- Overcrowding;
- Relatively small sizes of houses;
- Poor building standards in terms of inadequate sound attenuation or heat insulation, and
- Lack of basic urban design amenities, and inadequate supply of services (Carmona *et al*., 2003).

In brief, research studies indicate that the quality in the building of low-income or condominium houses is one of the reasons for dissatisfaction expressed by occupants.

The current market cannot provide low cost housing at the needed quantity with affordable price for large number of unmet housing need. Cognizant of these challenges, the Addis Ababa city government took the initiative to reverse the situation and committed itself to new and innovative approaches through the integrated housing development program in 2004 for the low- and middle income families.

The housing development program is also considered by the founder (Addis Ababa city administration) as the major development task to reduce urban poverty and improve the lives of slum dwellers and to bring sustainable socio-economic transformation.

The City government inspiration started Federal government signatory to "Cities without slum" by 2020 (Millennium Development Goal) and Reduction of poverty by 50% up to 2015.

In regards to achieve this development program the city administration engaged in the integrated housing development project that have been implemented for the last ten years in 18 project sites and will proceeds to many project sites. Then the city municipality has launched, therefore, this huge Condominium Housing program to respond to the population demands. The construction uses Low Cost Housing (LCH) construction methodologies. The goal was to provide houses with all the shelter related infrastructures (water, electricity and culvert). However, due to a bad project management not always has been possible to provide them all and many houses are being given to the households with many poor project quality deliveries (Uli Wessling Tolon 2008). Though, the study gave much emphasis on the quality of the projects specifically focusing on project 13, 14 or Yeka Abado and Bole Ayat condominium project site.

According to a guide to project management 4th edition, every project should have to implement with its specified project quality requirements to fulfill organizational objectives and satisfying all stakeholders including beneficiaries. The project must include activities and processes of the performing organization that determines quality policies, objectives and responsibilities to satisfy the needs for it which undertaken. Though the project should have practice all the required quality management and continuous improvement process through the project.

1.2. STATEMENT OF THE PROBLEM

According to many project management authors, project quality is a very crucial point in every project activities. This helps the project to deliver acceptable and recognized project outputs in the eyes of consumers.

project management institute book 4th edition stated that, modern quality management should have to complements with project quality management in different angles, for example the project must recognize the importance of project quality through the following critical points.

- Customer satisfaction: - This point describes that the project should have to understand, evaluate, define and managing the requirements and expectation of the project consumers.
- Prevention over inspection: - according to modern project quality management it should give more emphasis for prevention so as to reduce quality problems and cost. "The cost of preventing mistakes is generally less than the cost of correcting the problems found by inspection."
- Continuous improvement: - the project must implement project quality management process in every stage of the project in repetitive cycle to maintain a continuous quality improvement. The process includes planning, acting, checking, correcting in a continuous basis in every project activities.
- Management responsibility: - this is not to mean that securing project quality is not responsibility of only the management but it is responsibility of all members of the project team while the management teams have the biggest share.

However, the housing project of Addis Ababa indicates that housing shortage, poor quality in housing and poor living and working environments have remained critical problems for the majority of the population for decades. Many studies reveal that the majority of existing housing units in Addis Ababa are below quality standard and also many project deliveries have different quality problems which are raised by the final consumers (Abiyot , 2008).

Many journals and Ethiopian media reveal that quality issue is the major constraints in Addis Ababa city housing construction projects. Based on the result from informal survey assessment

and observation on the sites, the majority of beneficiaries of the housing project raised many quality complains and most of them are engaged in demolishing the interior design of the houses to redesign based on their interest and also to provide their own solution for the quality problems they had face. This situation leads the researcher to assess quality performance of the housing development project. There are many rumors regarding to Condominium houses quality performances related to quality assurance and quality control are not fully exercised in low-cost housing construction projects (Abiyot 2008). The low cost housing projects are implemented without the participation of the owners in the whole construction processes. Consequently low cost housing projects in project 13, 14 and Bole Ayat sites have quality problems. The research will conduct to assess the quality performance of the housing project in the case of project 13, 14 and Bole Ayat condominium sites.

1.3. RESEARCH QUESTIONS

In order to assess the problem stated in statement of the problem the researcher had set the following basic research questions.

- How do the projects implement project quality management?
- What are the major quality problems of the projects?
- What are the major determinants or variables that cause quality problems in the projects?
- What is consumers level of satisfaction regarding the project quality

1.4. OBJECTIVE OF THE STUDY

1.4.1. General Objective

The overall objective of this study is to assess quality performance of Addis Ababa City Housing construction project focusing on Project No. 13, 14 and Bole Ayat condominium sites

1.4.2. Specific Objectives

More specifically the objectives of this research are: -

- To assess project quality management practices and quality performance of the project.
- To assess and identify major quality defects or problems of the project.
- To assess major determinants and variables that causes quality problems of the project.

- To assess consumers level of satisfaction regarding the project quality.

1.5. SIGNIFICANCE OF THE STUDY

Now a day the project quality of Addis Ababa city housing development program is become under question. There are many quality problems are identified and raised by the consumers. Though this study could have much significance in order to provide relevant information for respected government officials and policy makers what major project quality problems and other related constraints have been occurred in the housing development projects. In addition the research will provide recommended solutions for the quality problems of the project. Moreover the research will fill the gaps in the area through providing relevant insights and important information.

1.6. SCOPE OF THE STUDY

The research was focus on only to assess the project quality performance of Addis Ababa city housing construction project on project site 13, 14 and Bole Ayat site 4. In this regards the study addressed quality defects of the project, the cause of quality problems, the solutions under taken, the overall project quality management practices of the project and consumer satisfaction.

Also the study will gather data from the respected project office and dwellers or beneficiaries of the project to generate relevant data to fulfill the study.

1.7. LIMITATION OF THE STUDY

The study had faced some limitation. The main limitation was difficult to get respondents who are owner of the house. The study also faced limitation regarding to get variety information, because its scope is focusing on three project sites from 18 sites. There was also a limitation related to respondents not to respond properly and on time. As indicated in most of research works respondent willingness was also a challenge. Getting enough secondary information related to the topic especially references published with in the last ten years was also a challenge to see and identify the gaps. Time and budget was also additional limitation.

1.8. ORGANIZATION OF THE STUDY

The research will be organized in five chapters. Chapter one is consists of background of the study, statement of the problem, the research questions, objectives of the study, significance of the study, scope of the study, limitation of the study and organization of the study. In chapter two detailed literature review including concepts and theories related to objective of the study area has presented. The third chapter is deals about research design and methodology. Chapter four had deals with data presentation and discussion. Also statistical data analysis based on the findings is presented in comparison with the theoretical concepts and issues raised in chapter two. Chapter five is contain conclusions or summary of the findings and recommendations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1. INTRODUCTION

This chapter focuses on the general overview of quality and project quality management, construction industry and its development, project quality and management in construction industry, the relationship between quality assurance and construction of low cost housing, workmanship, procurement time and cost of the project and their impact on quality performance of the housing construction project; In addition the researcher had set a comprehensive understanding of some of the theoretical concepts to draw the conceptual framework which contributes to project quality management and cause of quality problems in housing construction.

Before proceed to reviewing the quality issue of the project, the first some parts discusses about the general overview on concepts of quality and project quality management, practice and problems of the construction industry and its relation with project quality management practices. The other part of the literature describes about housing especially condominium or low cost housing construction projects and their project quality performance.

Houses are one of the basic human needs. Thus constructed houses need to be well serving the owners. For better management of housing construction, there is need for proper planning and implementation of the construction projects and above all the involvement of the house owners in all the house design, construction, control and monitoring activities should be given due attention.

2.2. QUALITY

The word quality has many meanings: a degree of excellence; conformance with requirements; fitness for use; delighting customers; freedom from defects, imperfections or contaminations (Hoyle, 2006). Although PMBOK 5th edition define quality in project term as "Quality is a performance or a result which is maintaining and fulfill all the requirement sets in the objectives of the product or deliverables of the project". Chan and Chan (2004) confer that in the construction industry, quality is defined as a totality of features required by a product or service to satisfy a given need- "fitness for purpose". However the way in which quality is determined is by the extent to which a product or service successfully serves the purpose of the user during

usage (not just at the point of sale). Price and delivery are both transient features, whereas the impact of quality is sustained long after the attraction or the pain of price and delivery has subsided (Hoyle, 2006). Nowadays, quality is the guarantee of the product that convinces the customer or the end-user to purchase or use.

The concept of managing construction projects is deeply embedded in the traditional building procurement system. Ireland (1983) argues that time; cost and quality are the principal feasible objectives of the client in any construction project. Although it is claimed that time, cost and quality are incorporated in the management of construction projects; research has shown that in fact a time-cost bias exists. Specifically quality is the most significance thing in construction projects that have been perceived as impactful in order to meet client satisfaction.

To the client, quality may be defined as one of the components that contributes to "value for money" (Flanagan and Tate, 1997). Vincent and Joel (1995) define total quality management as: "…the integration of all functions and processes within an organization in order to achieve continuous improvement of the quality of goods and services. The goal is customer satisfaction."

Furthermore, in order to achieve successful project quality management three separate drivers to quality management must be managed, namely:

- Integration of the project team so as to have a single objective and a common culture
- A customer focus for the team thereby facilitating the provision of products and services that will meet the client's needs
- A process of continuous improvement in the management of the construction project. When these three components are successfully integrated, the project will begin to realize significant, measurable and observable improvements in the attainment of the clients' objectives.

2.3. PROJECT QUALITY MANAGEMENT

Project quality management is the process and activities of performing organization that determine quality policies, objectives and responsibilities so that the project will satisfy its customer demand and the project objective by itself. (PMBOK fourth edition).

Project quality management is a process that contains the following

1. Plan quality management
2. Perform quality assurance
3. Perform quality control

These project quality management practices are interacted with each other and as well as interacted with other project management body of knowledge areas especially with project time management, project cost management, project risk management and project integration management. Each process at least occurs once in every project and the project phases.

Project quality management addresses the management of the project and project deliverables. It is applied in all types of project that differentiated based on their products or deliverables.

In any case failure to meet quality requirement always has serious negative consequence for all of the project stakeholders. This means when we take the case to Research organizations, if the research firm face or fail to meet the required project quality the company may lose clients trust, this also caused company's reputation in question. For example the following points could be major sources for quality problems.

- Meeting customer requirements by overworking the project team may result an increase in employee attritions, errors and rework the project that may leads to extra project cost.
- Meeting project schedule objectives by rushing planned quality management may result in undetected errors.

Project quality management implemented in different conditions and process. Among the methods of project quality management, total quality management, six sigma, failure mode and effect analysis, design review, voice of the customer, cost of quality and continuous improvement are the main implemented in different projects.

Project quality management as a discipline recognizes the importance of responding customer satisfaction, prevention over inspection, continuous improvement and management responsibilities are the most crucial in managing project quality.

As stated on the above project quality management has three main processes, plan quality management, perform quality assurance and perform quality control (PMBOK fourth edition). Then we will see the process in short as follows.

1. Plan quality management

It is the process of identifying quality requirements and standards for the proposed projects. And it is also documenting how the project will demonstrate compliances. In short it is proposing, identifying, measuring and documenting quality requirement or standards for the project. In research, every project has its own objectives that needs specified and documented quality standards based on its requirement. Also it should be performed parallel with other project

planning process. The planning process has consists of different processes as an input, tools and techniques and output

2. Perform quality assurance

It is the process of auditing quality requirements and the result from quality control measurements to ensure appropriate quality standards during the project is conducted. It is although an execution process that uses data created during performs quality control.

Perform quality assurance also can provide a continuous improvement in the quality performance of the project, it also being a means of an iterative improving of all quality processes. This could help the project to save cost and time as well as allocating the effectively and efficiently.

This process also has its own processes of input, tools and techniques and output.

3. Perform quality control

It is the process of monitoring, controlling and recording the result of executing the quality activities to assess performance of the project and provide recommendations for necessary changes. This process is performed throughout the project. This process often performed in an organization is by quality control department or quality control team. Their major responsibilities are identifying quality problems in the project and recommend and take actions to eliminate the quality problems occurred in the project. Most of the time the quality control team need to have statistical quality control knowledge especially sampling and probability knowledge.

This process also has its own processes of input, tools and techniques and output. Most of the processes in the tools and techniques are cause and effect approach (project management institute 2013).

2.3.1. QUALITY MANAGEMENT SYSTEM

If properly implemented, formal quality management systems provide a vehicle for achieving quality (i.e. conformance to established requirements). Quality system is the organizational structure, responsibilities, procedures, processes, and resources for implementing quality management (Battikha, 2002). In other words, Quality management systems refers to the set of quality activities involved in producing a product, process, or service, and encompasses prevention and appraisal (Burati, 1992). It is a management discipline concerned with preventing problems from occurring by creating the attitudes and controls that make prevention possible (Battikha, 2002). Quality activities include the determination of the quality policy, objectives,

and responsibilities and implementing them through quality planning, quality control, quality assurance, and quality improvement, within the quality system (ASQC, 1997 in Battikha, 2002).
Other views expressed by (www.abahe.co.uk/business) is that, a quality management system is a management technique used to communicate to employees what is required to produce the desired quality of products and services and to influence employee actions to complete tasks according to the quality specifications. In like manner, (bussinessballs.com/dtiresources) also explained quality management system as a set of co-ordinated activities to direct and control an organization in order to continually improve the effectiveness and efficiency of its performance. These activities interact and are affected by being in the system, so the isolation and study of each one in detail will not necessarily lead to an understanding of the system as a whole.
The main thrust of a QMS is in defining the processes, which will result in the production of quality products and services, rather than in detecting defective products or services after they have been produced. The paper continued to say that a fully documented QMS will ensure that two important requirements are met:

- The customers' requirements – confidence in the ability of the organization to deliver the desired product and service consistently meeting their needs and expectations.

- The organization's requirements – both internally and externally, and at an optimum cost with efficient use of the available resources – materials, human, technology and information (bussinessballs.com/dtiresources).

2.3.2. PURPOSE OF QUALITY MANAGEMENT IN BUILDING CONSTRUCTION

"The U.S. Army Corps of Engineers, (2004) states that Construction Quality Management "CQM" is the performance of tasks, which ensures that building construction, should performed according to plans and specifications, on time, within a defined budget, and a safe work environment.
For a construction project, quality begins with requirements carefully developed, reviewed for adherence to existing guidance and ultimately reflected in criteria and design documents which accurately address these needs. Therefore, the designer establishes the quality standards and the contractor in building to the quality standards in the plans and specifications, controls the quality of the work. The purpose of CQM is the Government's efforts, separate from, but in coordination and cooperation with the contractor, assure that the quality set by the plans and specifications is achieved. CQM is the combined effort of the contractor and the Government. The contractor has

primary responsibility for producing construction through compliance with plans, specifications, and accepted standards of the industry" (Hiwot 2012).

2.3.3. PRINCIPLES OF QUALITY MANAGEMENT

Quality Management is based on three fundamental principles (Sabah 2011): these are:-

1. Focus on customer and stakeholders;
2. Participation and teamwork by everyone in the organization;
3. A process focus supported by continuous improvement and learning.

2.4. CONSTRUCTION INDUSTRY AND ITS DEVELOPMENT

Wells (1984) stated that construction is one of economic activity and sector in almost all countries and nations. It is also an activity that plays a very vital role in the process of economic growth. The construction sector is characterized by many small enterprises and high labor intensity; it is also highly dependent on public regulations and public investments. Many authors agree on the impact of the construction industry on the economic development of a country. Moavenzadeh (1987) adds that construction has positive effects on the economy of a country by increasing GDP and employment. Currently Ethiopia is also intensively engaged in the construction industry. Both Government and private sector has played a vital role in the development of the sector through conducting many development and business building projects. Condominium housing construction and private real estate housing construction projects are some example in the sector. However, while conducting and providing the project outputs there are many problems encountered in the sector. Because of this many international organizations have been conducted researches on the sector especially in developing countries. Research on construction industry development and the effort to implement its findings have broad aim of solving the problems facing the construction industries of developing countries. Many international organizations such as Swedish International Aid Agency, Norwegian Overseas Aid Agency, UN Industrial Development organization, UN- Habitat, World Bank have shown interest and conducted studies on construction industry development (Ofori 1994). The studies mainly focus on identifying problems the construction industry is facing and propose improvements for the problem identified. In addition, the studies comprise technological changes the construction industry adapts in developing countries.

The construction industry in all developing countries should improve. Many writers state that governments are responsible for the construction industry development however; Ofori (1994)

argues that not only government but also construction enterprises and practitioners can contribute to efforts to improve the industry. He suggested two improvement areas one is the need of continual reviewing of building regulations and standards drafted in the form of technical aids rather than restrictive rules and in a language appropriate to the educational background of the majority of the users. The other is the need of construction enterprises to improve their productivity, efficiency, quality of work and innovation as corporate objectives, and set up appropriate organizational structures to achieve them. Ofori (1994) also states that improvement areas the governments can play are formulating national strategies, policies, administering, and improvement of national capacity in conventional technologies in most cases, prefabrication and industrialized buildings. Development activities include material development, human resource development, contract document development, contractor development, technology development and institution building (upgrading and expansion of micro-units and cooperatives) (Ofori 1994). In general, the practice of construction industry development mainly related to enabling approach of the process; governments shall improve their enabling approach to the industry and enterprises shall improve their productivity for the overall improvement of the construction industry.

2.4.1. CONTRACTORS PERFORMANCE AND BUILDING CONSTRUCTION DEVELOPMENT

Contractor performance has a direct impact on project performance for instance poor contractors‟ performance can lead to poor project performance. From the SWOT analysis made in European construction sector low productivity, little interest in education and training among small construction companies, and SMEs lack of marketing skills (ICT and management skills) are among the identified weaknesses in the construction sector (Jankovichova 2010). The other factor that negatively affects contractor performance is that contractors are not customer oriented and focused, service and quality seems to be ignored. Contractors can be rated in terms of various aspects such as management, claims orientated, site offices, safety, relations with site neighbors, plant and equipment condition, administration, worker skill, and quality (Latham, 1994). Latham further added factors that negatively affect contractors‟ performance in terms of quality for instance workers' skills, out of sequence work, late information, emphasis on production, project duration, poor specification, design change, employer change, bad weather, and late information and procurement system.

Due to the above constraints, it is difficult for the contractor to deliver quality production, which then affects the construction sector as a whole. These attract international organizations to develop improvement program, as the construction sector is important to economic development since it comprises a wide variety of activities, products and actors. Krooden, Milne & Atkins (1995) underline the importance of contractor development program to overcome poor workmanship and maximize development impact on projects in poor communities. Thus, development programs have to consider management options that encourage development, institutional roles that ensure coordination and project success and project options that match the project with development objectives (Krooden, Milne & Atkins 1995).

2.5. PROJECT QUALITY MANAGEMENT IN CONSTRUCTION PROJECTS

The concept of quality management is to ensure efforts to achieve the required level of quality for the product which are well planned and organized. From the perspective of a construction company, quality management in construction projects should mean maintaining the quality of construction works at the required standard so as to obtain customers' satisfaction that would bring long term competitiveness and business survival for the companies (Tan & Abdul-Rahman, 2005). Quality management is critically required for a construction company to sustain in current construction market which is highly challenging and competitive. Harris and McCaffer (2001) explained that quality management has to provide the environment within which related tools, techniques and procedures can be deployed effectively leading to operational success for a company. The role of quality management for a construction company is not an isolated activity, but intertwined with all the operational and managerial processes of the company.

As for the implementation of quality management in project management, the concepts of quality planning (identification of quality standards), quality assurance (evaluation of overall project performance) and quality control (monitoring of specific project results) in the quality management processes were defined by Project Management Institute (2000). Several tools and techniques were identified as part of the implementation process, there are, benefit/cost analysis, benchmarking, flow-charting, design of experiments, cost of quality, quality audits, inspection, control charts, pareto diagrams, statistical sampling, flow-charting and trend analysis. Mathews, Ueno, Kekale, Repka, Pereira and Silva (2001) divided quality tools and techniques that are in support of quality programs into three main types, i.e., hard quality tools, mixing methods and soft methods. Hard quality tools are formal quality systems, documented quality systems, quality

costs, control charts, and statistical sampling standards. Mixing methods are strategy and action plans review, flexibility of organization

Structure, control charts, quality circles, and quality planning tools. Soft methods are training, customer satisfaction surveys, regular contact with vendors and external organizations, actions to optimize environment impact, empowerment, self-assessment, and benchmarking.

2.6. QUALITY ASSURANCE AND CONSTRUCTION OF LOW COST HOUSING

The importance of Quality Assurance is based on the principles of getting things right first time. By implementing, maintaining, reviewing and continually improving a Quality Assurance System, a construction company can achieve and reap the benefits of having such a system in place. Quality Assurance exists because of the degree of dissatisfaction experienced by the industry's clients over a long period, combined with a growing impatience by some of their advisers to achieve value for money. An increasing number of building companies are also frustrated by the inadequacy of a system which however valiantly they try, leaves their efforts lacking in some regards. A revolution has occurred in the assembly of buildings from what was a craft process to one where the critical work of connecting interdependent units is done in the main by semi-skilled labor from a multiplicity of separate employers. This makes great demands upon supervision and management systems. (StudyMode.com, 2008).

A Quality System is designed to provide an assurance to Clients, which can be supported through documented records, that all contracts will be completed in accordance with the agreed time, cost and specification. It should also further ensure that the company personnel, sub-contractors and key suppliers are aware of customer requirements and that they are fully met. Conformance with requirements of the detailed procedures developed in accordance with the Quality Manual has to be mandatory for all staff employed in the company. It is essential to the system that encouragement is given to each employee to develop and maintain an attitude of continuing quality improvement and customer satisfaction. Quality Assurance is concerned with developing and planning the necessary technical and managerial competence to achieve desired results. It is also about attitudes, both of management and of all those for whom they are responsible. (Study Mode.com, 2008).

Quality Assurance plays a great role in the low-cost housing sector. Quality Assurance, in short refers to a program for systematic monitoring and evaluation of the various aspects such as design processes and workmanship characteristics of a project, to ensure that standards of quality

are being met (Quality Assurance- Wikipedia, 2016). Quality Assurance systems cannot guarantee with absolute certainty the production of quality products, but makes this more likely.

According to Harrison (2005) the quality assurance systems currently implemented in the low-cost housing sector are:

2.6.1. Document Control:

This is applied to ensure employees have the correct procedures and that the procedures are properly maintained.

Although in this category of Quality assurance audits is applied to verify that quality procedures are being followed.

Non-conformance Tracking: To monitor and track quality issues and those defects are kept from customers.

CAPA (corrective action and preventative action): To correct flawed processes (i.e. quality procedures) when detected via audits and nonconformance tracking and to prevent defects from reoccurring.

2.6.2. Management Review

This is the practice where managements are participating to review quality systems data performance (quality metrics) to determine if the quality system is working and if it is not, taking the appropriate action to improve the system.

2.6.3. Poor Design Processes in Housing Construction

There are several aspects that can contribute to poor design processes and which can lead to design failure. They are: selection of inappropriate materials, innovative designs, approving a defective product, client selected products and quality of design staff (Sawczuk, 1996).

Selection of Inappropriate Materials, Greig (1971) states that the early settlers at the Addis Ababa used natural building materials, which they found near at hand, like stone and mud to make bricks and mortar, shells from nearby materials to make lime, reeds for thatch and timber from the forests which were then limited in extent.

Today everything is made of some material, but it is not only the properties of materials that dictate poor performance or the failure of structures. It is through the rational use of mechanics, linked with intelligent material choice-part of a process called design-which will assure success (Rossmanith, 1996).

Problems can arise when the designer selects an inferior product or a good product, but which is not suited to its specific application. This problem also arises because of the workload or inexperience of the designer, which leads to improper evaluation taking place of the product being specified. In addition, smaller design consultancies cannot afford to keep a full technical and product library and those that can often have staff who still keep by their desk their own personal library which soon becomes outdated (Sawczuk, 1996).

The identified stage in the design process where many design details giving difficulties originated was generally on the drawing board of young, inexperienced engineers, and the most common cause of this inadequate detailing was a lack of supervision. Therefore poor performance and inadequate quality in housing can result from a building 'fault' in design which manifests during the life of a building, given certain precursors, as a 'defect' (Griffith, 1990).

2.6.4. Approving a Defective Product

It is generally accepted that, while the assessment of quality of construction is a subjective matter, quality can be measured against design drawings and specification (Kwakye, 1997). Within specifications produced by the designer a product may be specified with the option for the contractor to offer an alternative product of equal standard and quality for approval. Complications come about when comparing the two products in every respect. Therefore the product that the designer specifies originally, is a product which the designer has confidence in. When the designer is offered an alternative product he or she must take great care in evaluating it. If this is not done, quality is compromised (Sawczuk, 1996). Furthermore when compromising quality, threats to structural failure are almost a certainty, which in turn is thought of as an unplanned or unintentional negative effect of one or a combination of faults, which leads to a shortfall in structural performance (Douglas and Ransom, 2007).

2.6.5. Client Selected Products

Kwakye (1997) postulates that some clients are well-informed when it comes to construction and hence know what they want and take decisive steps to achieve it. Some know nothing about construction and need help and guidance to formulate their wishes and match them to the available budget. Now and then the client will select a particular product and ask the consultant (designer) to incorporate it into the project. The potential problem here is that the consultant is not aware of the product and that there is insufficient information available from the manufacturer to give the designer confidence in selecting the product. Alternatively the product

could be of inferior standard and not appropriate to the application. Another scenario is if the project is over the budget which is available and the consultant is instructed to make cost savings by changing the specifications to a lower cheaper standard (Sawczuk, 1996).

2.6.6. Quality of Staff

This task should be carried out in a professional manner, with the same amount of care as in the selection of the contractor. Although some situations will demand prompt negotiation with a proven team, if circumstances allow, proposals should be sought from three to six consultants. The information submitted by the consultants should include the design and supervision methodology as well as a fee proposal (Ashworth and Hogg, 2002).

Sawczuk (1996) further states that the consultant should make sure that the people writing specifications and making product selections are of the appropriate caliber. The design team must be kept up to date with current standards, regulations and detailing applications. There must be in place some form of quality management with regime of checking all work leaving the office. Therefore if selection of inappropriate materials, innovative design, approving a defective product, client-selected products and quality of staff are not constantly examined, quality assurance will be compromised.

2.7. QUALITY CONTROL AND THE CONSTRUCTION SECTOR

Investopedia explains 'Quality Control' as a process through which a business seeks to ensure that product quality is maintained or improved and manufacturing errors are reduced or eliminated. Quality control requires the business to create an environment in which both management and employees strive for perfection. This is done by training personnel, creating benchmarks for product quality, and testing products to check for statistically significant variations. A major aspect of quality control is the establishment of well-defined controls. These controls help standardize both production and reactions to quality issues. Limiting room for error by specifying which production activities are to be completed by which personnel, reduces the chance that employees will be involved in tasks for which they do not have adequate training.

Quality Management system, (2013) stated that, quality control is the process of evaluating whether construction projects adhere to specific standards. The main objective of quality control 31 is safety. Additionally, quality control is also meant to ensure that buildings are reliable and sustainable.

The ISO definition also states that quality controls the operational techniques and activities that are used to fulfill requirements for quality. This definition could imply that any activity whether serving the improvement, control, management or assurance of quality could be a quality control activity. What the definition fails to tell us is that controls regulate performance. They prevent change and when applied to quality, it regulates quality performance and prevents undesirable changes in the quality standards. It continued that quality control is a process for maintaining standards and not for creating them. Standards are maintained through a process of selection, measurement and correction of work, so that only those products or services which emerge from the process meet the standards. In simple terms quality control prevents undesirable changes being present in the quality of the product or service being supplied.

Quality control can be applied to particular products, to processes which produce the products or to the output of the whole organization by measuring the overall quality performance of the organization

It is often deemed that quality assurance serves prevention and quality control detection but a control installed to detect failure before it occurs serves prevention such as reducing the tolerance band to well within the specification limits. So quality control can prevent failure. Assurance is the result of an examination whereas control produces the result. Quality Assurance does not change the product, Quality Control does. Harris and McCaffer, (2001) defined quality control as a set of activities or techniques whose purpose is to ensure that all quality requirements are being met. In order to achieve this purpose, processes are monitored and performance problem are solved. Satterfield, (2005) in other words said quality control is critically important to a successful construction project and should be adhered to throughout a project from conception and design to construction and installation. Inspection during construction will prevent costly repairs after the project is completed. The inspector, engineer, contractor, funding agency, permit agency, and system personnel must work together to inspect, document, and correct deficiencies,

2.7.1. Importance of Quality Control in Construction

Quality Control (QC) in construction is the process of verifying that the project is built to plan, that the tolerances allowable by industry standard and engineering practices have been met or bettered, and that the finished project (and all phases to get there) meet with the quality standards of the architect, engineer, owner, and general contractor. On construction projects there are

dozens of subcontractors, all of which have specific responsibilities. Superintendents and project managers try to maintain high quality standards but they can't be everywhere at once. Required inspections by cities and counties (as well as other jurisdictions, depending on the project) help to ensure safety and code issues. In addition, a good general contractor or developer will have on staff a QC person, someone who is responsible for going through the building or project, ensuring compliance, and maintaining an ongoing list of corrective items that must be accomplished before the contractor who installed it is paid or leaves the job. QC technicians generally keep a very detailed binder, separated by areas/rooms/phases of the project with notes of items that must be either verified or corrected, with sign-off as each is accomplished. This binder becomes part of the project record and is an important element to completing the project on time and with expected quality maintained (Satterfield, 2005).

2.8. POOR CONSTRUCTION PERFORMANCE, CAUSES AND EFFECTS

Construction projects often suffer from poor performance in terms of time delays, cost overruns and quality defects because completion on time, within budget and with the required quality has been widely recognized as the three primary goals of project success. Meng (2011) identified time, cost and quality as major indicators to measure poor project performance. Rwelamila & Savile (1994) further divided the methods of measurement into two: traditional project performance, which measures cost, quality and time; and non-traditional performance that measures health and safety, environment, management, worker skills, industrial relations and facilities.

There are a number of factors which affect quality performance of a project. Ofori (1994) identifies the reasons contributing to poor project performance as delay in obtaining statutory approval and clearance, inadequate expertise in project appraisal, planning and budgeting, and assessment of technology. Other contributing factors include lack of attention to the economy, design and material selection, delay in budgetary approval and disbursement of funds, failure to monitor progress on projects, absence of modern management techniques, inappropriate IT systems, weakness in equipment procurement, and ambiguities in relationships among agencies involved in the projects.

So far, different causes are identified as causes of poor performance in construction. Rwelamila & Savile (1994) identified a lack of management expertise and worker participation, and Tam & Harris (1996) added equipment and quality management of the team as a major cause. Atkinson

(1999), Love & Li (2000) and Odeh & Battaineh (2002) further identify major causes of quality defects as human error, poor workmanship and contractual relationship respectively. Underlining on the effect of relationship management on project performance in construction, Meng (2011) identified deterioration of the relationship between project parties or stakeholders as a major cause of poor performance.

Since construction is undertaken as teamwork, it has incorporated actors with different role and responsibilities thus, collaborative working atmosphere is required. Partnering is widely recognized as a collaborative supply chain relationship where, supply chain relationship refers to the linkage in the network of an organization (Christopher 1992). Supply chain in construction project involves a larger number of key participants who contributes quality performance issues in the project. Among the participants or project stakeholders, project client, consultants, main contractor, specialist contractors, and various suppliers are major stakeholders (Meng 2011). Based on this statement the researcher has provided the following insights accordingly each factors contribution in the quality performance on the projects.

2.8.1. Poor Workmanship in the Construction Process and its Impact on Project Quality

Although the factors contributing to poor workmanship in the design process have been previously mentioned, parameters such as time, cost and quality also impact its sector. However, when focusing on problems concerning poor workmanship in the construction process these three parameters are pivotal (Chan and Chan, 2004).

2.8.2. Time

Buildings are long-lived capital assets. The period between decision and action, inception and occupation, use and obsolescence is rarely measured in months, usually in years or decades and occasionally, in centuries. More than in almost any other aspect of human activity, time is central to design, production and use of the built environment (Raftery, 1991).

Chan and Chan (2004) postulate that, time in the construction industry refers to the duration for completing the project. It is scheduled to allow the building to be in use by a date determined by the client's future plans. In addition, time is related to effectiveness, which in construction refers to how well the project was implemented or the degree to which targets of time and cost were met from the start-up phase to full production. Ashworth and Hogg (2002) mention that project duration or completion dates may be critical to the success of a project, and in some situations if these dates are not met due to poor workmanship, it could lead to total failure in meeting the

clients' objectives. Ashworth and Hogg (2002) further state that while most clients' desire early building completion, it is important to distinguish between this and true need since attempting to meet the objectives of early completion is likely to have consequences such as poor workmanship which is not a project requirement. In conjunction with this, unrealistic deadlines and bonus work encourages workers to rush their jobs, which often leads to unnecessary mistakes or skimping on standards (Douglas and Ransom, 2007). In general, clients could have the highest standards specified for their projects but through time constraints which contribute to poor workmanship; this will bring about a low quality product (Sawczuk, 1996).

2.8.3. Cost

The cost of a commodity, whether it is a simple one like a length of timber or a complex item like a building, is the sum of all payments made to the factors of production engaged in the production of that commodity (Raftery, 1991). Oakland and Marosszeky (2006) mention that when manufacturing a quality product, providing a quality service, or doing a quality job- one with a high degree of customer satisfaction- is not enough. The cost of achieving these goals however must be carefully managed, so that the long-term effect on the business, be it construction, is a desirable one. These costs are a true measure of the quality effort.

When reducing cost in any construction project, quality of workmanship ultimately compromised (Sawczuk, 1996). Ashworth and Hogg (2002) however postulate that if a limited capital budget is the prime consideration of the client, then the quality in the form of reduced specifications as well as workmanship is likely to be restricted. If the clients cost increases, a higher standard of workmanship will be specified (Ashworth and Hogg, 2002).

Regular cost reports should be produced throughout the construction stage of the project. From these, potential overspending can be identified before it occurs and corrective action taken. The client should however, recognize that such corrective action is not always beneficial since it is likely that cost savings can be made only by reduction in standard which includes a lower standard in workmanship produced.

2.8.4. Quality

As we had discussed in the previous section of the literature review the word quality has many meanings: a degree of excellence; conformance with requirements; fitness for use; delighting customers; freedom from defects, imperfections or contaminations (Hoyle, 2006). Chan and Chan (2004) confer that in the construction industry, quality is defined as a totality of features

required by a product or service to satisfy a given need- "fitness for purpose". However the way in which quality is determined is by the extent to which a product or service successfully serves the purpose of the user during usage (not just at the point of sale). Price and delivery are both transient features, whereas the impact of quality is sustained long after the attraction or the pain of price and delivery has subsided (Hoyle, 2006). Nowadays, quality is the guarantee of the product that convinces the customer or the end-user to purchase or use. The meeting of specifications by good workmanship is one way of measuring quality.

Specifications act as workmanship guidelines provided to the contractor by the client or the client's representative at the commencement of the project. If quality assurance mechanisms, such as benchmarking is not in place during construction, poor workmanship will be the end result affecting the quality directly (Ashworth and Hogg, 2002). Therefore poor workmanship affecting the quality of the end product is a direct link to time constraints and cost reductions made by certain clients. Additional problems contributing to poor workmanship in construction are problems such as lack of motivation, control and coordination between the main contractor, consultants and the client. Furthermore, when focusing on poor workmanship in the design and construction processes it brings to mind the selection of the correct procurement system to ensure smooth construction production (Pheng and Hwa, 1994).

2.8.5. Procurement

According to Harrison (2005) the need for construction quality assurance is easy to demonstrate, due to lawsuits, project delays, finger pointing, lost time and other costs of quality issues in newspaper and industry journals which have taken place for the past years. Many of these issues pointed to the low-cost housing sector. Harrison (2005) in addition confers that quality assurance systems in the Low-Cost sector plays a fundamental role in the knowhow and the ways in which government, housing contractors and sub-contractors implement and use the procurement systems at hand. This creates a better systematic approach to the procurement systems in the paragraphs which follow. Ashworth and Hogg (2002), postulate that procurement is the process which is utilized to deliver construction projects. The RICS Foundation (2002) adds that procurement facilitates the formal configuration and realization of a project, where a project is defined as the investment of resources for return. In the context of construction, procurement deals with the arrangements for acquiring construction goods and facilities by various clients, be it private individuals, corporate establishments or public institutions. Construction procurement

from the 1960s has grown in the sense whereby all public jobs and most private jobs were offered on just competitive tendering to having various alternatives. Currently there are several forms of procurement systems in place within the construction industry. They are: separated and co-operative arrangements, management-orientated procurement systems, integrated arrangements and discretionary systems (Fotwe and McCaffer, 2007).

In addition to this, The RICS Foundation (2002) mentions that the choice of procurement route is intrinsically and strategically linked up with the best value and value for money. Procurement strategies and contract strategies are not tactical choices within projects. They are in fact linked with the management and legal frameworks which are set up for risk, the delivery of functionality in the design and construction stages and the relationship between time, cost and quality.

2.9. BENCHMARKING

According to Alarcon and Serpell (1996) there is still a consensus around researchers and the construction industry experts, that one of the principal barriers to promote improvement and sustainability in construction projects is the lack of appropriate performance measurements. Alarcon and Serpell (1996) further mention that for continuous improvement to occur it is quite pivotal to have performance measures in place in order to check and monitor these performance, to also verify changes and the effect of improvement actions, to understand the variability of the Process and in general it is a necessity to have objective information readily available in order for any construction company to make effective decisions. (Mohammed (1996) also confers that the ever-rising customer requirements and expectations have increased demands for continually introducing improvements in the cost, timing and quality of the construction output. With competitors in construction increasing at a vast rate, construction organizations all around the globe are enhancing their competitive position by improving their performance and in addition setting new operating targets and standards for the national market. This dynamic mechanism and the well-known fierce national competition have raised the awareness of performance measurement known as benchmarking among the majority of construction organizations.

According to Alarcon and Serpell (1996) benchmarking is considered to be a new topic within the construction industry. Alarcon and Serpell (1996) further mention that to this day there is almost no available information that describes the potential that benchmarking offers to construction. However Kyro (2003) states that benchmarking has established its position as a

tool to improve organizations performance and competitiveness. Kyro (2003) defines benchmarking as the process of evaluating and applying best practices that provide possibilities to improve the quality of work. Kyro (2003) further mentions that benchmarking is an evolving concept that has developed since the 1940's towards more sophisticated forms. He proposes that it has undergone five generations. McCabe (2001) adds that many of the techniques directly associated with benchmarking may have their roots in the so-called quality movement of the 1980's, but the concepts which underpin them are a lot older. MacCabe (2001) explains that records show that the Egyptians used benchmarks in construction work, by cutting a notch in a lump of stone at accurately determined points, while a flat strip of iron would then be placed horizontally in the incision to act as the support (bench) for a levelling staff. Using this as a reference (mark) further heights and distances could be measured. While the term benchmark may have changed to a more contemporary meaning, at its heart it is still the fundamental principle of being able to measure in a definitive way, in order to improve quality standards (McCabe, 2001). Mohamed (1996) mentions that in construction benchmarking is not a straight forward task due to both the very nature of the industry which lacks solid data gathering and the remarkable fluctuation in productivity. In construction benchmarking attempts always run a risk of facing certain difficulties such as incomplete or non-existing data (plans incomplete). Even if the data was complete or did exist, benchmarking would be highly dependable on project size, type and budget. Therefore, it is difficult to use it effectively as a basis for comparison. Benchmarking only works if consistent methods of measuring the performance of operations can be developed and introduced.

The principle of benchmarking and best practice in construction is based on the assumption that there is a number of approaches in order to carry out any task and that these tasks involve certain processes. Improvement in quality standards can only take place if there is a set standard (benchmark), and in order to know if the changes have made a difference, measurement is essential (McCabe, 2001).

2.10. PROJECT QUALITY PERFORMANCE MEASUREMENT

Performance measurement is a fundamental building block of quality management and a total quality organization. Historically, organizations have always measured performance in some way through the financial performance, be this success by profit or failure through liquidation. However, traditional performance measures, based on cost accounting information, provide little

to support organizations on their quality journey because they do not map process performance and improvements seen by the customer. In a successful total quality organization, performance will be measured by the improvements seen by the customer as well as by the results delivered to the shareholders (bussinessballs.com/dtiresources). According to Takim, (2003), performance measurement in the manufacturing and construction industries is used as a systematic way of judging project performance by evaluating the inputs, outputs and the final project outcomes. However, very few companies systematically measure their performance in a holistic way. Moreover, the existing systems tend to focus more on product and less on process and design. This can lead to the suboptimal quality of the performance measurement system, the misjudging of relative performance, complacency and the denying of appropriate rewards to the deserving. Previous studies have revealed that performance can be measured in terms of financial and non-financial measures, or the combination of both. When measurements are being implemented, contractors, consultants and the management team's performances are blamed as the major reasons for the failure of a particular project. The other project stakeholders such as client, suppliers, trade contractors and the community at large are neglected

2.11. QUALITY PROBLEMS IN HOUSE BUILDING CONSTRUCTION

Defects in newly completed buildings are becoming a serious phenomenon as lower cost and medium cost house are being built (Alsadey, Omran & Pakir 2010). Construction defect according to Alsadey, Omran & Pakir (2010) is lacking and not meeting the required standard that may reveal as a building is constructed or after an element of work is completed. Construction defects usually include any deficiency in the performing of the design, planning, supervision, inspection, construction or observation of construction to any new home or building. The defects usually are starting to appear after 2 years of occupancy (Chong & Low 2006).

Construction defect affects society or end-users due to possible danger posed and direct and indirect cost of repairs imposed. Some of the most common construction defects involve leaking roofs and windows, cracked and heaving concrete, cracks in walls and joints, defective plumbing and improperly installed electrical equipment (Chew, Wong & Kang 1998; Alsadey, Omran & Pakir 2010)

2.12. CONCEPTUAL FRAMEWORK

As the researcher have been stated in the research objective, the overall concern of this research is to assess the project quality performance mainly identifying major quality problems and their

cause of the Addis Ababa condominium housing construction project specifically in project 13. To attempt this objective the researcher has developed conceptual framework on the issue which is raised.

According to research conducted by the Building Research Establishment (BRE) (Egbu, Ellis & Gorse, 2004: 308), 90% of building failures are due to problems arising in the design and construction stages. These problems include poor communication; inadequate information or failure to check information; inadequate checks and controls; lack of technical expertise and skills, and inadequate feedback leading to recurring errors. Egbu *et al*. (2004: 308) note that most of these problems are mainly 'people'-related problems. A great number of the defects in low-income houses occurred during the construction stage and were mostly due to poor communication and inadequate checks and controls (Sommerville, 2016). As an illustration, Alink (2003: 18) states that failures have resulted from incorrect building procedures and poor on-site supervision and workmanship. This is in accord with the contention of Egbu *et al*. (2004: 308). According to Alink (2003: 18), factors contributing to the lack of success and the non-achievement of quality in the low-income housing sector include:

- Lack of sufficient finance;
- Use of unskilled labor;
- Use of emerging contractors;
- Lack of contribution by the private sector;
- Lack of management commitment toward quality achievement, and
- Substandard quality of workmanship**.**

Many authors have provided different project quality problems and categorization regarding to housing construction projects. However according to extensive review of Heravitorbati, (2011) there are four major sources of project quality problems. These are stakeholders' managerial, technical, environmental, material and equipment culture and politics.

According to Heravitorbati, (2011) project quality problems in construction projects in the above four categories can be listed as follows.

Table1. Source of Quality Problems in Construction Projects

(Source*:* Heravitorbati et al. 2011 & Moavenzadeh 1987)

1. Stakeholders and Managers	**2. Technical**
➢ Poor contractor supervision	➢ Design complexity

➢ Poor communication ➢ Poor quality procedure and department ➢ Poor methods of contractor selecting ➢ Poor project management system ➢ Lack of managerial commitment ➢ Bureaucracy Supplier impact	➢ Difficult data collection system ➢ Poor performance of quality tools ➢ Lack of technical talent ➢ Poor workmanship ➢ Human error ➢ Difficult data collection system
3. Environmental, Material and Equipment ➢ Nature uniqueness ➢ Project size and complexity ➢ Material/Equipment specification ➢ Project Environment ➢ Poor quality and unavailability of resource ➢ Equipment idleness and inefficiency	**4. Culture and Politics** ➢ Lack of motivation ➢ Incompatible tendering procedures ➢ Lack of collaborative working atmosphere (mutual objectives, gain and pain sharing, trust, no blame culture) ➢ Corruption ➢ Lack of being customer oriented and focused ➢ Emphasis on production and project duration

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. INTRODUCTION

This chapter discusses the research design and methodology used in acquiring the necessary information to answer the research questions. It presents with the research design, population and sampling design, data source, method of data collection, method of data analysis and sample framework for sampling design and method of data collection. Accordingly the researcher has plan to answer the 1st, 2nd, 3rd and 4th question in the research question through the data obtained from interview with project consultants and in addition data for 3rd question is intensively gathered from house occupants.

3.2. RESEARCH DESIGN

Based on the purpose of the study, this study research design is descriptive research design. According to (Cooper and Emory, 1996), If the research is concerned to find out questions related who, what, where, when or how much then the study called descriptive. Because of this research focus and ask what are the major quality problems in the project, what are the main cause for these quality problems, how the project quality management practice is implemented in its objective and research question the study design is descriptive research design. As an objective the research will assess the project quality performance of Addis Ababa city housing development program project specifically in project 13, 14 and Bole Ayat site 4. In regards, to get relevant information the researcher will use mixed research approaches or both quantitative and qualitative research data. Qualitative research data used to get deep, brief and relevant data regarding to the issue from project consultant who have direct relation with the project implementation. And quantitative research approach will apply to get additional information and to compute and analyze the data collected from house occupants with the data collected in qualitative research approach.

3.3. POPULATION AND SAMPLING DESIGN

Currently the Addis Ababa City Administration housing development project has been constructing 18 condominium housing construction projects and completed and transfers 15 condominium housing projects sites to the dwellers in 11 round (AAHDP monthly report March

2017). Among these housing projects sites the target population as a source of information for this research will be project site number 13, 14 and Bole Ayat site 4 under kirkos sub city project are selected based on purposive sampling techniques.

To be recently transferred houses, availability of consultants and project managers and their offices on the project site, pre observation (researcher's own observation) and informal survey and result are the main reason for the researcher to select these project sites for this study. According to simple and informal survey and pre observation result, the reason to select these project sites is because, based on informal survey and review of report documents, there are many complain have been raised by the beneficiaries regarding to project quality performance. Even if the project branch office for housing development program had acknowledged that, poor capacity of contractors, lack of construction inputs and poor delivery of inputs on time are challenges and factors for poor quality performance of the houses (AAHDP Yeka Abado site branch office, October 30, 2007 E.C). Based on pre observation result quality defects have been observed in most of the houses and the dwellers are engaged in redesigning and reconstructing the interior part of their houses.

The entire respondent was recruited only from residence houses which are transferred to occupants excluding for shops. In these project sites totally 18,848 houses are built and under construction. To make easy task of selecting respondents from this huge number the researcher focus only on transferred residence houses excluding shops, communal houses for kitchen and set to categorize the houses based on block type. Based on the information from Yeka Abado project site report, there are three types of Blocks. These are G+7, G+4 and G+2. All houses in Bole Ayat site 4 are G+4 block type. Among these block type, based on purposive sampling the researcher is interested on G+4 house block type because it is common in all selected project site, the other block types are new type and the researcher believed there will be lack of information to complete the research. The total populations from those three project site lives in G+4 block type are 10,819 and are eligible to this study. Among these houses 6,173 are in project 14 sites, 4,105 are in project 13 site and 541 are in project Bole Ayat site 4 which are transferred to dwellers.

Drawing a sample from the occupants was not an easy task because of its big size of population. However a large size sampling 196 respondents will be select to ensure representativeness of the sample. The researcher applied proportion sampling formula which is the confidence level is

95% and the margin of error the researcher set is 7%. The reason the researcher judge to set margin of sampling error 7% is, since the research is social science research and the behavior of the study is not that much critical which means it does not need experiment or inspection Just it is descriptive research and focus on gathering and assessing data from people's opinion regarding the issue which are asking like what are major quality problems observed and how they try to fix and manage these quality problems in the house. Although the other reason is all the population eligible for this study are homogenous which are resident of G+4 blocks. Also because of all project site select for this study are consulted by one consultant for each of the project site. Applying common design and structure type of construction for all Blocks and using the same construction inputs and materials for all houses is also main reason to set the specified margin of error. In addition research cost and time to data collection and data analysis are considered. Because of the above reason the researcher had set 7% margin of error which does not have big impact on data representation and set 196 samples is representative for this study.

The basic formula the researcher applied is;

$$n=\frac{N}{1+N(e^2)}$$ (Israel, 1992)

Where: - n is the required sample size from the total population?

e^2 Is margin of error to the sampling?

N is total population size

To calculate the 196 sample size from the total population size the researcher suppose that $\pm$7% of margin of sampling error.

$$n=\frac{10{,}819}{1+10{,}819(0.07^2)}$$

n= 200 samples.

To get the correct sample the researcher use finite population correction formula as follows

$$n=\frac{n_o}{1+[\frac{n_o-1}{N}]}$$ (Israel, 1992)

$$\text{Therefor } n=\frac{200}{1+[\frac{200-1}{10{,}819}]}$$

Based on the above calculation the result and the final sample size for this study are 196.

Therefor the confidence interval in results falls between $\pm$7% of the results.

Respondents will be recruiting based on convenient sampling technique and systematic random sampling from the house occupants or dwellers and proportionally distributed to the three sites.

Convenience sampling technique also was applied to select three key informant respondents from consultant. “Convenience sampling technique (sometimes called an available subject sample) is a group of elements or often peoples that are readily accessible to and therefor convenient for the researcher”. Convenience sample are relatively in expensive and they can yield results that are wonderfully provocative and plausible (Clark, 2008)

3.4. DATA SOURCES

In this research primary and secondary data source was used. The primary data sources was collected through distributing questionnaires (survey) to house owners, key informant interview with project consultants and physical observation. The secondary data source will be collected from published and unpublished documents, literatures, journals, newsletters and other relevant publications.

3.5. METHOD OF DATA COLLECTION

The study was applied the most relevant data collections methods of both qualitative and quantitative research data. Survey or questionnaires was adapted and modified from previous research works which was conducted by Hiwot (2012) which is entitled “Effect of poor project performance on the quality of housing construction, the case of condominium houses in Addis Ababa”. Here the researcher did not get permission from Hiwot to use and modify the questionnaire. However the researcher modified and used the questionnaire standing from heart felt appreciation of her work and for only academic purpose. Then the researcher distributed to beneficiaries to get their objective or quantitative data regarding to the housing project quality performance. Here the researcher appoints two data collectors to gather resident’s opinion regarding to quality of the houses and their environment. Key informant interview with project consultants from each of project sites was conduct to get relevant information in their side about the housing project quality performance specifically related to the selected project site. And observation was also another data collection method to generate, confirm, and support the information gathered using the above methods.

3.6.RELIABILITY AND VALIDITY OF THE RESEARCH TOOLS

In order to reduce the possibility of inconsistent and wrong responses, attention was given for data reliability and validity test.

3.6.1. Reliability Test

Reliability refers to the degree to which data collection methods had provides with consistent responses, similar observations would be concluded. Also it helps to increases researchers transparency with how sense is added from collected data (Cherry, 2013).

In order to prove the data reliability the researcher performed a calculation using SPSS current version 20. Here Cronbach's Alpha test of reliability was performed. Applying this test specifies whether the items pertaining to each dimension are internally consistent and whether they can be used to measure the same construct or dimension of the responses. To approve the reliability of the tools or the questions Cronbanch's Alpha Coefficient result should be 0.7 or above (Nunnaly 1978). The researcher had provided all responses of the common questions to all of the respondents to be tested through distributing 16 questionnaires which had 45 items as a pilot. Then based on the result of Cronbanch's Alpha which is 0.809, the tool is reliable.

Reliability Statistics

Cronbach's Alpha	N of Items
.809	45

Source: survey result (2017)

3.6.2. Validity Test

Validity is concerned with whether the findings are really about what they appear to be and validity is defined as the extent to which data collection methods accurately measure what they are intended to measure (Saunders et al. 2003). To insure the validity of the data the researcher had collected data through appointing two data collectors who are well trained by the researcher. Also the questionnaire was adopted from previous research work by Hiwot 2012 as stated in methods of data collection section. Then the researcher modified based on basic research questions and research objectives. Although the researcher had received different comments from research professionals and adjust the questions to be convenient to respondents.

3.7.ETHICAL CONSIDERATION

In order to achieve the research objectives the researcher had addressed different sources of data which are primary and secondary data sources. The researcher acknowledges all secondary sources of data. Verbal consent and briefing about research objectives were also performed to gather data form all respondent participated in this research. All data were analyzed without using respondent's personal information such as their name. Also the data was analyzed collectively and it is impossible to identify individual's opinion. Generally all the data gathered from respondents is kept confidentially.

3.8. METHOD OF DATA ANALYSIS

Both qualitative and quantitative methods of data analysis were applied. Mainly descriptive method of data analysis was applied to analyze the data gathered based on quantitative and qualitative methods of data collection. In addition statistical method of data analysis and current version of SPSS (version 20) had used to analyze the data gathered based on quantitative data collection method/ survey or questionnaires.

Sample Framework For Sampling and Data Collection Methods

Table1. Sampling Framework

Respondents	**Sample size**	**Sampling technique**	**Data type**	**Method of data collection**	**Instruments**
Consultant	3	Convenience sampling	primary	In-depth interview	interview guide
House occupants	196	Systematic random sampling and convenient sampling	primary	survey	Questionnaire
Observation			primary	observation	

Source: own data (2017)

Proportion distribution of the sample size framework

Table2. Sample Size Framework.

Project site name	**Total population in the selected three project site**	**Distribution percentage**	**Number of distributed sample size**
Project 14	6,173	57%	112
Project 13	4,105	38%	74
Bole Ayat site 4	541	5%	10
Total	**10,819**	**100%**	**196**

Source: AAHDP reports (2009) own data (2017).

CHAPTER FOUR

DATA PRESENTATION AND INTERPRETATION

4.1. INTRODUCTION

This chapter comprises of research data findings and analysis. The findings here are an analysis of collective fieldwork data presented based on the research objectives and research questions. A short description of the study followed by introduction of general characteristics of research respondents is presented at the beginning for clear understanding of these findings and analysis. Then the next section provides a presentation and analysis of the data regarding the research questions.

The analysis part is presented in four sections which are categorized based on the research question and research objectives. The first part had comprises on the practice and process of project quality management and project quality performances of the project specifically related to the selected project sites. Here data from interview with project consultants is mainly presented. The second part presented in this chapter had comprises on data presentation and analysis of major project quality problems and defects. Data from interview with project consultants and survey result is presented. This section took much attention of the research and mainly the researcher provide survey questionnaire to house occupants to get intensive data. The third part is comprises on assessing and analyzing of major causes of project quality problems and defects. Data from interview with project consultant is mainly presented. The fourth and last part is comprises on consumers level of satisfaction regarding to project quality.

4.2. PROJECT DESCRIPTION

According to monthly report of the Addis Ababa Housing Development project office report on March 2009 E.C, the project first established and started its activity by transferring 18,988 houses in 1998 E.C. more than 175,000 houses are built and transferred for more than 700,000 dwellers in the last 12 years. Now a day there are over 92,000 houses are completed and transferred to more than 370,000 dwellers. In total of over 1 million dwellers are benefited from the project (AAHDP monthly report March 2009 E.C.)

Table3. AAHDP Housing Construction Progress Report

R.no.	Year of construction	Number of houses
1	From 1997-2002 E.C	81,266
2	2003 E.C	17,171
3	2004 E.C	44,876
4	2005 E.C	39,249
5	2006 E.C	54,651
6	2007-2008 E.C	41,421
Total		**278,634**

Source: AAHDP monthly report March 2009 E.C.

There are 18 project sites had been established since the AAHDP established. More than 175, 000 houses are built and transferred to dwellers. In order to maintain project quality the AAHDP project office appoint more than 30 project consultants in all project sites which are under construction. Project materials and inputs are provided through good quality inspection and management system. Now a day the project site numbers are reaching to 18 projects. Among these 15 projects are transferred to dwellers. Only 3 project sites are selected for this study based on purposive sampling method. These are project 13, project 14 and Bole Ayate site 4 which are completed and transferred to dwellers recently. In addition there was 5 project consultants were participated in these selected project sites and 3 project consultants are selected and participated in this research through collaborating to interview which are selected based on convenient sampling technique. PACE consulting company, MGM consulting company and ATKON consulting company are participated in this research. Based on the data results there are many quality issue is raised.

4.3. GENERAL CHARACTERISTICS OF RESPONDENTS.

This section comprises to present demographic characteristics of both the survey and interview respondents.

Table4: Response Rate.

Total number of population conducted	Agree to participate & % of response rate		Not participated due to different reasons	
	number	%	number	%
312	196	62.8%	116	37.2

Source: questionnaire analysis 2017

The above table shows that, the researcher distributed 196 questionnaires to house occupants. It was not an easy task to achieve the target strike number of respondent which is 196. The study conducts 312 house occupants to interview the targeted 196 respondents. The response rate to gather or conduct the survey was 62.8. House occupant not found in their home during visit, most of the residents are being tenant, and few of house occupants not willing to participate were significant challenges during conducting the survey. The researcher applied both systematic random sampling and convenient sampling techniques to select respondents. All 196 questionnaires are responded and collected. The reasons to collect all the questionnaire is because of the researcher appoint data collectors who are record the response directly by asking the respondents. This enable the researcher to achieve 100% questionnaires are achieved to be responded

Table5: Gender & **Age of the Respondent**

Survey		**Freq uency**	**Percent (%)**	**Interview with consultant**			
					Consultant 1(PACE)	**Consultant 2 (ATKON)**	**Consultant 3(MGM)**
Sex	Male	74	37.8	Gender	male	female	male
	Female	122	62.2				
	Total	196	100				
Age	18-23	8	4.1	Age	30	30	35
	24-29	18	9.2				
	30-35	40	20.4	Work experience	9	9	14
	36-40	78	39.8				
	Above	52	26.5				

	41						
	Total	196	100				

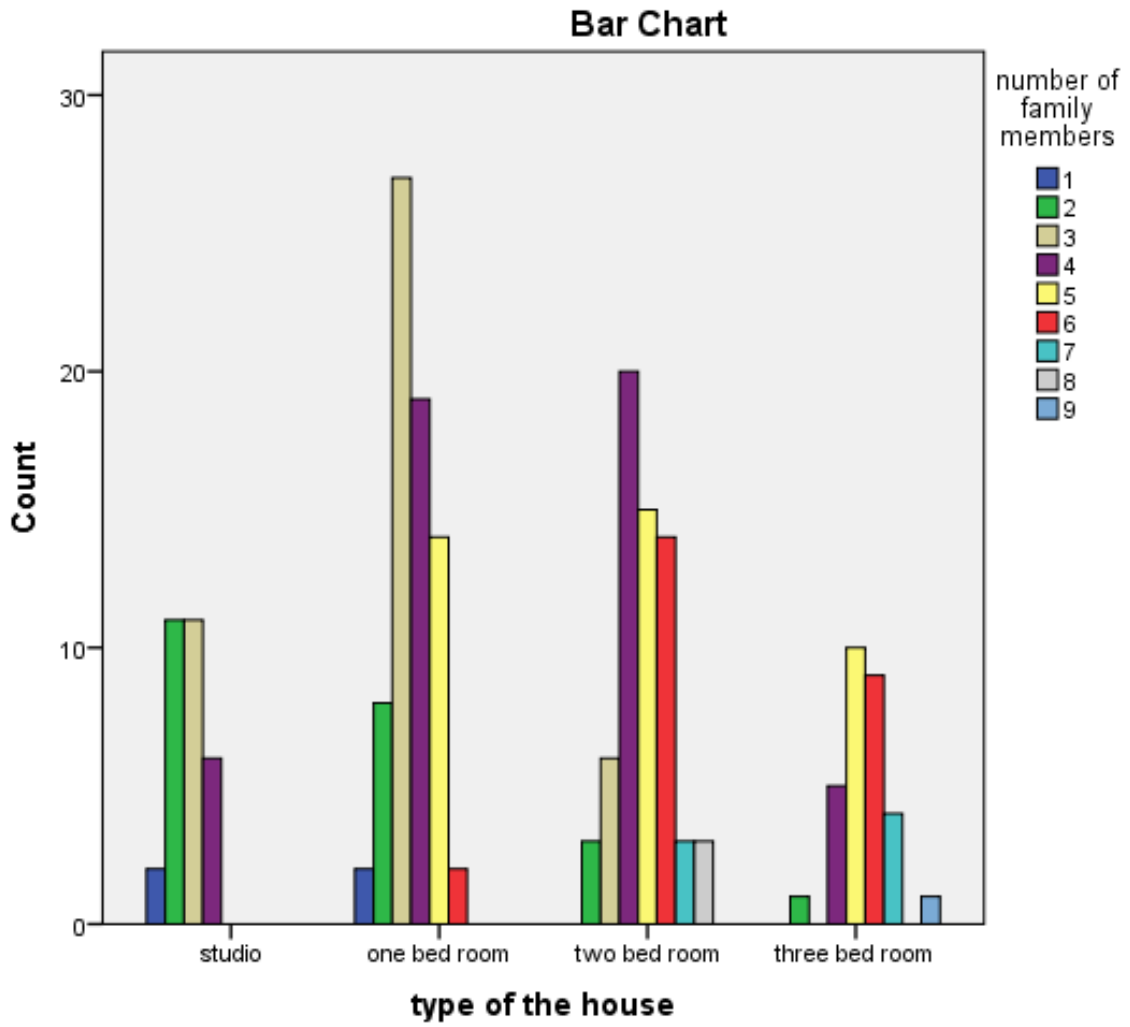
Source: questionnaire analysis 2017

Here this survey table shows that 37.8% of the respondents are male and 62.2% of the respondents are female. This shows that number of female is large due to different circumstance. The major reason for this is availability of females in the house during interview visit time. This condition is exclusive to the survey. On the other hand the researcher had interviewed 2 male and 1 female respondents for interview with consultants.

Also the table shows that the distribution of age in the population participated in this research. Here all the respondents were selected in systematic random sampling and in addition using convenient sampling technique. 4.1% of the respondents were in range age of 18-23. 9.2% of respondents were in age range of 24-29. 20.4% of the respondents were in age range of 30-35. 39.8% of the respondents were in age range of 36-40. And the rest 26.5% of the respondents were in age of above 41. In cumulative 60.2% of the respondents were fall in age range of 30-40. This shows that most of the respondents participated in this research were well matured and also shows significant data validity.

The above table also shows respondents' age and working experience from each project consultants.

Figure1: Number of Family Members' by House Type



Source: questionnaire analysis 2017

This figure shows that participants house type and number of their family members. According to this table number of family members is directly related to type of the house. According to the data on the table minimum number of family member is 1 and maximum number of family is 9 which only found in three bed room type of house. Most of the family members frequently emerged in this survey is 4 and 5 in one house. This shows the average number of family members in one house is 4 or 5.

Table6: Type of The House

		Frequency	Percent
House type	Studio	30	15.3
	one bed room	72	36.7
	two bed room	64	32.7
	three bed room	30	15.3
	Total	196	100.0

Source: questionnaire analysis 2017

This table shows that respondent distribution based on their house type. 15.3% of the respondents are lives in studio type of house. 36.7% of the respondents are lives in one bed room type of houses. 32.7% of respondents are lives in two bed room types of houses and the rest 15.3% of the respondents are lives in three bed room types of houses. However since the respondents are selected based on random sampling and convenient type of sampling technique the data might not exactly indicate the true population. This means type of the house could not affect data validity and it is not significance to this study..

Table7:House Floor Number

		Frequency	Percent
House floor number	Ground	10	5.1
	first floor	39	19.9
	second floor	63	32.1
	third floor	53	27.0
	fourth floor	31	15.8
	Total	196	100.0

Source: questionnaire analysis 2017

This table shows that respondent distribution based on house floor number. 5.1% of the respondents were lives in the house found on ground floor. 19.9% of respondents were lives in the house found on 1st floor. 32.1% of the respondents were lives in the house found on 2nd floor. 27% of the respondents were lives in the house where found on 3rd floor and the rest 15.8% of the respondents were lives in the house found on 4th floor. Most of the respondents participated in this study are lives in the house where found on 2nd and 3rd floor.

4.4. PROJECT QUALITY MANAGEMENT PRACTICE AND PROCESS

This section comprises to present project quality management practices and process in the housing construction project which is intended to answer research question one. All question rose regarding to this issue is directly forwarded to project consultants. Because of it is major responsibility of the project consultants.

According to the respondents from the selected consultant company, project quality management practice in these condominium housing construction projects is performed as per what the project need and intended to deliver its objectives. The quality management practice is mainly responsibility of the consultant. The process or the practice is performed based on project management standards. This practice is very continuous process and performed in each and every project activities. The process starts where the project activities start to perform.

As a consultant there are many tasks and responsibilities are performed in the project so as to maintain project quality and delivering the project outputs with the specified project quality requirement. Among the tasks inspect and approve or disprove construction materials, contract administration, supervising and controlling contractors, follow up project quality variation as per the standard are major responsibilities. In addition there are many construction process needs continuous quality management and improvement. Here the projects apply project quality assurance in order to provide quality project. For instance one of the consultants said that, "As a consultant they performed quality checkup before the construction go ahead and after completing. Before the building starts we perform quality checkups on all required materials and order to go ahead. Then we checkup again what is done how it is done based on the requirement. Here all stakeholders are actively participating to perform good quality of works. We had performed randomly checkup in every activity of the project's activity. For example let's take filling Slav, this is one activity. Then we perform pre activity checkup while the structure is set based on the requirement, checking material quality and labor are capable to perform this activity, checking the iron bars tied well, and other necessary checkups had performed. Then we order to go ahead, and then we perform after activity checkup while the activity is performed based on the specified requirement. But still the consultant has responsibility to check the activity continuously from the beginning to the end". This implies that the consultant had actively performed project quality management at each activity of the project. According to the

project management institute 2013, project quality management is performed at each activity and process of the projects. In addition, the other consultant also replied "our major task is contractor supervision. We had conducted many tasks during all construction phases. Inspection of material or inputs quality, plan and manage contact agreement, follow up variations and manage the contract agreement as per the standard, quality management through inspection of inputs such as iron bars, cements and gravels, pre concrete testing, after concrete testing, even if the client supply the bricks we set someone there to control fabrication of the bricks are our major tasks on the project". This activity is also performed by other consultants as a major responsibility in order to provide quality project. This all response implies that project quality management is well implemented. They have also the right to reject construction materials which are not fulfilling the quality requirement. All construction materials need to qualify Ethiopian quality standard and assurance test and need to be certified. Especially construction materials input for building of the structure, such as iron bars, gravels, cement and sand. According to respondents there is no quality problem or quality issue regarding to the project on its structural building phase, however, the project quality management system or practice has been implemented in this way, there are many challenges hinder consultant's effort and activity back. These challenges also could have big impact on project quality management activity.

4.5. PROJECT QUALITY PERFORMANCE

To assess project quality performance of the housing construction project specifically to the selected project sites, the researcher set some critical points to address the issue. These critical points are listed, because most of consumers complain are related to these conditions. According to the respondents the researcher has provided the following results regarding to the quality performance of the critical points.

4.5.1. DESIGN AND STRUCTURE OF THE HOUSE

According to the respondents, the design and the structure of the same typology of the houses are the same. All design and structure of the houses are prepared and developed by the AAHDP office. The consultant does not have any right to change or even if to modify the designs. Currently there are three types of house design in terms of number of floors. These are G+2, G+4 and G+ 7 types of houses. These all types of houses have the same design and structure in all

sites. Also there are another type of house structure and design in terms of housing typology. These are E1, E2, A1, A2, L1, L2, C7L, C7S, and G+2QP. All typology have their own structure and design. But there is no difference in structure and design in the same house typology. All houses typology are built as per the standard set by the AAHDP. However there is some changes and adjustment could be happen. This is because of topographical condition in some areas. Even if it is happened it could not mean there is design change. For example one consultant said that, "As a consultant we are sure that there is no any quality problem related to house construction design and structure. All the houses are built based on the design and structure set by the Addis Ababa housing development Agency. All the designs are comes from head office. We cannot change the design. We are performed all the houses based on the design and structure. But there are some design changes that are made as special case because of topographical issue. We are consulted and manage 145 blocks and we are made some adjustment on the physical appearance on the buildings, this is just reducing number of floors because of the topography but this is not to be considered as design change". In addition other consultants also share this idea as follows. "There is no change in architectural design. All designs are standard. The doors, the windows all the houses structures are standard. We can't make changes. However, as per the actual site condition there may be some design change to make the cost convenient to final users". This implies that, In general there is no change in structure and design of the house that leads to poor quality condition.

4.5.2. SUSTAINABILITY OF THE HOUSE

According the respondents, there are some ambiguities regarding to this situation. However all respondents agree that there is no poor sustainability issue regarding to the structural building of the houses. The most important thing to sustainability in construction industry is building of very good structural building. If it is well done there is no sustainability question. But still there is a sustainability question regarding to the finishing works. All respondents agree that there is poor sustainability issue regarding to finishing materials and finishing works. According to the respondents these failure to sustainability is due to poor workmanship, poor finishing design, poor quality of finishing materials and poor awareness of consumers how to apply the materials. For example one consultant said that, "There is no problem of sustainability regarding to structure of the house. I can tell you that all houses structure is well done. We can see the

sustainability issue in two ways, based on structural condition and fixture condition. In regarding to structural condition all houses are well designed and well-constructed. However you can find some problems regarding to site selection and landscape issue. But still there are quality problems related to fixture conditions. Most of the materials used in finishing or in fixture works, such as ceramics, sinks, hand wash basins and related materials may deteriorate fast. There are some quality problems have been observed which may affect sustainability of the house such as water leakages. In this regards the most common problem is safeties tank problem. It is observed in most of the sites. Most of the safety tanks become full before the designed time. This may occur because of design error. Also it could be happen because of, may be poor quality materials are used. Because there are too many materials are used during construction especially in fixing of finishing materials. Most of the time the consultant terminate or close out its responsibility during fixing of finishing work phase. Totally we didn't involve in finishing works. We can't wait to negotiate regarding to poor structural elements. You can't find quality problems regarding to materials such as iron bars, cement, gravels and other related construction inputs because we are engaged seriously to control and inspect and we have the right to reject if we face poor quality materials". This implies that consultants are not responsible in finishing works. So they believed that this poor quality performance regarding to sustainability of finishing work happened because of lack of their involvement. And the materials used for finishing works are not well inspected as of the material used for building structure.

4.5.3. PROJECT QUALITY AND WORKMANSHIP

Quality of workmanship in building construction especially in housing construction is very crucial thing. According different authors such as Alink 2003, poor workmanship is listed as one of the cause for poor quality of housing construction. Also according to the respondents most of quality problems occurred in this project is directly related to poor workmanship. This problem also indirectly related to capacity of contractors and capacity of government to perform this project. Even if there is some poor project quality performance caused by poor workmanship, there is no quality problem related to structure. Most of quality problems caused due to workmanship and poor contractor's capacity are related to finishing works. This is mainly happened because of poor capacity and poor budget to appoint most experienced employees. According the respondents most of the contractors have no sense of ownership regarding to what

they are doing. They are only focusing on how much profit they get instead of committed to quality of works. Because of this they appoint poor or non-skilled workmanship. For instance one consultant said that, “Here I can’t say we are achieved 100% quality works. There are many problems regarding to contractors capacity and workmanship. Even though there is no maximum level of defects. We can mention some problems regarding to finishing works but there is no any defects regarding to the house structure. There are also some technical defects which happened because of lack of skilled man power. Although because of there is no continuous training for unskilled labor, these problems can happen more likely. The other thing it is very hard to appoint and work together with most experienced engineers with this payment. As a government the budget for the program is low to appoint and engage more skilled and experienced workmanship. Because of this many experienced and skilled workmanship are not interested to work in this program.

Here also the main question is quality of the contractors by itself. In my belief “I don’t think the contractors feel they are Ethiopian and work for their country and for their people” it is very hard to think their quality of works without consultant engagement. They have poor capacity. I have also a question how they could they get their license. There are many requirements to give license for contractors such as human resource capacity, their skill level, capital and overall capacity of the contractor to perform projects. It is beyond my capacity to say the contractors have got their license in proper way but I don’t think contractors’ arrangement is well performed”. This implies that most of poor quality performances of the projects are caused by poor workmanship.

4.5.4. CONSUMER SATISFACTION

According to the respondents there too many complain regarding to poor quality performance of the houses from house occupants. But the consultants have very narrow chance to meet the house occupants. However, based on occupant’s complain from previous sites, the consultants are performed to eliminate those complains on the current project site. But the government by itself identifies there are some problems in these sites related to sewerage and electricity as well as waterline installation and engaged to solve soon. Most of the time as I mentioned in the above section most of the consultants are leave the project after they completed the structural building, they are not engaged in finishing works and infrastructural development works. Here for instance

one consultant said that,"As I told you we don't have responsibility on these infrastructure development works as well as the finishing works. Well infrastructure development, house slope, the road, and other utility problems are makes most dwellers dissatisfied with these quality problems". Here also all respondents agreed that most of quality problems that make consumers dissatisfied are related to finishing works and infrastructural development works.

4.5.5. ELECTRICITY AND WATER LINE INSTALLATION

Electricity and water installation works are performed by small and medium scale enterprises. Almost all SME are established on the site to manufacture different materials for the input of the project. However, most quality defects are occurred due to lack of skill and awareness how to work. This is happened because of lack of sufficient training and lack of continuous capacity improvement. As I mentioned earlier, according to respondents most of the project quality defects are emerged because of poor workmanship. Also poor communication between project stakeholders is one of the causes for poor quality of works regarding to electricity and water installation works. Also in addition work load is one of the challenges to consultants to manage project with best quality. According to respondents there very little quality defect is happened to installation of electricity and water line installation. Materials used for the installation are best. For instance one consultant said that, "Here we are not built one or two blocks. We are engaged in building of too many condominium blocks in a site. As a structure one consultant is expected to manage six buildings or blocks on average, one coordinator also expected and engaged to manage overall blocks in the site. When you multiply 6 blocks by 5 floors the result is 30 floors. Though one person as a consultant have been performed inspection and quality control on 30 floors on average. You can imagine how it is difficult to manage these 30 floors quality works step by step performed by one person. It is very bore and spadework to manage quality. Here the main challenge is we are not meet consumer satisfaction, we are not provided what the consumers expect and we can't meet their interest. As we observed many house occupants are engaged to reconstruction of the house. Most of them are wants ceramics, tiles for the floor, and expect bricks for partition, but we approved and build these in other materials based on pre specified design such as slave for the floors and Agro stone for inside partition. This makes the consumers dissatisfied and led them to reconstruction. And I believed that finishing works are not performed based on the current technology and market. However since the program is low

cost house, the materials we are used for finishing works are cheap and fulfill the quality requirements. But many of the consumers are engaged in changing these materials by expensive and quality products to satisfy their interests. But most of the time the building structure is faces challenges while they engaged in reconstruction.

As a consultant I believe that water and electricity installation are well performed based on the design and the standard. We have estimated number of lights and other sources of electric power in one house in the design based on standards. So we are well performed in installation of electricity and water line with expected quality. However there is some gap to transfer the houses with full quality of works in regarding to electricity and water line installation.

As a consultant we are not expected to manage and control all the finishing works rather providing the construction phase with expected quality.

The main challenge led consumers complaining on the quality is lack of integration between different stakeholders which are engaged in this project to provide different facilities and works. There are more than four government stakeholders in this project. But they have lack of integration. This implies that, In general the materials used to install electricity and waterline such as conduit, PPR, and other related materials are fulfilling the quality requirement. We are performed quality inspection in all materials. However it is impossible to satisfy interest of all consumers but we are providing based on the standard design".

4.5.6. INTERIOR PARTITION AND FINISHING WORKS

According to the respondents there are quality problems related to finishing works. Such as plastering and partition works. There are many consumers are engaged to rework of the interior partition. Most consumers are not satisfied with interior partition and plastering. Also there are many consumers complaining that there is no the same or common partition in the same house. However, there is no difference in common area classification of interior partition. This is come from lack of awareness. This ambiguity is come from lack of awareness about house typology. There are different house typologies as mentioned in the above section. For example there are one bed room type of house are found in E1, E2, A1, A2, L1, L2, and other type of house typology. But all one bed room houses in the same typology have the same area, partition and

design. But there is difference between houses in different house typology. The difference in the area is because of the difference in typology.

4.5.7. QUALITY OF MATERIALS

There is no quality problem related to quality of materials for structure building.. According the respondents there is no any drear related to quality of materials. Most of materials for the project are provided by government. Especially materials for building structure, such as cement, iron bars and gravels are supplied by government. There are more than 500 kinds of raw material are used to build one block. The houses are not built based on individual or company's interest. The houses are built based on the standards which are set by government. These materials are inspected well and ordered to construction of the house. But sometimes contractors may provide poor quality of materials such as sand. But consultants are responsible to test and approve. And they reject if the sand is not qualified. For instance one consultant said that, "All material used in the building are fulfill the quality requirement of the project. All materials are inspected and qualified based on the standard. All electricity and waterline inputs are used as per the specification and as per the quality standards. Most of the quality defects regarding to waterline and electricity are happened due to installation but not due to poor quality of materials". This implies that project inputs or materials have no any contribution to quality defect of the project. Because all necessary inputs are well inspected and qualified as per the standards of quality requirement. The other consultant said that, "Here I can tell you that the consultant have right to reject poor quality materials and approve qualified input for the project. All construction input or materials are inspected, check and approved by the consultant as well as Ethiopian quality Assurance Company. We had inspected the concrete many times and all contractors are obligated to allow for inspection more than five times for better quality. Even though the materials are supplied in bulk there is no quality complains. As I told you most of inputs are imported specially the iron bars are imported from turkey and fit the quality requirement. The project use PVC type of material for windows. But some dwellers complain regarding to the material that it has problem facing security problem. And some of them are forced to change in to metal works. But here we can't say that we are 100% perfect regarding to approving materials. As a human being we may make some defects. Even though I can tell you in confidence that the materials are

fulfill the necessary quality requirement and well inspected by the consultant and other stakeholders. The project has provided better quality materials in the market."

4.5.8. CONTRACTORS QUALITY AND CAPACITY

According to different authors the contractor's capacity, performing quality of works and workmanship quality is very significant in the construction sector. Alink, 2003 stated that poor workmanship, unskilled labor, poor capacity of contractors and use of emerging contractors have big contribution to poor quality performance of house construction. Most of the contractors engaged in housing development construction sectors are SME which are established in order to create job opportunity. According to the respondents' contractor's quality and capacity is poor. And it has big contribution to the poor quality performance of the project. Government set a standard that level six contractors to engage in this project. Most of contractors engaged in this project are level six contractors. However due to different circumstance most of the contractors have lack of delivering quality of works. For example project delay, contractors capacity by itself, poor workmanship, corruption, lack of sense of ownership, lack of material, delay of material supply are major factors hinder contractors to perform quality of works. For instance one consultant said that, "If you conduct a survey before, the contract agreement to complete the project is 10 months. Government set a minimum requirement of level six contractors to participate in this project. Of course most of the contractors participated in this project are level six contractors which are established by government as SME. So far, we appreciate this since it makes huge number of job opportunity. Most of the owners for these contractors are Engineers. However they can't complete on time. Most of them are complete the project in 4 and more years. Poor contractor capacity and poor material supply of government are major problems and reasons for the delay of the project. In my opinion contractors may complete the project on time with good quality if they have continuous material supply. Even though, termination and turnover is very high due to inconsistent supply of material. This is also can a major cause of quality defects of the project". This implies poor capacity and performance of contractors have big impact on the quality of the house.

4.6. MAJOR QUALITY DEFECTS OF THE PROJECT

This section comprises major quality defects of the projects. The data are presented from interview with consultants and survey.

4.6.1. GENERAL PROBLEMS

According to respondents there is no quality problems related to building structure. The building structures are built as per the standard using quality materials. But there are many quality problems related to finishing works in these project sites. "According to the benchmark we took from the previous site we had participated, we identify some quality problems happened in this site. Such as Water Leakages, improper wall structure and other related problems, improper fitting of doors and windows, poor floor finishing and leveling, poor roofing are some quality problems we had observed in this site caused by poor workmanship and poor capacity of contractors. But we are avoiding these problems in the preceding projects. All labors engaged to work in roofing, construction, sanitation works, electricity and waterline installation works, and other related works are not well trained and skilled. Because of this these quality problems have been occurred. Most of the labors are not skilled so we can't say; they can achieve quality 100%"

The first question for survey was "have you observed any quality problem over/in the house?

Table8: Observation of Quality Problem

		Frequency	Percent
Quality problem	Yes	182	92.9
	No	14	7.1
	Total	196	100.0

. Source: questionnaire analysis 2017

This table shows that 92.2% of the respondents agree that the houses they are lives in have quality defects. And 7.1% of the respondents say the houses they are lives in have no quality problems. When it is compared to the result from interview this data is valid. Because all respondents in the interview there is quality defects related to finishing works.

Also this table shows that only 182 respondents are eligible to this study to participate in all question presented in the questionnaire. But the rest 14 respondents are participated in this survey to respond only two questions which are question 4 and 5. Because they said they did not

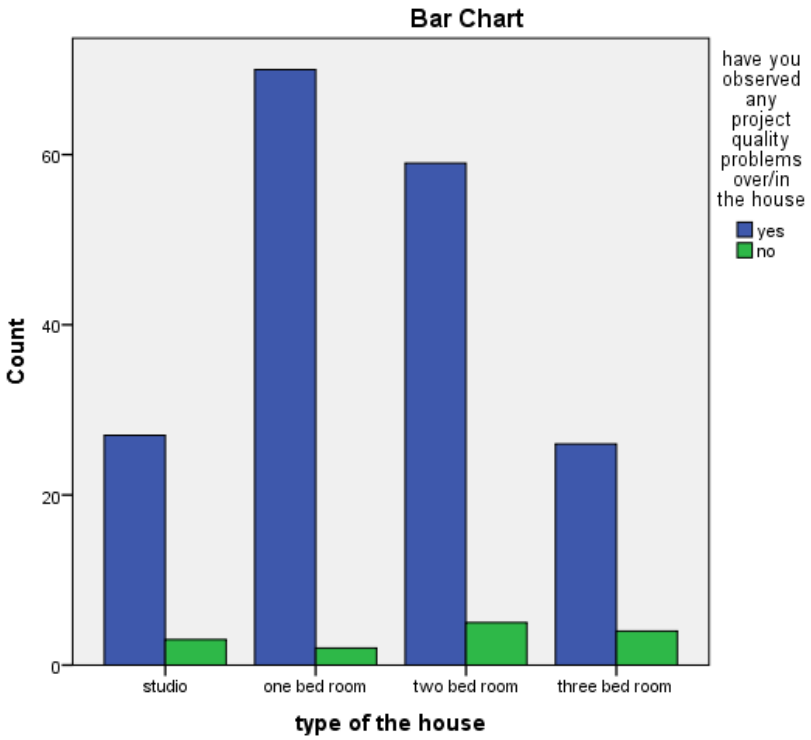
observe any quality problem in their house. This indirectly tells us they are satisfied with project. Note that except question 4 and 5 the rest of the questions are asked only for 182 respondents. Also analysis of frequency and percentage are calculated based on these 182 respondents except question 4 and 5.because these questions are presented for all of the respondents.

Table9: Cross tab one, type of the house * have you observed any project quality problems over/in the house Cross tabulation

		have you observed any project quality problems over/in the house		Total	Percent of yes
		Yes	no		
type of the house	studio	27	3	30	15.3
	one bed room	70	2	72	36.7
	two bed room	59	5	64	32.7
	three bed room	26	4	30	15.3
Total		182	14	196	100

. Source: questionnaire analysis 2017

Figure 2: Observed Quality Problems by House Type.



Source: questionnaire analysis 2017

This figure shows that the relation of quality problem occurrence with type of the house. The data shows that all house type have quality problem. In addition one bed room type of the house and two bed room types of houses are many say there is quality problem. But it is not significant because the number is large because the respondents in the two types are many because of the randomization. So it is not good to say the quality problems and type the house have direct relation.

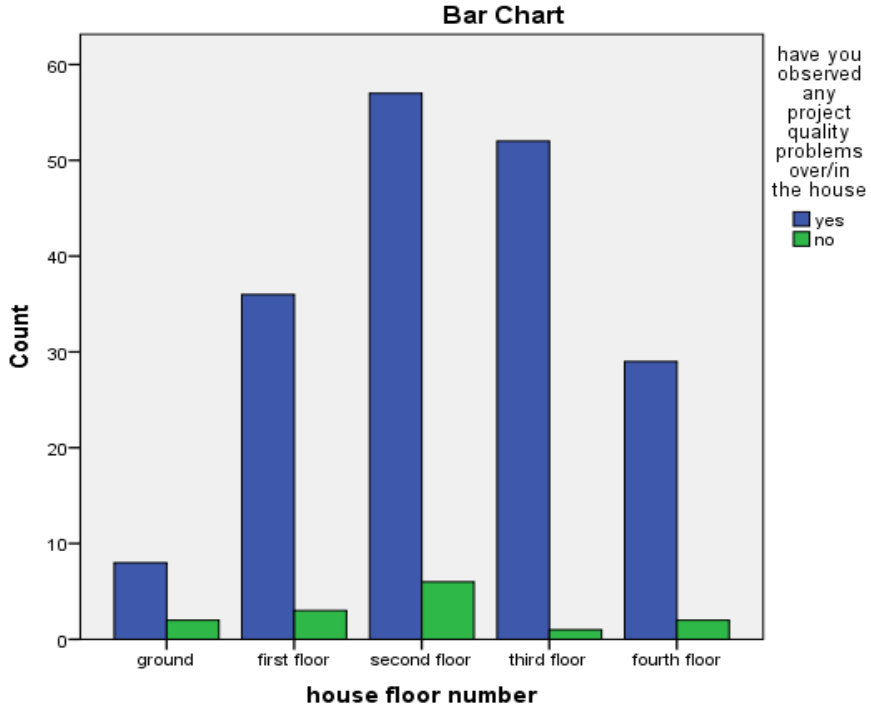
Table10: Cross tab two,house floor number * have you observed any project quality problems over/in the house Cross tabulation

		have you observed any project quality problems over/in the house		
		yes	no	Total
house floor number	Ground	8	2	10
	first floor	36	3	39
	second floor	57	6	63
	third floor	52	1	53
	fourth floor	29	2	31
Total		182	14	196

Source: questionnaire analysis 2017.

This table shows the distributions of respondents who say there is quality problem and say there is no quality problem in the number of house floor.

Figure3: Observation of Quality Problems by Number of House Floor.



Source: questionnaire analysis 2017

The second question is “What quality problems have you observed when you receive the house from Government?”

This question is presented to 182 respondents who said yes on question one from the total respondent, which asks if they observed quality problems in their houses. The rest 14 respondents are said no. Most of the variables presented in below table are selected based on pre informal survey. All the variables are selected because of most house occupants have quality grievance on these variables when they receive the houses from the government. The researcher provides these variables to test house occupant’s observation towards the quality of the house regarding to finishing works. Because most of the quality defects of the house are related to finishing works. Even this idea is supported by the consultants who are participated in this research.

Table11: Quality Defects

QUALITY PROBLEMS	YES		NO		TOTAL	
	frequency	%	Frequency	%	frequency	%
Broken door or window handle and broken glasses	91	50	91	50	182	100
Doors and windows not close and not open properly	146	80.2	36	19.8	182	100
Incomplete kitchen and toilet materials	121	66.4	61	33.6	182	100
Cracked wall, floors and Poor concrete ceiling	104	57.1	78	42.9	182	100
Leaking of water plumping, shower, kitchen and toilet sink	124	68.1	58	31.9	182	100
Deflection of roof	25	13.7	157	86.3	182	100
Leaking of kitchen and toilet hand wash sink	117	64.2	65	35.8	182	100
Poor electric line installation	44	24.1	138	75.9	182	100
Poor water line installation	47	25.8	135	74.2	182	100

Source: questionnaire analysis 2017

The above table shows that most of the respondents participated in this study had found many of the above quality defects in their house when they were received the houses from government. The result shows that 50% of the respondents found that their broken glass of window and door, also broken handle of window and doors. This shows half of the houses have this kind of quality defects when the government transfers the houses. This shows that definitely there is poor finishing work.

The other quality problem variable presented to the respondents was the condition well opening and closing of doors and windows. Regarding to this 80.2% of the respondents was agreed that doors and windows have a problem of easily to be open and close. This shows that finishing works regarding to fitting doors and windows are poor. According to respondents from the

consultant this kind of quality problem is caused because of poor workmanship. However the rest 19.8% of the respondent did not face any quality problem related to doors and windows.

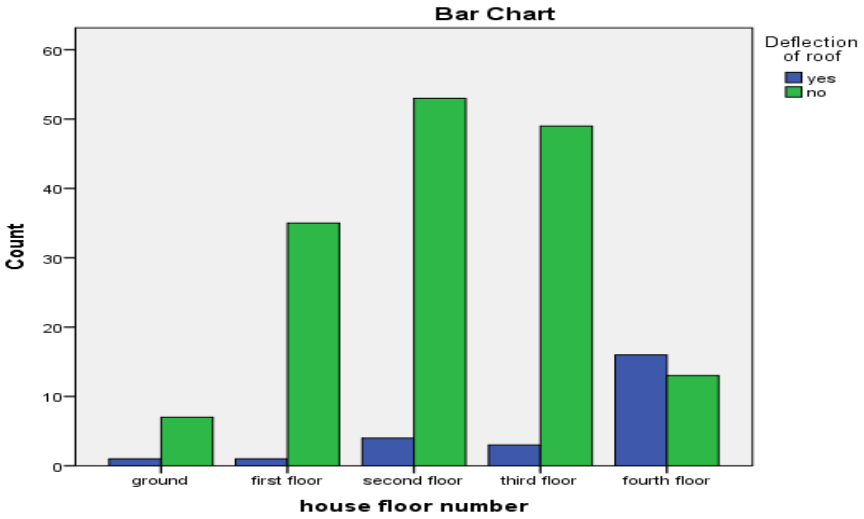
The other quality problem presented as a question to the respondents was whether they observe or not quality problem related to incomplete kitchen and toilet materials. 66.4% of the respondent reply that they face this problem. They found their house with in complete kitchen and toilet materials. The rest 33.6% of respondents reply that they did not face this kind of quality problem.

In this section respondents also asked about quality problem related to whether they observed cracked walls, floors and poor ceiling of concrete. In this regard 57.1% of the respondents were replied that they had faced this quality problem when they receive the house from government. And most of them are engaged to reconstruct the interior wall part of the house. This also shows there was poor finishing work in the project. The rest 42.9% of respondents were replied they did not faced this kind of quality problem when they receive the house.

Although respondents were asked whether they faced quality problem or not related to leaking of water inside shower and kitchen. 68.1% of respondents were replied that they had faced this problem when they receive and since they are start to live in the house. According to the respondents from the consultant this kind of quality problem is very critical in most projects sites of the AAHDP. Most of the housing construction project had this kind of quality defects which is leads the houses sustainability under question. The rest 31.9% of respondents replied they did not faced this kind of quality defects.

The other quality defects asked to the respondent was quality problem related to deflection of roof. Most of the respondents were responded they did not face this kind of quality problem. This counts to 86.3% of the respondents. The rest 13.7% of the respondents replied that they had faced this kind of problem when they receive the house. To make the data valid most of the respondents were lives in fourth floor. The following figure shows the relation of the fourth floor with deflection of roof.

Figure4: Deflection of Roof by House Floor Number.



Source: questionnaire analysis 2017

Regarding to the leaking of kitchen and toilet hand wash basin 64.2% of the respondents were replied that they have faced this kind of quality problem while they are living in their houses. The rest 34.8% of respondents replied that they did not faced this kind of quality problem while they are living in their houses.

The other factor presented to answer for respondents were quality problems related to electricity and water line installation. Most of the respondents were replied that they had no experience related to the quality problems. 75.9% and 74.2% of the respondents were replied they did not face electricity and water line installation problem when they receive the house respectively. The rest 24.1% and 25.8% of the respondents replied they had experienced poor electricity and water line installation quality problem in their house respectively.

In general this finding show that almost all quality problems mentioned in the table had been occurred. Among these variables doors and windows not open and close properly is the most significant quality problem. This problem had occurred in 80.2% of respondent's house. This quality problem is directly related to finishing work which is improper fitting of doors and windows. The second quality problems occurred next to this variable is Leaking of water plumping, shower, kitchen and toilet sink. This took 68.1% of respondent's agreement. This problem also shows that poor finishing works.

The next question provided to respondents was quality defects related to the most difficult condition when they are tried to fix finishing work after they received their house. Based on the data from observation most of respondents houses are reconstructed and plastering in new design. They had applying gypsum chuck and plastering with different paints based on their interest. But before they refit the interior part of the house, it was unattractive, cracked and irregular level of wall and ceiling. This shows poor finishing work of the project. Here also 182 respondents are participated who said yes on question one. The rest 14 respondents from 196 were not participated to respond this question because they don't have quality problem at all.

Table12: Difficult Conditions to Fix Finishing Work

QUALITY PROBLEMS	**YES**		**NO**		**TOTAL**	
	frequency	**%**	**frequency**	**%**	**frequency**	**%**
Irregularity of wall level	150	82.4	32	17.6	182	100
Irregularity of floor level	91	50	91	50	182	100
Irregularity of ceiling level	141	77.4	41	22.6	182	100
difficulty to fix inside and main door and windows	150	82.4	32	17.6	182	100

Source: questionnaire analysis 2017

The above table and figure shows that the most difficulties which faced house occupants when they are trying to fix finishing work after they received the houses.

According the respondents in interview with consultants, most of the quality defects of the houses are emerged due to poor finishing works. Here also most of the factors presented to test quality of the houses to respondents are somewhat related to finishing works. Even though, most of the respondents replied that they had faced these quality defects while they are conducted finishing work after they received their houses.

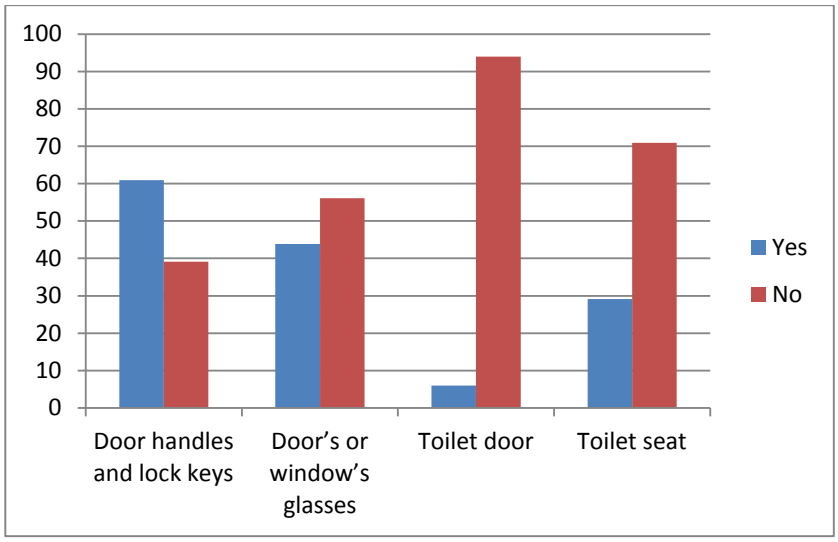
According to the data presented on the above table 82.4% of respondents replied that they had faced irregularity of wall level while they are conducted finishing work after they received the houses. The rest 17.6% of respondents replied that they did not faced this kind of quality problem while they are conducting finishing works. Based on the data from researcher's observation most of the houses which are transferred to owners but no resident yet, this condition had occurred significantly. The walls are not level, and they had cracked.

In another condition 50% of respondents replied that they had face irregularity of floor level when they received the house. This is also huge number to justify there is quality problem related to constructing floor levels.

77.4% of the respondents are replied that they had faced irregularity of ceiling level while they conducting finishing work after they received the houses. The rest 22.6% of respondents replied that they did not faced this kind of quality problem while they are conducting finishing work.

Finally 82.4% of the respondents were replied that they had faced difficulties of fixing, properly closing and opening of inside doors and windows while they are conducting finishing works. The rest 17.6% of respondents replied that they did not faced this kind of quality problem while they are conducting finishing works.

Figure5: Most Difficult Conditions to Fix Finishing Work



Source: questionnaire analysis 2017

In general all variables listed in the above table and figures are quality problems of the respondents. Among the listed quality problems regarding to being difficulties in finishing work for house occupants, irregularity of wall level sharing 82.4% of the respondents and difficulty to fix inside and main door and windows sharing 82.4% are significant quality problems faced by residents. This result shows that the houses have poor quality regarding to finishing works.

4.6.1.1. HOUSE BUILDING EQUIPMENT FORCED TO REPAIR

The researcher had provided some equipment which respondents are forced to repair because of improper function after they received the house. These equipment are presented based on pre survey which is focused what materials most of the house occupants are forced to repair. These equipment are changed not only because of poor quality or malfunction, it is also because of the materials are not attractive for the residents.

Table13: House Building Equipment Forced to Repair.

DEFECTED MATERIALS	YES		NO		TOTAL	
	frequency	%	frequency	%	frequency	%
Door handles and lock keys	111	60.9	71	39.1	182	100
Door's or window's glasses	80	43.9	102	56.1	182	100
Toilet door	11	6	171	94	182	100
Toilet seat	53	29.1	129	70.9	182	100
Hand wash basin	71	39.1	111	60.9	182	100
Plumping parts	113	62	69	38	182	100
Kitchen sink	4	2.1	178	97.9	182	100
Agro stone	26	14.2	156	85.8	182	100

Source: questionnaire analysis 2017

The above table shows that materials which are house occupants are forced to repair because of malfunction or not to be attractive for the residents. According to informal interview beside to the survey with respondents, most of the respondents are engaged to repair door locks and door handles are repaired because of most of them are not work and breaks. According to the data from the above table 60.9% of respondents are repair their houses door lock keys or door handles because of malfunction. The rest 39.1% of respondents did not engaged in repairing of door lock keys or door handles because of malfunction.

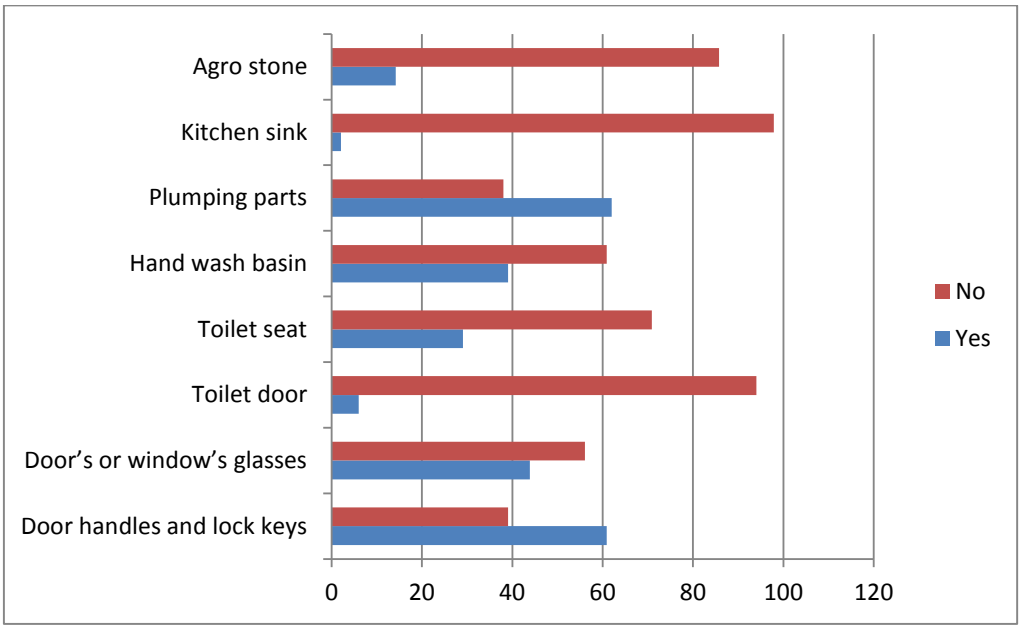
56.1% of the respondents were not engaged to repair their houses window's glasses because of malfunctioning. The rest 43.9% of the respondents were engaged to repair their houses window's glass because of breakage when they received the houses and also because of security issue. They were not satisfied with glasses which they believed that the glass could not have the

capacity to prevent robbers. According the data from respondents of interview with consultants most of the residents engaged to repair window glass, door glass and window PVC frame, it is because of fearing robbers and security issue.

Most of the respondents were not engaged in repairing of toilet doors. 94% of the respondents are not engaged to repair toilet doors. This shows toilet doors are good enough in their quality and are well-functioning. The rest 6% of the respondents were engaged to repair toilet doors because of malfunctioning or based on their interest.

70.9% of the respondents did not engage to repair their toilet seats. They are satisfied what they got when they were received the house. The rest 29.1% of respondents are engaged to repair their house toilet seats because of malfunctioning and poor quality. 60.9% of the respondents did not engage to repair their house hand wash basin because of malfunctioning. They had got the hand wash basin well-functioning and satisfied with its quality. The rest 39.1% of the respondents were forced to repair hand wash basin because of its malfunctioning. Most of the respondents were engaged to repair plumping parts because of leaking water and improper functioning. 62% of the respondents were engaged to repair plumping parts. The rest 38% of the respondents did not engage to repair plumping parts because of malfunctioning. In addition most of the respondents, 97.9% of the respondents did not engage to repair kitchen sink because of poor quality and malfunctioning. This shows that kitchen sinks are good quality materials. The rest 2.1% of the respondents were engaged to repair kitchen sink. Finally 85.8% of the respondents did not engaged to repair Agro stone board partition because of poor quality. But they have still complained on the quality of assembling and finishing works of the partition. The rest 14.2% of the respondents are engaged to repair the Agro stone board partition with bricks because of poor quality of assembling and finishing works.

Figure6: House Building Equipment Forced to Repair



Source: questionnaire analysis 2017

In general, according to the data result most of respondents are engaged to repair door handle and lock keys (60.9%) and plumping parts (62%). This shows that most of door handles and lock keys as well as plumping parts had big quality problems.

4.6.2. WATER AND ELECTRICITY UTILITY PROBLEMS

4.6.2.1. Table14: WATER LEAKAGE AND UTILITY PROBLEMS

WATER LEAKAGE PROBLEMS	YES		NO		TOTAL	
	frequency	%	frequency	%	frequency	%
Leaking through doors	70	38.4	112	61.6	182	100
Leaking through windows	125	68.7	57	31.3	182	100
Leaking through roof	82	45	100	55	182	100
Leaking inside the kitchen	42	23	140	77	182	100
Leakage inside bathroom	107	58.8	75	41.2	182	100

Source: questionnaire analysis 2017

The above table is presented to asses quality problems of the houses related to water leakage and water utility defects. Here the researcher provided five water utility quality defects most often occurred in most of the houses. According to the data presented in the table most of these problems are not significant except leakage of water through windows and leakage inside bathroom.

61.6% of respondents replied that they did not faced water leakage problem through their door, whereas the rest 38.4% of respondents replied that they had faced water leakage problem through their door. According to interview respondents this problem is happened because of improper fitting of doors. But the problem is not that much significant.

68.7% of the respondents agree that they had faced water leakage problem it might be rain through windows. According to respondents from interview with consultants this problem mostly happened because of poor finishing work related to poor fitting of windows. The rest 31.3% of respondents replied that they did not faced this kind of quality problem. In the other hand 55% of the respondents replied that they did not face water leakage problem through their house roof. However, adequate numbers of respondents (45%) to them are also replied they had faced water leakage problem through their house roof. Most of the respondents are lives in fourth floor of the buildings.

Table15: Cross tab three, House Floor Number * Leaking through roof Cross tabulation

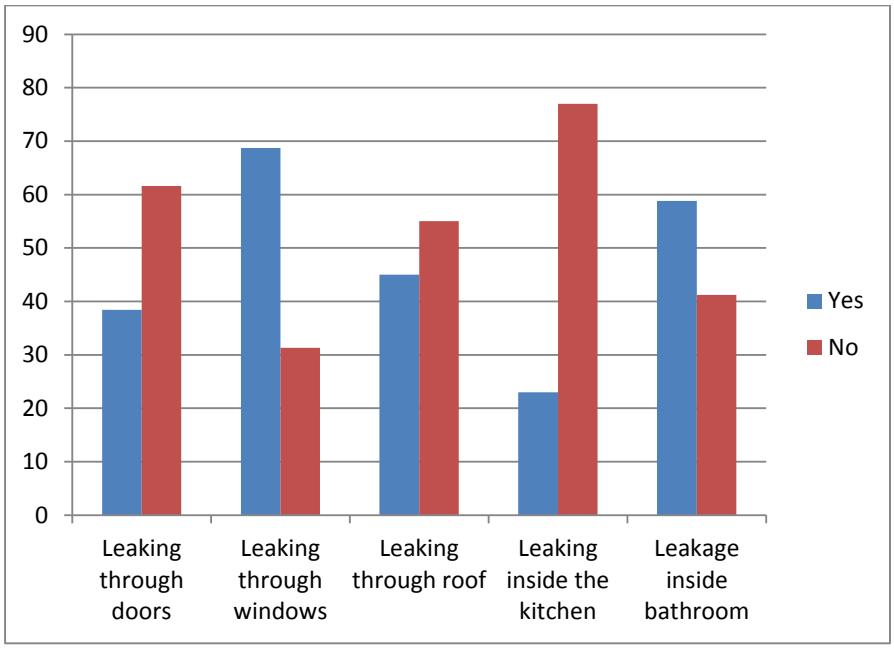
		Leaking through roof		Total
		Yes	No	
house floor number	ground	4	4	8
	first floor	14	22	36
	second floor	23	34	57
	third floor	19	33	52
	fourth floor	22	7	29
Total		82	100	182

Source: questionnaire analysis 2017

The above table shows that proportionally most of the respondent replied that they had faced water leakage problem through their roof are residents on second and fourth floor of the buildings. In the other hand 77% of the respondents were replied that they did not face water leakage problem inside their kitchen and the rest 23% of the respondents replied that they had

faced this kind problem inside their kitchen. Finally 58.8% of the respondents replied that they had faced water leakage problem inside their bathroom. The rest 41.2% of the respondent replied that they did not face water leakage problem inside their bathroom.

Figure7: Water Leakage Problems



Source: questionnaire analysis 2017

Generally water leakage problem through window (68.7%) and water leakage problem inside bathroom (58.8%) are the main challenges faced residents as water leakage problem.

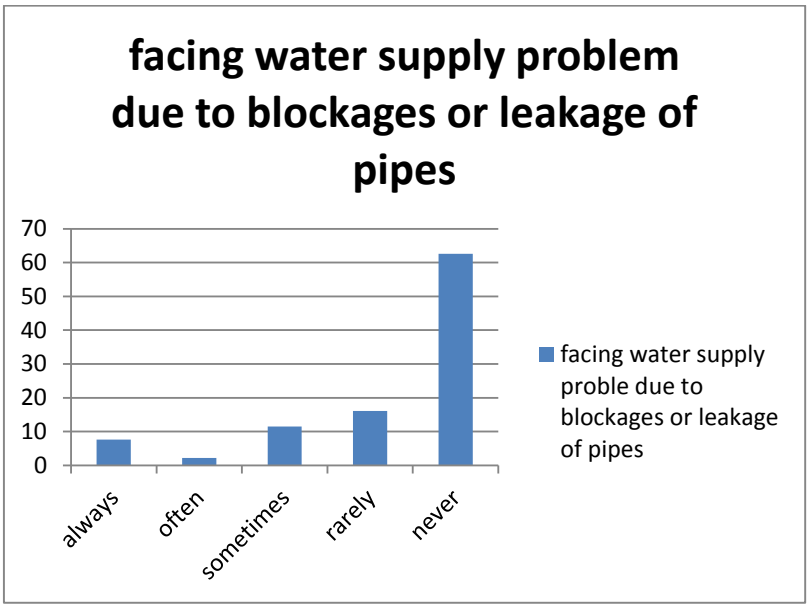
The next question provided to respondents was regarding to water utility problem. This question was intended to assess whether residents faced water utility problem or not due to water leakage problems.

Table16: Do you face water supply problem due to blockage or leakage of pipes

		Frequency	Percent
Valid	always	14	7.6
	often	4	2.2
	sometimes	21	11.5
	rarely	29	16.1
	never	114	62.6
	Total	182	100.0

Source: questionnaire analysis 2017

Figure8: Water Supply Problem due Water Pipe Leakage



Source: questionnaire analysis 2017

The above table and figure shows that most of the respondents did not faced water supply problem due to water pipe leakage. 62.6% of the respondents replied that they did not face any water supply problem because of water pipe leakages.

4.6.2.2. ELECTRICITY RELATED PROBLEMS

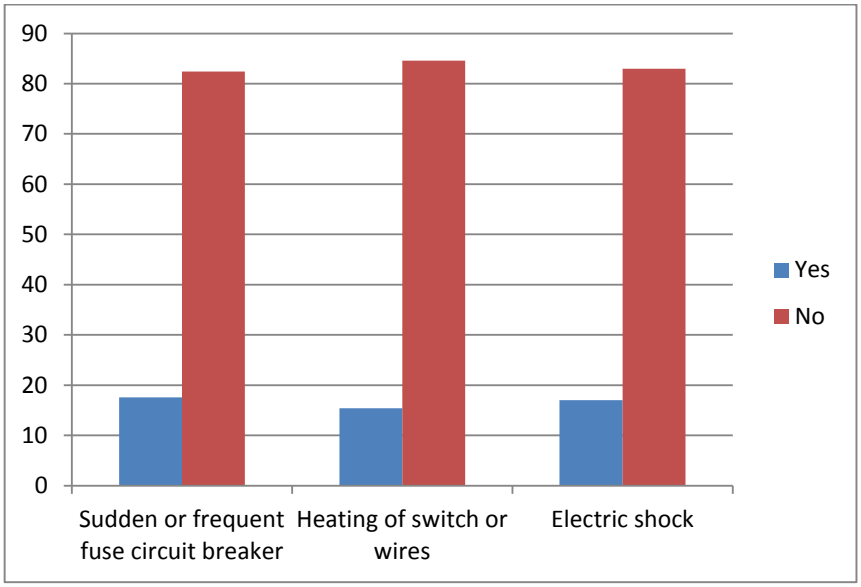
The researcher had provided questions to residents to assess whether they had faced or not quality problems related to electricity utility due to poor completion of the project. The question and variables listed to assess the issue had presented as follows.

Table17: Electricity Problem

ELECTRICITY PROBLEMS	YES		NO		TOTAL	
	frequency	**%**	**frequency**	**%**	**frequency**	**%**
Sudden or frequent fuse circuit breaker	32	17.6	150	82.4	182	100
Heating of switch or wires	28	15.4	154	84.6	182	100
Electric shock	31	17	151	83	182	100

Source: questionnaire analysis 2017

Figure9: electricity problem



Source: questionnaire analysis 2017

The above table and figure shows that most of the respondents replied that they did not faced electricity utility problem due to installation of electric works in the project. On average 83.3% of respondents replied that they did not faced the above electricity problems since they are living in their houses. This shows that the project has done good electric installation works.

4.6.3. HOUSE DESIGN AND ENVIRONMENTAL PROBLEMS

The first question in this section was related to assess whether residents are engaged or not to repair materials in order to fix quality problems related to overall construction and design of the house.

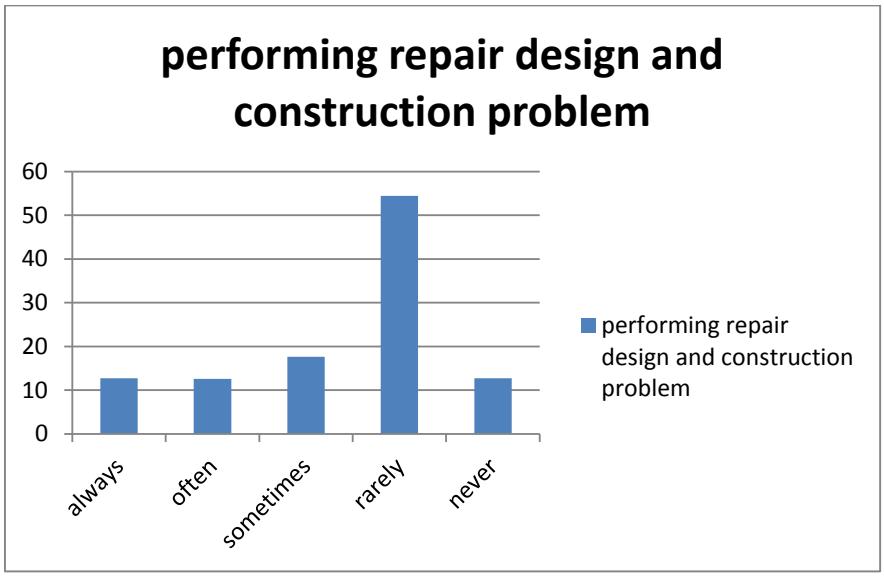
Table18: Performing Repair due to Poor Construction

overall how often do you required to perform repair due to construction problems in your house			
		Frequency	Percent
Valid	always	5	2.7
	often	23	12.6
	sometimes	32	17.6
	rarely	99	54.4
	never	23	12.7
	Total	182	100.0

Source: questionnaire analysis 2017

The above table shows that responses of residents for the question whether they engaged in action in order to repair construction outputs due to poor quality performance. According to the above result, 2.7% of respondents are replied that they had always engaged to repair construction problem. 12.6% of the respondents had replied that they were often engaged to repair construction problem. 17.6% of the respondents replied that they were sometimes engaged to repair construction problems. 54.4% of replied that they rarely engaged to repair construction problems. The rest 12.7% of respondents replied that they did not engaged to repair any construction problem.

Figure10: Performing Repair due to Poor Construction



Source: questionnaire analysis 2017

Generally according to the above chart most of the respondents referring the respondents rarely engaged to repair construction problem, are less engaged to repair construction problems.

Basically the researcher had developed Likert scale type questions to assess resident's opinion about housing design and total environment where the houses are constructed.

There are 13 questions were presented to respondents to assess their attitude towards the housing design and the environment where the construction sites are located.

Table19: Design and Total Environment Quality of the Houses

Problems	Strongly agree		Agree		Abstain		Disagree		Strongly Disagree		TOTAL	
	frequency	%	frequency	%	frequency	%	frequency	%	frequency	%	frequency	%
The houses are constructed with relevant and quality construction materials	1	0.5	13	7.1	53	29.1	93	51.1	22	12.1	182	100
The house interior partition and other finishing works are done with poor quality?	55	30.2	107	58.2	13	7.1	6	3.3	1	0.5	182	100
The house has enough air vents	10	5.5	98	53.8	15	8.2	52	28.6	7	3.8	182	100
Mobility is easy in the house	5	2.7	67	38.6	27	14.8	73	40.1	10	5.5	182	100
Number of windows are enough	7	3.8	101	55.5	10	5.5	53	29.1	10	5.5	182	100
Enough water and electric line infrastructure has built	6	3.3	88	48.4	27	14.8	52	28.6	9	4.9	182	100
The house is suitable to move for elders and disabled peoples	0	0	14	7.7	64	35.2	89	48.9	15	8.2	182	100
Children can easily move and play in the house	1	0.5	50	27.5	30	16.5	90	49.5	11	6	182	100
The compound have enough space for parking	1	0.5	23	12.6	91	50	63	34.6	4	2.2	182	100
The compound have enough space for children play ground and family retreat	0	0	3	1.6	82	45.1	89	48.9	8	4.4	182	100
The roof and rain disposal and drainage system is well designed	0	0	37	20.3	45	24.7	91	50	9	4.9	182	100
It is very good place where the houses are	53	29.1	78	42.9	20	11	28	15.4	3	1.6	182	100

built.												
The roads are built with good quality	4	2.2	82	45.1	41	22.5	52	28.6	3	1.6	182	100

Source: questionnaire analysis 2017

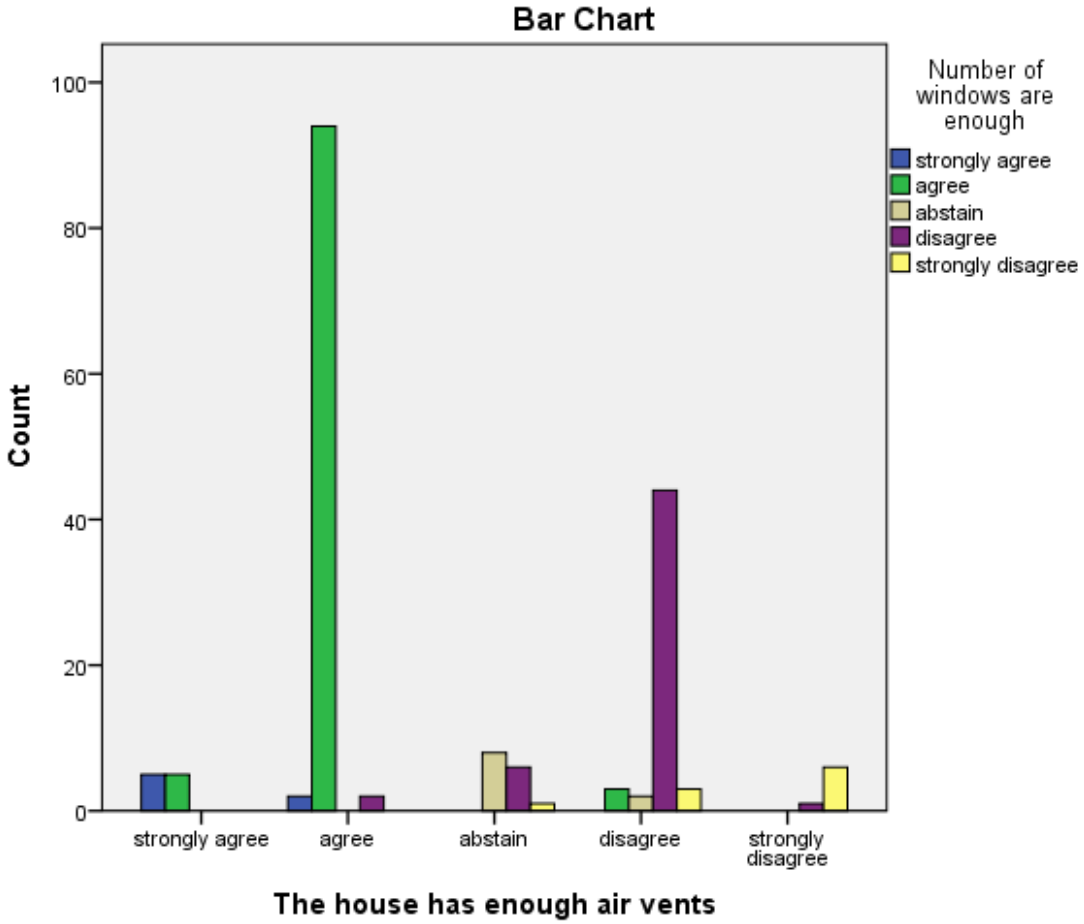
The above table is presented to show the assessment of project quality works regarding to house design and total environment of the project site. According to the results from the survey, the following points are presented. 51.1% and 12.1% of the respondents were replied that they disagree and strongly disagree regarding to the houses are built with relevant and quality input or project materials respectively. This shows that the materials are not fulfill the required quality performance. However according to the respondents from interview with project consultants, all materials used to construct the base and structural building are fulfill the quality requirement of the project. But they also replied that, they also have question on the quality of finishing materials. Based on their response, they did not have any involvement towards the finishing work. This shows that they are agree with resident's response towards poor construction materials are used with related to finishing work materials. The rest 21.9%, 7.1% and 0.5% of respondents were replied abstain, agree and strongly agree towards the issue respectively. Collectively most of the respondents almost 63.2% of the respondents agree that the project used poor quality construction materials.

The other question forwarded to respondent regarding to assess quality performance of the houses related to design and environment was, quality of the houses in relation to interior partition and other finishing works. 30.2% and 58.2% of the respondents were replied strongly agree and agree towards the issue respectively. The remaining respondents, 7.1%, 1% and 3.3% of respondents replied that abstain, disagree and strongly disagree towards the issue respectively. This shows that most of the respondents, almost 88.4% of the respondents were agreed that interior partition and finishing works of the project had been completed with poor quality.

The next issue presented to assess quality of works regarding to design and total environment of the house is whether enough air vents is available in the house or not.

Here the researcher needs to see this issue with combination of number of windows in the house. Because availability of air movement and air vent is directly related to number of windows in the house.

Figure11: cross tab between Enough Air Vents in The House and Number of Windows in The House



Source: questionnaire analysis 2017

The above figure shows that 5.5% and 53.8% of the respondents replied that they are agreed the houses have enough air movement and air vents. In addition 3.8% and 55.5% of the respondents were replied that they are agreed number of window is enough in the house. When we see this figure collectively almost 59.3% of the respondents are happy with availability of enough air vents in the house and 59.3% of the respondents are happy with number of windows in the house. The figure shows equal proportion of enough air vents in the house have enough number of windows.

The other issue presented in this section to assess design and environmental quality of the project is related to mobility in the house. 5.5% and 40.1% of the respondents replied that mobility is

difficult in the house. Whereas 2.7% and 38.6% of the respondents were replied that mobility is easy in the house. The rest 14.8% of the respondents replied that they can't say mobility is easy or difficult in the house. They remain saying abstain about the issue. However the above data shows mobility is somewhat difficult in the house.

The other issue regarding to quality of house design and total environment is installation of enough electricity and water line. Regarding to this condition most of the respondents (51.7% collective respondent of strongly agree and agree) replied that there is enough electricity and water line installation. 33.5% (collective of respondents to strongly disagree and disagree) of respondent replied that they don't believe installation of electricity and water line are performed with quality. The rest 14.85 of the respondent remain abstain to respond regarding to the issue. The other thing presented to assess about house design is whether mobility for elders in the house is difficult or not. Here most of the respondent replied that they are not agreed to the issue. Almost 57.1% of the respondents replied that they strongly disagree or disagree that the houses are suitable for elder's mobility. 35.2% of respondents remain abstain and the rest 7.7% of the respondent agreed that the houses are suitable for elder's mobility.

The other thing the researcher presented to assess design and environmental quality of the house is related to children, whether the house is good for children's movement of not. Here most of the respondents replied that the houses are not good for children's movement in the house. 55.5% of the respondents replied that the houses are not good for children's movement. 28% of the respondents replied that the houses are suitable for children's movement in the house. The rest 16.5% of the respondents remain abstain regarding to the issue.

The next question presented to respondents was whether the houses compound has enough parking spaces or not. 36.8% of the respondents replied that the compound does not have enough space for parking. 13.2% of the respondents replied that the compound has enough space for parking and the rest 50% of the respondents were remaining abstain. In general this data shows that the compound does not have enough parking spaces.

The other question presented to respondents were related to whether the compound or project site has enough spaces for children play ground and green areas for family retreat or not. The above data shows that 53.3% of the respondents replied that the compound does not have enough

children's playground and green area for family retreat. The other 1.6% of respondents agreed that the compound has children's playground and green area for family retreat. The rest 45.1% of the respondents remain abstain. This data shows that the compound completely doesn't have refreshing area.

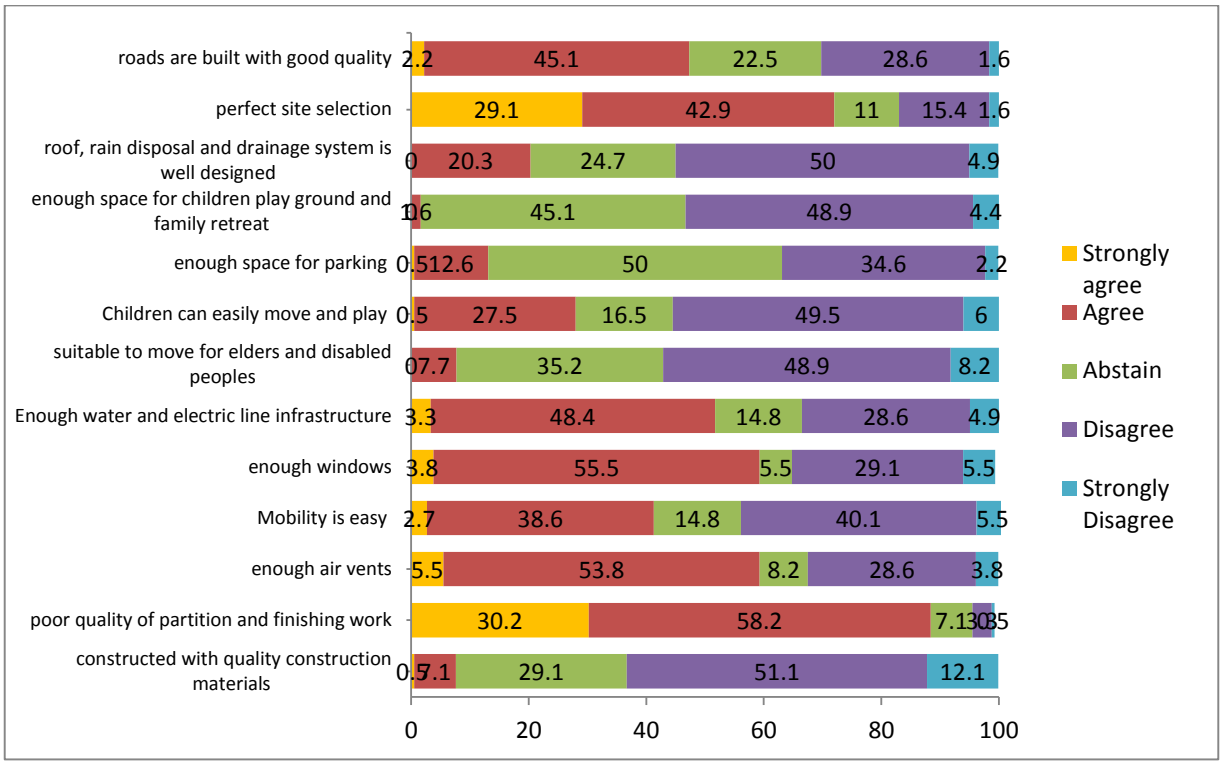
Regarding to design quality of the house in relation to roof rain disposal and drainage system is well designed, 54.9% of the respondents replied that there is poor roof rain disposal and poor drainage system. According to the researcher's data from observation, the drainage system of the project is poor. Because it is to find toilet wastes and house liquid wastes on the road side of the projects area. 20.3% of the respondents replied that they agree that roof rain disposal and drainage system of the project is well designed.

Regarding to site selection and project area 72% of respondents were replied that they are happy with site selection. 17% of the respondents replied they did not agree with the site selection and the rest 11% remain abstain. This data shows that the project site locations or the total environment are good to residence.

Regarding to quality of roads and other infrastructural development works 47.3% of respondents replied that they agreed that roads are constructed with good quality. 30.2% of respondents replied that they disagree that the roads are constructed with quality and the rest 22.5% of the respondents remain abstain. This data shows somewhat the roads and other infrastructural development works are performed with quality.

In general the figure presented below shows those responses of the participants in regarding to the raised issues related to quality of the house design and total environment.

Figure12: Design and Total Environment Quality of The Houses



Source: questionnaire analysis 2017

Generally based on the figure presented above, poor quality of partition and finishing work, using of poor quality of construction materials, difficulty to move in the house, difficulty to move in the house for elders, difficulty to move and play in the house for children, lack of enough space for children's playground and green area for family retreat, poor design of roof rain disposal and drainage system are the most significant design and environmental problems in these project sites.

4.7. MAJOR CAUSES OF QUALITY DEFECTS IN THE PROJECT

In construction project there many quality problems are emerged due to different reasons. According to the responses interview with project consultants, managing quality in the project is the very critical responsibility of all stakeholders who are participated in the project directly or indirectly. This task is not only the responsibility of the consultant. Project quality management needs big concentration and responsibility. However, most of the time, construction projects had

faced different quality problems due to different circumstances. Here according to the respondents there are many causes for project quality problems. In general poor workmanship, unskilled labor and lack of proper and continuous training for labors, project time, project cost or project budget and lack of material supply on time are the major factors for poor project quality performance. According the respondents the above major cause of quality defects has direct impact on the quality performance of the project. "Payment is the major cause for these quality problems. Most of the contractors can't appoint professional and skilled man power with this project budget and payment. Because of this most of the contractors appoint non skilled labor by giving some training to conduct the project based on its budget. This situation becomes the main cause for quality problems because of poor workmanship. All contractors engaged in this project are agreed to complete the project in 10-12 months. But the project took over 4 years. We can mention many factors for the delay. Lack of government and contractor and consultant capacity, lack of material are major factor contributed to delay of the project. Since government took responsibility to provide the required material, it must take the leading responsibility for the delay of the project. Because of the project delay, there are many problems also occurred. Contractors turnover, increase of material cost, increase of house cost, increase of contractor's cost are some problems. This directly indirectly can cause project quality problems. As we know that cost, time and quality in project can have direct relationship. If project time is delayed it may increase project cost and directly can affect project quality. When your cost increases very high the project quality may decrease in the same pattern. Cost escalation is very high. You can imagine that the time value of money before for years. For example wage for labor before four years is not the same as current, it is significantly increased. This may lead the contractors to appoint unskilled labor to meet the project based on the budget".

4.8. CONSUMER LEVEL OF SATISFACTION

Consumer satisfaction is one of the major aim project management and every project has striven to satisfy its consumers. In order to this every project had implement different strategies to provide quality products and deliveries. Here in this section the researcher has presented level of satisfaction of the consumers regarding quality conditions of the houses they received from the government. According to the data from interview respondents, consumer's satisfaction regarding project quality is medium. They forwarded many quality complains on the house. "As

a consultant I can say that consumer complaint is correct. But we need to know that government is tried to address the houses in low cost. Government set house affordability is as an objective. So the project is performed based on the project budget. The main cause for this project quality problem is the project budget". According to the respondents the major cause for quality problem here is the project budget. It can't invite professionals. So the project delivery is poor in quality. Then it is not fair to expect consumers could be satisfied with the project.

Based on the survey result consumer's level of satisfaction is presented below.

Table20: Rate Quality of Construction

overall how do you rate the quality of building in terms of its construction			
		Frequency	Valid Percent
Construction quality	very poor	33	16.8
	Poor	89	45.4
	Fair	55	28.1
	good	18	9.2
	very good	1	.5
	Total	196	100.0

Source: questionnaire analysis 2017

The above table shows that how consumers or house occupants rate the quality of the construction. According to the data most of the respondents agreed that the quality of the construction is poor. Almost 62.2% of the respondents replied that quality of the construction is poor.

Figure13: Rate of Construction Quality.

Source: questionnaire analysis 2017

According to the above figure the construction quality performance of the project is poor. This indirectly shows that most of the residents are not happy or satisfied with the project.

The next thing the researcher presented a question to assess satisfaction level of the consumers. This issue may directly relate to the above condition.

Table21: House Occupant's Level of Satisfaction

what is your level of satisfaction			
		Frequency	Valid Percent
Level of satisfaction	very dissatisfied	30	15.3
	dissatisfied	64	32.7
	middle	92	46.9
	satisfied	9	4.6
	very satisfied	1	.5
	Total	196	100.0

Source: questionnaire analysis 2017

This table shows that the frequency and percentage of the level of satisfaction of house occupant regarding to quality performance of the project. 15.3% of the respondent replied that very dissatisfied with the project, 32.7% of the respondent replied that dissatisfied with the project, 46.9% of respondent replied that fairly satisfied with the project, 4.6% of the respondent replied

that satisfied with the project and the rest 0.5% of the respondents replied very satisfied with project quality performance.

Figure14: Level of Satisfaction With Project.

Source: questionnaire analysis 2017

The above figure shows that most of the respondents are muddily satisfied with the quality performance of the project. However there are very little residence are very satisfied with quality performance of the project.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

This chapter presents conclusion arrived based on the research finding in relation to the review of literature Presented in chapter. Significantly the conclusion part is presented based on the research questions what this study intended to answer. Similar to the analysis part, summary or conclusion of the study is presented in four sections. Section one is comprises on the practice and process of project quality and management in the project. The second part also comprises that major quality problems and defects of the project. Major causes of quality defects of the project also summarized as section three and finally consumer satisfaction towards the project quality is summarized. Overall this research study had involved project consultants, physical observation and house occupants as a source of primary data and different books and literatures as a source of secondary information. All the data collected for the purpose of this research had been utilized in relation with literature review and the conceptual framework. Generally the conclusion part of this study is presented as follows.

CONCLUSION

5.1. SUMMARY OF THE MAJOR FINDINGS

This section has comprises summary of the major findings

5.1.1. PROJECT QUALITY MANAGEMENT PRACTICE AND PROCESS

According to different project management books, project quality management is the most crucial aspect to deliver project outputs with the required quality performance. As a project, housing construction projects are very sensitive towards project quality. It needs intensive project quality management. Accordingly the AAHDP has implemented intensive project quality management. Quality plan, quality assurance and quality control are major activities of project quality management. Based on the result from interview with project consultants, the AAHDP has mostly implemented quality assurance. Since quality assurance is applying continuous and intensive quality improvement activities, it is well implemented in every project sites. Mainly project consultants are pioneer responsible to conduct project quality management. Also government gives much emphasis to project quality management through increasing number of consultants. According to respondents the structural phase of the project is free from any quality

problems which ensure the sustainability issue is not fall in question. However, the project could not complete with quality. The project consultant has provided different reasons for completing the project with poor quality performance. Most of quality defects of the project are related to finishing works. To maintain quality project consultants implement continuous and improved quality management practices at each and every activity of the project.

5.1.2. MAJOR QUALITY DEFECTS OF THE PROJECT

As presented in the above section, even if the project consultants implemented intensive and continuous project quality management, the project had faced different project quality defects. As initiation of this research, it set assessing of major quality defects and their causes, the researcher involved project consultants and house occupants to gather major quality defects emerged in the projects. In general many quality problems are occurred in every house of respondents. Based on the information from consultants almost all of quality defects are related to finishing works. Even the data from survey is also support consultants idea. Because most of the quality problems presented to respondents as a question are responded as a project defects. According to Chew, Wong & Kang 1998; Alsadey, Omran & Pakir 2010 stated in review of literature the most common construction defects involve leaking roofs and windows, cracked and heaving concrete, cracks in walls and joints, defective plumbing and improperly installed electrical equipment are also proved by this study. Based on the result the most significant quality defects identified by this study are plumping parts, cracked wall and ceiling, interior partition and other related finishing works. Even though, most of the residents had engaged to repair plumping parts and doors handle and lock keys. However, almost all respondents replied that they did not face any quality defects related to electric utility and electricity installation. In addition poor quality of partition and finishing work, using of poor quality of construction materials, difficulty to move in the house, difficulty to move in the house for elders, difficulty to move and play in the house for children, lack of enough space for children's playground and green area for family retreat, poor design of roof rain disposal and drainage system are the most significant design and environmental quality defects in these project sites. Generally most of these quality defects are occurred in most of the project sites conducted by the Addis Ababa housing development program. Also most of the residents are complaining the quality

performance of the project. Project consultants ensure that many of residents are not happy with the quality performance of the projects.

5.1.3. MAJOR CAUSE OF QUALITY DEFECTS IN THE PROJECT

In construction project there many quality problems are emerged due to different reasons. Project quality management needs big concentration and responsibility. However, most of the time, construction projects had faced different quality problems due to different circumstances. Here based on the result from this study there are many causes for project quality problems. As stated in review of literature section especially in conceptual framework of the research, 90% of building failures are due to problems arising in the design and construction stages as well as human or workmanship errors. In addition Lack of sufficient finance, Use of unskilled labor, Use of emerging contractors, Lack of contribution by the private sector, Lack of management commitment toward quality achievement, and Substandard quality of workmanship are some of cause quality defects in housing construction projects. This study had proved these factors as a cause for quality defects of housing construction projects. Based on the result from this study poor workmanship, delay of project time, poor material supply system, poor capacity of contractors, poor experience of contractors, work load on consultants, poor contract administration and high turnover of contractors are major findings of the research as a cause for poor quality performance of the project.

5.1.3. CONSUMER SATISFACTION

Consumer satisfaction is one of the major aims in project management and every project has striven to satisfy its consumers. In order to this every project had implement different strategies to provide quality products and deliveries. Based on the result from this research almost half of the consumers are fairly satisfied by the project and also half the consumers are dissatisfied with quality performance of the project. To conclude the level of satisfaction further study should be conducted.

In general the researcher had attempted all the study objectives and addressed all the research questions.

5.2. RECOMMENDATION

As a conclusion it might not be fair to conclude all project site conducted housing construction by AAHDP has poor quality performance. However since most of the residents complaining regarding the quality of the project the researcher recommends for further study. Basing on the findings and conclusions, the researcher recommends the following to Addis Ababa housing project. It is known that shelter is one of Maslows' basic human needs. However this need should not be manipulated when it comes to quality. It has been found through this research study that the word quality is interpreted very differently by each individual and therefore each one's quality standards would be of a different nature. When it comes to housing, these ideas and standards make the delivery process very difficult. Granted each homeless family would appreciate a solid roof over their heads, but this does not mean that any given standard home would be the answer. Over the years and at present a repetitive model design is being implemented giving people no freedom of choice when it comes to low-cost housing units. This concern creates pressure at government levels to speedily and economically house the homeless but simultaneously suffocating and pressurizing the design team and their processes giving them tight time frames and low budgets to work with in order to deliver a quality design which will suit the homeless.

It was also found that pressures from the design team are passed down to the contractor who in turn needs to deliver the actual product within tighter timeframes and even lower budgets. Furthermore the literature and the findings create a view around procurement systems and its measures. These systems should therefore be closely looked at together with quality assurance systems to structurally alleviate the housing backlog allowing for sufficient timeframes and flexible budgets in order to deliver a quality product.

From the data presentation it is also recommended that community involvement and the incorporation of sustainable methods in the design and construction process should be practiced. In addition it is suggested that inclusion housing should be implemented making the development process much easier. It is through mutual co-operation and consultation that it builds a sound and healthy city, giving each one a sense of pride, by providing each homeless or downtrodden family a home, and by doing so generating a positive change in Addis Ababa today and for years to come.

Further, the researcher has provided the following important recommendation for future related projects with better quality performances.

- The researcher and also all project consultants recommended that, government should have given much attention when selecting project contractors.
- The contractors need to have sense of ownership while conducting the projects to deliver with required quality performance.
- Contractors need to appoint professionals in order to complete the project with expected quality requirement.
- Government should have transfer responsibility of material supply to other stakeholders who can provide all the needed materials on time.
- Participating and inviting final consumers in the design process.
- It better to work on the ground especially in universities to get effective and efficient Engineers and provide awareness to students to have sense of ownership in their future tasks.
- Leaving the finishing work to final consumer and reducing its equivalent costs.
- Conducting consumer survey regarding to finishing works and material selecting before conducting and performing the work.
- Finally in addition to creating job opportunity government need to give much attetion to providing consistent training and capacity building activities to contractors and SMEs who are participating in housing construction projects.

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APPENDICES

APPENDIX 1.

HOUSE OCCUPANT QUESTIONNAIRE

St. Mary's University

School of Graduate Studies

Department of Project Management

Questionnaire for condominium house occupants or dwellers

Thank you in advance for giving time to respond the following questions. This interview is conducted for the fulfillment of my MA program in project management and, of the study "project quality assessment of Addis Ababa condominium housing construction project. "The case of project13, 14 and Bole Ayat site 4." Your response will be completely anonymous and strictly confidential and also will not be identified by individual. All response in this research is used through compiled together with others respondent and analyzed as a group.

I. Demographic section.

1. Sex of respondent?
   a. Male
   b. Female
2. Age of respondent?
   a. 18-23 b. 24-29 c. 30-35 d. 36-40 e. above 41
3. Number of family member lives together ……
4. Type of house?
   a. Studio b. one bed room c. two bed room d. three bed room
5. House area in meter square ……...
6. Age of the house since they received……..
7. Floor number
   a. ground b. 1st floor c. 2nd floor d. 3rd floor e. 4th floor

II. Main questions

A. General problems.

1. Have you observed any project quality problems in the house?

a. Yes

b. No, if no please skip to question 5.

2. What quality problems have you observed when you receive the house from Government? (Multiple responses are possible), please use "√" for your response.

QUALITY PROBLEMS	**YES**	**NO**
Broken door or window handle and broken glasses		
Doors and windows not close and not open properly		
Incomplete kitchen and toilet materials		
Cracked wall, floors and Poor concrete ceiling		
Leaking of water plumping, shower, kitchen and toilet sink		
Deflection of roof		
Leaking of kitchen and toilet hand wash sink		
Poor electric line installation		
Poor water line installation		

3. What was the most difficult part when you executing finishing work? (Multiple responses are possible) please use "√" for your response.

QUALITY PROBLEMS	**YES**	**NO**
Irregularity of wall level		
Irregularity of floor level		
Irregularity of ceiling level		
difficulty to fix inside and main door and windows		

4. Over all how do you rate the quality of building in terms of its construction?

   a. Very poor b. poor c. fair d. good e. very good

5. What is your level of satisfaction?

   a. Very dissatisfied b. dissatisfied c. middle d. satisfied e. very satisfied

6. Which of the following house building equipment you are forced to repair or replace because of improper function or defected?

Quality defects	Yes	No
Door handles and lock keys		
Door's or window's glasses		
Toilet door		
Toilet seat		
Hand wash basin		
Plumping parts		
Kitchen sink		
If any other please specify		

B. Water and electric utility problems

7. What problems related to water seepage you observed in the house?

Problems	Yes	No
Leaking through doors		
Leaking through windows		
Leaking through roof		
Leaking inside the kitchen		
Leakage inside bathroom		

If any other please specify

8. Do you face water supply problem because of blockage or leakage of pipes?

   a. Always b. often c. sometimes d. rarely e. never

9. Have you ever detect the following electricity problem in the house?

Problems	Yes	No
Sudden or frequent fuse circuit breaker		
Heating of switch or wires		
Electric shock		

10. Overall how often do you required to perform repair due to construction problems in your house?

    a. Always b. often c. sometimes d. rarely e. never

C. Problems related to house design and environment

Please give your opinion for the following questions. There are five alternatives (strongly agree, agree, abstain, disagree and strongly disagree) to indicate your opinion about the questions, Please tick (√) on the space made available for each question.

5. Strongly agree 4. Agree 3. Abstain 2. Disagree 1. Strongly Disagree

Problems	**Strongly agree**	**Agree**	**Abstain**	**Disagree**	**Strongly Disagree**
The houses are constructed with relevant and quality construction materials					
The house interior partition and other finishing works are done with poor quality?					
The house has enough air vents					
Mobility is easy in the house					
Number of windows are enough					
Enough water and electric line infrastructure has built					
The house is suitable to move for elders and disabled peoples					
Children can easily move and play in the house					
The compound have enough space for parking					
The compound have enough space for children play ground and family retreat					
The roof and rain disposal and drainage system is well designed					
It is very good place where the houses are built.					
The roads are built with good quality					

APPENDIX 2.

INTERVIEW GUIDE QUESTIONS FOR PROJECT CONSULTANTS.

St. Mary's University

School of Graduate Studies

Department of Project Management

Interview question for project consultant

Thank you in advance for giving time to respond the following questions. This interview is conducted for the fulfillment of my MA program in project management and, of the study "project quality assessment of Addis Ababa condominium housing construction project. "The case of project13, 14 and Bole Ayat site 4." Your response will be completely anonymous and strictly confidential and also will not be identified by individual. All response in this research is used through compiled together with others respondent and analyzed as a group.

I. Personal information.

Sex 1. Male 2. Female

Age……..

Position…….

Educational status (highest level)…….

Working experience as a consultant (in a year)…….

II. Main questions

1. How do you evaluate the housing quality of this project in terms of the following points?
   - Constructing houses keeping its design and structure
   - Housing sustainability
   - Workmanship
   - Consumer satisfaction
   - Electricity and water line installation
   - Quality works regarding to roof and floor
   - Classification of interior partitions in common area of partition
   - Quality of materials (inputs)
   - Contractors capacity and performing quality works

2. Would you please explain how you inspect and measure housing quality?
3. How do you evaluate your project quality management system as a consultant in order to maintain project quality?
4. As a consultant what are the major project quality problems in this project?
5. What are the major causes for project quality problems in this project?
6. How do you explain the impact of project time and cost on project quality?
7. How do you explain house occupant complain regarding to housing project quality?
8. As a consultant, how do you evaluate your project monitoring and controlling practice in order to bring quality project?
9. What do you suggest for further intervention to keep quality in condominium housing construction project?

DECLARATION

I, the undersigned (Abraham Haile), declare that this Master's Thesis is my original work; prepared under the guidance of Tiruneh Legesse (Ass. Professor). All sources of data used for the thesis have been duly acknowledged. I further confirm that this thesis work has not been submitted either in part or full document to any other higher learning institutions for the purpose of earning any Degree Awards.

---------- ----------

Name signature

St.Marry's University, Addis Ababa, Ethiopia. May, 2017.

ENDORSEMENT

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

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Advisor signature

St. Mary's University, Addis Ababa, Ethiopia May, 2017