ASSESSING PROJECT QUALITY MANAGEMENT PRACTICES IN BUILDING CONSTRUCTION PROJECTS: THE CASE OF FEDERAL HOUSING CORPORATION, ADDIS ABABA, ETHIOPIA

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July 2024
Addis Ababa Ethiopia

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A THESIS SUBMITTED TO ST. MARY'S UNIVERSITY SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF PROJECT MANAGEMENT (MA)

June 2024

Addis Ababa

Ethiopia

ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

This is to certify that the thesis prepared by Dawit Misge Bayable is entitled: 'Assessing of Quality Management Practices in Building Construction Projects, in the Case of Federal Housing Corporation" and submitted in partial fulfillment of the requirements for a degree of master of project management that complies with the regulations of the university and meets the standards concerning originality and quality.

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The undersigned currently certifies that the thesis, "Assessment of Project Quality Management Practices in the Building Construction Industry at the Federal Housing Corporation in Addis Ababa, Ethiopia," is entirely original with no submissions for credit by anyone else to the best of their knowledge. It also states that all references consulted for the thesis have been properly cited.

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This certifies that the thesis completed by Dawit Misge on the subject of "Assessment of Project Quality Management Practices in the Building Construction Industry at the Federal Housing Corporation in Addis Ababa, Ethiopia" is his unique creation and may be submitted to be considered for a Masters of Art in Project Management degree. Acknowledgments

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Date June 2024

Acknowledgments

I begin by expressing my profound gratitude to the Almighty God for His unwavering support and protection throughout every facet of my life. I extend heartfelt thanks to my advisor, Dr. Abebaw Kasie (PhD), for his invaluable guidance and insightful suggestions throughout this project. My deepest appreciation goes out to all the respondent participants, particularly the dedicated team members of FHC's project development department, who generously contributed their time to complete questionnaires and engage in enlightening discussions.

I am immensely grateful to all my friends for their invaluable assistance and unwavering support. Lastly, I extend my sincere appreciation to all individuals who offered their help and encouragement along the way, contributing to the successful completion of this project.

Abbreviation

AACRA	Addis Ababa City Roads Authority
FDRE	Federal Democratic Republic of Ethiopia
FHC	Federal Housing Corporation
PQM	Project Quality management
PMBOK	Project Management of Body of Knowledge
PMI	Project Management Institute
QA	Quality Assurance
QM	Quality Management
QMP	Quality Management Process
QP	Quality planning
QP	Quality Policy
SPSS	Statistical Package for Social Science
ISO	International Organization of Standardization
TQM	Total Quality management

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Abstract

This study was primarily conducted to evaluate the quality management practice in building construction projects at FHC. To achieve its objectives, the study employed both descriptive and explanatory research methodologies, using both primary and secondary data. Data collection tools included questionnaires, interviews, and document reviews. The survey questionnaire was designed based on existing literature and information gathered through the document review of the project. The questionnaire was distributed to all 40-project implementation team members, achieving a 100% response rate. The data collected through the questionnaire was analyzed using the Statistical Package for Social Sciences (SPSS). The analysis involved the use of tables, frequency distributions, percentages, and multiple regression approaches. The results of the study indicated that FHC does not implement all stages of the quality management process, tools, and techniques. Inspection was identified as the primary quality management tool used to control project quality. Key determinants of quality in building construction projects included the qualifications and experience of personnel, top management support, communication with stakeholders, the quality of materials and equipment used, and adherence to specifications. The study found that various quality assurance measures were implemented, starting from defining project objectives to monitoring tasks, which were mostly carried out on a monthly or quarterly basis with the involvement of management members. Several barriers for effective quality management were identified, including inadequate management support, unrealistic deadlines, lack of a quality management policy, and right-of-way issues. The study recommended that FHC should develop a separate quality management policy to ensure a comprehensive project quality management process, enhance management involvement, and build capacity in project management skills for the successful implementation of building construction projects.

Keywords: *Quality, Quality Management, Quality Management process.*

CHAPTER: ONE INTRODUCTION

1.1 Background of the study

A project is a short-range endeavor initiated with the goal of creating a unique product, service, or result. It can have distinct beginnings and ends and long-lasting repercussions on the environment, the economy, and society. Every project produces a unique final good, service, or result, which may or may not be significant. Project activities might involve one or more people, one organization unit, or several organizational units from different organizations. Members of a project team might not be familiar with these types of activities (Bitew, 2019). Quality refers to the total characteristics of an entity satisfying stated needs, while grade is a category or rank for entities with similar functional use but different technical characteristics. Construction projects involve various parties, including owners, designers, contractors, and experts.

Quality management techniques are critical for project completion on schedule, within budget, and according to customer specifications. The goal of quality management is to ensure that deliberate, well-coordinated efforts are made to meet the requirements for products and services (K. Wysocki, 2019). From a construction company's perspective, quality management in projects should involve maintaining the required level of construction work quality to achieve customer satisfaction, as this would bring long-term competitiveness and business survival for the companies (Bitew, 2019). Quality management is essential for building enterprises to thrive in today’s aggressively competitive and challenging construction sector.

Quality management, according to McCaffer (2013), must offer the conditions necessary for the efficient deployment of relevant tools, techniques, and procedures, which will result in a company's operational success. For a construction company, quality management is an integral part of every managerial and operational procedure within the organization, rather than existing as a stand-alone function. Regarding the application of quality management in project administration, one of the most important elements in the success of building projects is quality. The happiness of the project participants, which includes the building contractor, multidisciplinary construction consultants, and client, can be seen as a key factor in both project success and quality. For a long time, Ethiopia's

building sector has struggled with quality concerns. Every year, a sizable portion of the budget is allocated to initiatives related to infrastructure and other development. This results in poor construction since the projects' quality outputs do not meet the necessary requirements. As a result, extra funding is needed for maintenance tasks and defect correction. Over the course of its life, a building project goes through several phases. A project's conceptual planning, feasibility research, design, procurement, construction, acceptance, operation, and maintenance are its primary stages (Asefa, 2018).

According to McCaffer (2013), a company's operational success depends on quality management creating the right atmosphere for the effective deployment of relevant tools, techniques, and procedures. The study of project quality management in building construction is important for several reasons. Understanding and implementing effective quality management practices in construction projects can have significant benefits for all stakeholders involved (Chan, 2004). Effective quality management can help identify and rectify quality issues early in the construction process, minimizing the need for rework. By preventing rework and ensuring quality at each stage, construction projects can avoid costly delays and cost overruns. This leads to improved project efficiency and financial performance.

Quality management practices in building construction encompass safety measures, ensuring compliance with safety regulations and standards. By prioritizing safety, construction companies can reduce the risk of accidents and injuries to workers and occupants of the building. (Gambatese, 2010) Effective quality management contributes to overall project success by improving project performance indicators such as schedule adherence, cost control, and quality outcomes. Consistently delivering high-quality projects enhances the reputation of construction companies, leading to increased competitiveness and attracting more clients and opportunities. Effective project quality management ensures that construction projects adhere to these regulations, avoiding legal complications and penalties. (Dehghanian, 2019).

The components of quality management processes are quality assurance, quality control, and quality planning. To satisfy quality targets and customer expectations, quality planning entails the methodical creation of processes and strategies. It involves tasks like

creating quality metrics, identifying criteria for quality, and figuring out what resources are required to reach target quality levels. Implementing these established procedures and actions and making sure they are adhered to uniformly across the business are the main goals of quality assurance. This dimension includes tasks like setting up quality management systems, conducting audits, and educating staff members. Finally, quality control means keeping an eye on and comparing the actual outputs to the predetermined criteria in order to spot any deviations or flaws.

This dimension seeks to identify and resolve quality-related problems by using methods including testing, inspections, and statistical analysis. Planning to satisfy quality requirements, or quality assurance, and taking procedures to control results to ensure they comply with requirements, or quality control, are both components of project quality management. The degree to which the final product satisfies the needs of the client is known as quality. One common reason a project fails is when quality is compromised in order to meet a strict schedule. When a project is finished on schedule, it is very beneficial to learn if the supplied item is defective (PMI, 2017).

In Ethiopia, the Federal Housing Corporation, founded in 1972, oversees government programs and offers low-income residents affordable housing. The Federal Government of Ethiopia has, by Regulation No. 398/2017, established the Federal Housing Corporation (FHC) in March 2017. The major target groups identified by the corporation are government employees, government officials, and the public at large (those households that are at the margins of the formal housing market). However, twenty-eight years ago, FHC began its venture by managing only existing homes until 20017, when it entered the construction industry as a newcomer with little previous construction experience.

As a newly established organization, FHC took on the enormous responsibility of creating the policies and regulations that would guide its building projects. This involves establishing the organization, recruiting staff members, obtaining land, and acquiring funding. FHC coordinated cooperative activities, providing all resources at its disposal to initiate its construction initiatives. Since 2019, a number of construction projects have been sparked by the reformative journey, which started with a major focus on housing

development through several tendering processes on designated construction sites. The result of these efforts is the continued construction of mixed-use residential apartment buildings. The corporation has planned to develop seventeen mixed-use apartments and one unique building project in its first phase of housing development. These seventeen projects are distributed among the nine sub-cities of Addis Ababa City. The project sites are located mostly in the prime location of the city, with a very good access road, utilities, and communication infrastructure. The selected project sites for the planned mixed apartments are the existing properties of the corporation.

The area of the projects and their shapes vary. The area of the project plots ranges from the largest site at Tezena Hospital with an area of 7,404.35 m2 to the smallest site at Aware Area with 1,4477.00 m2. The average area of the project sites is 3,131.15 m2. The floors of mixed-purpose apartments range from the longest 4B+G+21 at Tewodros Square to the shortest 2B+G+9 located at the Bole Friendship and Semen Mezegaja sites. The first phase of the housing project was having 1,094 residential housing units. The project also has more than 70,000 m2 of area allocated for commercial purposes. Implementation of phases one and two of the envisaged housing development project is estimated to take 49 months each. The implementation activity of phase one has already commenced and the remaining implementation activities are estimated to take 40 months each.

No	First Cycle	Second Cycle	Third Cycle
1	Aware	Kokebe Tsibah	Habete Giorgis
2	Bole(Friendship)	Josansun	Abebe Bikila Stadium Area
3	British Embassy	22 Mazoria	Semien Mezegaja
4	Tezena Hospital	Misrak Atekalay	Thewodros Adebabay
5	Mekanissa	Bole(Sangaham Restaurant)	

6		Paster Institute Area	
7		Kebena	
8		Somale Tera	

The total investment cost of phase one is estimated at Birr 7.468 billion. Out of the nine sub-cities where these houses are located, Arada is one of the most centrally located, followed by Yeka. Such locations actually contribute to the feasibility of the units, as these are the most sought-after sites within the city due to their centrality, good quality of service provision, and accessibility from all parts.

Table 1.1 Location of the Housing Development

Figure1. 1: Location Map of Housing Development Sites within Addis Ababa

Source: feasibility study of FHC

The FHC faces challenges in building construction project quality management due to a lack of commitment, communication gaps, accountability issues, and a lack of rules, guidelines, and standards. Despite extensive research on project quality management in the building industry, little attention is given to FHC's unique needs and conditions. (FHC, 2017). Hence, this study aimed to assess the quality management of building construction projects at FHC through a literature review and questionnaire survey. The research utilized descriptive survey methods to achieve its specific goals, which included investigating the influence of quality management on projects, examining project management practices, and assessing the influence of project management skills on construction project quality at FHC. It assesses FHC's planning methodologies, quality

control mechanisms, and project assurance procedures to ensure quality standards, regulatory compliance, and stakeholder expectations. By providing an answer to the question, "What are the issues that influence the quality of building construction projects in FHC, Ethiopia?" this study will close this gap.

1.3 Statement of the problem

Project quality management processes in building projects include the development of a comprehensive quality management plan that outlines quality objectives, standards, and processes for the project. This plan should clearly identify quality requirements, establish criteria for measuring project performance, and define processes for monitoring and controlling quality throughout the construction phase. By implementing robust quality planning, control, and assurance measures, construction projects can ensure adherence to quality standards, minimize defects, and deliver high-quality outcomes (PMI, 2017).

While Agbenyega's (2014) study focuses on quality management practices in building construction firms in Ghana, our research focuses on Addis Ababa, Ethiopia, with a specific emphasis on the case of FHC. This creates a geographical gap as the research is shifting from one country to another within the African context. Additionally, there is a temporal gap as Agbenyega's study was conducted in 2014, and since then, there may have been developments, advancements, and changes in quality management practices within the building construction sector that need to be explored and updated. Therefore, this research seeks to fill these gaps by examining quality management practices specifically within the context of Addis Ababa and focusing on FHC as a case study, providing current and relevant insights into project quality management in the region.

The research by Bitew (2019) focuses on assessing quality management practices in road construction projects, specifically ACCRA. However, our research focuses on building projects, highlighting the unique challenges and best practices of these projects. This gap in the literature arises from the difference between road construction and building projects, highlighting the need for a comprehensive understanding of quality management practices in building projects, particularly in Addis Ababa, using FHC as a case study.

Garomsa, (2019) Pointed out that present management practices in Ethiopian building construction projects are more traditional, and the industry is still plagued by delays, cost

overruns, and poor quality. For many years, Ethiopia's building industry has struggled with quality difficulties. Fisseha, (2021) claims that poor waste management in the building sector, especially in residential projects, is a contributing factor to quality problems. To ensure that quality standards are met and customer expectations are met, it is imperative to implement appropriate project quality management best practices. Tesfaye, (2022) we discovered that cost overruns are the cause of low-quality house handovers in Ethiopian housing projects. Project quality management techniques, particularly in the areas of project planning, control, and assurance in the context of FHC building projects, are an obvious sign of the gap. This shows that project management studies targeting FHC areas are very limited.

Hence, this thesis tries to fill these gaps. By providing a solution to the question, "What are the factors that influence the project quality management of building construction projects in FHC, Addis Ababa, Ethiopia?" This study will close this gap.

1.4 Research questions

1. What is the project quality management process for building construction projects in FHC?
2. What are the project quality management techniques applied in the building construction project at FHC?
3. What are the primaries challenges facing FHC's project quality management implementation problem in the case of the building project?
4. Which variables influence FHC's project quality management in building project practices?

1.5 Objective of the study

1.5.1 General objective

- To assess project quality management practices in building projects in FHC projects.

1.5.2 Specific objectives

1. To evaluate the existing project quality management processes in the building construction project at FHC
2. To measure the quality management techniques applied in the building construction project at FHC.
3. To determine influencing project quality management implementation in the case of building projects in FHC.
4. To identify the typical issues that arise during project quality management in building construction in FHC

1.6 Significance of study

The study aims to understand the quality management procedures used by the FHC and identify challenges in project quality management. By addressing these challenges, the FHC can enhance its practices, minimize risks, and improve project outcomes. Additionally, the study explores the variables influencing FHC's quality management practices, helping to identify areas for improvement and optimize resources. The findings can inform decision-making, policy formulation, and best practices in the construction industry, ultimately leading to improved project quality and delivery.

This research aims to improve quality management in FHC projects, particularly in the construction sector. The study will contribute to the development of project management and knowledge, providing insights for management and future projects. The findings also benefit policymakers, program designers, and donors and serve as a starting point for further studies at regional and national levels.

1.7 Scope of the study

The study assessed project quality management practices, specifically focusing on project quality management process, quality management tools and techniques, and quality management implementation problems and challenges within building projects undertaken by the FHC in Addis Ababa between 2010 and 2015 E.C. The assessment was limited to the project development department within the FHC, examining how these quality management processes are planned, implemented, and monitored within this

specific department. Due to time and financial constraints, the study did not extend beyond the project department or cover other departments within the FHC organization.

1.8 limitation of the study

In the preparation of this research paper, the student researcher encountered several limitations. One of the primary challenges was the company's data organization and document custody, which made it difficult to access valuable documents in a short period. Additionally, the company's structure and working environment posed challenges in reaching all relevant individuals promptly, affecting the ability to complete the research within the specified timeframe.

Other key limitation of qualitative data gathered through interviews is the potential for interview bias. The responses provided by interviewees can be influenced by a variety of factors, such as the way questions are framed, the personal characteristics of the interviewer, or the interviewee's own biases and motivations. This can introduce subjectivity into the data and compromise the objectivity of the findings.

1.9 organization of the study

The study was structured into five chapters. Chapter One includes the study's background, problem statement, objectives, research questions, significance, assumptions, and organization. Chapter two consists of the literature review, theoretical framework, and conceptual framework displaying variables and indicators. Chapter three details the research methodology, including research design, target population, research instruments (particularly questionnaires), instrument validity and reliability, and pilot testing. Presently the operationalization of the variables table was also. Chapter four were cover data analysis, presentation, and interpretation. Chapter Five summarizes findings, discusses them, draws conclusions, provides recommendations, and suggests areas for further research.

CHAPTER TWO: LITERATURE REVIEW

2 Introduction

This literature review explores project quality management (FHC) building projects, focusing on research and best practices. It aims to enhance readers' understanding of project concepts, management, and the context of FHC building projects.

2.1 Theoretical Literature Review

2.1.1 Concept and Definition of Project and project management

A project is described by PMI (2017) as a short-term undertaking to produce an original good, service, or outcome. Projects' transient character suggests that they have a clear start and conclusion. Being temporary does not always imply that a project will last for a limited time. It alludes to the duration and level of engagement of the project. Since most projects are undertaken to achieve a permanent consequence, the term "temporary" usually does not apply to the product, service, or outcome created by the project. Each endeavor yields a distinct good, service, or outcome. While certain project deliverables and activities could contain repeated parts, this repetition does not alter the essential, distinctive qualities of the project effort.

A project, as stated by Kerzner (2013), can be defined as any set of tasks and activities that: require both human and non-human resources (i.e., money, people, and equipment); are multifunctional (i.e., cut across several functional lines); have a specific objective and are to be completed within certain specifications; have defined start and end dates; and have funding limits (if applicable). Project management is the process of applying knowledge, skills, tools, and procedures to project operations to accomplish certain goals and objectives within a specified period, according to PMI (2017). The methods used to carry it out are planning, organizing, directing, and controlling company resources.

Various project management methodologies have emerged over the years, each offering a unique approach to managing projects. Traditional methodologies, such as the waterfall model, follow a sequential, linear process, while active methodologies, including Scrum and Kanban, promote flexibility, adaptability, and iterative development. The choice of

methodology depends on project characteristics, organizational culture, and stakeholder requirements (K. Wysocki, 2019).

According to K. Wysocki (2019), the most widely used definition of a project is that it is an assemblage of distinct, difficult, and related tasks with a single aim that must be finished on schedule, within budget, and by specifications.

Two professional associations devoted to project management that have developed into a scientific field are the Project Management Institute (PMI, 2017) (PMI, A Guide to the Project Management Body of Knowledge, 2013) and the International Project Management Association (IPMA). A Guide to the Project Management Body of Knowledge (PMBOK Guide), published by PMI, provides standard terminology and project management practices.

2.1.2 Project Quality Management

According to the Project Management Institute (PMI), it entails procedures and actions that establish quality standards, goals, and roles to meet project requirements. Quality assurance, quality control, and quality planning are the three primary activities that the PMI recognizes (PMI, 2017). Project quality management is necessary for building projects to guarantee that the final products meet or exceed the expectations of stakeholders. Project teams may enhance project outcomes, reduce risks, and increase customer satisfaction by implementing efficient quality management techniques. Investigating significant frameworks, best practices, and theoretical concepts linked to project quality management in construction projects is the aim of this review of the literature. One of the key theoretical pillars of project quality management is in place, having been developed by the International Organization for Standardization (ISO) in the ISO 9000 series. Customer focus, leadership, staff involvement, process approach, system approach, continuous improvement, fact-based decision-making, and mutually beneficial supplier partnerships are given top priority in these principles (9000, 2015).

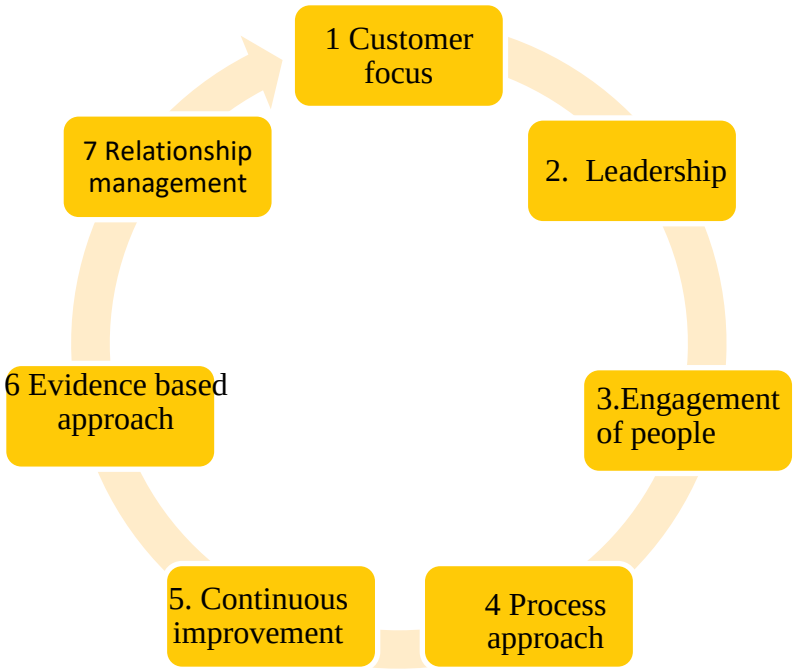


Figure 2.1 ISO 9000 Quality Management Principle

(Crawford, 2002) Enumerates the goals of quality management as ensuring product fitness, ensuring product use, satisfying customers, and following rules. The project model strongly emphasizes quality management from the perspectives of people, processes, and products to guarantee successful project completion. According to K. Wysocki (2019) and Wysocki (2014), quality management is crucial to project management since it guarantees both client happiness and project success. She asserts that quality management boosts resource efficiency, decreases waste and rework, and raises customer happiness.

2.1.3 Project Quality Management Process

The project quality management process is a systematic approach to ensuring that project outputs meet or exceed stakeholder expectations. Investigating significant frameworks, best practices, and theoretical concepts associated with the project quality management process is the aim of this survey of the literature.

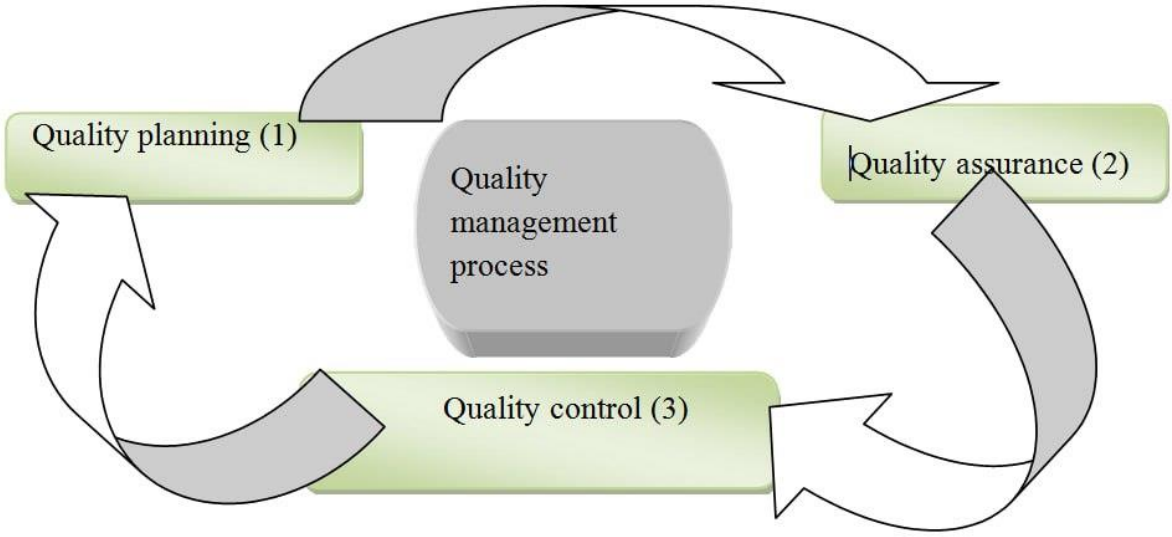


Fig 2.2Quality management process

2.1.3.1 Step One Project Planning

Quality planning involves identifying quality objectives, determining the necessary processes to achieve them, and developing a plan to meet quality requirements. PMI outlines quality-planning processes, including defining quality standards, identifying relevant stakeholders, and establishing metrics for quality. This process enables project teams to proactively address quality issues and ensure that the project is aligned with stakeholders' quality expectations.

The first step in quality management is to define quality, which is taken by the project manager and the team to identify what quality standards will be in the project from the perspectives of key stakeholders depending upon the area of specialization of the project. Identifying the quality standards that are relevant to the project and determining how to meet them. It is one of the key facilitating processes during project planning. Quality planning is usually involved during the preparation phase, the design phase, and the pre-construction phase. Quality planning should be performed regularly and in parallel with the other project planning processes. (McCaffer, 2013) Defined quality planning is a set of activities whose purpose is to define quality system policies, objectives, and requirements and to explain how these policies will be applied, how these objectives will be achieved, and how these requirements will be met. After this definition, it was stressed

that a quality plan is different from a test plan. The study continued that the quality plan defines the quality goals, is realistic about where defects come from, selects appropriate detection and prevention methods, and has meant not to “go dark." The “PMBOK” also addressed quality planning from a different position to enhance the thoughts earlier expressed. It is said that quality planning has process input generated by predecessor processes referred to as the project scope statement and project management plan. External units like Enterprise Environmental Factors and Organizational Process Assets introduce these processes. PMBOK further defines quality planning as the process of "identifying which quality standards are relevant to a project and determining how to satisfy them": In other words, it means planning how to fulfill process and product (deliverable) quality requirements: "Quality is the degree to which a set of inherent characteristics fulfills requirements.”

2.1.3.2 Step Two Quality Assurance

Quality assurance focuses on systematically ensuring that project processes and activities are carried out as planned and that the resulting deliverables are of acceptable quality. It involves implementing quality control measures, audits, and inspections to verify compliance with quality standards. The PMBOK Guide defines quality assurance processes, such as quality audits and process analysis (PMI, 2017).

Quality assurance is a set of activities aimed at demonstrating that an entity meets all quality requirements, inspiring confidence from customers and managers. It is primarily used in information processes to fulfill required quality levels. Quality assurance confirms that products meet needs, expectations, and requirements, ensuring the existence and effectiveness of processes, procedures, tools, and safeguards. It occurs during the implementation phase of a project, evaluating its overall performance regularly to ensure it meets the defined quality standards. (McCaffer, 2013)

2.1.3.3 Step Three Quality control

Quality control involves monitoring project activities and deliverables to ensure that they meet quality standards. It includes activities such as inspections, testing, and verification of project components. The PMBOK Guide outlines quality control processes, including

quality control measurements, process adjustments, and defect repairs (PMI 2017). Quality control measures enable project teams to identify and address deviations from quality standards, ensuring that the final deliverables meet the required level of quality.

The PMBOK places a high focus on quality control as a technical component of quality management to guarantee that the quality output from design, development, implementation, and maintenance complies with overall quality criteria. To do this, the project team members proactively embrace techniques and protocols.

Both emphasize the importance of quality control systems in ensuring quality. An efficient quality control system should include the following essential elements: choosing control areas, establishing standards, developing measuring methods, comparing results to quality standards, correcting nonconforming processes, monitoring and calibrating equipment, and providing comprehensive documentation. Controlling scope, budget, and timeline, comparing actual performance to goals, and determining the reasons behind subpar performance are all quality factors.

2.1.3 Quality Management in Construction Project

Numerous studies have investigated quality management practices in construction projects. For instance, Aziz (2018) conducted a comprehensive review of quality management practices in construction projects, highlighting the importance of leadership commitment, employee involvement, and continuous improvement. Similarly, Chan (2004) emphasized the significance of quality management systems and total quality management principles in enhancing project quality in construction.

Project quality management is of utmost importance in the construction industry, where the quality of the built environment has significant implications for safety, functionality, and durability. This section provides a brief overview of the theoretical foundations and key concepts in project quality management, specifically within the construction context, referencing relevant studies in the field.

Quality planning in construction projects involves establishing quality objectives, determining the necessary processes and procedures, and developing a plan to achieve and maintain quality standards. It encompasses activities such as defining quality criteria,

establishing quality control measures, and documenting quality requirements (Rumane, 2017). Effective quality planning ensures that construction projects are executed following the desired quality standards and client expectations.

Quality assurance in construction focuses on systematically ensuring that construction processes and activities conform to established quality standards and requirements. It involves implementing quality control measures, conducting inspections, audits, and tests, and monitoring performance to identify and address deviations or non-conformities. Activities in construction projects help to prevent defects, ensure compliance with regulations and standards, and maintain consistent quality throughout the project lifecycle.

Quality control in construction involves monitoring and inspecting construction activities, materials, and workmanship to verify compliance with quality standards and specifications. It includes activities such as inspections, testing, and verification of construction components, as well as corrective actions to address identified defects or quality issues. (Chan, 2004). Quality control processes in construction projects enhance the accuracy, reliability, and quality of the constructed facilities, leading to improved project outcomes. Continuous improvement in construction projects focuses on the ongoing enhancement of construction processes, methods, and practices to achieve higher levels of quality and efficiency. It involves learning from experience, analyzing performance data, and implementing changes to optimize construction processes and outcomes.

This brief theoretical literature review highlights the key aspects of project quality management within the construction industry, including quality planning, quality assurance, quality control, and continuous improvement. By incorporating these concepts into construction project management processes, organizations can ensure that construction projects meet or exceed quality expectations, resulting in safe, durable, and high quality built environments. The references provided serve as valuable resources for further exploration of the theoretical foundations and practical implementation of project quality management in construction. It is challenging to quantify construction quality due to the unique features of the project, such as client and community expectations, building

expenses, and delivery time. Meeting the needs of the owner while sticking to a predetermined scope of work, budget, and deadline is what defines quality management. Each building project is unique, custom-designed, and suited to the needs of the client. Entrepreneurs want their businesses to be better and more unique than dull, routine pursuits (Rumane, 2017).

According to Rumane (2017), quality control in construction projects is the process of meeting the needs of the owner and user while adhering to a budget and timeline, as well as a stated scope of work. Can represent the triad of construction projects (Rumane, 2017) Construction projects are tailored to the customer's specifications, with a defined timeframe and budget allocated for completion. They are also custom-oriented and custom-designed. There are distinctive components in every project; therefore, no two are alike. The owner has always accepted that his project is superior and unique. Every project must, in part, be planned and constructed to fulfill a certain requirement. Building projects are more personalized than a regular, repetitive business.

2.1.5. Quality Management Tools and Techniques

In the realm of project management, the Project Management Institute (2000) outlined the processes of quality planning (establishing quality standards), quality assurance (assessing project performance), and quality control (monitoring project outcomes) as integral components of quality management implementation. In a study by Mathews, Ueno, Kekale, Repka, Pereira, and Silva (2001), quality tools and techniques supporting quality programs were categorized into three main types: hard quality tools, blending methods, and soft approaches. Hard quality tools include formal quality systems, documented quality processes, quality cost analysis, control charts, and statistical sampling protocols. Blending methods encompass strategy and action plan assessments, organizational structure adaptability, control charts, quality circles, and quality planning aids. Soft approaches involve training initiatives, customer satisfaction surveys, ongoing communication with suppliers and external stakeholders, efforts to minimize environmental impact, empowerment strategies, self-assessment practices, and benchmarking activities

2.1.6. Problems in Quality Management Implementation

According to various studies by Tan Chin-Keng, Abdul-Rahman, Haupt et al. (2004), Tang and Kam (1999), Landin (2000), Moatazed-Keivani et al. (1999), Kumaraswamy and Dissanayaka (2000), Abdul-Rahman (1996), Low (1994), Serpell (1999), Au and Yu (1999), and Lai, Weerakoon, and Cheng (2002), there are numerous challenges in implementing quality management practices in the construction industry. These challenges include excessive paperwork, difficulties in engaging the workforce, skepticism towards quality methodologies, issues in measuring outcomes, resistance from subcontractors, lack of interest from suppliers, lack of understanding and buy-in from engineers, insufficient support from management, communication barriers, abstract concepts in quality standards, bureaucratic processes, and cultural and operational obstacles. Additionally, some studies highlighted the increase in administrative burdens, time consumption, and bureaucratic hurdles associated with implementing quality standards. Overall, there seems to be a consensus among these studies that the construction industry faces significant obstacles in effectively implementing and benefiting from quality management practices.

2.1.4 Factor affecting quality management in construction project

Several factors influence quality management in construction projects, including leadership and management commitment, stakeholder engagement, design and engineering practices, procurement and supply chain management, quality control and inspection activities, and a focus on continuous improvement. By recognizing and addressing these factors, construction project teams can enhance their ability to deliver high-quality outcomes that meet stakeholders' expectations.

Quality control and inspection activities are critical factors in managing and ensuring quality in construction projects. Effective quality control involves implementing inspection processes, conducting regular quality audits, and using appropriate testing and measurement techniques.

Quality control activities help identify and correct deviations from established quality standards, ensuring that the project deliverables meet the required quality criteria.

Collaboration among project stakeholders and the use of quality control tools enhance project quality (Kumaraswamy, 2013).

Effective leadership and management commitment are essential factors that significantly affect quality management in construction projects. Leadership plays a vital role in setting quality goals, establishing a culture of quality, and ensuring that quality is a top priority throughout the project. Management commitment involves allocating adequate resources, implementing quality management systems, and promoting a proactive approach to quality. Both leadership and management commitment create an environment that fosters quality improvement (Abdullahi, 2018). Stakeholder engagement is a critical factor in quality management for construction projects. Engaging stakeholders, including clients, architects, engineers, contractors, and end-users, allows for a shared understanding of quality requirements and expectations. Effective stakeholder engagement involves regular communication, collaboration, and feedback mechanisms throughout the project lifecycle. By incorporating stakeholders' input, the project team can align their efforts with the desired quality outcomes (Majed, 1997).

The design and engineering phases significantly influence project quality in the construction industry. The quality of design documents, specifications, and drawings directly affects the construction process and the final product. Effective design and engineering practices involve clear communication of design intent, consideration of constructability, and adherence to industry standards and codes. Collaboration among architects, engineers, and construction teams is crucial to ensuring that design and engineering decisions support the desired quality outcomes. (Fatayer, 2019) Procurement and supply chain management play a vital role in quality management for construction projects. The selection of reliable suppliers, contractors, and subcontractors significantly affects the quality of materials, equipment, and workmanship. Effective procurement and supply chain management practices involve prequalification processes, clear quality requirements in contracts, and ongoing monitoring of suppliers' performance.

Ensuring adherence to quality standards at each stage of the supply chain contributes to overall project quality (Othman, 2017). Continuous improvement is a key factor in quality management for construction projects. It involves regularly evaluating project

performance, identifying areas for improvement, and implementing corrective actions. The use of performance data, lessons learned from previous projects, and feedback from stakeholders contribute to ongoing quality improvement. Embracing a culture of continuous improvement fosters innovation, enhances processes, and results in higher project quality and customer satisfaction (Jimoh, 2018).

2.2 Empirical literature review

(A study on Nigerian building construction projects found that inadequate design, substandard materials, poor supervision, poor communication, poor planning, lack of awareness of quality management practices, inadequate training, and resources are significant barriers to effective quality management. Addressing these factors can ensure construction projects meet standards, and minimize delays, cost overruns, and dissatisfaction among stakeholders, ultimately leading to better project outcomes (Odeyinka, 2007)

In general, in construction projects, four key elements have been identified as being the most critical determinants: staff experience and qualifications, equipment and material quality, spec compliance, and meetings and training for quality assurance (Bitew, 2019). Additionally, according to Joy's study on the factors influencing the quality of construction projects, the main factors that affect quality are material, labor, financial concerns, adherence to codes and standards, top management support, management considerations, choice of contractor, choice of designer, cooperation between parties, contract documents, and lack of communication.

According to Agbenyega (2014), who conducted a study on it, the following main steps must be taken to overcome potential obstacles: management commitment, manager and employee communication, employee involvement, a detailed and logical work schedule, regular inspection, a quality audit report, a lack of team member training and education, and review and analysis. In his study, Birhanu found that in the absence of adequate supervision, communication, commitment management, and appropriate tools and materials available for use, he noted several hurdles to achieving project quality, including the quality assurance team leading the process, staff turnover, skilled turnover, ineffective resource management, and issues with contractors (Birhanu, 2017). In

addition, Temesgen identified three key issues in his study that are connected to unsuccessful projects and that influence project failures in Ethiopia's public sectors. The first issue is the lack of adequately qualified and skilled human, financial, and material resources. The second involves management issues like poor responsibility sharing during planning, weak follow-up, and poor coordination, and the third involves technical issues like slack connections to sectoral policy and strategy, poor technical skill, and poor project design, to name a few (Temesgen, 2007). Even if there are differences because of the actual environment of the projects, the issues that many academics have highlighted are essentially the same. As a result, these factors are also considered in the researcher's study in the context of construction projects (Bitew, 2019).

Projects are influenced by leadership commitment, which can lead to poor quality. Lack of dedication among project managers makes it difficult to supervise project execution. Professional development training is crucial for improving quality management as staff struggle with tasks. Quality control measures are also impacted by a lack of expertise. To improve quality management, project leaders should be dedicated to using quality practices, conduct regular monitoring, and conduct site visits. Regular participation in professional development training programs, such as seminars or workshops, can provide the necessary skills. Policies should be created to make each participant accountable for quality management (Abeid, 2019).

The study reveals that in Oyo State, construction sites lack the National Building Code, insufficient standard assurance organization sanction, and inadequate inspection. This lack of quality management contributes to lower maintenance costs, customer satisfaction, an enhanced built environment, and reduced human resource waste. The government, experts, quality organization agencies, construction employees, and other industry stakeholders produced the majority of variables influencing efficient project quality management. Time management has both positive and negative effects on perceived time control, job satisfaction, and somatic tensions. However, results on productivity at work remain ambiguous.

The review suggests that time management merits further investigation using more precise analytical techniques to better understand the processes and impacts on

perceptions, emotions, and performance. In June 2014, Agbenyeg's study aimed to assess Ghanaian contractors' commitment to quality management practices, identify challenges faced in implementing quality assurance, and propose effective measures. The study on quality management practices of Ghanaian contractors, focusing on D1 K1 registered with the Ghana Cocoa Board, found that meeting project deadlines and ensuring quality are crucial factors in project performance. Challenges faced by contractors include ineffective supervision, communication gaps, a lack of commitment, inadequate equipment availability, and a dedicated quality assurance team. Recommendations can support Ghanaian contractors in implementing effective strategies.

The study aims to understand public sector engineering managers' approaches to managing design and construction quality in design/build projects. It analyzes typical requests for proposals to understand public owners' requirements. The study examines the relationship between quality management and project delivery methods, particularly alternative methods. The findings are crucial for the design and construction industry in the United States, considering the increasing prevalence of design-build projects. The study reveals that owners in design/build projects prioritize construction quality control but have limited concern for design quality and design quality management (QM). They rely on professional qualifications for design quality, preferring a "quality by qualifications" approach. The transportation sector, especially highways, has adopted QM evaluation planning to mitigate quality risks. The study identified six different approaches to QM on DB projects, emphasizing the need for improved focus on design quality and QM in DB projects. It examines their interactions, challenges, and effects on project outcomes. The research aims to enhance project management techniques for the timely, economical, and high-quality completion of building projects (Abeid, 2019).

The study on Nigeria's construction industry reveals that planning deficiencies, fraudulent practices, and a lack of uniform evaluation standards significantly affect project parameters. Non-compliance has led to building collapses and project abandonment, highlighting the need for effective management practices for successful outcomes. Research by Chan (2004) Chan and Chan (2004) conducted an empirical study to examine the relationship between quality management practices and project performance in the construction industry. The study found a positive correlation between the

implementation of quality management practices, such as quality planning, quality control, and quality improvement, and project performance indicators, including cost, schedule, and customer satisfaction. (Koskela, 2002) investigated the impact of quality management practices on the performance of construction projects. The research highlighted the importance of quality planning, quality control, and quality improvement in achieving project success. The study concluded that effective quality management practices contribute to improved project outcomes, including cost control, schedule adherence, and customer satisfaction.

In a study by Tariq (2017), the researchers examined the relationship between quality management practices, project success, and stakeholder satisfaction in the construction industry. The empirical analysis revealed a significant positive correlation between the implementation of quality management practices and project success indicators. The study also emphasized the role of stakeholder satisfaction as a key outcome of effective quality management practices. A research study by Naoum (2015) was investigated. The study revealed that the implementation of quality management practices, such as quality planning, quality control, and quality improvement, positively influenced project outcomes, including cost performance, time performance, and quality performance.

Despite differences caused by the practical environment of the projects, the challenges reported by various researchers are nearly identical. Because of this, these factors are also considered in the researcher's study while discussing construction projects. Ethiopian construction projects face several quality-related concerns, and this study found that, out of the twelve problems it evaluated, labor-related issues are the most prevalent and crucial to the implementation of quality procedures. A high-quality result requires some sub-factors, including workers' experiences, training, communication skills, income level and wage, and motivating system. The second most significant issue contributing to lower quality problems in Ethiopian building construction projects is design-related issues. Completeness and consistency in the design document are two design-related challenges that are critical to the success of quality.

The literature review explores project quality management practices in building construction projects, focusing on Nigeria, Kenya, Ethiopia, and Ghana. Key factors

affecting project quality include inadequate design, substandard materials, a lack of supervision, poor communication, and poor planning. Barriers to effective quality management include a lack of awareness, inadequate training, and insufficient resources. However, studies show a positive correlation between quality management practices and project success indicators like quality planning, quality control, and quality assurance. The review emphasizes the importance of addressing these factors and implementing effective quality management practices in building construction projects.

Despite the valuable insights provided by existing empirical studies on project quality management practices in FHC building projects, there remains a notable gap in research regarding the effectiveness of specific quality management interventions and strategies in addressing the identified challenges. While studies have highlighted the general shortcomings and barriers to quality management in FHC projects, there is limited empirical evidence on the impact of targeted interventions, such as stakeholder engagement initiatives, capacity-building programs, or process improvement efforts, on enhancing project quality outcomes. Addressing this gap would provide valuable insights for policymakers, project managers, and practitioners seeking to improve project quality management practices in the context of FHC building projects.

Still, there is a visible gap when it comes to creating plans to get over these obstacles and finding out how quality management techniques affect certain project results. To identify and put into practice-targeted approaches to overcome these obstacles and assess the influence of quality management procedures on project results, more investigation is required. The assessment emphasizes the need for more investigation to create and execute plans to get over these obstacles and gauge how quality management techniques affect project results.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the research methods used to conduct the investigation. As a result, the research design type, data type, data source, sampling strategy, and data collection and analysis process were all discussed along with the relevant explanation.

3.2 Research Design and Approach

This study is dedicated to evaluating the quality management practices implemented by FHC Company in their building construction projects. The primary objective is to assess how the company implements these practices, drawing insights from collected responses and elucidating the interrelationships between these factors. By undertaking this analysis, we aim to complete a thorough examination of the variables influencing building construction projects, ultimately contributing to a deeper understanding of the factors influencing project quality. In pursuing this goal, we employed both descriptive and explanatory research methods. The descriptive method, known for its focus on defining the key characteristics of phenomena, was instrumental in evaluating the fundamental aspects of FHC Company's quality management methods. Parallel, the explanatory method delves into the relationships and the underlying reasons behind observed phenomena. This methodological combination is crucial as it allows us to compare groups, identify significant differences, measure the impact of independent variables on dependent variables, and assess the strength of these relationships. Through these meticulous approaches, we endeavor to enhance our comprehension of quality management practices within the context of building construction projects and contribute valuable insights to improve overall project quality.

The study used a quantitative and qualitative research approach to examine project quality management practices in construction projects. Both approaches were used to gather data. The quantitative approaches were to gather numerical data from a sample size; therefore, the methods listed above have been considered appropriate to address the research inquiries that the suggested study aims to address.

3.3 population of the study

The research consisted of a total of building construction projects in FHC that were in the past five years, from 2001 to 2015. Therefore, the researcher distributed a questionnaire to the members of the project development department. In the case of this research, the population does not mean all members (employees) of FHC.

This research study delves into building construction projects within FHC projects, encompassing project managers, engineers, and project team members within its target population. We limited the sample size to these specific sites to ensure a comprehensive representation of stakeholders and to enable practical data collection. To manage the investigation effectively due to the manageable and defined size of the target group, the researcher opted to involve all forty (40) employees, including experts, medium-level managers, and upper-level managers from all project development departments. This comprehensive approach ensures a thorough examination of the subject matter.

Within this study, 34 Engineers and 6 project managers constitute the respondents selected from the identified target population. By including professionals from diverse roles and levels within the organization, the research aims to capture a holistic view of the perspectives and insights pertinent to the construction projects under scrutiny. This strategic sampling strategy aims to provide a nuanced understanding of the project dynamics and contributes to the depth and richness of the study's findings. In addition to the data acquired through questionnaires, an interview session was also performed with five (5) management-level members to obtain more information addressing the difficulties in the project quality management practices of the FHC building development projects.

3.4. Source of Data

The researchers examined project quality management in building construction projects using primary and secondary data sources. Surveys and interviews were used to gather primary data, which yielded both quantitative and qualitative insights. Secondary data sources offered a thorough analysis of the body of knowledge, allowing the researchers to pinpoint study gaps and expand on earlier discoveries.

3. 5 Method of Data Collection

The study uses both primary and secondary sources of data to obtain the necessary information. Through semi-structured interviews and closed-ended questionnaires, primary data is gathered from sample respondents. To get first-hand information from sample respondents based on a review of pertinent literature that is significant to the study's topic, a questionnaire and interview approach were chosen. The project management-working manual is the primary source of secondary data collection, which also includes various catalogs, reports, project review documents, articles, academic journals, and other relevant publications to observe the structure, stakeholder list, and mode of communication with various. The questionnaire aimed to gather specific data related to the project quality management process, tools and techniques, and challenges of project implementation and their impact on project outcomes within the FHC construction project. Participants will rate the items on a scale from "very important (1)" to "very dis agree (5)." Utilize the RII method to determine and rank the quality awareness and implementation level of building construction projects. The RII method can help quantify the relative importance of different factors based on Likert scale ratings. The information gathered from survey respondents and utilized to evaluate quality management practices and issues were analyzed.

3.6 Method of Data Analysis

After collecting all required data using the above-mentioned instruments from the identified sources, both qualitative and quantitative methods of data analysis were applied. The data obtained from the questionnaire respondents used to assess quality management practices and problems was analyzed using SPSS. After organizing, coding, and defining variables, the responses of the cases were entered into the software. Then, for analysis, both descriptive and inferential statistical methods were used. In addition, results were presented using tables, percentages, and figures. The proposed model according to the identified dependent and independent variables from the conceptual model is described below

$$Y=\beta_0+\beta_1x_1+\beta_2x_2+\beta_3x_3+\varepsilon$$

Y=successful project quality management practice $X1_{=}$ project quality planning, $X_{2=}$project quality control, $X_{3=}$ project quality assurance, ε = error term; β1…β3=Regression coefficient of three independent variables

3. 9 Validity and reliability

3.9.1 Validity

In this research, we check the validity of the questionnaires developed for this study. Before distributing the final questionnaires to the respondents, they were checked and commented on by friends, project personnel, and the advisor of the researcher and pilots. The final version of the questionnaires was distributed after incorporating all the comments and feedback obtained from different professionals.

3.9.2. Reliability

Using Cronbach's alpha, a reliability analysis was carried out in three stages to ensure the internal consistency of respondent data on project quality management ratings. Good internal consistency is often regarded as being indicated by a Cronbach's alpha value of 0.7 or higher. For quality planning, quality assurance, quality control, quality management tools and techniques, and quality management implementation issues. SPSS was used to create these results.

Table 3.1 Result of Cronbach's alpha

List of variable	Cronbach's alpha
quality planning	0.854
quality assurance	0.879
quality control	0.865
quality management tools and techniques,	0.877
Quality management implementation issues	0.925

Source SPSS 2024

3.10 Ethical Consideration

Interactions with participants took place only after scheduling an appointment and obtaining a formal written letter of approval from the University to the FHC. Participants were not compelled to answer any questions. Instead, the purpose of the study was to be thoroughly explained to them to ensure they feel comfortable and at ease when responding. The researcher has affirmed that all participants are voluntarily involved in the data collection process by agreeing to complete the questionnaire. This ensures that participants are protected from any harm, and their responses are kept confidential and anonymous. Furthermore, the questionnaire is strictly for educational purposes and does not have any direct link to the respondents.

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

The project study's results were reported in this chapter. The collected data were coded, examined using SPSS, and discussed using descriptive statistical techniques, which included the interpretation and discussion of frequencies, percentages, means, and standard deviations. To help in a deeper and more comprehensive understanding, the results have been given in tabular and bar chart format. 40 respondents from the project development department's workforce and management participated in the study. Respondents received 40 questionnaires, of which 40 were returned. The proposed model, according to the identified dependent and independent variables from the conceptual model.

4.2. Demographic Data

In this research study aimed at measuring project quality management practices, the demographic data of the respondents includes a diverse range of participants. The sample comprises individuals from various age groups, representing a mix of experience levels in the field of project management. Additionally, the participants encompass both male and female professionals with diverse educational backgrounds, ranging from experts to managers within the project development department. The respondents are primarily engineers and project managers with varying years of experience in managing construction projects of different sizes and complexities. This demographic diversity within the sample is crucial for obtaining a comprehensive understanding of project quality management practices across different roles and organizational contexts.

The demographic statistics presented in the figure highlight a significant gender disparity among the respondents, with 75% identifying as male and only 25% as female. This gender distribution indicates a clear dominance of male participants in the population.

In the educational background analysis, the data reveals that a substantial majority, comprising 62.5% of respondents, possess a master's degree or above, while 37.5% hold

a bachelor's degree. This profile suggests a highly educated respondent group, as per the response, the participants provide appropriate, dependable data required for the research, and they align with the questionnaire's responses.

From the respondents' work division, it becomes apparent that the majority, constituting 85%, belong to the engineering domain, indicating a strong presence of engineers within the surveyed population. Although other divisions like project management exist, they comprise only 15% of the respondents, albeit with backgrounds that often intertwine with engineering. According to the Respondent, most respondents participated in the study to almost the same extent, demonstrating that they were aware of the fundamental information about building construction projects that the study needed to know. Their data is therefore thought to be reliable and relevant to the study.

Furthermore, when considering the respondents' level of experience in project management, a noteworthy 65% have 11 years or more of experience, underscoring the presence of highly experienced individuals within the organization. This distribution of experience levels suggests a wealth of seasoned professionals contributing to the knowledge base in project management within the surveyed. The results suggest that the majority of respondents possess adequate knowledge and expertise regarding their company and the topic under research.

Table 4.2.1 Demographic Data

		Frequency	percent	Valid percent	Cumulative percent
Gender	Male	30	75	75	75
	Female	10	25	25	25
	Total	40	100	100	100
Age	18-27	1	2.5	2.5	2.5
	28-35	18	45	45	45
	35-60	21	52.5	52.5	52.5

	Total	40	100	100	100
Educational	Diploma	0	0	0	0
	Degree	15	37.5	37.5	37.5
	Master's	25	62.5	62.5	62.5
	Total	40	100	100	100
Work experience	Up to 5 Years	0	0	0	0
	6-10 Years	14	35	35	35
	>10 Years	26	65	65	65
	Total	40	100	100	100
Work position					
	Engineer	34	85	85	85
	Project manager	6	15	15	15
	Other	0	0	0	0
	Total	100	100	100	100

Source SPSS 2024

4.3. Descriptive Analysis

The Likert scale is a widely used instrument for measuring attitudes, opinions, and perceptions. In the context of this research, the Likert scale was employed to measure project quality management practices with the level of employee engagement being measured on a scale of 1 to 5. To summarize the data, the researcher calculated the average score for each factor, rounding the result to the nearest whole number. This approach allowed the researcher to provide a clear and concise interpretation of the collected data, using criterion-referenced definitions to describe the overall level of agreement or importance for each factor. By leveraging the Likert scale in this manner,

the researcher was able to gain valuable insights into the Project quality management practices. The use of a standardized rating scale, coupled with the criterion-referenced

According to Chileshe and Kikwasi (2014), the mean values, which are driven by the 5-point Likert scale, can be rated and categorized as follows.

0 >= 1.80 indicates a very low extent or it is not important.

1.8 >= 2.6 indicated a low extent or somewhat important

2.6 >= 3.4 indicates average or moderate important

3.4 >=4.2 indicates a large extent or very important

4.2 >=5.0 indicates a very large extent or extremely important

This type of rating system allows researchers to easily contextualize and make sense of the Likert scale data they collect, which can then be used to draw meaningful conclusions and insights as part of their intended research findings.

4.3.1 Project Quality Planning Process

This section's study looked for data on the project quality planning processes used in the building construction sectors. Regarding the significance of adequate planning in FHC building construction sectors, the study asked participants to score how much their industry's project quality planning process follows it.

Table 4.3.1.1. Respondent’s opinion on issues in project quality planning conditions

	N	Mean	Std. Deviation
Quality Management Plan	40	3.40	1.081
Quality Planning Objectives	40	3.32	1.228
Project Quality-Planning Role:	40	3.58	1.035
Designated Team Responsibility:	40	3.60	1.008
Quality Standards at Project Beginning	40	3.53	0.960
Stakeholders' Involvement in	40	3.15	1.122

Quality Planning			
Impact of Well-Developed Quality Management Plan	40	4.60	3.280
Best Practices in Quality Planning and Cost Control	40	3.25	5
Grand Mean		3.55	

Source SPSS 2024

In Table 4.3.1.1, the overall mean score for the importance of the quality management planning process in building construction projects is 3.55. This score falls within the range of 3.50 to 4.50, indicating that respondents agree that the importance of quality management planning in building construction projects is at a high level. The results from Table 4.2 demonstrate that the building construction industries studied have recognized and valued the importance of quality management planning in their projects. These findings could be valuable for project industries seeking to improve the quality of their building construction projects in FHC.

According to the findings presented in Table 4.3.1.1, the building construction industries analyzed in this study have emphasized the significance of incorporating project quality management processes to improve the quality of building construction projects. These results could offer valuable insights for project industries seeking to elevate the quality of building construction projects in Ethiopia. The study's conclusion aligns with Bitew's (2019) assertion that fostering connections among different stakeholders in the building development sector, such as customers and manufacturers, can facilitate project quality planning processes.

The findings indicate that the project quality planning process is the quality of building construction projects at FHC. Evidence from the case study demonstrates that FHC faces difficulties in effectively implementing project quality planning in their construction projects. Consequently, the study concludes that the building construction industry within the FHC area in Ethiopia must focus on finding viable solutions to improve their project quality planning processes. This improvement is essential to enhance the overall quality of building construction projects.

4.3.2 Project quality control

The survey results provide insights into the perceptions of respondents regarding project quality control processes in building construction projects at FHC. The mean scores and standard deviations offer a glimpse into how these processes are viewed within the organization.

Table 4.3.2.1 Respondent's opinion on issues in project quality control conditions

	N	Mean	Std. Deviation	Std. Deviation
Systematic Implementation of Quality Control	40	3.35	.802	.802
Quality Control Inspections at Key Milestones	40	3.50	.987	.987
Integration of Quality Control Procedures into the Project Plan	40	3.30	.823	.823
Regular Communication of Quality Control Results to Stakeholders	40	3.23	1.097	1.097
Process for Implementing Corrective Actions Based on Findings:	40	3.65	.975	.975
Grand Mean		3.405		

Source SPSS 2024

Based on the data presented in Table 4.3.2.1 the mean score for all items relating to project quality control in building construction projects is 3.405. This score falls within the range of 3.4 to 4.2, indicating that respondents agree that project quality control processes in building construction projects are of significant importance.

The results from Table 4.3.2.1 suggest that the building construction industries included in the study have prioritized project quality control processes in their projects. This emphasis on project quality control processes could prove beneficial for project industries aiming to improve the quality of their building construction projects and address challenges in this area. As suggested by Chang (1999), an effective quality control system should encompass robust quality control processes.

In general, the comparative results indicate that project quality control is the quality of building construction projects within the FHC construction industries. The case study evidence shows that FHC industries face difficulties in maintaining project quality control in their building construction projects. Therefore, the study concludes that the building construction industries in the FHC area should prioritize finding effective solutions for project quality control to enhance the quality of their construction projects.

4.3.3 Project quality assurance

The survey results provide valuable insights into the perceptions of respondents regarding project quality assurance processes in building construction projects at FHC. The mean scores and standard deviations offer a comprehensive view of how these processes are perceived within the organization.

Table 4.3.3.1 Respondent's opinion on issues in project quality assurance conditions

	N	Mean	Std. Deviation
Quality Assurance Plan	40	3.40	.928
Quality Management System Requirements	40	3.53	.784
QA Team for Project Quality	40	3.53	.933
QA Audits for Quality Management	40	3.23	1.025
Documentation and Tracking System	40	3.25	1.006
Corrective Actions Process	40	3.30	1.043
Evaluation and Improvement of QA Measures	40	3.43	1.174
Garand mean		3.381	

Source SPSS 2024

The mean scores computed from Table 4.3.3.1 indicate the perceived level of Project quality assurance in building construction projects. A mean score falling between 0 to 1.5 suggests very low importance, 1.50 to 2.50 indicates low importance, 2.50 to 3.50 signifies moderate importance, 3.50 to 4.50 represents great importance, and any score above 4.50 signifies very high importance.

The findings from Table 4.4 reveal that the total mean score for all items related to Project quality assurance in building construction projects is 3.381. This score falls within the range of 2.6 to 3.4, indicating that respondents perceive the importance of Project quality assurance in building construction projects as being at an average or moderate level.

As highlighted by Harris and McCaffer (2001), quality assurance is an essential aspect that occurs during the project implementation phase. It involves assessing the overall project performance regularly to ensure confidence that the project will meet the quality standards set for it.

4.3.4 Project Quality Management Implementation Problems/challenges

The survey results shed light on the challenges and implementation problems faced in integrating quality management practices within building construction projects at FHC. The mean scores and standard deviations provide an overview of how these challenges are perceived by respondents within the organization. As shown on table 4.3.4.1

Table 4.3.4.1 Respondent's opinion on issues in Quality management implementation problems conditions

	N	Mean	Std. Deviation
implementing quality management practices	40	3.80	.838
Inadequate Management Support	40	3.63	.838

Integration with Project Management Systems	40	3.38	.933
Understanding Quality System	40	3.53	1.081
Communication Issues	40	3.60	1.121
Technical Expertise/Skills	40	2.97	1.095
Raw Materials Shortage	40	3.68	1.067
Employee turnover	40	3.20	.853
Garand mean		3.473	

Source SPSS 2024

Based on the results presented in Table 4.3.4.1, this study highlights several key challenges in implementing quality management practices within building construction projects at FHC. The mean scores and standard deviations offer insights into the perception of these challenges within the organization. Firstly, the challenge of implementing quality management practices received a mean score of 3.80, indicating a relatively high level of difficulty in integrating these practices effectively. This could be due to a lack of clear processes or guidelines for implementation. Inadequate management support, with a mean score of 3.63, suggests a need for more leadership involvement and commitment to quality initiatives. Integration with Project Management Systems, scoring 3.38, may point to issues with aligning quality goals with overall project objectives. The difficulty in understanding the quality system, evidenced by a mean score of 3.53, indicates a need for improved training and communication on quality standards. Communication issues, scoring 3.60, highlight the importance of fostering transparent and effective channels for information sharing. The lower scores for technical expertise/skills and employee turnover suggest the need for targeted training programs and strategies to retain skilled personnel. Raw materials shortage, with a mean score of 3.68, underlines the importance of supply chain management in

ensuring project quality.

Based on the results presented in Table 4.5, the mean scores for all items about the Project Quality management implementation challenges in building construction projects yield a total mean score of 3.47. This score falls within the range of 3.4 to 4.2, indicating that respondents concur with the notion that the challenges related to Project Quality management implementation in building construction projects are significant. Therefore, the study concludes that these industries should focus on finding solutions to address the problems associated with project quality management implementation to improve the quality of their building construction projects.

4.3.5 Project Quality Management Tools, Techniques applied

The survey results provide insights into the application and utilization of quality management tools and techniques within building construction projects at FHC. The mean scores and standard deviations offer a glimpse into how these tools and techniques are perceived and implemented by respondents within the organization.

Table 4.3.5.1 Respondent's opinion on issues in Project quality management tools, Techniques conditions

	N	Mean	Std. Deviation
Quality tools applied in FHC's construction projects.	40	3.33	.797
Quality software streamlines control at FHC.	40	2.80	1.043
RCA resolves construction quality issues at FHC.	40	2.87	.939
Benchmarking compares project quality at FHC.	40	3.23	.862
Risk tools mitigate quality risks at FHC.	40	3.03	.891
TQM philosophy ensures holistic quality management at FHC.	40	3.05	.876

Garand mean		3.05	

Source SPSS 2024

The findings from Table 4.5 reveal that the average score for all aspects related to the challenges of implementing Project Quality management in building construction projects is 3.47. This score falls within the range of 3.4 to 4.2, signifying a consensus among respondents regarding the substantial nature of the challenges associated with Project Quality management implementation in building construction projects.

4.4 Correlation Analysis

Correlation coefficients, which can range from -1 to 1, are used to measure the linear relationship between two variables. A value closer to the absolute value of 1 suggests a strong relationship, while a value closer to 0 indicates a weak or no linear relationship between the variables. According to Pallant (2005), correlations are commonly utilized to gauge the size of an effect: ± 0.1 is considered small, ± 0.3 is moderate, and ± 0.5 is considered large.

In this study, correlation analysis was employed to examine the relationship among the variables of interest: the successful project quality management practice (dependent variable), Project quality planning process, Project quality control, Project quality assurance (independent variables), and the moderating variable of project distinctiveness. The correlation coefficients were used to determine the strength and direction of these relationships, while the p-value indicated the significance of these relationships in the context of the research objectives and conceptual frameworks.

Table 4.4.1 a matrix displaying the correlations among the dependent variable, independent variables, and moderating variable.

		successful project quality management practice	Project quality planning process	Project quality control	Project quality assurance
successful	Pearson	1	.869**	.779**	.745**

project quality management practice	Correlation				
	Sig. (2-tailed)	.000	.000	.000	.000
	N	40	40	40	40
Project quality planning	Pearson Correlation	.869**	1	.768**	.785**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	40	40	40	40
Project quality control	Pearson Correlation	.779**	.768**	1	.748**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	40	40	40	40
Project Quality Assurance	Pearson Correlation	.745**	.785**	.748**	1
	Sig. (2-tailed)	.000	.000	.000	.000
	N	40	40	40	

Source SPSS 2024

*Correlation is significant at the 0.01 level (2-tailed).*Correlation is significant at the 0.05 level (2-tailed).

The correlation matrix in Table 4.4.1 examines the relationships between the dependent variable and the independent variables. The analysis of the correlation between the

dependent variable and the independent variables is presented below.

As presented in Table 4.4.1, a Pearson correlation test was conducted to examine the relationship between the dependent variable (success of project quality management practice) and independent variables (project quality planning, project quality control, project quality assurance, project quality management tools applied). The results of the study indicate a significant positive correlation at the 0.01 level between the dependent variable and the independent variables. Specifically, project quality planning, project quality control, project quality assurance, and project quality management tools were applied to show a positive relationship with correlation coefficients of 0.869* (r=0.869), 0.779* (r=0.779), and 0.745* respectively. These correlations are highly significant at the 0.01 level, indicating a strong association with the dependent variable (success of project quality management practice).

The results of the empirical investigation presented in Table 4.4.1 are in line with a majority of previous studies and align with recent research findings, providing further support to the research conclusions. This strengthens the overall understanding of project quality management practices in building construction projects: a case study of Federal Housing Corporation, Addis Ababa, Ethiopia. Furthermore, the new insights and research directions derived from the empirical observations help reconcile conflicting theoretical perspectives on project quality management practices in building construction projects, offering valuable insights.

In summary, the statistical analysis of the correlation matrix demonstrates that the relationship between the dependent variable (success of project quality management practice) and independent variables (project quality planning, project quality control, project quality assurance) is positive and highly significant. These findings suggest a strong and significant association between these variables in the context of the research study.

4.5. Regression Analysis

Including inferential analysis in the study on measuring project quality management practices is essential for drawing meaningful conclusions and making insightful recommendations based on the gathered data. By employing inferential analysis

techniques, such as regression analysis, researchers can determine the relationships between variables and assess the significance of these relationships within the context of project quality management. This statistical approach allows for generalizing the study findings beyond the sample to the broader population of interest, providing valuable insights for decision-making and practice in project management.

4.5.1 Test of Assumption of the Regression Analysis

In order to verify that the data obtained accurately reflects the survey and that the researcher has produced the best results, it is imperative to satisfy the regression analysis assumptions (Hair et al., 1998). This study's regression analysis included three assumptions, which were examined for the individual variables: linearity, normality, and multicollinearity. All of the assumptions are explained in the paragraphs that come next.

4.5.1.1 Test for Linearity

The normal P-P plot of the dependent variable was utilized to assess the linearity assumption in the regression analysis. This plot compares the observed cumulative distribution function against the expected cumulative distribution function under the assumption of normality. In this context, the plot is used to determine if the data points fall along a straight diagonal line, indicating that the residuals are normally distributed and the linearity assumption is met. The normal P-P plot is a graphical tool that aids in evaluating the normality of the data and is commonly used in regression analysis to ensure the validity of the model assumptions.

This examination aims to determine the linearity of relationships between the dependent variable, (successful project quality management practice), and independent variables such as project quality planning, control, assurance. The use of SPSS software facilitated the generation of regression residual plots, aiding in the verification of linear relationships and adherence to the homoscedasticity assumption within the model analysis process.

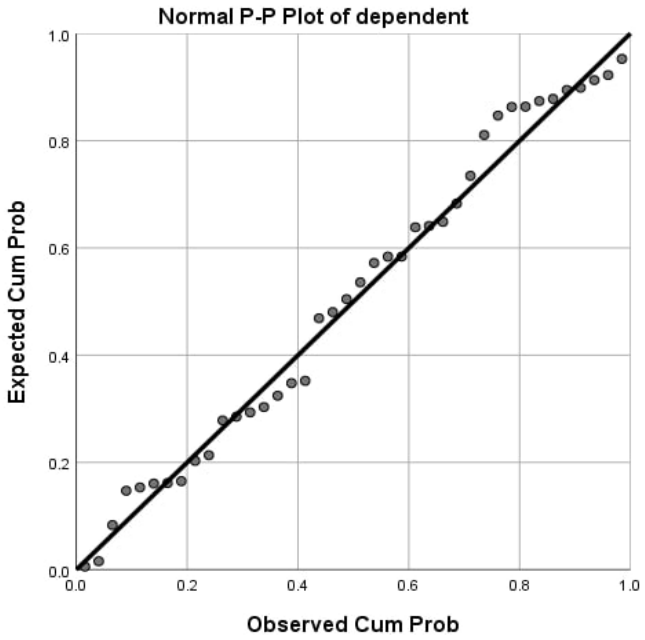


Figure 4.5.1.1 Tests for Linearity

4.5.1.2 Test for Multicollinearity

The initial inspection of the Pearson Correlation Matrix for the regression models revealed that the correlations between the independent variables did not exceed 0.70. While checking, the independent variables showed a significant relationship with the dependent variable.

Tolerance is the amount of variance in the individual variable not explained by the other predictor variables. It varies from 0 to 1; a value close to 1 indicates that the other predictors do not explain the variance in that variable.

A value close to 0 indicates that a significant portion of the variance in the variable is explained by the other variables, suggesting a potential issue of multicollinearity. To ensure that the multiple regression assumptions are met, it is important to have tolerance scores not less than 0.1 VIF scores not greater than 10, or tolerance scores not less than 0.2 and VIF scores not greater than 5. The multicollinearity statistics analysis conducted revealed that there was no multicollinearity present, as all variables had VIF values below 10 and tolerance scores above 0.1. Additionally, the VIF values for all variables were below 5 and above 0.2, further confirming the absence of multicollinearity in the

data.

Table 4.5.1.2 Multicollinearity problem testing using VIF

variable	Tolerance	VIF
project quality planning	0.246	4.020
project quality control	0.352	2.837
project quality assurance	0.326	3.067

Source SPSS 2024

The results presented in Table 4.10 indicate that there are no significant issues of collinearity among the independent variables. This conclusion is supported by the fact that the tolerance values for all independent variables are above 0.1, and all Variance Inflation Factors (VIF) are below 10 (VIF < 10), as recommended by Pallant (2005). Therefore, based on the findings in Table 4.10, it can be inferred that there is no collinearity present in the study's data.

4.5.1.3 Homoscedasticity

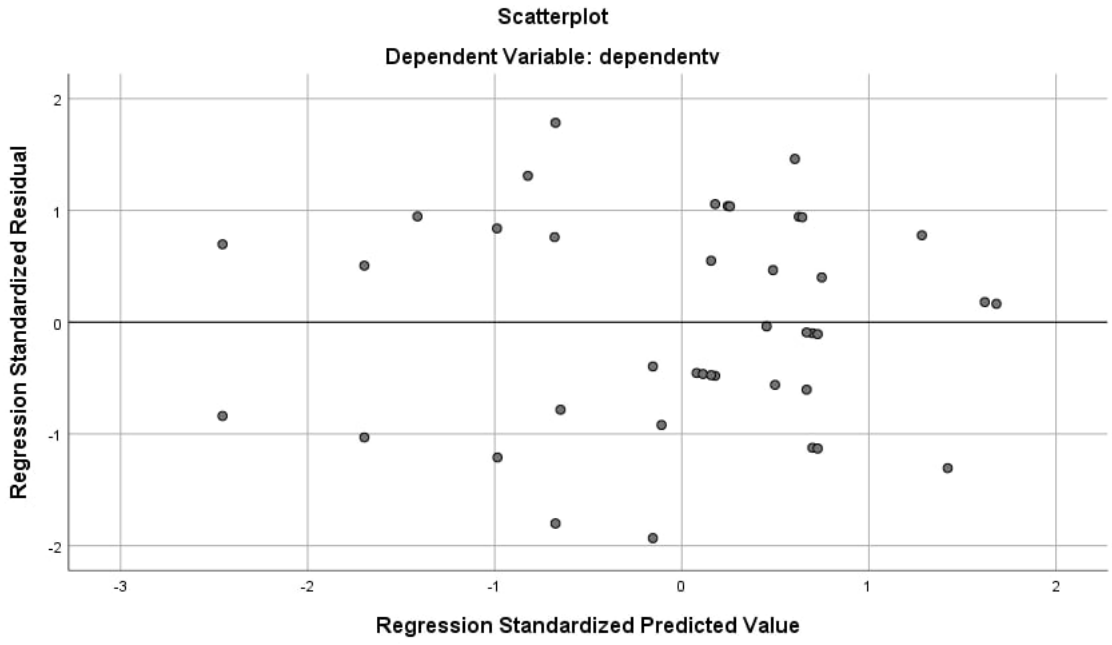


Figure 4.4.1.2 Homoscedasticity

4.5.1.4 Auto-correlation Test

A test is reasonable or acceptable on the premise of an independent mistake. To check for serial correlation between errors, utilize the Durbin-Watson test. The range of values for the Durbin-Watson statistic test is 0 to 4. A residual statistics field with a value of 2 is considered uncorrelated (2006). Adjacent residuals have a negative correlation when the value is more than 2, and a positive correlation when the value is less than 2. In a similar vein, Ott and Longnecker (2001) state that in the absence of serial correlation, the Durbin-Watson test statistic d is predicted to be about 2.00; in the presence of serial correlation, d exceeds 2.00. However, one should anticipate a positive (or negative) serial correlation if d is less than or more than about 1.5.

The multiple linear regression models that have been suggested are unsuitable if serial correlation is suspected. With reference to this and the model summary table that is included, the study's Durbin-Watson value is nearly 2.00. Since the auto-correlation test result falls between 1.5 and 2.5, we may conclude that our model is serial correlation-free with virtually certainty. Refer to the appendix at the back to view the Durbin-Watson test between each dependent variable.

4.5.1.5 Test for Normality

According to this supposition, a visual inspection of the residuals' normal probability plots is used to verify the error term's normality. To evaluate normality, normality probability plots were plotted. The P-P plots resembled a straight line rather than a curve. Consequently, it was determined that the residuals had a rather normal distribution.

The condition indicates if the distribution is peaked, whereas the skewness number indicates how symmetrical the distribution is. The right (positive) skew is indicated by a positive skewness value, and the left (negative) skew is shown by a negative number. The skew increases with increasing absolute value (Tabachnick & Fidell, 2001).

Graph 4.5.1.3 Normality

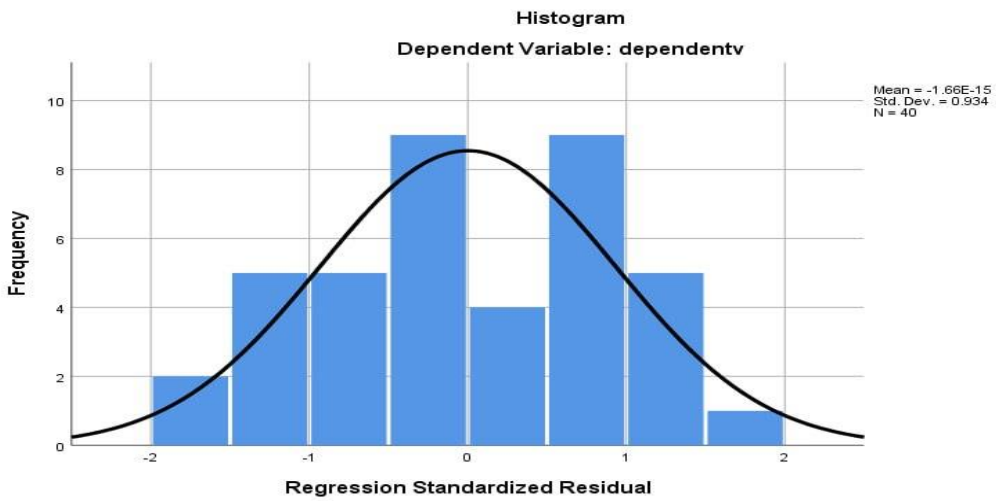


Figure 4.4.1.3 above illustrates how the standardized residuals' frequency distribution looks when compared to a normal distribution. As you can see, most of the residuals are very close to the curve, even though some residuals (such as those that occur around 0) are relatively far away from it. Additionally, the bell-shaped histogram suggests that the residuals, or errors or disturbances, follow a normal distribution. As a result, the error term was not regularly distributed by modifications of the assumption.

To view the test of normality for each dependent variable after reviewing the data from all three tests, the researcher has concluded that there are not any noteworthy issues with the data that would indicate a substantial violation of the assumptions of classical linear regression. Finally, the researcher assumed that the data are approximately normally distributed in terms of skewness and kurtosis.

4.6. Regression analysis result

Determining the direction and strength of the relationship between the independent and dependent variables was the underlying assumption. The combined effect that the independent variables had on the dependent variable while acting jointly was then calculated by fitting a multiple regression model, which was represented as follows:

$Y=\beta0+\beta1x1+\beta2x2+\beta3x3+\varepsilon$ where; Y= successful of project quality management practice; X1= project quality planning; X2=project quality control; X3= project quality assurance ε = error term; $\beta1\ldots\beta3$ = regression coefficient of four independent variables.

In Table 4.6.1, the regression model for successful project quality management in the

building construction industry showed a coefficient of determination (R square) of 0.792 and a correlation coefficient (R) of 0.890. This means that 76.1% of the variation in successful project quality management can be explained by the independent variables X1 = project quality planning, X2 = project quality control, and X3 = project quality assurance. The remaining 23.9% of the variation is attributable to other factors. This high R square value indicates a good fit for the model, as values above 50% are considered favorable.

The study also employed analysis of variance (ANOVA) to assess the significance of the overall regression model. According to Green and Salkind (2013), ANOVA helps determine the relationship between research variables. The ANOVA results indicated a significance level of 0.000, which is below the typical threshold of 0.05. The F statistic value was found to be 25.846, significant at a 95% confidence level. Furthermore, the F-ratio in the ANOVA table assesses the overall goodness-of-fit of the regression model to the data. It indicates that the model is significant, and the coefficients included in the model have enhanced its fit to the data.

Table 4.6.1 displays the beta coefficients for various independent variables concerning successful project quality management in the building construction industry. Project Quality Planning (X1) exhibited a coefficient of 0.739, with a t-statistic of 3.666 and a p-value of 0.004, indicating its significant positive impact on successful project quality management. Quality assurance (X2) had a coefficient of 0.115 with a p-value of 0.032, and Quality Control (X3) showed a coefficient of 0.372 with a p-value of 0.0035, highlighting its significant positive effect on successful project quality management. Respectively, indicating their significant impacts on successful project quality management.

The findings of this study demonstrate that all independent variables (including project quality planning, project quality control, and project quality assurance,) along with the moderating variable (successful project quality management practice) positively and significantly influence the dependent variable (quality of building construction projects) within the building construction industries in FHC. The standardized coefficients show that project quality planning has a Beta of 0.575 (tolerance level of 3.66, significant at

0.04), project quality control has a Beta of .257 (tolerance level of 1.948, significant at 0.01), project quality assurance has a Beta of .087 (tolerance level of 6.32, significant at 0.038). These results from the regression analysis indicate a positive and significant relationship between all independent variables and the dependent variable (successful project quality management practice) in the selected building construction industries within FHC.

Table 4.6.1 Multiple Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.890[a]	0.792	0.761	0.506

a. Predictors: (Constant), project quality control, project quality assurance, project quality planning

b. dependent variable: successful of project quality management practice

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	33.074	5	6.615	25.846	.00
Residual	8.701	34	.256		
Total	41.775	39			

a. Dependent Variable: successful project quality management

b. Predictors: (Constant), project control, project assurance, planning

ANOVA[a]

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	33.074	5	6.615	25.846	.000[b]

Residual	8.701	34	.256			
Total	41.775	39				

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	P value
(Constant)	-1.366	.753		-1.815	0.04
Quality planning	.739	.201	.575	3.666	0.001
Project control	.372	.191	.257	1.948	.038
Project assurance	.115	.182	.087	.632	0.035

Source SPSS 2024

As per the SPSS generated table above, the model equation would be ($Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \varepsilon$) becomes $Y = -1.366 + 0.739X1 + 0.372X2 + 0.115X3$. This indicates that successful project quality management in the building construction industry = -1.366 + 0.739 (project quality planning) + 0.372 (project quality assurance) + 0.115 (project quality control).

This model suggests that successful project quality management in the building construction industry is influenced by the various factors included in the model. Enhancing the project quality planning process is increased by one unit in successful project quality management practice resulting in an average increase of 0.74 units. Similarly, when project quality control is increased by one unit, the successful project quality management practice sees an average rise of 0.372 units, all while maintaining other aspects constant. In the context of project quality assurance, a one-unit increase leads to a growth of 0.115 units in successful project quality management practice, with other variables held steady. Understanding and leveraging these incremental improvements are essential for fostering excellence in project quality

management practices.

The implications of these results suggest that focusing on improving project quality planning is likely to have the most significant impact on enhancing successful project quality management in the building construction industry. This could be due to the critical role that effective planning plays in ensuring the overall quality and success of construction projects. Additionally, the positive coefficients for project quality assurance, project quality control, and project management tools and techniques indicate that these factors also contribute positively to successful project quality management. This model provides insight into the key determinants of successful project quality management in the building construction industry and highlights the importance of project planning, quality assurance, control processes, and achieving high-quality construction outcomes.

4.5 Result of Interview

The survey results indicated significant insights into the perceptions and practices related to project quality management in building construction projects at FHC. These findings were further enriched by Sami structured interviews with key individuals directly involved in projects at FHC, shedding light on specific challenges, impacts, and mitigation strategies within the organization.

From the survey data, the majority of respondents held advanced degrees, primarily in engineering fields, signifying a highly educated respondent group with significant expertise. The survey also highlighted a wealth of experienced individuals, with a notable percentage possessing over 11 years of project management experience.

In terms of project quality planning, the survey revealed a high level of importance placed on this process within building construction projects at FHC, as indicated by the mean score falling within the range signifying great importance. This emphasis on quality management planning aligns with the need for effective planning to ensure project success and compliance with quality standards.

Similarly, the focus on project quality control and assurance processes was evident, with respondents recognizing the significance of these aspects in ensuring quality outcomes in construction projects. The mean scores fell within ranges indicating significant importance,

reflecting the prioritization of quality control and assurance within the surveyed organizations.

Moreover, respondents identified notable challenges related to Project Quality management implementation in building construction projects. The total mean score suggested a consensus among respondents regarding the significant nature of these challenges. Issues such as delays in project completion, cost variations, discrepancies in design, and poor planning were highlighted in the interviews as common hurdles faced by project managers. To address these challenges, strategies such as applying liquidated damages, monitoring schedules, and engaging in conflict resolution were implemented to mitigate risks and ensure successful project outcomes.

Semi-structured interviews were conducted with key individuals, including middle and top-level managers, who are directly involved in projects undertaken by FHC. Participants were asked about specific challenges they faced in projects, the impacts of these challenges, and how the organization addressed them. One common challenge reported by most participants was the delay in project construction and commissioning. Additionally, they identified various factors that hinder effective project management practices, such as a lack of project management practices resulting in cost variations leading projects to exceed the contract price, discrepancies between design drawings and actual site conditions, sufficient standard rules and regulations, and poor quality of planning.

The impact of these challenges was highlighted by the completion of projects beyond the contractual period and budget, delayed delivery of projects ready for operation, and loss of income. To address these issues, the organization implements strategies such as applying liquidated damages to compensate for losses, taking contractual measures, closely monitoring the schedule for remaining tasks, implementing conflict resolution measures, and engaging in strategic planning. These measures are aimed at mitigating project delays, cost overruns, and quality issues to ensure successful project completion within the agreed timeframe and budget, ultimately safeguarding the organization's financial viability and active efficiency.

Chapter Five; Conclusion and Recommendation

5.1 Conclusion

Based on the extensive analysis conducted in our research project, it is evident that the study has provided valuable insights into the landscape of project quality management within building construction projects at the FHC. The conclusions drawn from the demographic data analysis, correlation analysis, regression analysis, and interviews collectively paint a comprehensive picture of the challenges, importance, and strategies surrounding project quality management in this context.

Firstly, the demographic data revealed that the majority of respondents were highly educated males, predominantly from the engineering sector, with significant experience in project management. This demographic profile lends credibility to the insights gathered, indicating that the data collected is from a knowledgeable and experienced group of individuals directly involved in the construction industry.

The analysis of project quality planning, control, and assurance processes highlighted their critical importance in ensuring successful project outcomes. The high mean scores associated with these aspects underscored the consensus among participants regarding their significance. It is clear that effective quality planning, control, and assurance are fundamental pillars for achieving quality standards in building construction projects at the FHC.

Furthermore, the correlation and regression analyses provided quantitative evidence of the strong positive relationship between project quality planning, control, assurance, and successful project quality management practices. The high coefficient of determination and significant F-statistic reinforced the predictive power of the model, emphasizing the impact of these variables on overall project success.

Insights gleaned from interviews with key individuals corroborated the findings from the quantitative analyses, shedding light on the practical challenges faced in project management within the construction industry. Delays in project completion, cost variations, design discrepancies, and poor planning emerged as common hurdles,

emphasizing the need for robust quality management practices to mitigate these issues effectively.

Our research project has elucidated the importance of effective project quality management in building construction projects at the FHC. By addressing the identified challenges and focusing on enhancing quality planning, control, and assurance processes, stakeholders can significantly improve project outcomes and quality standards in the Ethiopian construction industry. These findings not only contribute to the academic understanding of project management but also provide actionable insights for practitioners to enhance their project delivery processes and ultimately drive positive change in the construction sector.

5.2 Recommendation

The majority of employees at FHC hold master's degrees, indicating a high level of education within the organization. However, there is a need to update their skills through short-term training programs. Additionally, since many employees are engineers, it suggests that the management system may not prioritize project quality management adequately. Therefore, FHC should consider hiring other professionals, such as project managers, to ensure successful project quality management.

According to various scholars, planning serves as the foundational stage of any endeavor. However, the survey results suggest that while planning processes are implemented within the organization, they may not be sufficient or of high quality. This observation indicates a lack of alignment with project quality management within the system. Therefore, it is recommended that the organization enhance its quality planning processes to proactively prevent project defects.

Improvements are necessary in the planning process to ensure it becomes more participatory. This is especially important due to the varying levels of knowledge among the project team regarding quality tools and techniques used in quality management. Enhancing participation will enable the team to better understand and effectively implement these tools and techniques in the projects they undertake at FHC.

Effective quality management in construction projects necessitates collaboration among stakeholders, including clients, contractors, and consultants, each fulfilling their defined roles and responsibilities. Therefore, it is imperative for the organization to actively foster partnerships and collaboration with its stakeholders.

Moreover, there is a need for a comprehensive review of the current government contract administration and procurement policies, procedures, and requirements. It's crucial to move beyond solely considering the lowest price as the determining factor for selecting winners. The revision should encompass factors such as the past performance of contractors, their work experience, current capacity, and any other pertinent criteria.

FHC needs to focus on continuous professional development by establishing ongoing opportunities for professional growth. This includes certifications, advanced courses, and seminars aimed at keeping the team updated with the latest industry practices and innovations.

FHC should develop and implement comprehensive quality management systems that include detailed procedures for planning, control, and assurance. This will help address the gaps in quality management effectively.

FHC should ensure the establishment of clear and detailed contracts, clearly outlining the scope, timelines, and responsibilities. This proactive approach helps prevent misunderstandings and disputes, promoting smoother project execution and stakeholder alignment.

5.3 Future studies

The practice of quality project management in Ethiopia is still in its early stages, with limited research conducted, particularly focusing on quality management within project management. Future research efforts can delve into this area in depth, incorporating insights from various project-based organizations. Comparing their practices in project quality management can significantly contribute to the discipline's growth and development.

Additionally, this study centered on evaluating quality management practices and related challenges at the organizational level within FHC building construction projects. Future

studies could expand to include quality management practices at the national level, aiming to enhance the performance of building construction projects more effectively.

Reference

Abdullahi, M. S. (2018). Effect of training and development on employee's productivity among academic staff of Kano State Polytechnic, *Asian People Journal*.

Agbenyega, I. (2014). *Quality management practices of building construction firms in Ghana.* Ghana.

Albert P.C. Chan, a. P. (2004). Key performance indicators for measuring construction success. *Key performance indicator*, 205.

Asefa, B. (2018). *Assessment of quality management practices of Ethiopia contractors Focused on Building Construction Projects.* Addis Ababa: Addis Ababa University.

Aziz, R. F. (2018). Best practices for quality management in construction projects. *Journal of Construction Engineering and Management*, 144.

Birhanu, B. D. (2017). Quality management practice in Ethiopia. Addis Ababa Institute of Technology, *African Journal of Business Management*, 17.

Bitew, D. (2019). *Assessment of Quality management practices in construction projects: the case of ACCRA.* Addis Ababa: Addis Ababa University.

Chan, A. P. (2004). Key performance indicators for measuring construction success. *An International Journal*, 203-221.

Chin-Keng and Abdul-Rahman. (2011). Study of Quality Management in Construction Projects. *Chinese Business Review*, 542-552.

Crawford, J. (2002). *Project Management Maturity Model Providing a Proven Path to Project Management Excellence, Project Management Solutions*, . New works: Havertown, Pennsylvania,.

Daniel WM Chan, M. M. (1997). A comparative study of causes of time overruns in Hong Kong construction projects, *International Journal of Project Management, Volume 15*,(Issue 1,), Pages 55-63,

Dehghanian, C. e. (2019). Construction industry regulations A systematic review. *Automation in Construction*, 78-91.

Fatayer, F. H.-H.-M. (2019). Investigation of facilities management practices for providing feedback during the design development and review stages. *International Journal of Building Pathology and Adaptation*.

FHC. (2023-2018). *report of Federal Housing Corporation.* Addis Ababa: Federal Housing Corporation.

FHC, 2. (2017). *Feasibility Study for Housing Construction, Development & Administration Project for FHC-*. Addis Ababa: TECHNICAL STUDY AND FINANCIAL.

FISSEHA, A. (2021). *Assessment of quality management practices of grade one building contractors in Addis Ababa.*

Gambatese, M. R. (2010). Application of the Delphi Method to Construction engineering and management CEM Research. *Journal of Construction Engineering and Management*, 96.

Garomsa, E. D. (2019). Concept of Value Engineering and Current Project Management Practice in Ethiopian Building Construction Project. *American Journal of Civil Engineering*, 1-8.

Girma, E. (2016). *Study on Material Wastage of 40/60 Condominium Construction.* Addis Ababa.

Jimoh, R. O. (2018). Total quality management practices and organizational performance: the mediating roles of strategies for continuous improvement. *International Journal of Construction Management*.

K.Wysocki, R. (2019). *Effective Project Management, Seventh Edition.* wiley.

Kerzner. (2013). project management best practice. *Achieving global excellence Hoboken, NJ; John Wiley & sons*.

Kerzner, H. (2017). *Project management Metrics.* New York,

Koskela, L. &. (2002). The underlying theory of project management is obsolete. *Proceedings of the PMI Research Conference, Seattle, Washington.*

Kumaraswamy, M. M. (2013). Continuous improvement (CI) in the construction process: A case study. *Journal of Management in Engineering*, 133-139.

Majed, A. J.-T. (1997,). A comparative study of causes of time overruns in Hong Kong construction projects, *International Journal of Project Management*, 55-63.

McCaffery, F. H. (2013). *Modern Construction Management seventh edition.* London: Blackwell.

Naoum, S. &. (2015). the impact of quality management systems on project performance in the UK construction industry. *International Journal of Quality & Reliability Management*, 527-543.

Odeyinka, H. A. (1997). The causes and effects of construction delays on completion cost of housing projects in Nigeria. *Journal of Financial Management of Property and Construction*.

Othman, I. S. (2017). Quality planning in Construction Projects. *IOP Conference Series: Materials Science and Engineering*, 291.

PMI. (2013). *A Guide to the Project management body of knowledge.* Project management.

PMI. (2017). Project Management Institute,

Rumane, A. R. (2017). *Quality Management in Construction Projects (2nd ed).* CRC press.

Saunders, M. L. (2009). Research Methods for Business Students. In M. L. Saunders, *Saunders, Mark.* New York.: Pearson.

Tariq, M. A. (2017). Quality management practices and project success in the construction industry. *Journal of Construction Engineering and Management*, 143.

Temesgen, W. (2007). *Managing the Project Cycle: A Challenge for the Ethiopian Public Sector (Federal Level).* Addis Ababa: St. Mary's University.

Tesfaye, M. (2022). *Assessment of project time and cost overrun: the case of projects at Ethiopian Ministry of Mines.* Addis Ababa: St. Mary's university.

Appendix

Appendixes' A: Questionnaire

St. Mary's University

SCHOOL OF GRADUATE

MASTER PROGRAM IN PROJECT MANAGEMENT

QUESTIONNAIRES

Dear respondent

The objective of this survey is to gather information for a research study on the "**Assessment of project quality management in building construction projects**, with a specific focus on FHC as partial fulfillment of the mandatory project management degree. Please fill out this questionnaire, which will be kept private for the study. I sincerely hope that your candid and sincere answers will greatly enhance the quality of the findings of this investigation. My sincere gratitude for your participation in this project is extended ahead of time.

Dawit Misge//0912672202//dmisge@gmail.com

Thank You in advance for your cooperation!

Part I. General information

Please put a "√" mark on all your responses in the circle provided beside each statement.

1. Sex: Male_____ Female.

2. Educational Background:

Blow Diploma___ Diploma_____ Bachelor Degree_____ Master's Degree & above

3. Work Division: Project manager_____ Engineer_____ other: _____

5. Age less than 27 years____(28-35) years_____ 35 years & above.

6. Work Experience: less than 5 years____(6-10) years_____ 11 years & above.

Part II.

This subsection covers questions related to the quality management process, tools and Techniques, top management commitment, and problems encountered in FHC.

Please, tick "✓" in the appropriate columns for your response to closed-ended questions among the provided alternatives. The scale rating description: 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree.

1. Indicators of performance

Please, tick "✓" in the appropriate columns to indicate the extent that the following listed Indicators of performance on the FHC housing project.

Performance indicators in the FHC project	Scale				
	1	2	3	4	5
1 Construction scope 1.1defination of project scope					
1.2 The importance of project scope management are aware in FHC project team?					

1.3 Plan scope management					
2 Construction time					
2.1 Create WBS? Activity Definition					
2.2 typical stages and time line of project?					
3 Construction cost					
3.1 Define project cost estimation are accuracy					
3.2 regularly project budget update					

2. Quality planning

The following statements regarding the importance of proper preparation in FHC construction projects should all be carefully considered. Select the option that most accurately expresses your point of view.

	Project quality planning contains the following:	1	2	3	4	5
1.1	Quality management plan developed for every building construction project.					
1.2	Quality planning objectives are clearly defined and documented at the beginning of each.					
1.3	Project quality planning plays a significant role in the overall success of building construction projects at FHC					
1.4	Designated team responsible for developing and implementing the quality plan for building construction projects					
1.5	Quality standards and requirements established at the beginning of each project at FHC					

1.6	Stakeholders involved in the quality planning process to ensure alignment with project expectations at FHC					
1.7	well-developed quality management plan positively impacts project outcomes					
1.8	The implementation of best practices in quality planning contributes to project cost control					

3. Quality control

Please check the necessary boxes to identify the quality control processes that, in your opinion, go against the technical and process quality management emphases of the FHC construction projects. The scale rating description: 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree.

	Would you make sure to take into consideration the following elements in your quality control process	1	2	3	4	5
3.1	Is project quality control systematically implemented throughout building construction projects at FHC?					
3.2	Are quality control inspections conducted at key project milestones to ensure compliance with quality standards at FHC?					
3.3	Are quality control procedures integrated into the project plan from the initial stages at FHC?					
3.4	Are quality control results regularly communicated to project stakeholders to ensure transparency at FHC?					
3.5	Is there a process for implementing corrective actions based on quality control findings at FHC					

4. Quality Assurance

In your experience, please indicate the quality assurance practices, which cut across the quality management practice of technical and process aspects of the FHC Construction Projects by ticking the appropriate boxes. The scale rating description: 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree.

	Would you make sure to take into consideration the following	1	2	3	4	5

	elements in your quality assurance process					
2.1	A documented quality assurance plan is in place for building construction projects at FHC.					
2.2	Clearly specifies the quality management system Requirements in tender and contract documents.					
2.3	Designated quality assurance team responsible for monitoring and evaluating project quality at FHC					
2.4	Quality assurance audits are performed to assess the effectiveness of quality management practices at FHC.					
2.5	A system in place to document and track quality assurance activities for each project at FHC					
2.6	Is there a process for implementing corrective actions based on quality assurance findings at FHC					
2.7	Is the effectiveness of quality assurance measures evaluated and improved upon for future projects at FHC					

5. Quality Management Implementation Problems /challenges

The scale rating description: 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree.

	From the list, would you make sure to take into consideration the following elements in your quality management implementation problems	1	2	3	4	5
4.1	Are there challenges in effectively implementing quality management practices in building construction projects at FHC					
4.2	Inadequate management support					
4.3	Are there challenges in integrating quality management processes with existing project management systems at FHC					
4.4	Difficulties in understanding the quality system					

4.5	Ineffective communication					
4.6	Inadequate technical expertise/skills					
4.7	Problem with raw materials shortage					
4.8	Employee turnover					

6. Quality Management Tools and Techniques Applied

In your experience, please indicate the Quality Management Tools and Techniques Applied, which cut across the quality management practice of technical and process aspects of the FHC Construction Projects by ticking the appropriate boxes**.** The scale rating description: 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree.

	The list suggests that you should consider the following elements in your quality management The organization applied:-	1	2	3	4	5
5.1	Are our quality management tools and techniques consistently applied in building construction projects at FHC?					
5.2	Quality management software systems are utilized to streamline quality control processes at FHC.					
5.3	Root Cause Analysis (RCA) is utilized to investigate and resolve quality issues in building construction projects					
5.4	Benchmarking is employed to compare project quality performance					
5.5	Are Risk Management tools and techniques integrated into quality management processes to mitigate project quality risks at FHC?					
5.6	Is the Total Quality Management (TQM) philosophy embraced to ensure a holistic approach to quality management in projects at FHC					

Part III. Interview Questions

1. How is project quality management practiced? Based on:

a. Has the formal quality management system (e.g., ISO 9000) been widely practiced?

b. Is the philosophy of TQM adopted?

c. What are the quality management tools and techniques commonly applied?

2. Does the top management ever communicate to the subordinates the importance of Meeting customer requirements?

3. Are there quality management standardized guidelines?

4. Does the top management lead in setting quality policies? If yes, please mention the policy principles.

5. Does the top management conduct management reviews on project quality?

6. Have you participated in the project designing process? If yes, please mention which quality management processes that you are involved in.

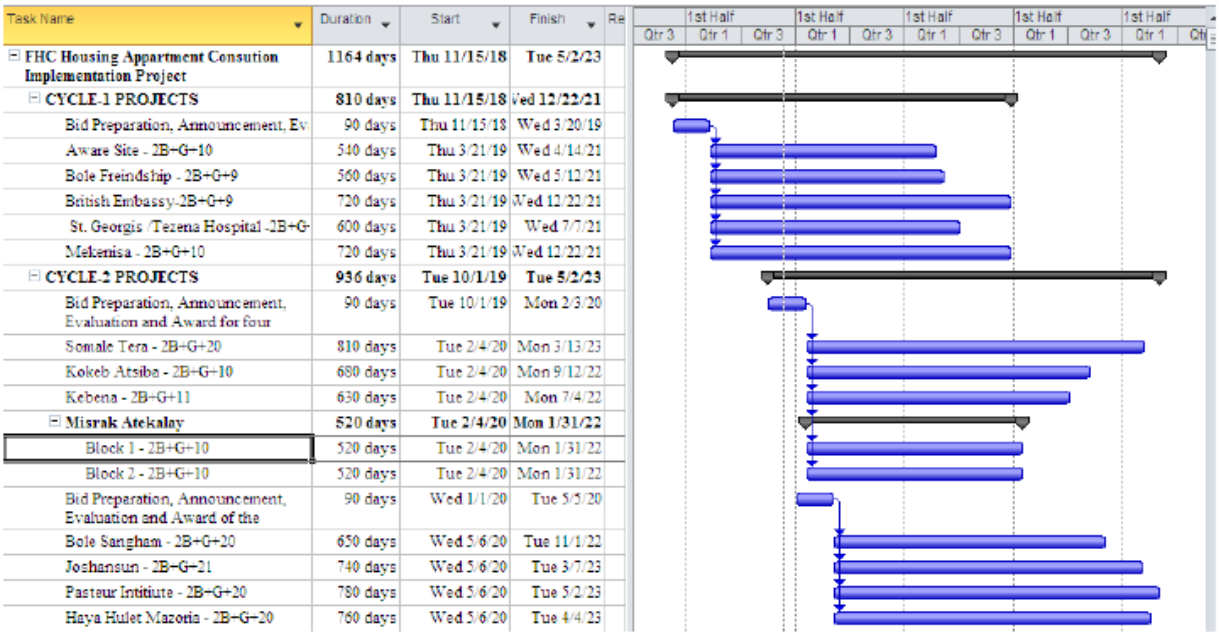
7. What are the problems with implementing project quality management in your organization?

8. As for quality management in your project is concerned; do you recommend the Allocation for financial resources to be increased?

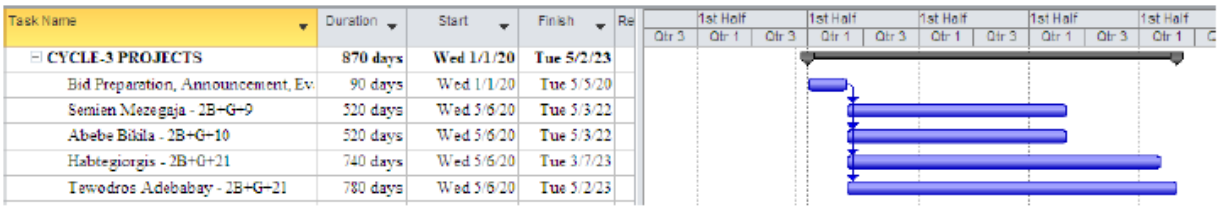
9. As for quality management in your project is concerned; do you recommend the Allocation for human resources to be increased?

10. What do you think must be fulfilled for successful project quality implementation and management in general?

APPENDIXE B: FHC Construction Project Schedule



Task Name	Duration	Start	Finish	Re
FHC Housing Appartment Consution Implementation Project	**1164 days**	**Thu 11/15/18**	**Tue 5/2/23**	
CYCLE-1 PROJECTS	**810 days**	**Thu 11/15/18**	**Wed 12/22/21**	
Bid Preparation, Announcement, Ev	90 days	Thu 11/15/18	Wed 3/20/19	
Awaie Site - 2B+G+10	540 days	Thu 3/21/19	Wed 4/14/21	
Bole Freindship - 2B+G+9	560 days	Thu 3/21/19	Wed 5/12/21	
British Embassy-2B+G+9	720 days	Thu 3/21/19	Wed 12/22/21	
St. Georgis /Tezera Hospital -2B+G+	600 days	Thu 3/21/19	Wed 7/7/21	
Mekenisa - 2B+G+10	720 days	Thu 3/21/19	Wed 12/22/21	
CYCLE-2 PROJECTS	**936 days**	**Tue 10/1/19**	**Tue 5/2/23**	
Bid Preparation, Announcement, Evaluation and Award for four	90 days	Tue 10/1/19	Mon 2/3/20	
Somale Tera - 2B+G+20	810 days	Tue 2/4/20	Mon 3/13/23	
Kokeb Atsiba - 2B+G+10	680 days	Tue 2/4/20	Mon 9/12/22	
Kebena - 2B+G+11	630 days	Tue 2/4/20	Mon 7/4/22	
Misrak Atekalay	**520 days**	**Tue 2/4/20**	**Mon 1/31/22**	
Block 1 - 2B+G+10	520 days	Tue 2/4/20	Mon 1/31/22	
Block 2 - 2B+G+10	520 days	Tue 2/4/20	Mon 1/31/22	
Bid Preparation, Announcement, Evaluation and Award of the	90 days	Wed 1/1/20	Tue 5/5/20	
Bole Sangham - 2B+G+20	650 days	Wed 5/6/20	Tue 11/1/22	
Joshansun - 2B+G+21	740 days	Wed 5/6/20	Tue 3/7/23	
Pasteur Intitiute - 2B+G+20	780 days	Wed 5/6/20	Tue 5/2/23	
Haya Hulet Mazoria - 2B+G+20	760 days	Wed 5/6/20	Tue 4/4/23	



Task Name	Duration	Start	Finish	Re
CYCLE-3 PROJECTS	**870 days**	**Wed 1/1/20**	**Tue 5/2/23**	
Bid Preparation, Announcement, Ev	90 days	Wed 1/1/20	Tue 5/5/20	
Semien Mezegaja - 2B+G+9	520 days	Wed 5/6/20	Tue 5/3/22	
Abebe Bikila - 2B+G+10	520 days	Wed 5/6/20	Tue 5/3/22	
Habtegiorgis - 2B+G+21	740 days	Wed 5/6/20	Tue 3/7/23	
Tewodros Adebabay - 2B+G+21	780 days	Wed 5/6/20	Tue 5/2/23	

Item	Project Site (Local Name)	Block types
I	Cycle 1 - Projects	
1	Aware	2B+G+10 floors
2	Bole - Friendship	2B+G+9 floors
3	British Embassy	3B+G+9 floors
4	St. Georgis (Tezena Hospital Area)	2B+G+8 floors
5	Mekenissa	B+G+10 floors
II	Cycle 2 - Projects	
1	Somale Tera	3B+G+20 floors
2	KokebetTsebah	2B+G+10 floors
3	Kebena	2B+G+11 floors
4	Misrak Atekalay	2B+G+10 floors
5	Bole Sangaham Restaurant	3B+G+20 floors
6	Johansson	3B+G+21 floors
7	Pasteur Institute Area	3B+G+20 floors
8	22- Mazorya	3B+G+20 floors
III	Cycle 3 - Projects	
1	Semien Mezegaja Area	2B+G+9 floors
2	Abebe Bikila Stadium Area	2B+G+10 floors
3	Habete Giorgis	3B+G+21 floors
4	Tewodros Adebabay	4B+G+20 floors
	Total Housing Units	
	Share of the total (%)	