



**ST. MARY'S UNIVERSITY SCHOOL OF GRADUATE
STUDIES**

DEPARTMENT OF PROJECT MANAGEMENT

**ASSESSMENT OF QUALITY MANAGEMENT PRACTICE IN BUILDING
CONSTRUCTION: THE CASE OF ADWA MUSEUM 0.0 KM PROJECT**

BY

EYOBEL TSEGAYE

ADVISOR: ABEBAW KASSIE (PhD)

JANUARY, 2024

ADDIS ABABA, ETHIOPIA

**ASSESSMENT OF QUALITY MANAGEMENT PRACTICE IN BUILDING
CONSTRUCTION: THE CASE OF ADWA MUSEUM 0.0 KM PROJECT**

BY

EYOBEL TSEGAYE

ADVISOR: ABEBAW KASSIE (PhD)

**A THESIS SUBMITTED TO SAINT MARY'S UNIVERSITY FOR PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR AWARD
OF
MASTER OF ART IN PROJECT MANAGEMENT**

JANUARY, 2024

ADDIS ABABA, ETHIOPIA

ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES

**ASSESSMENT OF QUALITY MANAGEMENT PRACTICE IN BUILDING
CONSTRUCTION: THE CASE OF ADWA MUSEUM 0.0 KM PROJECT**

BY
EYOBEL TSEGAYE

APPROVED BY BOARD OF EXAMINERS

Dean, graduate studies

signature

Advisor

signature

External examiner

signature

Internal examiner

signature

Declaration

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

Eyobel Tegaye

Name

St. Mary's University, Addis Ababa

Signature

January, 2024

ENDORSEMENT

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

Abebaw Kassie (PhD).

Name of Advisor

Signature

St. Mary's University, Addis Ababa

January, 2024

Acknowledgements

First of all, I would like to thank almighty God for giving me the strength, ability, and opportunity to complete this proposal. I also owe my deepest gratitude to my families and employees in Adwa Museum zero km project for their universal collaboration with providing all necessary information towards the successful completion of this proposal. Moreover, I would also like to thank my family and friends for their endless support in conducting this study.

My special thanks go to my advisor Dr. Abebaw Kassie (PhD) for giving me valuable advice during this study.

Table of Contents

Table of Contents

Declaration	i
ENDORSEMENT	ii
CHAPTER ONE.....	1
1 INTRODUCTION	1
1.1 Background of the study	1
1.2 Statement of the problem	2
1.3 Research questions.....	3
1.4 Objectives of the study	4
1.5 Significance of the study	4
1.6 Scope of the study	4
1.7 Organization of the study.....	5
CHAPTER TWO.....	6
2 LITREATURE REVIEW	6
2.1 Theoretical literature.....	6
2.2 Quality	9
2.3 Empirical Review of Literature.....	18
2.4 Research gaps.....	20
CHAPTER THREE.....	21

3 RESEARCH METHODOLOGY	21
3.1 Research approach and design	21
3.2 Data source and data collection method	21
CHAPTER FOUR.....	25
4 DATA ANALYSIS AND DISCUSSION.....	25
4.1 Introduction.....	25
4.2 Analysis and discussion of data	25
CHAPTER FIVE.....	35
5 CONCLUSION & RECOMMENDATION	35
5.1 Introduction.....	35
5.2 Summary of the Finding.....	35
5.3 Conclusion	36
5.4 Recommendations.....	37
5.5 Future studies.....	38
Reference.....	39
Appendices.....	43
Appendix A.....	43

List of tables

Table 3.2 Reliability Statistics	23
Table 4.1 Descriptive result of characteristics of respondents.....	26
Table 4.2 Descriptive Statistics of quality management practices at pre-contract stage	27
Table 4.3 Descriptive Statistics of quality planning	29
Table 4.4 Descriptive Statistics of quality control	31
Table 4.5 Descriptive Statistics of quality Assurance.....	32
Table 4.6 Descriptive Statistics of quality Management Tools and Techniques Applied	33

Abbreviation and Acronyms

ECDSWCo	Ethiopian Construction Design Supervision Works Corporation
ISO	International Organization for Standardization
MUDHo	Ethiopian ministry of urban development and housing
PMBK	Project Management Body of Knowledge
PMI	Project Management Institute
QA	Quality Assurance
QC	Quality Control
QM	Quality Management
QMP	Quality Management Process
QMS	Quality Management System
QP	Quality Planning
SPSS	Statistical Package for Social Science

Abstract

This study was mainly set out with a general purpose of assessing the quality management practices in building construction in the case of Adwa Museum 00km project. To achieve its objective, the study employed descriptive research and both primary and secondary data were used. Questionnaires, interview, and document review were, therefore, used as data collection tools. Furthermore, it employed purposive sampling techniques to draw its samples. The survey questionnaire was designed based on the literature and on the information collected through the document review of the project. The survey questionnaire was distributed to 38 project team members who were selected purposively among them 33 respondents were responded, which represented a response rate of 86.8%. The data gathered through the questionnaire was analyzed by Statistical Package for Social Science (SPSS). The generated data was analyzed using tables, frequency and percentage. The result of the study indicated that there is very poor-quality management tools and techniques implementation, Inspection is found to be the major successfully implemented quality management tool used to control the quality of the case project. Also, from the study it is observed that quality management practice at pre contract stage was very good however during the construction phase quality planning, assurance and controlling practice is moderate. The study recommended consideration on building capacity of staff on quality management, quality management tools successfully, and project managers should work on partnership/collaboration with its stakeholders in order to be successful on quality management.

Key words: Quality, Quality management, Quality management practice, quality management tools and techniques.

CHAPTER ONE

1 INTRODUCTION

1.1 Background of the study

Construction industry is one of the main accelerators of national economy, it is the way where infrastructure development is achieved and it has a significant effect on other industry sectors efficiency and productivity. Project success can be measured by completing on time within the estimated cost and desired quality (Abdul R., 2011).

In construction, quality is defined as the fulfillment of the owner's needs as per defined scope of works within a budget and specified schedule to satisfy the client's requirements. Quality for construction is different from other manufacturing products and services because of its character of every project is unique and has its own requirements. The contractor is expected to finish construction under requirements from the client (Abdul R., 2011).

Ethiopia is a developing country where its construction sector is highly affected by poor quality construction. This is due to very poor-quality management system. Poor quality in construction will create building to collapse and in roads it creates accidents and also the constructed building will be out of service before the designed time. That's why quality management is very crucial for construction industry (MUDHo,2011).

The concept of quality management is to ensure efforts to achieve the required level of quality for the product which are well planned and organized. From the perspective of a construction company, quality management in construction projects should mean maintaining the quality of construction works at the required standard so as to obtain customers' satisfaction that would bring long term competitiveness and business survival for the companies.

In today's extremely difficult and competitive construction market, quality management is crucial for a construction company to survive. In order for a corporation to operate successfully, quality management must create the conditions for the utilization of relevant tools, techniques, and procedures. For a construction company, quality management is a crucial function that is integrated into all of the business's operational and administrative procedures (Abdul R., 2011).

1.2 Statement of the problem

Quality non-conformance in construction" refers to situations where construction work does not meet established quality standards or specifications. This could involve various aspects of the construction process, such as materials, workmanship, design, or adherence to regulations. In simple terms, it means things are not being built as they should be, which can lead to issues like safety hazards, structural weaknesses, or problems with functionality. Quality non-conformance needs to be addressed and corrected to ensure that construction projects meet the required standards and perform as intended. (Abdul R., 2011).

Good Project quality management involves both quality assurance (planning to meet quality requirements) and quality control (steps taken to control results to see if they conform to requirements). Quality can be defined as the level of conformance of the final deliverable to the customer's requirements. One cause of usual project failure is that quality is overlooked or sacrificed, so that a tight deadline can be met. It is very helpful to complete a project on time, only to discover that the thing delivered will not work properly (PMI, 2008).

Biniyam in his study identified that the perception of contractors in Ethiopia on quality is different. The majority of contractors perceived quality works gives competitive advantage for the contractors by creating another opportunity for getting other projects in the future. The next perceptions of the contractors are elimination of defects by doing quality works so that they can

increase profit. In general contractors have different perception about quality there is no common understanding about quality this makes it difficult for the contractor to manage quality (Biniyam, 2018).

According to Abebe Dinku (2016) cited by Biniyam (2018), the collapses of a five-storey building in Addis Ababa were not new in Ethiopia. There were similar collapses that occurred in Ethiopia like a three-storey building in Gonder; three –storey building in Hawassa; and a four-storey building in Wolayta in the past couple of years. And he suggested the most important elements for high quality in the construction industry are active participation of all stakeholders like client, contractor, consultant, financiers and so on.

The study and reports mentioned before show how important it is to have good quality in buildings or structures for them to work well. This study aims to understand how quality management practiced in one sample mega project in Addis Ababa, the aim the study is determining whether quality management is practiced and understood by the contractor in the case of Adwa Museum zero km project and after the assessment suggestions and recommendation will be forwarded based on the findings.

1.3 Research questions

- What is Level of Quality management practice in the selected Construction project?
- To what level are the quality management, tools and techniques are applied?
- What is extent the project management team is applying quality planning, assurance and control?

1.4 Objectives of the study

1.4.1 General objective

To assess the quality management practice in case of Adwa Museum zero km project

1.4.2 Specific objectives of the study

Under the general objective, the following are specific objective of the study:

- To assess the quality management practices in in case of Adwa Museum zero km project from the perspective of processes, tools and techniques applied;
- To assess the level of quality management, tools and techniques.
- To assess quality plan, control and assuring practices

1.5 Significance of the study

This study helps the contractors and other project stakeholders by providing necessary information related with quality management. The study will assess the quality management system in one of the biggest projects in the city. This quality management system provides information about the quality culture in mega projects like Adwa Museum zero km project. As a source of information in order taking necessary measurement and decision making for project client, contractor, and consumer and even for society. Moreover, the study used to fill the knowledge gap in literature about quality management practice in the sector of construction project. Additionally, this study also helps other researchers to do more studies in depth and using as a reference for conducting further research on another related topic.

1.6 Scope of the study

This study will be conducted to assess the quality management practice in the case of Adwa Museum zero km project. The project is under Addis Ababa mega projects administration office the study will also involves engineers and architect from the administration office. The project is located in Addis Ababa and specifically the project to be constructed in the center of piazza

adjacent to Menelik second square. The study is planned to start from Feb 2023 and expected to be completed in May 2023 based on the context of the study.

1.7 Organization of the study

The study is organized into five chapters. The first chapter presents introduction of the study. It includes background of the study, background of the organization, and statement of the problem, objectives, significance of the study and scope of the study. Chapter two covers the review of related literature. Research design and methodology is given in chapter three. Chapter four is about Data presentation, analysis and discussions. The last chapter deals with conclusion and recommendations.

CHAPTER TWO

2 LITREATURE REVIEW

2.1 Theoretical literature

This section reviews literatures written by different authors and researchers in relation to the study. It also describes some definitions, major concepts regarding the project quality management and review of empirical works.

2.1.1 Project

Many definitions developed to provide an explanation for the meaning of a project. Kezner, (2000) defined project as any series of activities and tasks that has a specific objective to be accomplished within certain specification, defined start and dates, funding limits and consumes resources. Whereas PMI, (2013) defines project as temporary endeavor undertaken to create a completely unique product, service, or result.

Based on PMI (2013), a project has a definite beginning and end where the end is reached when the project's goals are achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. To ensure the overall success of a project, project management practices must be used.

2.1.1.1 Project Management

Project management refers to the application of knowledge, skills, tools and techniques to project activities to meet a relatively short-term objective that has been established to complete specific goals and objectives (PMI, 2008). It is accomplished through the planning, organizing, directing, and controlling of company resources (Kerzner, 2009). Today, the concept of project management has been increasingly applied in diverse industries and organizations (Kerzner, 2009; Packendorff, 1995).

Project management has become a scientific field with its own professional associations, the Project Management Institute (PMI) and the International Project Management Association (IPMA), these associations are known as promoters of the standardization of project management and certification programs for project managers (Soderlund, 2004).

A Guide to the Project Management Body of Knowledge (PMBOK Guide), published by PMI, presents a set of standard terminology and guidelines for project management. The PMBOK Guide is process based, describing project management as being accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing. Further, it assumes that all project management practices fall into ten knowledge areas, which are project integration management, project scope management, project time management, project cost management, project quality management, project resource management, project communications management, project risk management, project stakeholder management, and project procurement management.

2.1.1.2 Construction project

A “construction project” is a high value, time specific, special construction mission of creating a construction facility or service, with predetermined performance objectives defined in terms of quality specification, time, cost and other specified constraints (Chitkara, 2011).

2.1.2 The Ethiopian Construction Sector

According to a report from the MUDHo (2012), the GDP contribution of the construction sector to Ethiopia's economy is large. Over the past 11 years, there has been an increase in investment in the development and expansion of numerous infrastructure projects, contributing to the sector's impressive growth.

Since 2005, a number of initiatives have been taken to assist the neighborhood construction market. The local building industry's condition hasn't improved despite these efforts. The inability of the public sector to deliver services effectively, corruption, erratic job prospects, the use of outdated tools and methods, a lack of effective enabling regulations, and a fragile economy are a few of the drawbacks. According to the research, successful outcomes necessitate greater collaboration among stakeholders, and real progress can only be made with full cooperation from all parties (MUDHo, 2012).

The method through which construction work is carried out has seen a significant transformation in recent years. The way that construction projects are managed and procured has changed as well, not just in terms of new technology. In the unorganized sector of industry as well, a sizable portion of construction work is done. The informal sector builds the homes, offices, and other tiny pieces of infrastructure for this significant portion of the population. The unprotected and unregulated informal construction industry consists of people who participate in economic activities like providing labor, supplies, and building materials directly to the licensed industry in response to client demands. Additional works produced by both people and groups are also included. (MUDHo, 2012).

According to the same report, the inefficient and deteriorated state of the construction industry with poor performance has detrimental effects to the development of the industry and the weaknesses, problems and constraints hampering the performance and development of the industry include

- Low capacity and capability of the local contractors and consultants due to weak resource base and inadequate experience.

- Inadequate and erratic work opportunities, inappropriate contract packaging of works which favor foreign firms in donor funded projects, low public investment in infrastructure projects and over dependence on donor funding.
- Inefficient and non - transparent procurement systems, corruption and financial mismanagement in public/private sectors.
- Lack of supportive institutional mechanisms in terms of financial credit facilities, equipment for hire and professional development.

2.2 Quality

According to Joseph Juran and Frank Gryna defined quality as “Fitness for use”. The ISO 9000 defines it as ‘The totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs’. Armand Feigenbaum explains Quality as “A customer determination based upon a customer’s actual experience with a product or service, measured against his or her requirements stated or unstated, conscious or merely sensed, technically operational or entirely subjective and always representing a moving target in a competitive market”. American Society for Quality denotes quality as an excellence in goods and services, especially to the degree they conform to requirements and satisfy customers.

2.2.1 Project Quality Management

The overall aim of quality management is to satisfy the customer, conform to requirements, ensure fitness for purpose, and to ensure the product for use. Project model looks at quality management as set of activities or tasks that are required to ensure the project satisfies all the needs for which it was undertaken based on documented in the state of work and includes a focus on quality

management from the perspective of product, processes, and the people needed to make quality an effective and efficient aspect of successful project completion (Crawford, 2002).

Moreover, Wysocki in his effective project management book states that: A sound quality management programs with processes in place that monitor the work in a project is a good investment. It is not only contributing to customer satisfaction but also it helps organizations use their resources more effectively and efficiently by reducing waste and rework. He further described “Quality management is one area that should not be compromised. The payoff is a higher probability of successfully completing the project and satisfying the customer” (Wysocki, 2014).

PMBOK Guide explains that “Project Quality Management includes the processes and activities of the performing organization that determine quality policies, objectives and responsibilities so that the project will satisfy the needs for which it was undertaken. It implements the quality management system through policy and procedures with continuous process improvement activities conducted throughout, as appropriate” (PMBOK, 2000).

Furthermore, the PMI's PMBOK states that project quality management include: To identify all the quality standards relevant for the project and plan how to satisfy them, to evaluate the project to ensure that the relevant quality standards will be met, to monitor, to compare with the relevant quality standards, and to correct the product and the processes.

The concept of quality has existed for many years, but its meaning and perception has changed and evolved over time. Before the early twentieth century, quality management meant inspecting products to ensure that they met specifications (Reid and Sanders, 2007 cited in Sabah 2011). Similarly, Harold Kerzner (2003) described the changing view of quality in the past and present as follows.

2.2.2 Quality planning

Planning quality management is the process of identifying quality requirements and/or standards for the project and its deliverables, and documenting how the project will demonstrate compliance with relevant quality requirements. The key benefit of this process is that it provides guidance and direction on how quality will be managed and validated throughout the project (PMBOK Guide, 2013).

Quality planning should be performed in parallel with the other planning processes. For example, proposed changes in the deliverables to meet identified quality standards may require cost or schedule adjustments and a detailed risk analysis of the impact to plans (PMBOK Guide, 2013).

The Project Management Book of Knowledge also addressed quality planning from a different position to enhance the thoughts earlier expressed. It said that quality planning has a process input generated by predecessor processes referred to as the project scope statement and project management plan. These processes are introduced by external units like enterprise environmental factors and organizational process assets. Further defined quality planning as the process for "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 fulfill requirements". By planning the quality one has to respect some principles, and these are Customer's (i.e. client or its representative) satisfaction comes first: Quality is defined by the requirements of the client (i.e. Client or his representative who have enough knowledge about the requirements).

- **Prevention over inspection:** It's better to avoid mistakes than to inspect the result and repair the defects.
- **Management responsibility:** Costs of quality must be approved by the management.

- **Continuous improvement:** Becoming better is an iteratively structured process. Requirements of the client (i.e. Client or his representative who have enough knowledge about the requirements).
- **Prevention over inspection:** It's better to avoid mistakes than to inspect the result and repair the defects.
- **Management responsibility:** Costs of quality must be approved by the management.
- **Continuous improvement:** Becoming better is an iteratively structured process.

2.2.3 Quality assurance

Despite the wealth of site experience accumulated throughout the decades, one in ten building contracts still leads to client dissatisfaction and complaint against the contractor. A survey conducted by the Building Research Establishment in the United Kingdom indicates that 40% of building defects occur during the construction phase (BRE, 1982) as cited in (Chung H.W., 1999). In most cases, the defects are found to be the result of:

- Misinterpretation of drawings and specifications;
- Use of superseded drawings and specifications;
- Poor communication with the architect/engineer, subcontractors and material Suppliers;
- Poor coordination of subcontracted work;
- Ambiguous instructions or unqualified operators;
- Inadequate supervision and verification on site.

Consistent quality can only be achieved when such avoidable mistakes are avoided in the first instance. Preventive measures must be taken to minimize the risk of managerial and communication problems. This is the basic concept of quality assurance, (Chung H., W, 1999).

According to Harris and McCaffer, (2001) The performance of an individual in an organization could directly or indirectly affect the quality of the finished product. Responsibility for quality therefore stretches from the chief executive right down to the person-on-the-job. If consistent quality is to be assured, all staff in the organization, both in the head office and on site, must: To practice quality assurance, an organization has to establish and maintain a quality management system (usually abbreviated to quality system) in its day-to-day operation. A quality system contains, among other things, a set of documented procedures for the various processes carried out by the organization. Implementing a quality management system does not replace the existing quality control functions, nor does it result in more inspection and testing; it just ensures that the appropriate type and amount of verification is performed when and where it is planned to be done. In other word quality management system does not add or replace the existing QA/QC in the company just it ensures the works are done according to the planned. In fact, a quality system embraces quality control as its technical arm. This is why a quality management system is sometimes referred to as a QA/QC program.

In short, quality assurance is oriented towards prevention of quality deficiencies. It aims at minimizing the risk of making mistakes in the first place, thereby avoiding the necessity for rework, repair or reject (Teklebrhan K., 2014).

2.2.4 Quality control

The PMBOK refers to quality control as the technical aspect of quality management. Project team members who have specific technical expertise on the various aspects of the project play an active role in quality control. They set up the technical processes and procedures that ensure that each step of the project provides a quality output from design and development through implementation

and maintenance. Each step's output must conform to the overall quality standards and quality plans, thus ensuring that quality is achieved (PMI, 2008).

According to Harold (2003) a good quality control system will; "Select what to control, set standards that provide the basis for decisions regarding possible corrective action, establish the measurement methods used, compare the actual results to the quality standards, act to bring nonconforming processes and material back to the standard based on the information collected, monitor and calibrate measuring devices and include detailed documentation for all processes" (Harold, 2003). Similarly, according to Juran quality control relies on five basics: a clear definition of quality; a target, a clear goal; a sensor, a way to measure actual performance; a way to interpret the measurement and compare with the target; and a way to take action, to adjust the process if necessary (Juran, 1999).

Quality control is the use of techniques and activities that compare actual quality performance with goals and define appropriate action in response to a shortfall. It is the process that monitors specific project results to determine if they comply with relevant standards and identifies different approaches to eliminate the causes for the unsatisfactory performance. The goal of quality control is to improve quality and involves monitoring the project outputs to determine if they meet the quality standards or definitions based on the project stakeholder's expectations. Quality control also includes how the project performs in its efforts to manage scope, budget and schedule (PDEM, 2014).

2.2.5 Quality on construction project

In the construction industry, quality is defined as meeting the owner's needs in accordance with the established scope of work, on-budget, and according to the planned timetable. Because each project is distinct and has its own requirements, building quality differs from those of other manufacturing products and services. Abdul R. (2011).

Quality may mean different things to different people. Some take it to represent customer satisfaction, others interpret it as compliance with contractual requirements, yet others equate it to attainment of prescribed standards as regards quality of construction. Chung (1999).

Quality of construction is difficult to define. First of all, the product is usually not a repetitive unit but a unique piece of work with specific characteristics. Secondly, the needs to be satisfied include not only those of the client but also the expectations of the community into which the completed building will integrate. The construction cost and time of delivery are also important characteristics of quality Chung (1999).

As per PMBOK (2013), project Quality Management works to ensure that the project requirements, including product requirements, are met and validated. PMBOK also describes quality management in to three processes; planning quality management, performing quality assurance & controlling quality.

2.2.6 Quality Management

According to various authors, quality improvement and management has become a subject of great importance in organizations. Quality Management focuses on the overall process of a system rather than just concentrating on results, it is the determination and implementation of the quality policy with regard to the organization. Many organizations throughout the world have started to

realize the potential it holds for them and have therefore adopted new philosophies focused on quality management rather than just being focused on the end result (Piskar & Dolinsek, 2006).

Quality Management does indeed have a positive effect on the various business functions and therefore calls for a deeper look. The empirical studies were undertaken through questionnaires during 2002 in Slovenia. 212 Companies that were already implementing the ISO 9001 system were asked to participate in this study. The results obtained from this study were analyzed and compared by the various authors. In conclusion all the authors were in favor of the Quality Management System (Piskar & Dolinsek, 2006).

A Quality Management System consists basically of an organizational structure, responsibilities, procedures, processes and resources for implementing quality management. More focus will be given on processes and procedures later on in this study. The objective of a Quality Management System is for the continuous improvement of quality in an organization and therefore it is implied that a Quality Management System reaches all parts of an organization, it is not just isolated to one area of the business. A good Quality Management System can provide the following benefits: greater efficiency, reduced cost, better performance, less unplanned work, fewer disputes, improved visibility, reduced risk, problems show up earlier, better quality, improved customer confidence, portable and reusable products and better control over contracted products. Currently there are two different ways to define a Quality Management System. One can either choose the home-grown approach or choose from an existing model such as ISO 9000, SEI-CMM and MBNQA, these models can then be adapted to fit the organization (Kelkar, 2008).

As per PMBOK (2013), project Quality Management works to ensure that the project requirements, including product requirements, are met and validated. PMBOK also describes

quality management in to three processes; planning quality management, performing quality assurance & controlling quality

2.2.6.1 Consequences of poor-quality management in construction

Empirical studies examining the consequences of poor quality management in construction are abundant in academic literature. Here are some common findings and themes from such studies:

Cost Overruns: Poor quality management often leads to cost overruns due to rework, delays, and additional expenses incurred to fix defects. A study by Love et al. (1998) found that poor quality management practices were associated with significant cost overruns in construction projects.

Schedule Delays: Inadequate quality management can result in schedule delays, which impact project timelines and increase costs. Turner and Cochrane (1993) found that poor quality management was a major contributor to schedule delays in construction projects.

Decreased Customer Satisfaction: Poor quality management can lead to dissatisfaction among clients and end-users due to defects, rework, and failure to meet quality standards. Zavadskas et al. (2017) found that poor quality management negatively impacted customer satisfaction in construction projects.

Legal Issues and Disputes: Construction projects with poor quality management are more likely to face legal issues and disputes, including claims for damages and contract disputes. A study by Odeyinka and Kaka (2013) found that poor quality management was a significant predictor of legal disputes in construction projects.

Reputation Damage: Construction firms with a reputation for poor quality management may suffer long-term damage to their reputation and credibility, affecting their ability to secure future

projects. An empirical study by Chan et al. (2004) demonstrated the negative impact of poor-quality management on the reputation of construction firms.

Safety Risks: Poor quality management practices can also pose safety risks to workers and occupants of construction projects. Lack of adherence to quality standards and regulations can result in accidents and injuries. Hinze and Tracey (1994) found a correlation between poor quality management and increased safety incidents on construction sites.

These are just a few examples of the consequences of poor-quality management in construction, as highlighted in empirical studies. Addressing quality management issues through effective quality control processes, training, and implementation of quality management systems can help mitigate these risks and improve project outcomes.

2.3 Empirical Review of Literature

The empirical literature provides empirical evidences of quality management practices in construction projects.

Quality Management has increasingly been adopted by construction companies as an initiative to solve quality problems and to meet the needs of the final customer. Accordingly, this section is concerned with other studies conducted on other area in similar topics. The first study selected for the empirical review is “assessment of quality management practices of construction companies in akwa-ibom state” in Nigeria by ekpenyonganwan Effiong her study preliminarily investigates the quality management practices of construction companies with a view to ascertaining their influences on project performance in Akwa Ibom State, findings on the study show that, there is need for more attention to be put into quality management practices in the Nigerian construction

industry and it is essential for the long-awaited turnaround in the performance of the projects dished-out into the built environment of Nigeria.

The other study conducted by Ever line, in his study on factors affecting the performance of Construction projects in Kenya, identified four major factors that most important determinants in general construction projects; Experience and qualification of personnel, quality of materials and equipment, conformance to specification and quality assurance training and meetings (Everline, 2014). In addition, as Joy stated in his study on factors influencing quality of construction projects, the major factors that affect quality; material, labor, financial issues, conformance to codes and standards, top management support, management factors, selection of contractor, selection of designer design, co - operation of parties, contract documents and lack of communication (Joy, 2014).

Further as stated by Agbenyega (2014) in his study in “quality management practices of construction firms in Ghana”, solving the potential barriers are the main measures to be taken, namely: management commitment, communication between managers and employees, employee involvement, detailed and logical work program, regular inspection, quality audit report, lack of training and education of team members and review and analysis (Agbenyega,2014).

Binyam Asefa on his study “Assessment of Quality Management Practices of Ethiopian Contractors Focused on Building Construction Projects” find out that the contractors involved in building construction projects are aware of the concept of quality and quality management but its application was relatively low and the contractor’s main focuses are more on finishing the work on time and with profit than practicing quality (Binyam, 2018).

Furthermore, Temesgen on his study identified three major problems related to unsuccessful projects and that contribute to failures of projects in Ethiopia public sectors; the first is resource problem that includes shortage of adequately trained and skilled human, financial and material resources. Second involves, management problems such as weak sharing of responsibility during planning, weak follow-up, poor coordination and third, technical problems which include loose linkages with sectoral policy and strategy, weak technical skill and poor project design are some of the identified problems (Temesgen, 2007).

The problems identified by different researchers are almost similar even though there is variation due to their practical context of the projects. Accordingly, these variables are also considered in the researcher study to consider in the context of the construction projects.

2.4 Research gaps

Some researchers have done research on the assessment of quality management on building construction projects, but still There are few researches on the Addis Ababa mega project quality management practices Despite the significant expansion of mega projects in Addis Ababa, there remains a noticeable gap in the academic investigation concerning the implementation and effectiveness of quality management practices within these projects. While literature exists on mega project management methodologies, little attention has been devoted to practice, specific challenges, strategies, and outcomes related to quality management in the context of Addis Ababa's mega projects. It is essential to realize the complex dynamics of quality management in these massive projects in order to improve project performance, reduce risks, and promote sustainable growth in the area.

CHAPTER THREE

3 RESEARCH METHODOLOGY

3.1 Research approach and design

This study employed descriptive research method, utilizing quantitative data for its ease of analysis, tabulation of frequency, and presentation of results as percentages. Additionally, the study embraces a mixed research approach, integrating both qualitative and quantitative methodologies. As noted by Mark (2009), as cited in Aida (2015), combining qualitative and quantitative approaches offers the potential to mitigate weaknesses inherent in each method by leveraging strengths from the other. Visual aids such as tables are employed to elucidate the collected data and enhance reader comprehension

3.1.1 Sample size and sampling procedure

To select the respondents for the questionnaire a purposive sampling technique was employed. This sampling method is chosen for it allowed the researcher to focus on a limited number of informants that were selected from the project experts to get the required information to carry out the study in order to get optimal insight. The respondents were selected based on their experience, information and area of work they have about project quality management implementation and management practice. Based on these 38 employees were selected.

3.2 Data source and data collection method

This study uses both primary and secondary data sources. Primary data is obtained from the employees of Adwa Museum zero km project through self-administered questionnaire and interviews. The secondary data is obtained from reports of previous studies, office reports and literatures. There are two basic types of survey questions from which to choose: open-ended and closed-ended. This questionnaire survey has both open-ended and closed-ended questionnaires.

Archival documents are useful mostly from completed projects, in which contract documents, project reports, correspondence letters and payment certificates were investigated thoroughly which were very important in assessing the quality management practice of the project.

3.2.1 Data analysis method

An interactive procedure called analysis looks at the responses applied to evaluate if they are relevant to each study question, working with the data involves organizing it, dividing it into manageable components, synthesizing it, looking for patterns, determining what is significant and what can be learned from it, and deciding what the researcher wants to communicate to others (Bogdan & Biklen, 1982). This implies that conclusions must be drawn from the study data gathered in order to address the research questions and generally fulfill the mandated goal of the research.

In this study, the collected data will be examined and checked for completeness and comprehensibility. The data will then be tabulated. Data presented using table with mean score. The data analysis techniques employed are mainly two types. In the first part of the analysis, descriptive method is used which are interpreted in the form of frequency and means. In this case, after collecting data it will be analyzed and discussed separately. Descriptive statistics is analyzed using Package for Social Sciences version 21.

3.2.2 Validity and Reliability of Instruments

3.2.2.1 Validity

The researcher checked the validity of questioners developed for this study. Before distributing the final questionnaires to the respondents, it was be checked and commented by friends and project personnel and the advisor of the researcher and pilots done to check the valid. The final

version of the questioners was distributed after incorporating all the comments and feedbacks obtained from different professionals.

3.2.2.2 Reliability

Reliability analysis was carried for internal consistency with regard to respondent’s data on project quality management rating using Cronbach’s alpha and in principle Cronbach’s alpha of 0.7 is acceptable for internal consistency of data obtained from respondents.

Reliability Statistics

Table 3.2 Reliability Statistics

	Cronbach's Alpha	N of Items
pre contract stage quality management practice	.75	10
quality planning	.87	12
quality assurance	.74	4
quality control	.76	4
quality tools and techniques	.79	8

Source: Own Survey Result, 2023

3.2.2.3 Ethical Issues

Interaction with participants would be done after prior appointment and written letter from the University to Adwa Museum 00km project. Questions were not being forced upon them to answer. Rather the purpose of the study would be explained to them to make them more comfortable to reply. The researcher has declared that all participants were voluntary participate in the data collection by collaborating in filling of the questionnaire. By doing so, the respondents are free of any harm and more importantly their views were very confidential and anonymous. Moreover, the

questionnaire does not have any connection with the respondents since it is done for education purpose.

CHAPTER FOUR

4 DATA ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the result of the questionnaire and discusses the result to answer the research questions and tries to achieve objectives that the study was set.

4.2 Analysis and discussion of data

The interview was conducted face-to-face with the selected interviewees by asking questions and explanations. Semi-structured interview was conducted with respondents to gather information for the assessment of quality management practice in the case project. The information collected used to support the literatures in order to include them in the questionnaires in other word to merge it to form questionnaires.

4.2.1 Response Rate

A total of 38 questionnaires were distributed to various respondents of interest for the study. Out of the covered population, 33 were responsive representing a response rate of 86.8%. The other 5 questionnaires are not been received. Therefore, 33 questionnaires were used in the analysis.

4.2.2 Descriptive result of characteristics of respondents used in the study

Table 4.1 Descriptive result of characteristics of respondents

Parameter	Sub-parameter	N	%
Gender of the respondents	Male	24	72.7
	Female	9	27.3
Educational level of the respondent	master's degree	8	24.2
	bachelor degree	23	69.7
	diploma	2	6.1
Experience of the respondent (yrs)	1-10 years of experience	7	21.2
	11-15 years of experience	16	48.5
	16-20 years of experience	8	24.2
	over 20 years of experience	2	6.1
position of the respondents	Manager	4	12.1
	Engineer	15	45.5
	Architect	8	24.2
	Lab technician	6	18.2

Source: Own Survey Result, 2023

4.2.3 Evaluation of the level of use of quality management practices at pre-contract of the project

Table 4.2 Descriptive Statistics of quality management practices at pre-contract stage

Descriptive Statistics				
	N	Minimum	Maximum	Mean
Matching of design with client requirement	33	3	4	3.79
Site visiting to obtain information on site conditions before commencement of design	33	4	5	4.24
Checking of drawings before they are issued	33	4	5	4.33
Giving detailed explanation of design to the client	33	3	5	4.12
Seeking approval of the client at every stage of design	33	3	5	4.06
Site inspection to ensure compliance with quality requirements	33	3	5	3.97
Communication of design decision to another consultant.	33	3	5	3.85
Using of simple and straight-forward specifications	33	1	5	4.39
Testing on new materials and components before specifying them	33	3	5	3.85
Soil investigation to determine bearing capacity of soil before carrying out design	33	4	5	4.36
Valid N (listwise)	33			
Over all mean				4.06

Source: Own Survey Result, 2023

The data in table 4-2 shows the descriptive statistics of the questions on use of quality management practices at pre-contract and contract stages. the mean value for use of quality management practices at pre-contract and contract stages found to be in the range of 4.39 and 3.79. with the mean value of 4.39 most participants highly agreed on use of simple and straight-forward

specifications during pre-contract and contract stages, this indicates most employees didn't face a problem to understand specifications. site inspection to ensure compliance with quality requirements scored the least mean value which is 3.79, This shows the majority of respondent's didn't believe that project site wasn't inspected on the level of their expectation.

Based on the overall mean value of 4.06 the respondent agreed on the successful application of factors listed under quality at the pre contract stage.

Quality management at the pre-contract stage in construction plays a critical role in ensuring that project objectives, specifications, and quality standards are clearly defined and communicated. This stage involves comprehensive planning, risk assessment, and stakeholder engagement to establish quality requirements, identify potential risks, and develop proactive strategies for quality assurance and control. Effective quality management at the pre-contract stage helps mitigate uncertainties, prevent costly changes, and lay the foundation for successful project delivery.

Azhar, S., Carlton, W. A., Olsen, D., & Ahmad, I. (2011)

4.2.4 quality planning

Table 4.3 Descriptive Statistics of quality planning

	N	Minimum	Maximum	Mean
Describing Each project briefly	33	3	5	4.18
Presenting List of contract documents and drawings	33	3	5	3.88
Listing and clarify Project quality objectives	33	2	4	3.12
Specify clearly Specific criteria of subcontractor nomination, material and equipment	33	2	4	2.94
Specify clearly list(s) of materials and appliances used for the project, showing the verification requirement of each	33	2	5	3.33
List out and clearly clarify methodologies for Inspection and test plans, or list thereof	33	3	5	4.15
Clearly describing and listing of quality procedures and work instructions applicable to project by making reference to the company's Quality Manual and Procedures.	33	3	5	3.76
Preparing formats for checklists, or target dates for their provision	33	3	5	3.97
list of quality records to be kept, including appropriate quality records from subcontractors	33	3	5	4.15
Specifying frequency (or provisional dates if possible) of internal quality audits	33	2	4	2.73
Describing Each project briefly	33	2	4	2.48
Presenting List of contract documents and drawings	33	2	4	2.91
Valid N (listwise)	33			
Overall mean				3.46

Source: Own Survey Result, 2023

The data in table 4-3 shows the descriptive statistics of the quality planning process. The mean score is between 2.48 and 4.18. most respondent agreed on that the project plan contains brief description of the project with the mean value of 4.18. frequency of internal quality audit scored low it indicates the project plan don't include internal quality audit.

Scoring overall mean value of 3.46, successful applications of factors under quality plan of the project is responded neutral and most of quality plan factors are not implemented successfully in the project.

Construction projects are complex endeavors that require careful planning and execution to ensure success. However, poor quality planning can lead to significant challenges, including cost overruns, delays, and compromised structural integrity. Most of the result shows that the respondents disagree or felt neutral on the application of factors in quality planning practice of the case project. According to (Abdul-Rahman et al., 2014) Quality planning establishes a framework for identifying quality requirements, defining standards, and outlining processes to achieve project objectives. Quality planning contains the standard variables for construction project as recommended by (George, 2003). So, the based on the result the project doesn't apply listed factors in quality planning. Mean result for each factor is presented in table 4.3

4.2.5 Quality Control

Table 4.4 Descriptive Statistics of quality control

	N	Minimum	Maximum	Mean
Selecting what to control and set standards that provide the basis for decisions regarding possible corrective action.	33	2	4	2.55
Establishing the measurement methods used, compare the actual results to the quality standards.	33	3	4	3.55
Acting to bring nonconforming processes and material back to the standard based on the information collected.	33	2	4	3.39
Monitoring and standardizing measuring devices, include detailed documentation for all processes.	33	2	4	3.52
Valid N (listwise)	33			
Over all mean				3.25

Source: Own Survey Result, 2023

The data in table 4-3 shows the descriptive statistics of the quality control system. The mean score is between 2.55 and 3.55. most respondent are neutral on the successful application of listed quality control factors on the project. Establishing the measurement methods used, scored the highest mean score, with the mean score of 3.55 still even if it scored the highest the result felt in neutral zone. Selecting what to control and setting standards that provide the basis for decisions regarding possible corrective action scored the least mean score in this category with mean score of 2.55.

The overall mean for the quality control category is 3.25, means most respondent felt neutral on the factors under quality control category, Scoring overall mean value of 3.46.

Quality control in construction is a systematic process aimed at ensuring that construction activities adhere to established standards and specifications, thereby meeting quality requirements and mitigating defects and deficiencies. Effective quality control not only enhances the durability, safety, and functionality of constructed facilities but also fosters client satisfaction and reputation for construction firms. By implementing robust quality control measures, construction projects can minimize risks, optimize resources, and achieve desired quality outcomes (Abdul-Rahman et al., 2014)

4.2.6 Quality Assurance

Table 4.5 Descriptive Statistics of quality Assurance

Descriptive Statistics				
	N	Minimum	Maximum	Mean
Selecting the appropriate quality management system requirements for each project.	33	2	5	3.48
Clearly specifying the quality management system requirements.	33	2	5	3.52
Evaluating and selecting Laboratory technician on their ability to meet specified requirements.	33	3	5	4.33
Appropriate checking, measuring or testing of products and keeping proper records.	33	3	5	4.42
Valid N (listwise)	33			
Overall mean				3.93

Source: Own Survey Result, 2023

The data in table 4-3 shows the descriptive statistics of the quality assurance system in the project. The mean score is between 3.48 and 4.42. most respondent highly agreed on the Evaluating and selecting Laboratory technician on their ability to meet specified requirements, scored mean value of 4.33. with the mean score of 3.48, Selecting the appropriate quality management system

requirements for each project scored the least mean score respondents agreed on the implementation of factors listed under quality assurance. The overall mean for the quality assurance system category is 3.93, means most respondent agreed the quality assurance practice in the project.

According to (Abdul-Rahman et al., 2014) Quality assurance in construction refers to the systematic processes and procedures implemented to ensure that construction projects meet predefined quality standards and requirements. It involves proactive planning, implementation, and monitoring of quality management practices throughout the project lifecycle, aiming to prevent defects, errors, and deviations from specifications. By embedding quality assurance principles into project management processes, construction firms can enhance client satisfaction, mitigate liabilities, and uphold their reputation for delivering high-quality projects. The mean score for all tools and techniques listed on the questionnaires are presented on table 4.5.

4.2.7 Level of Quality Management Tools and Techniques Applied

Table 4.6 Descriptive Statistics of quality Management Tools and Techniques Applied

Descriptive Statistics				
	N	Minimum	Maximum	Mean
Benefit/ cost analysis	33	2	3	2.36
Benchmarking	33	2	3	2.33
Flowcharting	33	2	4	2.61
quality audits	33	1	3	2.00
Inspection	33	4	5	4.48
Charts and diagrams	33	1	4	2.24
Statistical sampling	33	2	4	2.91
trend analysis	33	2	4	2.48
Valid N (listwise)	33			
Overall mean				2.67

Source: Own Survey Result, 2023

The data in table 4-3 shows the descriptive statistics of Quality Management Tools and Techniques Applied in the project. The mean score is between 2.00 and 4.48. most respondent very highly agreed inspection of works on the project with mean score of 4.48. quality audit is rated low based on respondent answer.

The overall mean for the Quality Management Tools and Techniques Applied is 2.67, means most respondent disagreed on the successful application of listed Quality Management Tools and Techniques applied on the project. Successful application Inspections are highly agreed by the respondent but the successful application of quality tools and techniques in construction projects has been demonstrated to enhance project outcomes and mitigate risks. And also, the successful application of these tools and techniques not only enhances the quality of construction projects but also contributes to improved efficiency, cost-effectiveness, and client satisfaction. Shen, Q., Yu, J., & Tam, C. M. (2017)

CHAPTER FIVE

5 CONCLUSION & RECOMMENDATION

5.1 Introduction

This chapter has three sections. The first section presents summary of major findings, the second section presents conclusion of the study derived from findings and the last section is recommendations drawn based on the findings.

5.2 Summary of the Finding

Based on the results of the study carried out the major summary of finding of the study are:

- ✓ Based on the response quality management practice at pre contract stage was good however during the construction stage the project can't maintain the quality management practice trend specially on using quality management tools and techniques
- ✓ The quality planning process lacks Specifying clearly Specific criteria of subcontractor nomination, material and equipment, specifying frequency (or provisional dates if possible) of internal quality audits, Describing Each project briefly, Presenting List of contract documents and drawings and the project implemented successfully, listing out and clearly clarifying methodologies for Inspection and test plans, or list thereof.
- ✓ There is poor implementation of quality tools and techniques in the project, Benefit/cost analysis, Benchmarking, Flowcharting, quality audits, Charts and diagrams, Statistical sampling, trend analysis are not successfully implemented, but inspections are successfully implemented in the case project
- ✓ quality control, assuring and planning is below expectation of successful implementation based on the response.

5.3 Conclusion

The study assessed the quality management practices in the case of Adwa Museum 00km project with the general objective of studying the current practice of quality management practices. As discussed in detail in the literature review part of this study, Successful Quality management enhances the chance of successfully completing works within time, cost and quality constraints. Quality management also helps to achieve project constraints such as within customer satisfaction, and meeting the organizational goal of the project.

Quality management is one of the nine core knowledge areas that quality managers should be familiar and for the successful management of projects the organization has to undergo the quality management process. It involves estimating the planning process, quality assurance process, quality controlling process based on the organizational quality procedure.

Quality Management practices remain important for achieving effective quality to achieve social and economic developments. The quality management process is partially undergoing with limitations of considering all the steps and parameters fully under consideration. since the case project has no guiding for designing quality management at organizational level. Therefore, the quality management process lacks standardization as per the literature on the process quality management.

Additionally, regular and periodic site supervision and inspection are the most important measure to improve quality management of the project. The next important measure is implementing a comprehensive quality control mechanism starting from the planning phase and continuing into the end of implementation phases.

Therefore, it may be concluded that, undertaking complete quality management process by developing quality management policy at organizational level helps to improve the quality management related problems and working on the factors that affect quality management.

5.4 Recommendations

Based on the findings of study it is recommended that the client considers the following areas of improvement in management of its future mega projects in general and quality management in particular.

- ✓ Project Managers should consider building capacity of staff on quality management to use qualified and experienced staffs to follow up the use of good quality of materials and equipment to ensure the work conformances to specification and standard requirements.
- ✓ According to different scholars, planning is the first stage of any activity. Since, as observed in the result most of the planning process factors are not applied successfully in the case project. This indicated that the project is not utilizing quality management planning tools successfully. So, the project should work towards implementing these factors successfully for the rest of the works.
- ✓ Quality Assurance authority should give attention to appropriate quality management practice requirements and the authority should make appropriate checking, measurement or testing of products and keeping proper records.
- ✓ Top management should work on identifying the gaps which require their strong support and strengthen the quality focused activities, since their guidance is critical for the success of the quality conformance of the project.
- ✓ Quality management of mega projects like the case project requires stakeholder's collaboration from laboratory technicians, engineers and managers sides on the basis on their respective roles

and responsibilities defined. Therefore, the organization should strongly work on to build partnership/collaboration with its stakeholders.

- ✓ Therefore, the project managers can make use of the results of this study to identify areas of improvements in order to manage its project quality.

5.5 Future studies

The practice of quality project management based on the project management skills and knowledge is in its early stages in Ethiopia and only few researches were conducted that are relevant to project management in general specially to quality management. Thus, future researches can be conducted in detail and incorporating various project-based organizations to compare their project quality management practice and contribute to growth of the discipline.

Moreover, this study focused on a single project level, to assess the quality management practices.

Future studies can be done incorporating quality management practice in the mega projects in the regional (Addis Ababa) level for a better performance.

Reference

- Abdual, R (2011): Quality Management in Construction Projects, Department of Systems and Engineering Management Air Force Institute of Technology (AFIT) – Dayton, Ohio
- Aida Taye (2015). Assessment of quality management practice on organizational performance in three selected engineering consulting companies in Addis Ababa [Master's thesis, Addis Ababa university].
- Ashenafi Birhanu (2020) Total Quality Management Implementation in Selected Building Construction Firms in Addis Ababa [Master's thesis, Addis Ababa university].
- Azhar, S., Carlton, W. A., Olsen, D., & Ahmad, I. (2011). Building Information Modeling for Sustainable Design and LEED® Rating Analysis. *Automation in Construction*, 20(2), 217-224.)
- Benjamin Varghese Roy, Sriram K.V, Giridhar Kamath and Asish Oommen Mathew, Evaluation of Cost and Time Overrun in Government Construction Projects - *A Case Study*, *International Journal of Civil Engineering and Technology*, 9(7), 2018, pp. 457–466
- Biniyam Assefa Assessment of Quality Management Practices of Ethiopian Contractors Focused on Building Construction Projects [Master's thesis, Addis Ababa university].
- Chan, A. P., Scott, D., & Lam, E. W. (2004). Framework of success criteria for design/build projects. *Journal of Construction Engineering and Management*, 130(2), 153-159.
- Cheung Sai On, Suen Henry C.H. and Cheung Kevin K.W., (2004), PPMS: A Web- based construction Project Performance Monitoring System, *Automation in Construction*, Vol. 13, PP. 361-376

Chitkara (2011). “Construction Project Management - Planning, Scheduling and Controlling”, 2nd Edition, Tata McGraw Hills.

Chung H.W., 1999, Understanding Quality Assurance in Construction a Practical Guide

Ethiopian Ministry of Urban Development and housing website <http://mwud.gov.et>

Fourth Edition, PMBOK

Harris, F., McCaffer, R., and Edum, F. (2001). Modern Construction Management, London Blackwell Publishing.

Hinze, J., & Tracey, D. (1994). Construction safety: description and theory. Safety Science, 18(1-3), 249-259.

ISO 9000 for Contractors, E & FN Spon published in the Taylor & Francis e-library, 2002.

ISO/TC. ISO 9000:2000 Quality Management Systems - Fundamentals and Vocabularies.

Juran, J.M., and Godfrey, A.B. (1999). Juran’s Quality Handbook, 5th edition, New York: McGraw-Hill.

Kalwankar, A. (Producer), & Kelkar, P. S. (Director). (2008). Lecture — 35 Quality Management Systems [Motion Picture]. Bombay, India.

Kerzner, H. (2009). Project management: a systems approach to planning, scheduling, and controlling 10th ed. John Wiley & Sons, Inc., Hoboken.

Lakshmi R., 2015, “Quality Control and Quality Assurance in Building Construction” available at: [http:// www.internationaljournals.org](http://www.internationaljournals.org)

- Love, P. E., Mandal, P., Smith, J., & Li, H. (1998). Investigating construction quality management systems and practices in Australia. *Construction Management and Economics*, 16(3), 259-271.
- Nicholas and Steyn (2008) Nicholas, John M. and Herman Steyn. (2008). *Project Management for Business, Engineering, and Technology: Principles and Practices*. 3rd ed. New York: Elsevier Inc.
- Odeyinka, H. A., & Kaka, A. P. (2013). Key performance indicators for measuring construction success. *Engineering, Construction and Architectural Management*, 20(6), 611-623.
- Piskar, F., & Dolinsek, S. (2006). Implementation of the ISO 9001: from QMS to business model. *Industrial Management and Data Systems* Vol. 106, 1333-1343.
- PMI. (2003). *A Guide to the Project Management Body of Knowledge*. Newtown Square, PA: Project Management Institute.
- Project Management institute (2017). *A guide to the Project Management Body of Knowledge*.
- Shen, Q., Yu, J., & Tam, C. M. (2017). Enhancing quality management in construction projects in China. *International Journal of Project Management*, 35(7), 1310-1324.)
- Tekleberhan, K. (2014), *Assessment of the Impact of ISO 9001 Certification on Ethiopian Construction Companies* [Master's thesis, Addis Ababa university]
- Temesgen, W. (2007). *Managing the Project Cycle: A Challenge for the Ethiopian Public Sector (Federal Level)*.

Turner, J. R., & Cochrane, R. A. (1993). Goals-and-methods matrix: coping with projects with ill-defined goals and/or methods of achieving them. *International Journal of Project Management*, 11(2), 93-102.

Zavadskas, E. K., Kaklauskas, A., Turskis, Z., & Tamosaitiene, J. (2017). Quality management in construction projects: empirical study in Lithuania. *Journal of Civil Engineering and Management*, 23(6), 776-785.

Zikmund, W.G. (2000). *Business research methods*. 6thed. Orlando, US: Dryden Press.

Appendices

Appendix A

ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF PROJECT MANAGEMENT

Questionnaire

Name: Eyobel Tsegaye

Tel: +251940415455

Email: eyobelt33@gmail.com

Dear respondent,

My name is Eyobel Tsegaye. I am a postgraduate student in the Saint Mary's University Department of Project Management. I am undertaking the research entitled " assessment of quality management practice in building construction: the case of Adwa Museum 0.0 km project" for partial fulfillment of the requirements for the award of a Master of Arts in project management. The objective of this questionnaire is to support research being conducted on the mentioned title for academic purposes only. Dear respondent, your honest response will be highly influential on the final result of this research. Therefore, you are kindly requested to give your answer carefully. I assure you that all the responses you provide will be kept strictly confidential.

If you want to ask any unclear question or for further explanation, please feel free to contact me at the address mentioned above.

Thank you in advance

Eyobel Tsegaye

Part One: General Information of the respondents

1.1 Gender

- A) Male B) Female

1.2 What is the highest level of education you have completed?

- A) College Diploma B) Bachelor Degree C) Master’s degree

1.3 You are currently working as employee of

- A) Manager B) Laboratory technician C) Engineer D) architect

1.4 How long have you been working in construction project?

- A) 1–10-year B) 16 -20 years
 C) 11- 15years D) More than 20 years

Part II. This sub-section covers questions related to quality management process, tools and techniques in Adwa Museum 00km project.

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

Quality Management Practices at Pre–Contract Stage

I. No.	Do you think the following factors applied during pre-contract stage successfully in the project	1	2	3	4	5
1	Matching of design with client requirement					
2	Site visiting to obtain information on site conditions before commencement of design					
3	Checking of drawings before they are issued					
4	Giving detailed explanation of design to the client					
5	Seeking approval of the client at every stage of design					

6	Site inspection to ensure compliance with quality requirements					
7	Communication of design decision to another consultant.					
8	Using of simple and straight-forward specifications					
9	Testing on new materials and components before specifying them					
10	Soil investigation to determine bearing capacity of soil before carrying out design					

Quality planning

Do you think the project applied the following quality plan factors successfully?

I. No.	Do you think the following quality planning factors applied successfully in the project	1	2	3	4	5
1	Describing Each project briefly					
2	Presenting List of contract documents and drawings					
3	List and clarify Project quality objectives					
4	Specify clearly Specific criteria of subcontractor nomination, material and equipment					
5	Specify clearly list(s) of materials and appliances used for the project, showing the verification requirement of each					
6	List out and clearly clarify methodologies for Inspection and test plans, or list thereof					
7	Clearly describing and listing of quality procedures and work instructions applicable to project by making reference to the company's Quality Manual and Procedures.					
9	Preparing formats for checklists, or target dates for their provision					
10	list of quality records to be kept, including appropriate quality records from subcontractors					
11	frequency (or provisional dates if possible) of internal quality audits					

Quality control

Do you consider the following factors in your quality control mechanism?

I. No.	Do you think the following quality control factors applied successfully in the project	1	2	3	4	5
1	Selecting what to control and set standards that provide the basis for decisions regarding possible corrective action.					
2	Establishing the measurement methods used, compare the actual results to the quality standards.					
3	Acting to bring nonconforming processes and material back to the standard based on the information collected.					
4	Monitoring and standardizing measuring devices, include detailed documentation for all processes.					

Quality Assurance

Do you consider the following factors in your quality assurance mechanism?

I. No.	Do you think the following quality assurance factors applied successfully in the project	1	2	3	4	5
1	Selecting the appropriate quality management system requirements for each project.					
2	Clearly specifying the quality management system requirements.					
3	Evaluating and selecting Laboratory technician on their ability to satisfy specified requirements.					
4	Appropriate checking, measurement or testing of products and keeping proper records.					

Quality Management Tools and Techniques Applied

No.	Do you think the following quality management tools and techniques applied successfully in the project	1	2	3	4	5
1	Benefit/ cost analysis					
2	Benchmarking					
3	Flowcharting					
4	quality audits					
5	Inspection					
6	Charts and diagrams					
7	Statistical sampling					
8	trend analysis					