St. Mary's University

School of Graduate Studies

Masters of Business Administration

Building Construction Quality Management Practices:
The Case of J.JCON CONSTRUCTION

By: Zebiba Shemsu

ID No.: SGS/0200/2012A

Section: F

Advisor: Dr. Abebaw Kassie, PhD

A Thesis submitted to School of Graduate Masters of Business Administration in Partial Fulfillment of the Requirements for the Degree of Master of Business Administration

Addis Ababa, Ethiopia

June, 2021GC

St. Mary's University

School of Graduate Studies

Masters of Business Administration

Building Construction Quality Management Practices: The Case of J.JCON CONSTRUCTION

By: Zebiba Shemsu

Approved by Board Examiner:

Dr. Abebaw Kassie, PhD Advisor	Signature	Date
Wondimeneh Mamo (Asst.Prof.) External Examiner	Signature	Date
Shoa Jemal (Asst.Prof.) Internal Examiner	Signature	Date
Chairman	Signature	Date

Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university. All sources of materials used for this thesis have been duly acknowledged.

Name: Zebiba Shemsu

Signature:-……

Date:-……

Addis Ababa, Ethiopia

Certificate

This is to certify that Zebiba Shemsu carried out this research on the topic entitled, "Building Construction Quality Management Practices: The Case of J.JCON CONSTRUCTION**".** This work has been submitted for examination with my approval.

Dr. Abebaw Kassie, PhD		
Advisor	Signature	Date

Acknowledgements

First of all I would like to give my glory and praise to the Almighty God for his invaluable care, support and all the things throughout my life. Next I would like to express my gratitude to my advisor Dr. Abebaw Kassie for the useful comments, remarks, and engagement through the learning process of this study. Furthermore I would like to thank my family and school friends for the support on the way. Also, I would like to thank the participants in my survey, who have willingly shared their precious time during the process of filling questionnaire and interviewing.

Abbreviations and Acronyms

COPQ	Cost of Poor Quality
DOE	Design of Experiment
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
IPM	Integrated Post Management
ISO	International Organization for Standardization
PM	Project Management
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
QA	Quality Assurance
QC	Quality Control
QMP	Quality Management Practice
QMS	Quality Management System
TQM	Total Quality Management
UNCRD	United Nations Center for Regional developmen

Table of Contents

List of Tables

Chapter Two

Chapter Four

List of Figures

Chapter Two

Abstract

This research intends to work on building construction quality management practices in the case of J.JCON CONSTRUCTION. To achieve its objective, the study employed both descriptive and quantitative research design and both primary and secondary data were used. Questionnaires, interview, and document review were, therefore, used as data collection tools. Furthermore, it employed census method to draw its samples since, the number of respondents are are managable. 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 employees in the company who were selected purposively all 38 respondents were responded, which represented a response rate of 100%. The data gathered through the questionnaire was analyzed by statistical analysis that proceeded to interpret, manipulate and evaluate the core idea and findings of the data. The descriptive statistics are a method of analysis that provides a general overview of the results and used to analyze the result of questions. Rating scale is one of the most common formats for questioning respondents on their views or opinions of an event or attribute. In this regard, participants were asked to indicate the level of the impleme ntation components of facility management and causes of problems on building facility management implementation by rating them on five point scale, (Very low important (1), Low important (2), Medium important (3), high Important (4), Very high important (5)). The research finding indicated that most respondents were familiar with the concepts of quality and quality management but its application was low. Several authors also pointed out that most of the hindrances to the application of quality management practices are lack of information in the area. Further to this, different success factors are identified for the success of quality management practices.

Keywords: Quality, Quality management, Quality management process, Construction industry, Success factors.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Quality is one of the critical factors in the success of construction projects. Quality of construction projects, as well as project success, can be regarded as the fulfillment of expectations (i.e. The satisfaction) of the project participants (i.e. client, multi-disciplinary construction consultants and building contractor) (M. Abas, S.B. Khattak, I. Hussain, S. Maqsood and I. Ahmad, 2015).

The construction industry in Ethiopia has been struggling with quality issues for many years. A significant amount of the budget is spent each year on infrastructure and other development projects. Since the quality outcomes of the projects are not according to the required standards this leads to faulty construction. Consequently additional investments are required for removal of defects and maintenance work. A construction project in its life span goes through different phases. The main phases of a project can be described as: conceptual planning, feasibility study, design, procurement, construction, acceptance, operation and maintenance (Derso, 2018).

The concept of quality management is to ensure efforts to achieve the required level of quality for the product which are well planned and organized. From the perspective of a construction company, quality management in construction projects should mean maintaining the quality of construction works at the required standard so as to obtain customers' satisfaction that would bring long term competitiveness and business survival for the companies (Tan & Abdul-Rahman, 2005).

Quality management is critically required for a construction company to sustain in current construction market which is highly challenging and competitive. Quality management has to provide the environment within which related tools, techniques and procedures can be deployed effectively leading to operational success for a company. The role of quality management for a construction company is not an isolated activity, but intertwined with all the operational and managerial processes of the company (Harris and McCaffer (2001)).

According to (Addis Ababa City Administration Trade and Industrial Development Bureau, 2016) J.JCON CONSTRUCTION is one of the construction companies undertaking various construction projects in different parts of Ethiopia. The Organization is currently registered as a Class IV Building Contractor, with a capital exceeding Birr 100 Million. (Addis Ababa City Administration Trade and Industrial Development Bureau, 2016)

J.JCON CONSTRUCTION has a vision of becoming a cross-border, reputable construction company. It operates with a mission of quality service to the public and reasonable profit to the owner. Core values that govern the organization include client satisfaction, professionalism, integrity, quality and Social responsibility.

Currently J.JCON CONSTRUCTION has various projects at hand in Addis Ababa. A few Projects are mention below:

- ✓ Repi Soap and Detergent PLC, Addis Ababa
- ✓ Shoa Bakery and Flour factory ware house, Addis Ababa
- ✓ Al-Sam PLC Ware house, Addis Ababa
- ✓ W/ro Rahel Gugsa 2B+G+7 Apartment, Addis Ababa
- ✓ Ato Dawit Zemui G+10 Apartments, Addis Ababa
- ✓ Ato Beyan Ebro B+G+10 Mixed use Building, Addis Ababa
- ✓ GTM Trading S.C B+G+9 Mixed use Building, Addis Ababa

1.2 Statement of the Problem

The research problem in this thesis is to analyze the construction sector's activities regarding quality by using existing quality management systems. With inefficient or nonexistent quality management procedures, significant expenditures of time, money, and resources are wasted on construction projects. In addition, the lack of quality due to deficient construction quality management is detected through non-conformance to established requirements. In construction, non-conformance occurs when the finished state of a project and its components deviates from the established requirements. Non-conformance also occurs because of time and cost of a project if it's not managed properly. Quality-related problems during construction can be projected on

the operating life of the finished project. To a contractor, non-conformance can yield penalties as well as cost time burdens for re-work, which can convert into productivity loss(ISO 9000:2015).

According to ISO 9000:2015 Conformity is the "fulfillment of a requirement". To conform means to meet or comply with requirements and a requirement is a need, expectation, or obligation. There are many types of requirements including customer requirements, quality requirements, quality management requirements, management requirements, product requirements, service requirements, contractual requirements, statutory requirements, and regulatory requirements.

During the last some years the construction industry has been heavily criticized for its performance and productivity in relation to other industries. With the turn of the new millennium (2000 E.C), it appears that the construction industry is going through an intense period of looking inward which is exacerbated by increased technological and social change. These changes are altering the tempo of the environment within which construction operates. Now a day building collapse in Ethiopia has become so alarming (Ayalew, T., Dakhli, Z. and Lafhaj, Z. (2016)).

According to Abebe Dinku (2016), the collapses of a five-story building in Addis Ababa were not new in Ethiopia. There were similar collapses that occurred in Ethiopia like a three-story building in Gondar; three story building in Hawassa; and a four-story 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.

Birhanu in his study identified that lack of effective supervision, communication, management of commitment, proper equipments and materials available for use, quality assurance team lead the process, staff turnover, skilled turnover, Inefficient resource management and problems with contractors are some of the challenges he identified to the attainment of project quality (Birhanu, 2014).

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 aforementioned study and reports will clearly demonstrates the value of quality on the performance of a building/structure by identifying the major factors that are mostly affecting the quality of building construction during the construction phase and investigate how the concept of quality and quality management is adopted in the construction process.

1.3 Research Objective

The overall objective of this study is to assess the quality management practices of J.JCON CONSTRUCTION Company on building construction projects in Addis Ababa and propose measures for effective quality management practices in this particular company and in Ethiopia at large. Specifically, the study aims to achieve the following objectives:

- To investigate how the concept of quality and quality management are adopted in the building construction projects by the company.
- To identify the key factors affecting the quality of building construction during the construction phase. In this regard, the study will identify the relative importance of factors related to design, project, contract, materials, labor , equipment, sub-contractors, site layout, systems, site-staff, owners and financial issues. .

1.4 Research Questions

The main research questions this study sets out to ask are the following:

1. How the concept of quality and quality management are adopted in the building construction projects in J.JCON CONSTRUCTION Company?
2. What are the relative contribution of factors related to design, labor, equipment, systems, etc to ensure quality on building construction in the company?
3. What are the main objectives of using quality management system?

4. What Measures are taken for effective quality management practices in Ethiopia building construction?

1.5 Significance of the study

Directing a construction project towards quality with optimal cost and scheduled time of completion is a greater concern today. This is due to the fact that quality is required to meet project requirements of the owners, contractors and other parties involved with a greater satisfaction. Moreover, poor quality could lead to unnecessary cost to the organization where it could create costs due to failure, appraisal and prevention. (Mallawaarachchi & Senaratne, 2015). Hussain et.al (2018) argue that time, cost and quality have been accepted as key factors of project success. Among these three generally accepted constraints, the quality dimension is studied as the least explicit feature of project success.

This research is of great significance to the growing building construction sector in Addis Ababa. First, it raises the quality awareness and implementation in construction. Second, it allows building contractors to focus on key factors that may affect quality and quality management principles that in turn helps them improve their quality management system.

In research and academic perspective the research gives a different insight on the quality management systems of Grade-4 building contractors. Furthermore, a comparative study helps to associate the current quality management system with different levels in construction.

The research can also be used as a ground for further studies. Similar research can be conducted by simply changing the scheme of this research from building to other construction modes as road, irrigation, bridge etc.

1.6 Scope and limitation of the study

The research emphasized on building Construction Company named J.JCON CONSTRUCTION in the city of Addis Ababa. This company was prefered because of its poor quality management practices and also the researcher can collect the data needed for the research easly and the respondents give their response without any hesitation. But the main reason why the researcher prefer this company was to improve the quality management practices on building projects of the company. Other construction companies had not been considered. General contractors are also

not part of the scope of the study due to capability differences with their building contractor counterparts.

1.7 Organization of the study

This paper comprised five chapters in which the first chapter illustrates the study backgrounds, statements of the problem, basic research questions, objectives, significance, scope and limitation of the study and the second chapter deals with 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

LITERATURE REVIEW

This chapter discusses different literature published by scholars in the area of construction management and quality management practices in construction. It puts into perspective different findings and conclusions of various articles. Recent articles and publications have been considered to reflect the central idea of this paper.

2.1 Theoretical Literature

2.1.1 Quality and Quality Management

Brief Overview of Quality Management

Quality has been described by many authors broadly over the years. However, the definitions for quality can be summarized as a process by which products and services meet or exceed customer expectations. Quality management is the act of overseeing different activities and tasks within an organization to ensure that products and services offered, as well as the means used to achieve them are consistent. ("What is Quality Management", n.d.).

Related ISO quality Management Standards are based on the following QMPs: Customer Focus, Leadership, Engagement of People, Process Approach, Improvement, Evidence-Based decision making, Continuous Improvement and Relationship Management. (Henssen, 2015)

What is Quality?

The definition for quality is manifested in different ways as conformance to requirements (Crosby's definition) where the lack of not meeting "zero defects" in production will be the cost of non-conformance. Another definition relating to quality is Six Sigma (Jack Welch of General Electric) that views quality as a product/ service in which 99.99966% of total production is free from defects.

J.M Juran, who is one of the gurus of quality states that quality is a process or a product that is fit for purpose. If the purpose of an aircraft is to be fast, efficient, comfortable and safe then that's the definition of a quality aircraft. (Mar, 2013)

"Quality" means freedom from deficiencies-freedom from errors that require doing work over again (rework) or that result in field failures, customer dissatisfactions, claims, and so on. In this sense, the meaning of quality is oriented to costs, and higher quality usually "costs less." (Juran & Godfrey, 1999).

In addition to the general definitions of quality, Hussain et al. noted that "In the construction industry, quality is defined as the effective and successful accomplishment of contracted project goals between clients and the service providers or main contractors. (Fan, 1995)"

Additionally Wysocki identified two types of quality as part of every project; the first is product quality which refers to the quality of the deliverable from the project. The second type of quality is process quality, which is the quality of the project management process itself. The later mainly focus on how well the project management process works and how can it be improved (R. K.Wysocki, 2003). Moreover, he described projects with the following constraints: scope, cost, time, resources, quality and risk. Except for risk these constraints are connected, a change in one constraint will affect at least another constraint. The scope triangle clearly illustrate variables of the project and there interdependence. Similarly PMI illustrates project quality through the concept of the triple constraint project scope, time and cost. Project quality is affected by balancing these three interrelated factors. "The relationship among these factors is such that if any one of the three factors changes, at least one other factor is likely to be affected" (PMBOK, 2000). The following scope triangle clearly illustrate variables of the project and there interdependence.

Figure 2- 1 Triple triangle or Iron triangle, Source: (Robert K.Wysocki, 2014)

According to Dale Bester field (Quality Control, A Practical Approach, 7th edition, 2004), Quality can be expressed as: Q = P / E Where: Q = Quality P = Performance E = Expectation If Q is greater than 1.0, then the customer has a feeling of great satisfaction about the product or service rendered. The determination of Q is based on perception, with the contractor determining performance and the customer determining expectations. The customer expectations are continually becoming more demanding.

Quality Management

Quality Management is nothing more than managing the processes in a system to bring out the best outcome. Armand Feigenbaum is one of the gurus of quality and is renowned for his great contributions as Total Quality Management and the Hidden Plant. Total quality management (TQM) is the integration of all functions and processes within an organization in order to achieve continuous improvement of the quality of goods and services.

The goal is customer satisfaction. (Ross, 1999).According to Juran Quality Management revolves around three principles (the Quality trilogy): Quality Planning, Quality Control and Quality improvement. The figure below shows The Juran Trilogy diagram.

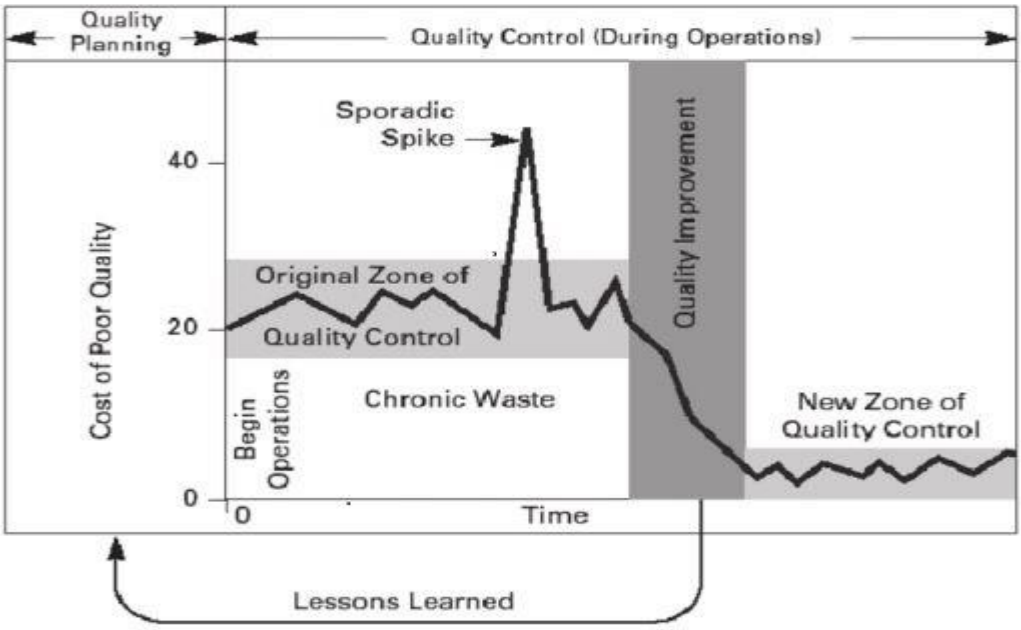

Figure 2- 2 Juran Quality Trilogy Diagram, Source: (Juran & Godfrey, 1999)

2.1.2 Project and Project Management

Project

A project can be defined in many ways. Many scholars have their own definitions of what a project is.

A project is an activity to create something unique. (Pranchi, n.d). Project Management Institute. A Guide to the Project Management Body of Knowledge (PMBOK) defines project as an activity with a beginning and an end oriented towards achieving a certain goal. A project is an activity to meet the creation of a unique product or service and thus activities that are undertaken to accomplish routine activities cannot be considered projects.

Project is a unique process consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective confirming to specific requirements including constraints of time, cost and resources. (ISO 10006:2003–Quality Management Systems – Guideline for Quality Management in Projects). J.M Juran, one of the gurus of Quality, defined project as a problem scheduled for a solution.

Although there are broad definitions for Project, it can be said that most definitions state that project is temporary in that it has a beginning and an end; a project utilizes various resources as time, people and cost; and a project can be regarded as a task that involves certain degrees of planning and executing towards obtaining a predetermined goal.

Likewise, the organization of Governance Commerce defines a project as "a unique set of coordinated activities with definite starting and finishing points undertaken by an individual or team to meet specific objectives within defined time, cost and performance parameters as specified in the business case". Also a project is "a unique endeavor to produce a set of deliverables within a clearly specified time, cost, and quality constraints"(UNCRD, 2000).

Project Management

Having the understanding of what the core concepts of a project are, a project management can then be viewed as the set of tools and techniques to carry out the project to its determined goal. Radujkovic and Sjekaica (2017) noted that "Project management is planning, organization, monitoring and control of all aspects of project, with motivation of all included to achieve project goals on safe manner, within agreed schedule, budget and performance criteria. (IPM Association, 2006)" It can be seen from the definition of project management, that it is focused on project performance, regarding short-term dimensions of project success – adherence to criteria of time, cost and quality. (Radujkovic & Sjekaica, 2017).

Project Management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements. ("What is Project Management?" n.d.). Project management is the application of processes, methods, skills, knowledge and experience to achieve specific project objectives according to the project acceptance criteria within agreed parameters. Project management has final deliverables that are constrained to a finite timescale and budget. ("What is Project Management", n.d) A key factor that distinguishes project management from just 'management' is that it has this final deliverable and a finite timespan, unlike management which is an ongoing process. Because of this a project professional needs a wide range of skills; often technical skills, and certainly people management skills and good business awareness.

The processes of Project Management fall into 5 stages, namely, initiating, Planning, Executing, Monitoring Controlling and Close-out. ("What is Project Management", n.d.).

Successful project management can be defined as achieving a continuous stream of project objectives within time, within cost, at the desired performance/technology level while utilizing the assigned resources effectively and efficiently. (Kerzner, 2017)

When considerations about project management success are made, it is possible to find and use many different approaches. One of the most traditional ones is the iron triangle approach. It affirms that three main aspects that must be managed together characterize projects: scope, cost and time. (Machado & Martens, 2015). However, Al-Zayyat, Al-khaldi, Tadros and Al-Edwan (2010) argue that knowledge management also has a significance impact on Project management. They also highlight that TQM, six sigma and ISO 9000 have recently contributed directly or indirectly to improve project initiation, planning, execution and control.

According to Crawford 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 contributes 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) descried the changing view of quality in the past and present as follows.

Past	Present
Quality is the responsibility of blue-collar workers and direct labor employees working on the floor	Quality is everyone's responsibility, including white-collar workers, the indirect labor force, and the overhead staff
Quality defects should be hidden from the customers (and possibly management)	Defects should be high-lighted and brought to the surface for corrective action
Quality problems lead to blame, fault justification, and excuses	Quality problems lead to cooperative solutions
Corrections-to-quality problems should be accomplished with minimum documentation	Documentation is essential for "lessons learned" so that mistakes are not repeated
Increased quality will increase project costs	Improved quality saves money and increases business
Quality is internally focused	Quality is customer focused
Quality will not occur without close supervision of people	People want to produce quality products
Quality occurs during project execution	Quality occurs at project initiation and must be planned for within the project

Table 2- 1 changing views of Quality, Source: Harold Kerzner

From the Harold Kerzner changing view of comparing the past and present shows that quality as the process and dynamic concept which changes from individual based to collective, hidden to remedial solution, complain to two-way, rather than documentation to learn to improve, from incurring cost to minimize and enlarge the company, from internal to customer centered by producing quality product by focusing on the whole process of the project cycle rather than focusing only on the quality during implementation only. Therefore this may inferred that quality is dynamic concept for improvement of the business from one person to group for improvement of the business to meet organizational goal.

2.1.3 Construction Management System

The construction industry is one of the major bloodlines for the Ethiopian economy. During the past decade robust public and private expenditure on infrastructure and other construction works has served as a catalyst for Ethiopia's rapid economic development. The country has consistently invested more than 30% of GDP into Gross Fixed Capital Formation (GFCF) expenditure since 2010 and as a result, Ethiopia has emerged as one of the fastest-growing economies in the world. The market value of the construction sector is currently estimated at more than US$7bn. According to the 2017 edition of African Economic Outlook, construction activities in Ethiopia accounted for 15.9% of GDP at current prices during the 2015/16 fiscal year. (Veitch, 2018)

Globally, the construction industry hugely influences the economy, the environment and the society. In 10 trillion USD revenue and added value of 3.6 trillion, the sector is account for about six percent of the world GDP, according to World Economic Forum's 2016 report. (Derso, 2018)

In order to effectively utilize massive resources that are being invested annually in this industry the construction management is of at most interest. The construction industry in Ethiopia faces numerous challenges. A study by Gadisa and Zhou (2019) on project performance in Ethiopia revealed that weak management leadership skills as one of the critical factors affecting government financed infrastructures project performance.

In agreement with this, Ayalew, Dakhli and Lafhaj (2016) based their research on a study at the London School of Economics that found that the management practice in Ethiopia is even far behind from those poor performing developing countries in Africa. Their research also found that

the level of construction project management practice in terms of adapting general project management procedures, project management functions, tools & techniques to be unsatisfactory.

Previous research shows that the construction management in Ethiopia is an area that requires improvement.

2.1.4 Quality Management in Construction

Construction industry plays an important role in the development of any country. The development of construction industry depends on the quality of construction projects. Quality is one of the critical factors in the success of construction projects. Improvement in the quality of construction projects is linked with quality management in the project life cycle. Although quality management at every stage of project life cycle is important but the quality management at the execution (construction) stage contributes significantly on final quality outcome of construction projects. (Ashokkumar, 2014).

2.1.5 Importance of Quality for Construction Projects

The construction industry is one of the main sources of economic growth and development all over the world. Thus, the success of these projects is very important. Construction projects are engaged with three main factors of time, cost, and quality. Among these three factors, quality is considered as one of the most significant competitive factors. An important factor in maintaining and controlling quality and reinforcement of buildings is continuous supervision.(Shahraki, Saghatforoush & Ravasan, 2018).

For developing countries like Ethiopia construction plays a key role in supporting the livelihood of many in the industry. Construction in modern Ethiopia is the major blood line of the economic development in the country as construction practices have been attracting many foreign investors. Shahraki et al. (2018) also pointed that “the construction industry is considered as the wealth of any country. Due to the strong relation of this industry with other industries, any change in it affects other industries (Negara, 2011).” Higher product quality is required for a company to become more competitive, both locally and in international trade. Improved quality at the enterprise level lowers its cost of operations and increases its productivity. The benefits that accrue from improved quality at individual firm level also augmentation competitiveness. Hence, many world class firms and nations use quality as a powerful competitive tool. (Kitaw and Bete,

2003)

Currently, the country forms the heart of Africa's economic evolution due to high demands in the construction sub-sectors. The wave of construction in Addis Ababa has spilled into other Ethiopian cities, causing investors to take serious measures in expanding their business in the country. ("Construction in Ethiopia and opportunities in the Ethiopian Building Industry",n.d.)

Ethiopia's economy experienced strong, broad-based growth averaging 10.3% a year from 2006/07 to 2016/17, compared to a regional average of 5.4%. Ethiopia's real gross domestic product (GDP) growth decelerated to 7.7% in 2017/18. Industry, mainly construction, and services accounted for most of the growth. Agriculture and manufacturing made lower contribution to growth in 207/18 compared to the previous year. Private consumption and public investment explain demand-side growth, the latter assuming an increasingly important role (World Bank, 2019). The construction industry is the second largest industry in creating employment opportunities for over 1.8 million people. (Derso, 2018)

This shows that construction practices play a vital role in the economic growth of the nation. Quality in the delivery of construction projects should be stressed highly and critical success factors for sustainable delivery of projects should be sought after.

2.1.6 Quality Management Tools and Techniques

As for the implementation of quality management in project management, the concepts of quality planning (identification of quality standards), quality assurance (evaluation of overall project performance) and quality control (monitoring of specific project results) in the quality management processes were defined by Project Management Institute (2000). Mathews, Ueno, Kekale, Repka, Pereira and Silva (2001) divided quality tools and techniques that are in support of quality programs into three main types, i.e., hard quality tools, mixing methods and soft methods. Hard quality tools are formal quality systems, documented quality systems, quality costs, control charts, and statistical sampling standards. Mixing methods are strategy and action plans review, flexibility of organization structure, control charts, quality circles, and quality planning tools. Soft methods are training, customer satisfaction surveys, regular contact with vendors and external organizations, actions to optimize environment impact, empowerment, self-

assessment, and benchmarking.

According to project management body of knowledge project quality management tools and techniques are: Benefit/ cost analysis, Benchmarking, flowcharting, Design of experiments, cost of quality, quality audits, inspection, control charts, Pareto diagrams, statistical sampling, and trend analysis. Let me define each individuals based on PMBOK.

Benefit/ cost analysis: The primary benefits of meeting quality requirements include less rework, higher productivity, lower costs, increased stakeholder satisfaction, and increased profitability. A cost-benefit analysis for each quality activity compares the cost of the quality step to the expected benefit.

Benchmarking: Benchmarking involves comparing actual or planned project practices to those of comparable projects to identify best practices, generate ideas for improvement, and provide a basis for measuring performance; Benchmarked projects may exist within the performing organization or outside of it, or can be within the same application area. Benchmarking allows for analogies from projects in a different application area to be made.

Flowcharting: Are also referred to as process maps because they display the sequence of steps and the branching possibilities that exist for a process that transforms one or more inputs into one or more outputs. Flowcharts show the activities, decision points, branching loops, parallel paths, and the overall order of processing by mapping the operational details of procedures.

Design of experiments: Design of experiments (DOE) is a statistical method for identifying which factors may influence specific variables of a product or process under development or in production. It is also an analytical technique which helps identify which variables have the most influence on the overall outcome. DOE may be used during the Plan Quality Management process to determine the number and type of tests and their impact on cost of quality.

Cost of quality: Cost of quality includes all costs incurred over the life of the product by investment in preventing nonconformance to requirements, appraising the product or service for conformance to requirements, and failing to meet requirements (rework) Failure costs are often categorized into internal (found by the project) and external (found by the customer). Failure costs are also called cost of poor quality.

Quality audits: A quality audit is a structured, independent process to determine if project activities comply with organizational and project policies, processes, and procedures. Quality audits can confirm the implementation of approved change requests including updates, corrective actions, defect repairs, and preventive actions.

Inspection: An inspection is the examination of a work product to determine if it conforms to documented standards. The results of an inspection generally include measurements and may be conducted at any level. For example, the results of a single activity can be inspected, or the final product of the project can be inspected. Inspections may be called reviews, peer reviews, audits, or walkthroughs. In some application areas, these terms have narrow and specific meanings. Inspections also are used to validate defect repairs.

Control charts: are used to determine whether or not a process is stable or has predictable performance. Upper and lower specification limits are based on requirements of the agreement. They reflect the maximum and minimum values allowed.

Pareto diagrams: a Pareto diagram is a histogram, ordered by frequency of occurrence that shows how many results were generated by type or category of identified cause. Rank ordering is used to guide corrective action the project team should take action to fix the problems that are causing the great number of defects first. Pareto diagrams are conceptually related to Pareto's law, which holds that a relatively small number of causes will typically produce large majority of the problems or defects. This is commonly referred to as the 80/20 principle, where 80% of the problems are due to 20% of the causes.

Statistical sampling: Statistical sampling involves choosing part of a population of interest for inspection (for example, selecting ten engineering drawings at random from a list of seventy five). Sample frequency and sizes should be determined during the Plan Quality Management process so the cost of quality will include the number of tests, expected scrap, etc. There is a substantial body of knowledge on statistical sampling. In some application areas, it may be necessary for the project management team to be familiar with a variety of sampling techniques to assure the sample selected represents the population of interest.

Trend analysis: it involves using mathematical techniques to forecast future outcomes based on historical results. Trend analysis is often used to monitor:

Technical performance: - how many errors or defects have been identified, how many remain uncorrected. Cost and schedule performance: - how many activities per period were completed with significant variances.

2.2 Empirical Review

Quality Awareness and Implementation

Quality awareness is the way to promote quality activities by emphasizing quality at all stages of the business, which can help solving complex problems and denote excellence. Quality has become a key concern to organizations, not only because of growing importance of the quality system, but also because of the multitude challenges. Quality awareness is one of the major issues in all industries working hard to cope with the quality challenges irrespective of their working nature. (Hussain, Abba & Merviel, 2006)

Industries in Ethiopia are deficient in vigor and stagnant: hence less exposed to a highly competitive market and don't adopt the latest quality control techniques in order to gain knowledge about systems to improve quality and operational performance (Berhe & Gidey, 2016). In a study conducted by Berhe and Gidey (2016) that included 44 companies in various industry sectors most of quality departments do not fully recognize quality control tools. 62% of their respondents have indicated that they did not get any training concerning quality control tools. This is mainly due to lack of awareness and motivation of top managements.

From the various literatures, the following items have been identified to study the quality awareness and implementation in the companies.

1. Availability of Quality planning, control and assurance methodology in the company
2. On-site quality tracking
3. Familiarity and application of quality management tools and techniques
4. Trainings and inductions regarding quality management
5. Aim towards acquiring international quality certifications

Factors Affecting Construction Project Quality

Project quality is greatly affected by poor management practices in each stages of the project. Quality of construction projects is linked with proper quality management in all the phases of project life cycle (Ashokkumar, 2014). A research by Ayalew, Dakhli & Lafhaj (2016) found that the level of Ethiopian construction project management practice in terms of adapting general project management procedures, project management functions, tools & techniques were unsatisfactory. In addition, the level of practices in terms of safety, risk and time management was found to be very low. Projects also showed schedule delays and planned cost overruns. Furthermore, other variables as risk, quality, resources utilization and safety deviates by up to 40% from predetermined requirements at the beginning of the projects. Agreeing with this, Shahraki, et al. (2018) argue that unfortunately, due to the significance of construction industry, the poor performance of supervisor engineers leads to poor quality of urban constructions. On the other hand, Aigbavboa, Oke and Tyali (2016) argue that lack of adherence to ethical practices that help ensure transparency and accountability within the construction industry is a major impediment towards being a consistent and an effective growth to the economy.

From comprehensive literature review on factors of poor quality in construction, the following items have been adopted for this study.

- ✓ Skilled and qualified people not assigned on jobs
- ✓ Lack of trainings
- ✓ Inappropriate equipment and defective materials
- ✓ Absence of on-site quality tracking
- ✓ Wasteful construction practices
- ✓ Non-conformance to specifications and drawings
- ✓ Unethical practices
- ✓ Absence of quality planning, control and assurance methodology
- ✓ Leadership commitment

Cost of Poor Quality

The construction industry has been plagued with problems associated with lack of proper standards and lack of effective project management practice. The complex nature of the industry is what made the construction industry sensitive to poor projects performance (Yahya, Abba, Mohamed & Yassin, 2019).

Researches have shown that the cost of poor quality is substantial, and often much larger than is shown in accounting reports. For most companies the quality related cost range from 25 to 40 % of operating expenses (Juran and Godfrey, 1999).

From the various researches, the following items have been identified and used to study the cost of poor quality in the Addis Ababa construction context.

1. Cost of unplanned rework
2. Long-term firm competence
3. Exposed Health and safety issues
4. Poor staff morale
5. Administrative and support costs

Quality Improvement

Cost of poor quality (COPQ) in the construction industry is a serious problem that the industry is faced with, due to failure in preventing wastage and defects during construction work. The cost of poor quality remains hidden and eats up to 40% revenues of the construction enterprise. (Mashwama, Aigbovboa & Thwala, 2017)

The study conducted by Mashwama, Aigbovboa and Thwala (2017) indicated that the role of the managers in construction projects is still under looked and therefore, this can be a problem if it is not attained and revealed. Further, it concludes that are a lot of success factors such as the use of quality management system and the critical success factors can actually help eliminate poor quality in most construction projects.

In line with the factors for poor quality and the subsequent cost attached for failing to meet quality standards, the following items have been recognized as quality improvement techniques.

1. Continuous trainings on waste and quality management
2. Assigning qualified staff
3. Adopting quality documentations and records
4. Respecting code of working ethics
5. Conformance to standards and specifications

Quality Management Principles

There are different quality related criteria awards companies could use to implement for their quality management system. Building construction companies could adopt any of The ISO 9001 requirements, Malcolm Baldridge Criteria, The Ethiopian Quality Award, The European Quality Criteria or the Australian Quality Criteria to improve their quality management system.

Many researchers have conducted studies using the ISO 9001 criteria in order to assess the quality management system of various industries. Gap analysis was conducted by Demissie et.al (2016) to assess and determine improvement areas for Ethiopian garment enterprises.

Similarly, Ochieng, Muturi and Njihia (2015) found that ISO 9001 certification influenced return on net assets of the organizations in East African countries thereby influencing their performance.

Furthermore, from a survey based research on construction project performance from 336 respondents there was a significant difference at the 5% confidence level that ISO 9000 certified companies have enhanced levels of performance in their project environments compared to those in non-certified companies. (Din, Abd-Hamid & Bryde, 2011).

Taking this into account, quality management principles as per ISO 9001:2015 were adopted to study the quality management system of the building construction companies.

ISO has a range of standards for quality management systems that are based on ISO 9001 and adapted to specific sectors and industries. ISO 9001:2015 sets out the criteria for a quality

management system and is the only standard in the family that can be certified to. Using ISO 9001:2015 helps ensure that customers get consistent, good quality products and services, which in turn brings many business benefits. (ISO 9000 Family – Quality Management, n.d.)

The ISO 9000:2015 and ISO 9001:2015 standards are based on seven quality management principles. Customer Focus, Leadership, Engagement of People, Process Approach, Improvement, Evidence-based decision making and Relationship Management have been used as per the ISO 9001:2015 standards to study the quality management practices of the respective construction companies.

2.3 Research Gap

Quality management system require having the organizational structure, responsibilities, procedures, processes and resources for implementing quality management such that there is a guiding framework to ensure that every time a process is performed the same information, method, skills and controls are used and practiced in a consistent manner. Total Quality Management (TQM) has been defined as a comprehensive systematic, integrated, consistent, organization-wide effort dedicated to customer satisfaction through continuous improvement. With its primary focus being the involvement of everyone, TQM has the potential to improve business results, greater customer orientation and satisfaction, worker involvement and fulfillment, team working and better management of workers within companies. However, the construction industry in Ethiopia has been slow to embrace the concept of TQM.

CHAPTER THREE

RESEARCH DESIGN

3.1 Research Approach and Design

The research adopted the most suitable researching techniques that go along with the main topic in focus. Since the study involves identifying and analyzing the quality management practices factors and measurements, the research mainly conduct quantitative approaches. During a case study deep information about quality management practices are gathered from key informants. On top of that, quantitative data were gathered from employees. In addition, some qualitative aspects on critical concepts of the research title are used for the clarifications.

The study employed quantitative research design to helps others better understand the need for the research and to provide a better perspective to make critical decisions using numbers. The research design was drawn according to the strict procedures to be followed so that a desired data can be collected for the internalization of the research problems and its forwarded questions. The procedural design let the research to be full on its own for the reliable sources and cross checking of the research objective with the findings from the analysis of the data.

3.2 Population and Sampling Procedure

In J.JCON CONSTRUCTION, there are about 3 project manager, 2 office engineers, 5 Forman, 8 site engineers and 20 sub-contractors. Out of these distinctive subjects the research identified all portion of samples by using census method because the total number of population is manageable and it helps to get accurate information.

That means based on census sampling the researcher identified 2 office engineers out of 2, 5 Forman out of 5, 8 site engineers out of 8, and 20 sub-contractors out of 20. Thus; the total number of population of this study was thirty eight (38).

3.3 Data Sources and Data Collection Methods

In order to synthesize our goal of the study topic, the research shall have a confirmed and reliable data source and collection methods. There are different types of techniques which are deployed to gather trusting and relevant information to analyze and synthesize the quality management

systems, best practices and elaborative analysis of case studies using suitable models. These explicit methods were Specific Questionnaires for each employees and project managers which were designed based on the literature and on the information collected through the document review of the project. Interviews were conducted to get accurate and in-depth understanding of the organizations Quality management practices method, working principles, procedures and methods. And to check the data found by the questionnaire are in line with the employee responses. Furthermore data were gathered from documents and reports through reviewing them.

3.4 Validity and Reliability

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.

To ensure the quality of research and make it credible for the scientific community, the researcher gave due care to both validity and reliability issues of the data, the research process in general as well as the research output. The researcher used different source of data form literature, interview, site observation and document review to triangulate the data. The need for triangulation arises from the ethical need to confirm the validity of the processes involved. Triangulation increases the reliability of the data and the process of gathering it.

3.5 Data Analysis Method

In order to successfully process any type of data, a clear distinction between quantitative and qualitative data collection must be presented so as to clarify the basis of knowledge, the type of collection methods, and the type of analysis that needs to be done (Saunders et al. 2009, p.482). On the one hand, the basis for quantitative data analysis is generally numbers, collected either by numerical or statistical approaches, and analyzed through a use of diagrams and/or statistics (Saunders et al. 2009, p.482). On the other hand, qualitative data is based on meanings expressed through words, gathered through non standardized collection methods, and analyzed through conceptualization techniques (Saunders et al. 2009, p.482).

The research used the so called statistical analysis that proceeded to interpret, manipulate and evaluate the core idea and findings of the data. The descriptive statistics are a method of analysis that provides a general overview of the results and used to analyze the result of questions. Rating scale is one of the most common formats for questioning respondents on their views or opinions of an event or attribute. In this regard, participants were asked to indicate the level of the impleme ntation components of facility management and causes of problems on building facility management implementation by rating them on five point scale, (Very low important (1), Low important (2), Medium important (3), high Important (4), Very high important (5)). Relative Important index is used to rank the factors and the findings were presented in a table.

For purposes of higher degree of expressions, Tabular, percentage and numeric explanations on the analyzed topics were summarized based on the analysis findings were finalized drawing a concrete package of tangible information which help the conclusions and recommendations to be clearly and precisely stated later on.

3.6 Ethical Considerations

The purpose of the research was thoroughly explained to the Company. All data collection process was carried out after consent with the project managers and managing director of the company. Collaboration letter issued by the University was also provided to show the legitimacy of the study.

The collected data was not used for other purposes than for the success of this research attaining the research questions and objectives. The names of the employees or the respondents who provided relevant data was concealed and not disclosed in this paper.

CHAPTER FOUR

ANALYSIS AND INTERPRETATION OF DATA

This chapter analyses the data gathered from questionnaires and interviews. This chapter includes the general information about respondents that helps the research to get the necessary information from the firm. Then concept of quality and quality management adopted in the construction process are assessed. Finally factors affecting quality practices in the building construction projects also investigated. Data were captured and the responses were analyzed using the Microsoft Excel software package.

4.1 Response Rate

This paper was conducted on 38 employees of J.JCON CONSTRUCTION Company in Addis Ababa. Thirty eight questionnaires were given out to possible respondents in the sector. Of the thirty eight handed out questionnaires all thirty eight were filled and returned. From the rough visual check, all were deemed usable by the researcher. The interview was conducted with the focused group in the company. Accordingly, all the data gathered are presented, analysed and interpreted in the forthcoming subsequent pages.

S/n	Demography	Valid	Frequency	
			In number	In percent
1	Gender	Female	5	13.16%
		Male	33	86.84%
		Total	**38**	**100.00%**
2	Educational background	Master's degree	2	5.26%
		Bachelor's degree	15	39.47%
		Diploma	12	31.58%
		Certificate	9	23.68%
		Total	**38**	**100.00%**
3	Roles	Project Manager	3	7.89%
		Office Engineer	2	5.26%
		Forman	5	13.16%
		Site Engineer	8	21.05%
		Sub-Contractors	20	52.63%
		Total	**38**	**100.00%**
4	Work Experience	1-5 years	13	34.21%
		6-10 years	11	28.95%
		11-15 years	14	36.84%
		16-20 years	_	_
		21-25 years	_	_
		Above 26	_	_
		Total	**38**	**100.00%**

Table 4- 1 Demographic Characteristics of employees, Source: Survey Output, 2021

4.2 Demographic Characterstics of Responses

Gender Composition

From the table, it can be seen that 86.84% of the participants were Male while the remaining 13.16% were female. Paraphrasing, of the 38 valid responses, 33 were male while 5 were female. The gender composition shows that the sample population on J.JCON CONSTRUCTION Company is more dominated by male respondents.

Educational Background

From the above table it can be seen that most of the respondents are with a Bachelor's degree qualification. From the total sample 15 of the respondents (39.4%) have a Bachelor's degree. Similarly, 12 of the total respondents (31.58%) have a college diploma while the remaining 9 and 2 of the total respondents (23.68% and 5.26%) have a certificate and a Master's degree respectively. Most of the respondents have a Bachelor's degree which was helpful in getting accurate information and in achieving the objectives of the study.

Roles of Respondents

The positions held by the respondents were grouped into 5, namely, Project Manager, Office Engineer, Site Engineer, Forman and Sub-Contractor. Accordingly, three of the respondents were found to be in the Project Manager position (7.89%), two were Office Engineers (5.26%), five were Forman (13.16%), eight were Site Engineers (21.05%) and the remaining twenty were occupied in sub-contractors (52.63%).

Work Experience of Respondents

In addition, years of working experience was grouped into three: 5 years or less, 6-10 years and 11-15 years. Analysis showed that of the total 38 respondents 13 had 5 years or less working experience (34.21%). Similarly, 11 respondents had working experience between 6-10 years (28.95%) and 14 respondents had working experience between 11-15 years (36.84%). This means there are more number of respondents with better working experience which was helpful in getting dependable response for achieving the research objectives.

4.3 Analysis and discussion of data from interview

The interview was conducted face-to- face with the selected interviewees by asking questions and explanations. Semi-structured interview were conducted with project managers, office engineers and site engineers to gather information on the organization quality management, quality problems, factors affecting the quality of construction projects and the sub factors important for the quality of construction. The information collected used to support the literatures in order to include them in the questionnaires.

The interviews are conducted on 3 project managers, 2 office engineer head and 3 site engineers. A total of 8 respondents are participated. All the respondents experienced on building projects.

The interview consists of four questions those four questions prepared to meet the objectives of the thesis. The first question is how can quality expressed in building constructions projects? For these question five answers are identified those answers are: meeting specified requirements; work without defects and wastes; expensive work (high cost); good appearance and customer's satisfaction. This shows quality doesn't have clear meaning or common meaning in the construction industry. Common understandings are very important to understand each other's and to create quality management systems. The second question is what do you think the major objectives of quality management in the company? For this question four answers are obtained those answers are: Increasing profit; elimination of defects; to get good reputations in order to get additional works and safe work. These show how the objectives of the company. So, quality objectives of the company should be related with more of with the quality works. Third interview question is the quality improvement program of the company which is the respondent of this thesis works in for this question only two answers are responded: quality control/quality assurance and ISO 9001 QMS system. The fourth and the final question is what are the factors that affects the quality of building construction projects for this interview question 14 factors are responded that are:

1. The drawings and specifications do not specify clearly the intentions of the designers;
2. Poor workmanship;

3. The contractor pay more attention to complete the works on schedule and control the costs to within budget than to achieving quality in construction;
4. Poor co-ordination exists between the contractors and the sub-contractor as well as the nominated subcontractors;
5. Contractor cannot plan and control the works;
6. Contractor lack to provide the end products on site in accordance with the design and specifications;
7. The contractor do not know how to establish a quality system to control the works;
8. The contractor do not use good quality construction materials;
9. Lacks storage and handling system;
10. Lacks of good utilization of equipment;
11. Contractor lacks of finance;
12. Skill and experience contractor's staff;
13. The location of the site and
14. The projects complexity

The interview result shows that design related issues comes first with 90% of interview respondents mentioned. These show the problem related to design have high degree of effect on quality in building projects. Design related issues happened mainly because of reliability of all information used as basis of the products for projects. The other is reliability of design solution and detailed specification. And material related issues comes second with 85% of interview respondents mentioned. The materials related problems are the major factors that affect the quality of the projects. For example the availability of good quality construction materials and using storage and handling system has great effect on quality of construction. The third variable that interview respondents mentioned is labor related issues with 75%. The labor force also has an

effect on the project according to the contractors the labor don't have enough skill, miscommunication because of different language they used and they come directly from rural area of Ethiopia. Those variables were subsequently followed by sub-contractors related issues, equipment related issues, site staff issues, site layout of the project, systems, contract issues, project (type and complexity) related issues and owner (public, private) related issues respectively. To summarize the ranks: designs, materials, labors, subcontractors, financial, equipment, site staff, site layout, systems, contract, project and owners are factors affecting quality of the construction process are the components of construction inputs and process in the company.

Those factors are failure factors or the causes for poor quality management practices in building construction projects. Then those factors are arranged as success factors to design questionnaires like observed in the Appendix-I.

4.4 Analysis and discussion of data from questionnaires

4.4.1 Quality perception of the company

The quality of building constructions are very difficult to define. First of all, the product is usually not a repetitive unit but a unique piece of work with specific characteristics. Taking building construction as an example, the product can be an entire building, a section of a building or just a prefabricated component that ultimately forms part of a building. 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. All these should be properly addressed in designing the building, and the outcome should be expressed unequivocally in drawings and specifications.

The word quality has different meaning for every employees in the construction firm for this reason the respondents asked to select words that define quality. The respondents also asked to select more than one words from the option provided in the Table 4-2.

Define as	Frequency	
	In number	In percent
Expensive	4	7.02%
Good Appearance	9	15.79%
Increased profit	3	5.26%
Customer's satisfaction	19	33.33%
Meeting specification requirement	22	38.60%
Others		0.00%

Table 4- 2 Quality defined by respondents, Source: Survey Output, 2021

As presented in Table 4-2 (38.6 %) of the respondents define quality as meeting specification requirement. The other 33.33% were given to customer's satisfaction. The definitions next to those two definitions are: good Appearance; expensive; and increase profit respectively. Biniyam.A also conclude his study that the majorty of contractors define quality as meeting the requirement specified on the specification..

The respondents also ranked what perception they have on quality by selecting those three words or writing their own by the space provided as shown in Table 4-3 below:

Words	Frequency	
	In number	In percent
Elimination of defects	18	36.73%
A tool to increase profits	8	16.33%
A competitive advantage	22	44.90%
Others	1	2.04%

Table 4- 3 Perception of Quality, Source: Survey Output, 2021

Most of the respondents agreed quality works gives a competitive advantage (44.9%) for the next time to get another works. The next rank is given to elimination of defects by 36.73%;

it is the main thing in order to do good works according to the literature of this thesis. A tool to increase profits and others comes next to the above variable by 16.33% and 2.04% respectively.

4.4.2 Quality management system

Quality improvement as which emphasizes that quality is the responsibility of every one in an organization: as processes of managing change; as a strategy to improve organizational competitiveness and effectiveness as a value system that emphasizes striving for quality in product or services; and as an approach to doing business that covers the whole organization.

The results as shown in Table 4.4 shows (100 %) of respondents believe that the company has the intention to develop and implement a quality management system.

QM consideration	Frequency	
	In number	In percent
No	_	0.00%
Such a plan is under consideration	38	77.55%
A quality improvement program has been implemented recently	_	0.00%
A quality improvement plan has been a part of corporate policy for some time now	_	0.00%

Table 4- 4 Quality Management System, Source: Survey Output, 2021

The construction companies' uses different kinds of quality management system as mentioned on the literatures like total quality management; ISO 9001; quality control /quality assurance; and others. This quality system improves quality of the construction projects and also gives better pictures for the companies. Quality management systems are very important in achieving QMS in the organizations. The respondents describe that the company has an intention to practice quality control/quality assurance quality management system type. The quality management system has various objectives. These objectives are: Increase productivity; cost reduction; involvement of employees in the quality building effort and compliance with statutory; and environment and safety requirement. Beside this respondents believe that the

company will has the above various objectives.

4.5 Main factors affecting quality of building construction projects

4.5.1 The effect of design on quality of building construction projects

The majority of the construction problem occurred because of design according to both the interview and the questionnaires results. The issues raised are: the completeness and consistency of design documents; drawings are prepared in details; conformance to codes and standards; and bill of quantity are detailed and accurate. Those factors are compared according to the importance they have on quality. The completeness and consistency of design documents comes first with RII=0.84 which is very important for quality achievement when it compared with other factors. The design document should be complete to understand fully some people also say if design is complete the work ideally 50% completed even not constructed on the ground. The consistent of design is very important for constructability of project because reliable designs are easy to apply to the ground. The second variable ranked by the respondents is drawings should be prepared in details with RII is 0.81.

The other factors followed by the above two factors are conformance to codes and standards; and bill of quantity are detailed and accurate with RII=0.78 and RII=0.76 respectively. Those factors are ranked as shown in Table 4-5.

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	Completeness and consistency of design documents.	0	3	6	10	19	159	0.84	1
2	Drawings are prepared in details	0	4	8	9	17	153	0.81	2
3	Conformance to codes and standards	0	5	7	12	14	149	0.78	3
4	Bill of quantity is detailed and accurate.	0	4	10	13	11	145	0.76	4

Table 4- 5 Design related factors affecting Quality of building construction projects,

Source: Survey Output, 2021

- Note that the responses are ranked according to the importance of the factors on quality of construction projects. very low important (1), low important (2), medium important (3), high important (4), very high important (5)

4.5.2 The effect of materials on quality of building construction projects

The construction industry needs a lot of materials both in type and amount so using this resources effectively are very essential. According to literature review part of this thesis all material purchased should satisfy the standards or building control authority requirements. Here are materials related factors are ranked according to their level of importance for quality as shown in Table 4-6 below:

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	Applying material management system	1	8	6	13	10	137	0.72	2
2	Cooperation between contractor and material suppliers	2	5	16	8	7	127	0.67	4
3	Construction materials quality	0	2	11	9	16	153	0.81	1
4	Storage and handling system	1	8	7	13	9	135	0.71	3

Table 4- 6 Material related factors affecting Quality of building construction projects,
Source: Survey Output, 2021

Table 4-6 shows availability of good quality construction materials are very essential and ranked first with relative important index of 0.81. According to the respondents, the materials purchased itself very decisive on the quality of the construction projects. Purchasing good quality materials are very important because construction materials have direct effect on the quality of building construction project. The second important factor is using a complete material management system with the relative important index of 0.72. The third factors ranked by the respondents are using storage and handling system with RII=0.71. The fourth is cooperation

between contractor and material suppliers with RII=0.67.

4.5.3 The effect of labors on quality of building construction projects

Labors are an important resource we use to construct building especially when the resource for equipment are limited and also some work could not be done by equipment only so, using labors are necessary. In our country construction needs a lot of labors because of the capacity we have (the development) but the problem are not that the problem are the skills and the deduction they have for works. In other hand the managements of the company are very important in order to develop the skill and motivations of the labors. The respondents ranked the variables under labors considering the effects on quality practices of building construction projects as shown in Table 4-7.

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	Communication skills of labors	0	5	7	12	14	149	0.78	3
2	labors experience	0	2	9	10	17	156	0.82	1
3	Motivation System	2	5	9	10	12	139	0.73	5
4	Training courses for labors	0	3	10	11	14	150	0.79	2
5	Income level and wages of labors	0	7	8	11	12	142	0.75	4

Table 4- 7 Labor related factors affecting Quality of building construction projects,

Source: Survey Output, 2021

Table 4-7 shows the level of labors experience is very important on quality practice when compared with the other factors with RII of 0.82. The labors impacts on the quality of the construction are very high but the labor forces did not get enough attention by Ethiopian contractors. So, in order to develop or grow their capacity training courses are important. The second variable selected by the respondents is giving training courses for labors to improve their skills with relative important index of 0.79. The third factor ranked in the table is the

impact of communication skills of the labors on the quality of construction project were ranked with RII of 0.78. Communication problem is the main factors which observed in Ethiopia construction project. The main reason is as we know Ethiopia is multi linguistic country this makes it difficult to understand each other on the site. Therefore, Interpersonal relations of labors are important because it reduces the differences they have on working place. The fourth factor ranked in the table is the motivation systems were ranked with RII of 0.75. The final ranking is given to income level and wages of labors with RII of 0.73. This factor was somewhat low effect on the quality of building construction projects as respondents ranking.

4.5.4 The effect of subcontractors on quality of building construction projects

The main problems of contractors are doesn't give emphasis on subco ntractors because contractors are busy with own works they don't give time to assess the works of subcontractors. According to the informal interview of professionals the selection system of the company has problems in the beginning because they select subcontractors by friends or by knowing each other not by the capacity of subcontractors. This is the main cause for poor quality management practices in building construction projects. Sub-contractors related factors are ranked as shown in Table 4-8 below:

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	Company's methods and procedures of selecting subcontractors	0	2	7	16	13	154	0.81	2
2	Cooperation between subcontractors and contractor	0	2	12	14	10	146	0.77	3
3	System to evaluate subcontractors performance	0	6	8	13	11	143	0.75	4
4	Subcontract conditions	0	1	8	15	14	156	0.82	1

Table 4- 8 Sub-contractors related factors affecting Quality of building construction projects,

Source: Survey Output, 2021

Table 4-8 shows subcontract conditions have great impact on the success of construction quality

according to the ranking of contractors with RII=0.82. The second and the third factors are company's methods and procedures of selecting subcontractors and cooperation between subcontractors and contractors were ranked with RII=0.81 and RII=0.77 respectively. The final ranking were given to using a system to evaluate subcontractors performance with RII=0.75.

4.5.5 The effect of finance on quality of building construction projects

Financial issue is the main factors affecting construction success especially when there is no proper financial control and management. Cash flow problem may cause inefficiency of Construction Company (contractor). Inefficiency contractors may also affect quality construction. This indicates that with a good cash flows management, companies could be kept efficient and financially healthy. Cash flow in construction is the money that is moving (flowing) in and out of company with some time. Finance related factors are ranked as shown in Table 4-9 below:

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	The amount of contractors cash flow	2	4	9	15	8	137	0.72	1
2	The non-delay of interim payments	1	14	5	10	8	124	0.65	2

Table 4- 9 Finance related factors affecting Quality of building construction projects,
Source: Survey Output, 2021

The results in Table 4-9 shows the amount of contractors cash flow are ranked first compared with the non-delay of interim payments with relative important index of 0.72. But these two factors affect indirectly the quality of the building construction. But these two factors affect indirectly the quality of the building construction. Interim payments can be agreed in advance and paid at particular milestone, but they are more commonly regular payments the value of which is based on the value of work that has been completed (this is the actual value of the work completed, taking into account variation etc.). The interim certificate provides the mechanism for the client to make payments to contrac tor. So, the delay of these payments

may cause the construction to stop and lagging of the work because of this the material on the site is affected the time problem is also happened. There fore, the qualities of constructions are in question.

4.5.6 The effect of Equipment on quality of building construction projects

There are a lot of activities performed by equipment on building project like excavation, compaction, lifting, moving, mixing, spreading, crashing, and cutting etc. All those work are very important for good quality construction work. The use of equipment will reduce cost, improve safety and yield higher quality of the construction project so; using equipment in construction project gives us success. Here are equipment related factors were ranked as shown in Table 4-10 below:

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	Availability of Equipment	0	1	10	18	9	149	0.78	1
2	Equipment management system	0	4	10	15	9	143	0.75	3
3	Measurement of equipment Productivity	3	4	14	9	8	129	0.68	5
4	Utilization of equipment	1	4	9	15	9	141	0.74	4
5	Equipment maintenance	0	3	11	12	12	147	0.77	2

Table 4- 10 Equipment related factors affecting Quality of building construction projects,

Source: Survey Output, 2021

The results in Table 4-10 shows the effect of availability of Equipment were rated first with RII=0.78. The lacks of construction equipment by the contractors reduce the quality of project, because construction equipment performs better than human on the activity mentioned above. The construction equipment fasten construction of the building this gives benefit for the contractors to work the project without time stress. Us we know the stress to finish the project is the cause for defect works. Equipment maintenance, equipment management system and utilization of equipment were ranked second, third, and fourth respectively on the effect they have on quality. The last factor is measurement of equipment productivity with relative

important index of 0.68.

4.5.7 The effect of site staffs on quality of building construction projects

In construction industry cooperation of site staffs are must to achieve success in time, cost and quality of construction project therefore, without cooperation of site staffs we cannot achieve project objectives. For example cooperation between supervision and contractor's staffs were very important for quality construction.

The other factors were important for quality management is the understanding of supervision staffs about contract administration of the construction projects. The skill and experience of supervision staffs are very important for quality management practices. The contractor's staffs skill and experience are also very important for QMP. The site staffs issues are also ranked by the respondents on the level of importance that have on quality management practices.

The first rank given by the respondents are skill and experience s of contractor's staff with RII=0.81. The other factors next to above are: skill and experience of supervision staff; and cooperation between supervision and contractor's staff were ranked with RII=0.77 and RII=0.76 respectively. Understanding of contract administration by Supervision staffs is ranked in last place by the respondents with RII=0.73 as shown in Table 4-11.

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	Cooperation between Supervision and Contractor's staff	0	7	8	8	15	145	0.76	3
2	Understanding of contract administration by Supervision	3	6	7	8	14	138	0.73	4
3	Skill and experience of Supervision staff	0	8	6	8	16	146	0.77	2
4	Skill and experience Contractor's staff	0	4	7	11	16	153	0.81	1

Table 4- 11 Site staffs related factors affecting Quality of building construction projects,

Source: Survey Output, 2021

4.5.8 The effect of site layout on quality of building construction projects

Site layout of the project is very necessary for the success of the project. Issues related with the site layout are: Site layout is large and suitable for movement of labors and equipment, site layout is organized well, layout has storage areas for materials and site is clean. Those factors are identified and modified as shown in Table 4-12 below:

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	Site layout is large and suitable for movement of labors and equipment	1	10	11	7	9	127	0.67	2
2	Site layout is organized	0	6	12	11	9	137	0.72	1
3	Site layout has storage areas for materials	3	10	9	8	8	122	0.64	3
4	Site is clean	2	13	10	7	6	116	0.61	4

Table 4- 12 Site layout related factors affecting Quality of building construction projects,

Source: Survey Output, 2021

Table 4-12 shows the site layout organized well sub factor were ranked first with RII=0.72. The Site organizations of the projects are very necessary for the project success both for quality and safety of the project and also important to handle materials, equipment and other things which need care on the site. The site layout should be large and suitable for movement of labors and equipment were ranked second with RII=0.67. Third and the fourth issues are site layout has storage areas for materials and site is clean with RII=0.64 and RII=0.61 respectively ranked. The cleanness of the site layout were very important especially for materials stockpiled on the site otherwise the quality of materials are affected and also the reason for poor QMP.

4.5.9. The effect of systems on quality of building construction projects

Organizations are a combination of different systems to work together to develop the company. Construction Company have different system like quality control and quality assurance system, cost control system, time control system and safety control system. The above systems are some of them which are considered in this research. The other systems are included under others factors. Those factors mentioned above are ranked according to the degree of importance they have on quality of construction projects as illustrated in Table 4-13 below:

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	Quality control and quality assurance system	0	1	10	12	15	155	0.82	1
2	Cost control system	2	11	8	9	8	124	0.65	2
3	Time Schedule	3	10	9	8	8	122	0.64	3
4	Safety program	10	13	6	5	4	94	0.49	4

Table 4- 13 System related factors affecting Quality of building construction projects,

Source: Survey Output, 2021

Table 4-13 shows implementing quality control and quality assurance system is ranked first with RII=0.82. QC/QA system is one of quality improvement program were used to improve

the quality construction work. So, using this system has great degree of influence on quality. QC/QA systems are one of the contributing factors for the success of QMP in construction firms. The second factor is using cost control system ranked with RII of 0.65 which isn't have direct effect on quality but very important for the quality of construction work. The third and the fourth factors are using time schedule and implement a safety program with RII=0.64 and RII=0.49 respectively.

4.5.10. The effect of contract on quality of building construction projects

Contract documents consists so many things like quality control prices. This prices are for obtaining samples; performing contractor quality control testing; performing tests for contractor quality control testing; performing tests for contractor process control; providing inspection; exercising management control; submitting a written control quality Plan, maintaining control charts; submitting the records and certifications; and furnishing labor, materials, tools, equipment, and incidentals necessary to complete the work. So, these costs help the contractors to keep the quality of construction. Contract related factors are ranked as shown in Table 4-14.

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	Cooperation between parties involved in contract	2	3	15	9	9	134	0.71	1
2	Previous relations between parties (good or bad)	2	11	8	9	8	124	0.65	3
3	A written contract with conditions clear and fair and responsibilities distribution is clear	3	6	8	12	9	132	0.69	2
4	Using a standard contract	5	8	9	10	6	118	0.62	4

Table 4- 14 Contract related factors affecting Quality of building construction projects,

Source: Survey Output, 2021

Table 4-14 shows the cooperation between parties involved in contract were ranked first with RII=0.71. The construction works needs the cooperation and works of different bodies as stated on the contract of project. The second ranking is given to written contract with conditions clear and fair and responsibilities distribution is clear with RII=0.69. The other factors comes after the two factors are previous relations between parties and using a standard contract were ranked with RII=0.65 and RII=0.62 respectively.

4.5.11. The effect of projects on quality of building construction projects

The unique character of construction industries are each projects has different from one another. This is the main reason that makes quality management difficult to manage. According to literature review the scope of the project; location of the project; site access and period of the project are the sub factors that affect quality under main factors of projects. The effects of each sub factors of the projects are ranked by the contractors as shown in Table 4-15 below:

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	Scope of the project (type and nature of the project)	1	4	8	10	15	148	0.78	1
2	Location of the project	3	6	7	9	13	137	0.72	2
3	Site access	5	8	12	6	7	116	0.61	4
4	Period of the project	2	8	9	11	8	129	0.68	3

Table 4- 15 Project related factors affecting Quality of building construction projects,
Source: Survey Output, 2021

Table 4-15 shows the scope of the project (type and nature of the project) are ranked first with RII=0.78 the importance this factor is high according to respondents. The other factors are location of the project, period of the project and site access with RII=0.72, RII=0.68 and RII=0.61 respectively ranked by the respondent.

4.5.12. The effect of owners on quality of building construction projects

Past experience of highly successful construction project has clearly demonstrate that early and active involvement of the owner has major impact on safety and quality performance of all

contractors on the job. The slight additional cost required at the beginning of construction project to implement an effective quality program will provide a high rate of return at project completion. The method of selection of contractors by the owner is very important for the success of construction project. Especially emphasis for quality is very important during selection of contractors. Owners' related factors are ranked as shown in Table 4-16 below:

Item No.	Sub-Factors affecting quality	Degree of importance					Total	RII	Rank
		1	2	3	4	5			
1	Owner organization nature (Public or Private)	1	6	15	9	7	129	0.68	4
2	The Owner is not delaying to make Decisions	2	6	7	8	15	142	0.75	2
3	Owner's contribution to design	1	5	13	8	11	137	0.72	3
4	Owner's emphasis on quality	0	4	8	9	17	153	0.81	1

Table 4- 16 Owners related factors affecting Quality of building construction projects,

Source: Survey Output, 2021

Table 4-16 shows owners emphasis (active owners) on quality is ranked first with RII=0.81. The second factor ranked by owners is not delaying to make decisions that mean owner should decide on things on time before things goes wrong (RII=0.75). The third and the fourth factors are: owner's contribution to design and owner organization nature (Public or Private) with RII=0.72 and RII=0.68 respectively.

The owner's contribution to design doesn't have that much effect on quality but if the contractors participated it is good for quality according the interview with professional. The other issue ranked fourth is owner organization nature (public or private) now a day weather public or private doesn't have that much effect because both clients are try to keep quality in their own way. In the past government projects doesn't have that much control especially in terms of quality but now according the interview of professionals the situation is improved in government projects.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of findings

The quality management practices of the company are assessed in chapter 4 of this thesis both by interview and questionnaires. The first emphases are to differentiate the works that are public, private and cooperative. According to the result majority of the company's clients are private sectors and cooperative comes final. So, this indicates public sectors are more influenced by contractor's quality management activities.

The company's priorities are also assessed in this section the most important and highly prioritized factors by the company are project cost budget this shows the company focus on how to be profitable but only focusing on cost doesn't bring profit because the other factors like quality work and time are highly important for more profitability of contractors.

The perception of employees in the company on quality are different the majority of respondents perceived quality works gives competitive advantage for the company by creating another work to get in the future. The next perceptions of the respondents are elimination of defects by doing quality works they can increase profit. In general respondents have different perception about quality there is no common understanding about quality this makes it the company direction on quality to manage difficult.

The other analyzed issues were about quality improvement program of the company. Types of quality improvement program are also included in chapter 4 like ISO 9001, Total quality management, quality control/quality assurance. From these types of quality improvement the respondents describe that the company has an intention to practice quality control /quality assurance quality management system type.

The major objectives of the company using quality improvement programs are assessed and the result shows compliance with statutory, environmental and safety requirements were the major objective. The second objective selected by respondents is cost reduction.

The main factors affecting quality of building construction projects are analyzed in this chapter.

The number of the main factors are 12 here is their list project, design, contract, materials, labors, equipment, subcontractors, site layout, systems, site staffs, financial and owner. The above main factors have their own sub factors which are 48 in numbers. All the main factors and sub factors are ranked by the respondents which are helpful for the company in order to concentrate on the factors that influence highly the quality of the project especially during design quality management system for the company.

5.2 Conclusions

The following conclusions are made based on the objectives of the thesis:

1. The employees in the company involved in building construction projects are aware of the concept of quality and quality management but its application was relatively low. The company main focuses are more on finishing the work on time and with profit than practicing quality.
2. The majority of the employees in the company don't implement quality management system. The contractors which implement QMS like: ISO 9001 and quality control/quality assurance have better quality understanding and practice than the contractors who doesn't implement quality management system as it understood from the analysis of the other related study. And also the contractors that implement quality management system have their own objectives about their quality management system this helps them to achieve quality and other related issues like for example success in finance and bidding.
3. Building construction projects in Ethiopia are suffering quality problems and this study identified that, design related issues are the most common among the twelve different factors examined in this study and very important for the success of quality practices. Design related issues like completeness and consistency of design document is very important for success of quality.
4. Material related issues are the second important factors to reduce the quality problem issues in Ethiopia building construction projects. Availability of good quality construction materials, using a complete material management system, using storage

and handling system and cooperation between contractor and material suppliers are very important sub-factors in order to get high quality.

5. Labors related issues are the third most important factors to reduce the quality problem issues in Ethiopia building construction projects. Labors with experiences, training, communication skill, income level and wage of labors, and motivation system are very important sub-factors in order to get high quality.

5.3 Recommendations

The following points are recommended to J.JCON CONSTRUCTION in order to improve its quality management system.

1. The company should effectively use quality management system to develop or grow the potentials of their employees to increase the quality of construction work and the efficiency of the company.
2. The company should have to give training at different level of employees about quality management techniques.
3. The company should try getting the ISO 9001 system certificate. And also the Government bodies should encourage contractors to get ISO 9001 system certificate in their company. For example, by asking contractors about details information about their company quality management system during bidding of public building construction projects and considering ISO 9001 certification as bidding requirement during tender.
4. The company should give great attention on the factors affect quality like: design related factors; labor related factors; systems related factors; site staff (cooperation, understanding, experience); materials related issues; financial Issues; subcontractors related issues; contract related issues; site layout related issues; owner related issues; and project related issues. The above factors should have to get emphasis according to the importance they have on quality. So, these factors are essential for the company to solve quality problem on the construction projects.

5. The present study is an essential first step towards highlighting the major issues that need attention to improve the quality of building construction projects in the case of J.JCON CONSTRUCTION Company. But more efforts are still needed to investigate the major issues that need attention to improve the quality of building construction projects in Ethiopia and ways to formulate management systems (policies and procedures) to handle each factor individually.

REFERENCES

1. Abebe Dinku, 2016, “construction overhaul overdue ”, Addis fortune Newspapers online available at: http://addisfortune.net/interviews/construction-overhaul-overdue/ (Accessed on 29th August, 2016)
2. Aderaw, S. (2019). Effect of TQM Dimensions on Operational Performance of Ethiopian Pharmaceutical Companies. (Master’s Thesis). Addis Ababa University, Ethiopia.
3. Al-Zayyat, A. N., Al-khaldi, F., Tadros, I. and Al-Edwan, G. (2010). The Effect of Knowledge Management Processes on Project Management. Journal of IBIMA Business Review. 2010(2010). 1-6
4. American Society for Quality, what is quality? Available at: http://www.asq.org, (accessed on February 15, 2016)
5. Asefa, B. (2018). Assessment of Quality Management Practices of Ethiopian Contractors Focused on building construction projects. (Master’s Thesis). Addis Ababa University, Ethiopia.
6. Ashokkumar, D. (2014). Study of Quality Management in Construction Industry. International Journal of Innovative Research in Science, Engineering and Technology. 3(1), 36-43.
7. Ayalew, T., Dakhli, Z. and Lafhaj, Z. (2016). Assessment on Performance and Challenges of Ethiopian Construction Industry. Quest Journals 2(11). 01-11.
8. Azlan S. Ali and Ismail Rahmat; 25th September 2009. "The performance measurement of construction projects managed by ISO-certified contractors in Malaysia"
9. Behnam Neyestan; December, 2016. "Effectiveness of Quality Management System (QMS) on Construction Projects"
10. Berhe, L. and Gidey, T. (2016). Assessing the Awareness and Usage of Quality Control Tools with Emphasis to Statistical Process Control (SPC) in Ethiopian Manufacturing Industries. Intelligent Information Management. 8(6). 143-169.

11. "Birhanu Beshah and Daniel Kitaw (2014), Quality management practice in Ethiopia. Addis Ababa Institute of Technology, African Journal of Business management, Vol 8(17)."
12. Derso, B. (2018, March 28). Ethiopia: Transforming Construction Industry. The Ethiopian Herald.
13. Gadisa and Zhou (2019). A Study on Critical Factors Affecting Public Infrastructures Project Performance in Ethiopia. Advances in Social Science, Education and Humanities Research. 352. https://doi.org/10.2991/aemh-19.2019.41
14. Harris, F., & McCaffer, R. (2001). Modern construction management (5th ed.). Oxford: Blackwell Science Ltd.
15. Henssen, S. (2015, May 06). ISO 9001:2015 and the 8 Quality Management Principles to Take You to the Head of the Class. [Blog Post]. Retrieved from https://www.pilgrimquality.com/blog/iso90012015-quality-mgmt-principles/
16. Hussain, S., Fangwei, Z., Siddiqi, A., F., and Ali, Z. (2018, May 03) Structural Equation Model for Evaluating Factors Affecting Quality of Social Infrastructure Projects. Sustainability. 10(5). Retrieved from https://www.mdpi.com/2071-1050/10/5/1415.
17. ISO 9000 Family – Quality Management. (n.d.). Retrieved from https://www.iso.org/iso-9001- quality-management.html
18. Juran, J. M. and Godfrey, B. A. (1999). Juran's Quality Handbook (5th ed). New York, NY: McGraw Hill.
19. Kerzner, H. (2017). Project Management – A Systems Approach to Planning, Scheduling and Controlling. Hoboken, New Jersey: John Wiley and Sons, Inc.
20. M. Abas, S.B. Khattak, I. Hussain, S. Maqsood and I. Ahmad, "Evaluation of Factors affecting the Quality of Construction Projects," Technical Journal, University of Engineering and Technology (UET) Taxila, Pakistan, Vol.20, 2015, pp.115-120
21. Machado, F. J. and Martens, C.D.P. (2015). Project Management Success: A bibliometric analysis. Journal of Business and Projects. 6(1). 28-44.

22. Mallawaarachchi, H. and Senaratne, S. (2015). Importance of Quality for Construction Project Success. 6th International Conference on Structural Engineering and Construction Management, 2015. Knady, Sri lanka, 11th – 13th December 2015.

23. Norhayati Zakuan and Muhamad Zameri Mat Saman; January 2014. "Review of quality management system research in construction industry"

24. Radujkovic, M. and Sjekavica, M. (2017). Project Management Success Factors. Procedia Engineering. 196(2017). 607-615.

25. Shreyas Gowda, Ramesh Nayaka, Sachidananda Murthy and Shashi Kumar; Aug-2015 "Total Quality Management in Construction"

26. Tan, C. K., & Abdul-Rahman, H. (2005). Preliminary research into overcoming implementation problems in construction projects.

27. Proceeding of the 4th Micra Conference. Faculty of the Built Environment, University Malaya, 08.15-08.28.

28. Temesgen, W. (2007). Managing the Project Cycle: A Challenge for the Ethiopian Public Sector (Federal Level).

29. Tiong Kung Leong, Norhayati Zakuan, Muhamad Zameri Mat Saman, Mohd. Shoki Md. Ariff, and Choy Soon Tan; 2013 "Using Project Performance to Measure Effectiveness of Quality Management System Maintenance and Practices in Construction Industry"

30. Veitch, C. (2018, January 30). The Construction Industry in Ethiopia. Retrieved from https://www.whoownswhom.co.za/store/info/4567?segment=The+Construction+Industry+in+Ethiopia)

31. What is Project Management? (n.d.) Retrieved from https://www.pmi.org/about/learn-about- pmi/what-is-project-management

32. Yahya, M., Y., Abba, W., A., Mohamed, S. and Yassin, A., Md. (2019, August 30). Contributing Factors of Poor Construction Project Performance in Nigeria. International Journal of Property Science. 9(1).

APPENDICES

APPENDIX I: Questionnaire

Dear respondent,

The purpose of this questionnaire is to collect data for the study on Quality management practices on building construction projects in Addis Ababa: in the case of J.JCON CONSTRUCTION for partial fulfillment of a degree Masters of Business Administration. Believing that your frank and genuine responses will contribute vastly to the quality of the findings of this study, I would like to request you kindly to complete this questionnaire which will be kept confidentially for the study purpose. I would like to express my heartfelt thanks in advance for taking part in this endeavor.

Name: Zebiba Shemsu

Phone: 0911 22 06 56

Email:Zebib1252@gmail.com

Part I: General information

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

1. Gender

☐ Male ☐ Female

2. Educational Background

☐ Master's degree or above ☐ College Diploma

☐ Bachelor's Degree ☐ High school Completed

☐ Other (Please specify) _____.

3. Which of the following best describes your role in the building construction project?

☐ Project Manager ☐ Office Engineer ☐ Site Engineer

☐ Forman ☐ Sub-contractor

☐ Other (Please specify)_____.

4. How many years of working experience do you have?

☐ Less than 5 years ☐ 6-10 years ☐ 11-15 years ☐ over 16 years

Part II: Question related to the quality practices

5. In your view, which of these words best define quality? (Not limited to one answer)

- ☐ Expensive
- ☐ Appearance
- ☐ Increased profit
- ☐ Customer's satisfaction
- ☐ Meeting specification requirement
- ☐ Others (please specify): _____

6. What is your organization's perception of quality?

- ☐ Elimination of defects
- ☐ A tool to increase profits
- ☐ A competitive advantage
- ☐ Others (please specify): _____

7. Does your organization have a quality management system?

- ☐ No (Please go to next section of question)
- ☐ Such a plan is under consideration
- ☐ A quality improvement program has been implemented recently
- ☐ A quality improvement plan has been a part of corporate policy for some time now

8. What type of quality management system do you have?

- ☐ ISO 9000
- ☐ Total Quality Management
- ☐ Quality Control / Quality Assurance
- ☐ Others (please specify): _____

Part III: Sub-factors affecting Quality in constructon projects during construction

9. Please identify (carefully) the degree of importance of factors affecting quality in your construction project by ticking (√) the appropriate box.

Very high important = **5** high Important = **4** Medium important=**3** Low important =**2**

Very low important = **1**

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
1	Factors related to project	Scope of the project (type and nature of the project)					
		Location of the project					
		Site access					
		Period of the project					

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
2	Factors related to design	Completeness and consistency of design documents.					
		Drawings are prepared in details					
		Conformance to codes and standards					
		Bill of quantity is detailed and accurate.					

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
3	Factors related to contract	Cooperation between parties involved in contract					
		Previous relations between parties (good or bad)					
		A written contract with conditions clear and fair and responsibilities distribution is clear					
		Using a standard contract					

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
4	Factors related to materials	Applying material management system					
		Cooperation between contractor and material suppliers					
		Construction materials quality					
		Storage and handling system					

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
5	Factors related to labors	Communication skills of labors					
		labors experience					
		Motivation System					
		Training courses for labors					
		Income level and wages of labors					

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
6	Factors related to Equipment's	Availability of Equipment					
		Equipment management system					
		Measurement of equipment Productivity					
		utilization of equipment					
		Equipment maintenance					

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
7	Factors related to sub-contractors	Company's methods and procedures of selecting subcontractors					
		Cooperation between subcontractors and contractor					
		System to evaluate subcontractors performance					
		Subcontract conditions					

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
8	Factors related to site layout	Site layout is large and suitable for movement of labors and equipment					
		Site layout is organized					
		Site layout has storage areas for materials					
		Site is clean					

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
9	Factors related to systems	Quality control and quality assurance system					
		Cost control system					
		Time Schedule					
		Safety program					

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
10	Factors related to site staffs	Cooperation between Supervision and Contractor's staff					
		Understanding of contract administration by Supervision					
		Skill and experience of Supervision staff					
		Skill and experience Contractor's staff					

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
11	Factors related to financial Issues	The amount of contractors cash flow					
		The non-delay of interim payments					

Item No.	Group	Sub-Factors affecting quality	Degree of importance				
			5	4	3	2	1
12	Factors related to owners	Owner organization nature (Public or Private)					
		The Owner is not delaying to make Decisions					
		Owner's contribution to design					
		Owner's emphasis on quality					

APPENDIX- II: Interview Questions

1. From your experience, how could quality expressed in building projects?
2. What do you think major objectives of quality management in the construction company?
3. How does your organization manage quality? Or is there any quality management program your organization implements?
4. What are the factors that you think will affect the quality of construction projects during construction phase? Please explain with example.