

**EVALUATION OF TOTAL QUALITY MANAGEMENT PRACTICE OF
BUILDING CONTRACTORS, THE CASE OF ADDIS ABABA BASED PRIVATE
LOCAL CONTRACTORS**

By
Abel Shawel

Principal Advisor: Mohammed Seid (PhD, Associate Professor)



A thesis submitted to
Addis Ababa University College of Business and Economics for the requirements of
partial fulfillment of Masters of Science Degree in Management Specialization in Total
Quality Management and Organizational Excellence

February 2022

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MSc Thesis

By

Abel Shawel

February 2022

Approved by the Board of Examiners

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Declaration

I, the undersigned, declare that this study entitled “Evaluation of Total Quality Management Practice of Building Contractors, the Case of Addis Ababa Based Private Local Contractors” is my own work. I have undertaken the research work independently with the guidance and support of the research advisors. This study has not been submitted for any degree or diploma program in this or any other institutions and that all sources of materials used for the thesis have been properly acknowledged.

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Certification

This is to certify that the thesis prepared by Abel Shawel, entitled: “Evaluation of Total Quality Management Practice of Building Contractors, the Case of Addis Ababa Based Private Local Contractors” and submitted in partial fulfillment of Masters of Science Degree in Management Specialization in Total Quality Management and Organizational Excellence.

Board of Examiners

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Abstract

The research mainly focused on the assessment of total quality management practices in building construction firms in the context of private local contractors at the capital city of Ethiopia, Addis Ababa. The quality of building construction projects in different countries shows the level of development attained, giving that the construction industry provides most of the fixed assets of different countries. The study explores factors that affect quality management of the building construction firms, conformity of firms to quality management practices and the effect of firm size to conformance with quality management practices. Purposive sampling was used and 110 structured questionnaires were administered to building construction firms in order to assess quality management practices in fifty-five private local contractors at Addis Ababa. The research findings showed, Company's construction process oriented management (RII = 0.679), Customer centeredness (RII = 0.671) ranked highly significant as factors for implementation of total quality management. Evidence based decision making (RII = 0.651), Information analysis and evaluation (RII = 0.634), In relation to human resource development (RII = 0.625), Top management considers strategic importance of quality (RII = 0.619) ranked medium significant as factors for implementation of total quality management. Whereas Continuous improvement (RII = 0.609) and Supplies management (RII = 0.605) ranked low significant factors on the implementation of total quality management. The research also confirmed that there are some variations with regards to firm size in conformity with quality management practices. From the research findings, it was concluded that Total quality management is not a common practice, Implementation of quality management is greatly perceived as a means to fulfill contractual obligations instead of satisfying the needs of clients. The research recommends that Management has to be committed and dedicated to the application of TQM in order to improve Quality.

Keywords: *quality management, construction project management, practices, management commitment, problems*

Table of Contents

Declaration.....	i
Acknowledgement	ii
Abstract.....	iii
CHAPTER ONE	1
1.1 Background.....	1
1.2 Statement of problem.....	2
1.3 Research Objectives.....	3
1.3.1 General Objective	3
1.3.2 Specific objectives	3
1.4 The research questions.....	3
1.5 Scope of the Study	4
1.6 Significance of Study.....	4
CHAPTER TWO	6
Literature Review.....	6
2.1 Introduction.....	6
2.2 A synopsis of construction industry.....	8
2.2.1 An overview of Ethiopian construction industry	9
2.3 The Concept of Quality.....	10
2.4 Quality Management Systems in the construction industry.....	11
2.5 Construction Quality Management	12
2.5.1 Reasons for construction quality problems.....	13
2.5.2 Actual examples of poor quality management.....	15
2.6 Evolution of Total Quality Management System.....	17
2.7 Defining the concept of Total Quality Management.....	20
2.7.1 Features and Elements of TQM	20
2.8 Applicability of TQM in Construction Industry	23
2.9 Advantage of TQM for Construction Industry.....	25

2.9.1 The role of TQM in achieving competitiveness.....	26
2.9.2 The role of TQM in improving profitability	26
2.10 Barriers for Implementing TQM in Construction	26
2.11 Theoretical framework for implementation of TQM in CI.....	30
CHAPTER THREE	32
3. Research Methodology	32
3.1 Research Method Adopted for the Study	32
3.2 Research Design.....	33
3.3 Data Collection Technique.....	34
3.4 Questionnaire Design.....	35
3.5 Sample Size.....	36
3.6 Research Location.....	37
3.7 Relative Important Index (RII)	37
3.8 Pilot testing of the instrument	39
3.9 Validity and Reliability of the instrument.....	39
3.10Data Analysis Technique	42
CHAPTR FOUR	44
Data Presentation, Analysis, and Discussion of the Results	44
4.1. Introduction.....	44
4.2. General Information.....	44
4.3. General information analysis Results	44
4.3.1. Questionnaire Response.....	44
4.3.2. Organization establishment.....	45
4.3.3Academic Qualification of respondents	46
4.3.4 Occupation	47
4.3.5 Respondents work experience.....	48
4.4 Section II Assessment of Total Quality Management awareness results.....	49
4.4.1 Definition for Total quality management.....	49
4.4.2 Attention given by your firm	50
4.4.3 Yes or no questions related to level of awareness of Total Quality Management	50

4.5 III. Quality management practicing evaluation..... 51

 4.5.1 Quality improvement program..... 51

 4.5.2 Factors in order of their importance in quality program of firms 51

 4.5.3 Types of Quality improvement practicing in firms..... 52

 4.5.4 Full support of top management in quality improvement program 52

 4.5.6 Firms practicing in total quality management..... 53

 4.5.7 Data acquisition 53

 4.5.8 Review on Quality Audit 56

 4.5.9 Training related to quality and quality improvement..... 57

 4.5.10 Quality related Policy in the construction firms 58

4.6Section IV: Assessment of TQM deployment 59

CHAPTER FIVE 70

 Conclusion and Recommendation 70

 5.1 Introduction..... 70

 5.2 Conclusion 71

 5.3 Recommendation 75

 Reference 78

 Appendix..... 82

List of Figures

Figure 2. 1 Common poor quality problem in the Addis Ababa Building Construction	7
Figure 2. 2 Description of the study area Addis Ababa Ethiopia (Source: http://www.operationworld.org/ethi)	9
Figure 2. 3 Construction of structural quality problems and defects (Addis Ababa).....	15
Figure 2. 4 Material handling and storage management problem (Addis Ababa)	16
Figure 2. 5 Finishing work and sanitary pipe lines failure happened immediately after completion of the work (Addis Ababa).....	16
Figure 2. 6 The four stages of quality management (Tang, 2005)	19
Figure 3. 1 Flow chart of Methodology	34
Figure 4. 1 Academic Qualification of respondents.....	46
Figure 4. 2 Occupation of respondents in their firms.....	47
Figure 4. 3 Occupation/Position of respondents in their firm.....	48
Figure 4. 4 Response rates related to level of awareness of Total Quality Management	50
Figure 4. 5 Respondents response on practicing Quality improvement types	52
Figure 4. 6 Response on full Support of quality improvement program.....	52
Figure 4. 7 Respondent's response of firms practicing in total quality management	53
Figure 4. 8 Respondent's response on ensuring internal quality audits effectively	56

List of Tables

Table 2. 1 Definition of quality adapted from (Anas&Gözde, 2018).	10
Table 2. 2 Basic concepts of different QM models (self-generated)	12
Table 2. 3 Core Elements Influencing Quality adopted from (Razek, 1998) as cited by (Thong, 2016). ..	14
Table 2. 4 Steps of TQM application in the CI adopted from (Anas&Gözde, 2018)	31
Table 3. 1 Likert Scale of Evaluation	36
Table 4. 1 Distribution of Questionnaires	44
Table 4. 2 Years of Organization established	45
Table 4. 3 Respondents response on definition of Total Quality Management	49
Table 4. 4 Analyzed result and ranking on definition of Total Quality Management	49
Table 4. 5 Respondent’s Response on attention given by construction firms.....	50
Table 4. 6 Analyzed Results and ranking on attention given by construction firms.....	50
Table 4. 7 Response rates related to companies quality improvement program.....	51
Table 4. 8 Respondent’s responses, analyzed results and ranking on their importance in quality program.	51
Table 4. 9 Response of respondent’s on data collection to measure the performance of constructionoperation.....	53
Table 4. 10Respondent’s response on company and project performance measurement ways.....	54
Table 4. 11 Respondent’s response on data accusation methodology within the firms and projects.....	54
Table 4. 12Respondent’s response on system for gathering customer suggestion	55
Table 4. 13Response of respondent’s on gathering of customer suggestion	55
Table 4. 14Response of Respondent’s on well-established quality audit procedure	56
Table 4. 15Response of respondent’s on ensuring internal quality audits effectively	56
Table 4. 16Response on carry out of project review after close out	57
Table 4. 17 Response on training in quality improvement to employee.....	57
Table 4. 18Response on method of training	57
Table 4. 19Training organized related to quality	58
Table 4. 20Respondent’s response on the availability of quality policy and standard manual.....	58
Table 4. 21Company mission statement in relation to quality	58
Table 4. 22Critical success factor the implementation of Total Quality Management	59
Table 4. 23 Reponses on Factor affecting implementation of Total Quality Management	67

CHAPTER ONE

1.1 Background

Construction projects are fundamental for the development of any country in order to achieve economic, social and political growth. But these projects have cost, time and scope constraints which are commonly referred as the iron triangle. Thus, in order to meet Client's needs and expectations, projects have to be completed within the cost, time and scope. Accordingly, effective and efficient system of project management is compulsory to meet these requirements. And the project management system for meeting these requirements has a specialized sub sector management area known as project management body of knowledge (PMBOK). Accordingly, time management, cost management and quality management are the core areas of PMBOK.

As construction quality management is the key to a success of a project, it is therefore imperative that the construction industry should give an emphasis for adoption of relevant and efficient quality management system in order to get competitiveness and enhance the growth of the national economy. But the method of management of quality of construction in Ethiopia doesn't change a bit, though it is a significant sector for ensuring development of the country. And this is costing contractors significant amount of their annual income, as poor of quality is causing rework, repair and replacement. Furthermore, insufficient quality may lead to poor productivity, as well as reconstruct and repair the defect; and poor quality management may cause project late, over cost and endure from poor materials and workmanship (Thong, 2016).

Therefore, an increased demand to achieve a high quality products and services, construction companies and others have realized the importance of applying total quality management practices to the construction and production processes in order to minimize costs and to create end products with high quality characteristics. This is because today in many parts of the world, the industry is embarking on a period of adjustment in how it operates and functions and is making gradual changes provoked by the need to observe to new legislations and regulations and the extended use of technology and management techniques and concepts. The results of such changes indicate that traditional industry structure and practices are gradually changing course in and to reduce waste and to improve performance, delivery and overall client satisfaction on projects. And one of the means of achieving this accomplishment is by applying the principles

of Total Quality Management (TQM) in Construction; and this became the rationale for conducting this thesis.

1.2 Statement of problem

Excessive expenditures of time, money and resources, both human and material, are wasted each year because of inefficient or nonexistent quality management procedures in the construction industry globally as well as in our country. As attainment of acceptable levels of quality in the construction industry has long been a problem and the increased global competition in the construction sector in Ethiopia are becoming the driving forces for assessing and implementing relevant quality management system to be more effective and to enhance their competitive advantage.(Journal of EEA, Vol. 20, 2003).

Moreover, with an increasing demand of the construction quality, Ethiopian contractors have no option than to adopt appropriate quality management strategies such as TQM to reduce cost, time and increase competitiveness. However, in most developing countries like Ethiopia, the principles of TQM are not employed in construction leading, and this is leading to low quality works, high construction costs, time and dissatisfied clients.

Thus, as the construction industry needs proactive management methods for achieving the quality needs of the market, and TQM is one of the systems which can improve quality of works; reduce re-work, and completion time. As far as TQM is an essential approach for long-term survival in all business including the construction industry, and its achievement in manufacturing industry it has been supposed by researcher that TQM can fill the quality management gap in construction industry.

1.3 Research Objectives

1.3.1 General Objective

To analyze the implementation of total quality management practice in Addis Ababa based local private building contractors.

1.3.2 Specific objectives

- To identify current total quality management practices employed in the grade one and two private building Construction companies in Addis Ababa Ethiopia.
- To evaluate the extent of TQM awareness within the Addis Ababa based local private building contractors.
- To determine the external environmental factors and obstacles that affect TQM implementation within the Addis Ababa based local private building contractors.
- Conclusion and recommendation

1.4 The research questions

This research paper will answer the question: -

- What Ethiopian local building Contractors know about Total Quality Management?
- What is the current status of the total quality management systems (QMSs) being implemented in the Addis Ababa based building Construction companies?
- What are the quality management tools and techniques commonly applied in the private local building construction companies in Addis Ababa?
 - Essentially, the identification of the status of QMS implementation in an organization involves examining how effective and successful the implementation of QMS requirements, such as the standards of ISO 9001, is taking place. The complex nature of construction practices often causes challenges in the roll-out of QMS at the management and project levels. These challenges need to be identified in order to take measured actions to overcome the barriers. Furthermore, the assessment of a company's performance during implementation of a QMS is also important in order to evaluate the impact of the quality system on effectiveness of the system, specifically in the Addis Ababa context.

- How could quality problems be improved in the building Construction companies in Addis Ababa Ethiopia using TQM’?
- What are the problems encountered in relation to the implementation of total quality management?
- If there are obstacles to the implementation of TQM, what are they?
 - Do the barriers to the implementation of an effective total quality management system significantly relate to the quality management system practices?

1.5 Scope of the Study

This paper focuses on assessing the implementation of TQM specific to the execution phase of construction projects. It is targeted to private local contractors within the city of Addis Ababa Ethiopia. To conduct the research within the given timeframe and to reduce cost of conducting the study, the researcher limited the sample to only grade one and two private general construction (GC) and building construction (BC) firms.

However, this research study would not assess any other construction firms established as share companies and public enterprises. Similarly, private construction firms which are participating in road and irrigation projects are not the scope of this study.

1.6 Significance of Study

Generally, the researcher considers the thesis have the following significances; it will tell total quality management practices as a determining tools for quality performance and organizational performance as a whole. Secondly, the results of the study can be used to create awareness on the effect of TQM on competitive advantage in the construction industry of Ethiopia.

Furthermore, the study can also be used by researchers and other interested parties who may have due interest in this area. Additionally, results obtained from this research will assist future efforts to develop and build a concrete TQM for building construction companies in Addis Ababa Ethiopia.

1.7 Organization of the Thesis

The thesis is organized with five chapters. The first chapter begins the basic research information as an introduction part of the research. The literature review is dealt in chapter two followed by the third chapter which covers research design and methodology in order to achieve the objectives of the study. The fourth chapter encompasses the analysis of findings and discussions part. The last chapter comprises the conclusions made and recommendations forwarded based on the major findings of the study.

CHAPTER TWO

Literature Review

2.1 Introduction

Construction projects are always expected to create a balance between cost, time and quality. Appropriately, time and cost concerns on a project have gained important attention. However, as cited by (Thong, 2016) narrated that quality hasn't gained sufficient place as a strategic weapon in the competition for market shares and improved profitability. On the contrary, the current world business is characterized by ever stiffening competition and ever changing customer expectations and demand, an organization must come up with unique and proactive competitive strategies that continuously meet and exceed these demand and expectations. And due to this, no organization operating in the business sector, whether manufacturing, service or construction can afford to ignore its changing environments if it is to survive. Consequently, quality is seen as the proper method to improve company competitiveness, sustainability, and performance because it focuses on the entire organization and creates a relation between all participants and customers in understanding their needs and requirements (Bani, 2012).

Companies operating in a dynamic environment are liable to carry up continuous improvement in its operation; they explained that the face of competition changes faster in this environment as a result of the changes in customer's needs, competitor's activities and service/product innovation. However, the satisfaction of quality level in the construction projects has not been achieved and it has been a serious problem and this is because of poor quality management. (Mallawaarachchi and Senaratne, 2015). However, construction firms always want to reduce the product delivery time, improve the product quality and reduce production costs and lead times. As a result, different concepts of business process reengineering, scheduling, materials management, and total quality management (TQM) have been applied to attain this target, but success, at best, has so far been partial. Correspondingly, this paper investigate relevance and applicability of TQM to address the poor quality issue in the construction industry; since TQM consist of all activities that management carries out to improve quality. This includes quality planning, quality control, quality assurance, and quality improvement. (H. Kaynak, 2003).

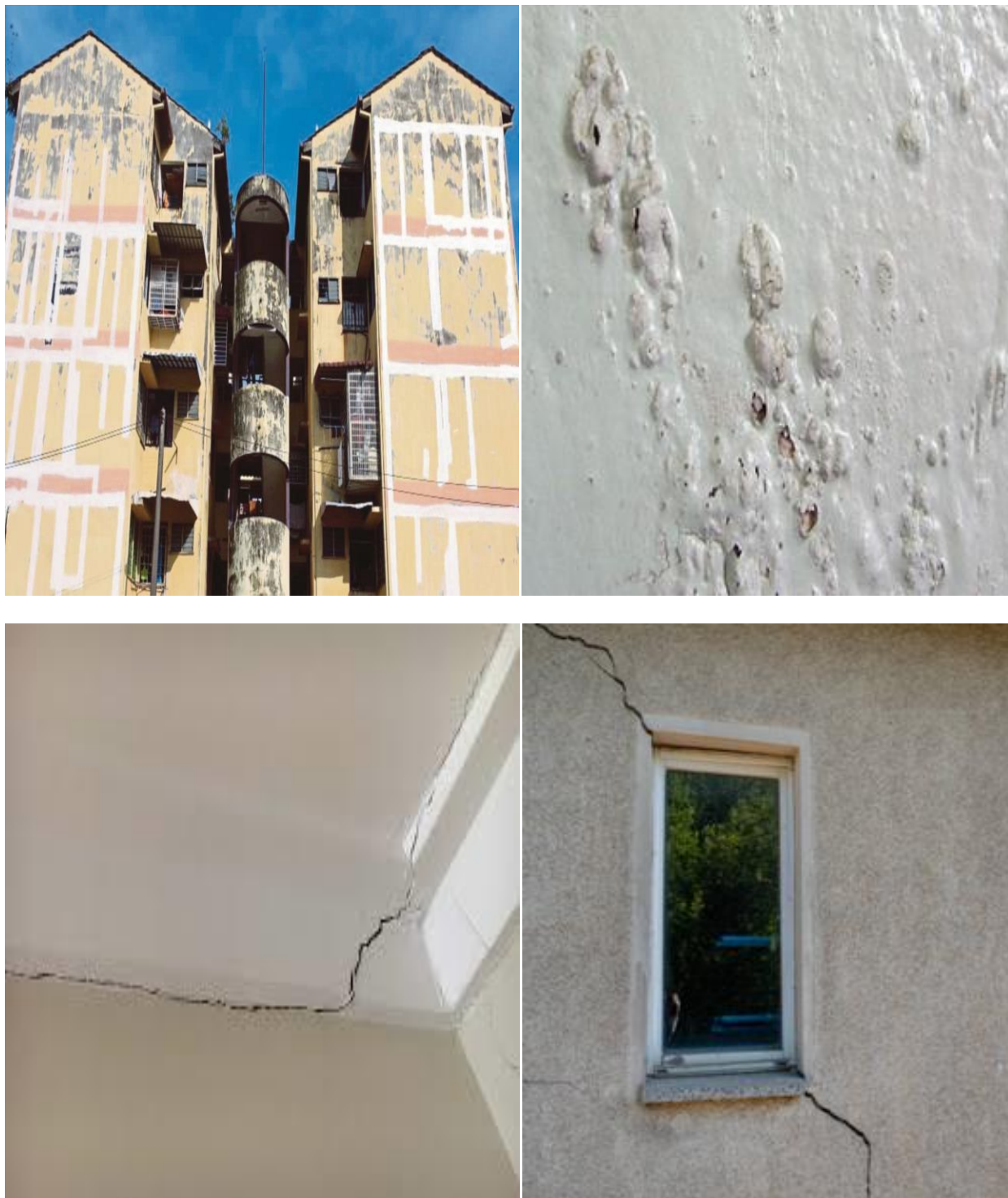


Figure 2. 1 Common poor quality problem in the Addis Ababa Building Construction

2.2 A synopsis of construction industry

The construction industry is viewed as unique by the majority of commentators due to its complexity and sheer magnitude. It is an industry that has major importance to economic development not only from an employment perspective but also because of the financial contribution, it provides to an economy as a whole. Furthermore, construction project is the complex series of sequential and separate operations and tasks undertaken by individual parties, resulting in a construction project being reliant on hundreds of organizations, especially when delivering major construction projects. As a result, it is recognized as fragmented and distinguished by a collection of large and small firms, bulk material suppliers, and many other support professionals.

Unfortunately, construction is also an industry which has, and continues to be, severely criticized for poor performance at almost every level of its operation. Indeed, its failure to keep up with technological and systems advancements which have been adopted by other industries has become a key focus of many governments during the past decade. Most construction projects today struggle with the same problems that have faced the industry such as no centralized source of information and resource management, multiple parties involved on each project resulting in constantly changing people and companies on each job-site, multiple projects occurring simultaneously resulting in redundant and costly duplication of processes and activities and multiple customers even different departments within the same organization can result in different rules being enforced on each project resulting in higher management and administrative costs.

The global market for construction is characterized by change: changes in technology, changes in procurement routes and changes in finance, are all influencing the industry, its constituent organizations and project operation. Coupled to this, the increasing demands by clients for greater cost-efficiency, assured quality, and shorter time scales have led construction organizations to seek new management approaches to remain competitive. So under the increasing competitive global market, with the support of the rapidly developing information technology, the traditional quality management mode is changing revolutionarily, and the new quality management modes have been paid more and more attention to.

2.2.1 An overview of Ethiopian construction industry

Here in Ethiopia, construction industry is a fundamental economic sector which permeates most of the other sectors as it transforms various resources into constructed physical economic and social infrastructure necessary for socio-economic development. As per world bank's official data, Ethiopia's economy experienced strong, broad-based growth averaging 9.9% a year from 2007/08 to 2017/18, compared to a regional average of 5.4%. Accordingly, construction, and service sectors accounted for most of the growth.

Correspondingly, the construction sector in Ethiopia is booming and still continuing to have a leading part in the economy. The fast growth of the construction industry causes increased in the number of contractors joining the industry. Consequently, there are a numerous building contractors (BC), road contractors (RC) and general contractors (GC) registered, most of them operating in the capital city Addis Ababa. Moreover, foreign companies are increasingly participating due to series of policy reforms targeting at opening up the economy and encouraging local and foreign direct investments the country has made (Ayalew et al., 2016).

However, the construction sector in our country has faced some capacity and quality-related limitations (Ayalew et al., 2016). Out of the problems facing Ethiopian construction industry, quality issues are triggering local construction firms to loose competitiveness as there is a tremendous amount of competition from their counterparts especially from Chinese and Europeans contractors as of noted by the researcher. Therefore, each local company in the construction sector should initiate changes within their own organization in order to halt the industry problems which are being carried on over and over.

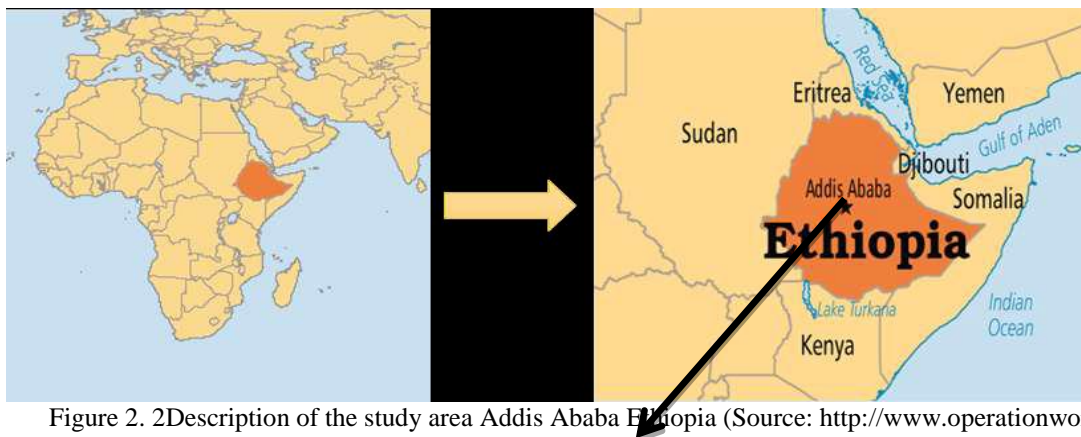


Figure 2. 2Description of the study area Addis Ababa Ethiopia (Source: <http://www.operationworld.org/ethi>)

2.3 The Concept of Quality

Etymologically, the term ‘Quality’ has been driven from the Latin word ‘quails’ that means ‘of what kind?’ and used to describe specification of a product or service in any sector (Ephantus, 2015). And as we can note from the recorded history of humans, quality has been the symbol of human civilization and has got greater concern throughout any fields including construction industry (Thong, 2016).

The term ‘Quality’ being a qualitative term, has been subjective to interpretation from different perspective, leading presence of no unified definition of quality. Accordingly, quality refers to the different workmanship of various activities. Consequently, each business or activity has a different definition of quality, for example in sales the term quality is more focused on the services which are provided to customer, while in manufacture, the term quality is more focused on the production process, and in construction, quality refers to both of services provided.

However, many researchers and organizations tried to define quality in different ways which can be summarized as follows:

Table 2. 1Definition of quality adapted from (Anas&Gözde, 2018).

No.	Definition	Reference
1.	‘Fitness for purpose or use’	Juran
2.	‘Quality is meeting customer’s requirements’	Oakland
3.	‘Conformance to requirements’	Crosby
4.	‘Quality should be aimed at the needs of the internal and external consumer, present and future’	Deming
5.	‘Degree to which a set of inherent characteristics fulfills requirements’	ISO
6.	The totality of structures and characteristics of a product or service that bear on its ability to satisfy stated and applied needs’	BSI.
7.	‘The combination of features that based on ability to respond to the product or service requirements’	TSE.

Adapting Oakland’s definition of quality as “meeting the customer’s requirements”; in construction industry, quality can be defined as meeting the legal, aesthetic and functional requirements of a project; and these requirements are set by the designer, constructor and regulatory agencies as well as the owner (Mallawaarachchi and Senaratne, 2015). On the other hand, Oakland’s definition of meeting the customer’s requirements’, may include availability,

delivery, reliability, maintainability, and cost effectiveness among many other features"(Nongiba and Frank, 2015). Accordingly, quality in construction industry is the performance of project duties in the delivery of products and services in a way that achieves the listed requirements and expectations of the client, design professional team and project constructor (Thong, 2016).

However, these requirements may be simple or complex, or they may be stated in terms of the end result required or as a detailed description of what is to be done. Thus, the quality is obtained if the stated requirements are adequate, and if the completed project conforms to the requirements (Mallawaarachchi and Senaratne, 2015).

Concurrently, quality can also be defined from the view point of function, by how closely the project conforms to its requirements. Furthermore, in construction industry, quality must be a set of characteristics including of marketing, engineering, manufacture and maintenance through the product or service so as to meet the demand of consumers (Yingr, 2010).

2.4 Quality Management Systems in the construction industry

As cited by (Pravin &Jalindar, 2015), (Mane &Patil, 2015) note down that quality is one of the critical factors in the success of construction projects. Quality of building construction projects, as well as project success, can be regarded as the satisfaction of expectations of the project participants. And these quality requirements are achieved by implementation of QMS in the industry.

Additionally, (Tang, 2005), pointed that, quality systems refer to the organizational structure, procedures, processes and resources needed to implement quality management; whereas according to (Poh et al., 2016) Quality Management System is “the managing structure, responsibilities, procedures, processes and management resources to implement the principles and action lines needed to achieve the quality objectives of an organization”.

From the viewpoint of a construction company and projects, quality management in construction projects should mean sustaining the quality of construction works at the required standard so as to obtain external customers’ satisfaction that would bring long term competitiveness and business survival for the construction firms. Thus, 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. (Mallawaarachchi and Senaratne, 2015)

As Quality management system is a continuing process of improvement involving all aspects of the business, it has been widely used by the organizations for achieving operational and market benefits, it is an optimized standard to upgrade and promote the companies and projects performance. Besides, quality management contains the process of planning, organizing and controlling the factors so as provide high quality of work with low cost ensuring customer satisfaction and enhancing the reputation of the organization.

There are different models developed for quality management like ISO, six sigma, lean management and TQM; and their basic concepts are summarized as follows:

Table 2. 2 Basic concepts of different QM models (self-generated)

No	QM Models	Basic concept
1.	ISO	Deals with the fundamentals of QMS, which provides comprehensive guidance on the scope, implementation and the principles based on eight principles of TQM (Poh et al., 2016).
2.	Six Sigma	A business process that allows companies to drastically improve their bottom line by designing and monitoring everyday business activities in ways that minimize waste and resources while increasing customer satisfaction by some of its proponents (Ayman, 2016).
3.	Lean Management	Systematic removal of waste by all members of the organization from all areas of the values stream (Ayman, 2016).
4.	TQM	TQM is the coordination of efforts directed at improving customer satisfaction, increasing employee participation, strengthening supplier partnerships, and facilitating an organizational atmosphere of continuous quality improvement.

2.5 Construction Quality Management

Construction project management (CPM) is the processes that are used to coordinate the various elements of the project, by prioritizing between competing objectives and alternatives. Construction project management is referred to the overall planning, coordination and control of construction management aiming at meeting client’s requirements as to produce a financially viable and functional project. Thus, effective management of the construction project during the building phase is targeted to the project's building phase and plan, organize, guide and control project efficiently through a short term special soft organization, and attain the purpose of the organic integration of management functions during the building phase. It will attain complete

coordination and optimization of dynamic management and project objectives during the building phase, in that way enabling the accomplishment of the project in the best operating condition helps to produce the optimal results in a relatively short period of time.

Consequently, CPM has different sub-discipline managements and thus quality management is a sub-set of CPM. So that, the meaning of Quality management system is “all activities of the overall management function that determine the quality policy, objectives and responsibilities, and implement them by means for instance quality planning, quality control, quality assurance and quality improvement within the quality system”. Accordingly, 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 by making sure things are done according to the plans, specifications, and permit requirements and standards.

Unfortunately, the quality outcomes of the projects are not according to required standards, resulting in faulty construction. Accordingly, additional investments are required for removal of defects and maintenance work. And the causes of these defects have been summarized as follows:

2.5.1 Reasons for construction quality problems

Construction works quality depends on the availability of skilled and professional personnel, construction material including raw material, finished products, semi-finished products, components' and parts. Additionally, the technology in the construction machinery and equipment are essential for the modern construction, reflecting the construction capabilities of the firm, which have a direct and a significant impact on the project progress and quality.

Since construction projects are an extremely complex process, involving a wide range of activities in different phases by various stakeholders, factors affecting the quality of construction are plenty as summarized in table below.

Table 2. 3 Core Elements Influencing Quality adopted from (Razek, 1998) as cited by (Thong, 2016).

No.	Elements	Factors Influencing Quality in Construction Project
1.	Client	<ul style="list-style-type: none"> • Conciseness of project mission and scope • Owner's emphasis on quality requirement
2.	Project	<ul style="list-style-type: none"> • Type of project and its complexity • Location and duration of the project • Site access, site condition and site coordination
3.	Design	<ul style="list-style-type: none"> • Non-integrated and non-consistency of design • Insufficiency of the detail of drawings • Nonconformance of design to law and standard
4.	Contract	<ul style="list-style-type: none"> • Less collaboration between parties involved in contract • Types of awarding tender
5.	Material	<ul style="list-style-type: none"> • Effectiveness and efficiency of material management system • Available of storage and handling system of materials
6.	Contractor	<ul style="list-style-type: none"> • Capability and experience of contractor
7.	Supplier	<ul style="list-style-type: none"> • Supply of good quality materials • Supply of materials on time
8.	Equipment	<ul style="list-style-type: none"> • Plant and equipment management system • Right utilization of equipment
9.	Subcontractors	<ul style="list-style-type: none"> • Good and fair condition of subcontract • Good communication and collaboration between main contractor and subcontractors
10.	Site Layout	<ul style="list-style-type: none"> • Size of site layout • Detail of the site layout and housekeeping
11.	Systems	<ul style="list-style-type: none"> • Quality control system execution and quality assurance • Work Program and time scheduling • System of cost control • Health, Safety and Environment system
12.	Staff	<ul style="list-style-type: none"> • Collaboration and communication between staff • Capability and experience of staff
13.	Document	<ul style="list-style-type: none"> • Quality of shop drawings • Detail of procedure to execute activities on site
14.	Financial Issues	<ul style="list-style-type: none"> • Clarity of cash flow statement • Late interim payment

2.5.2 Actual examples of poor quality management

Construction quality of work problems are generally classified into defects, common problems, and accidents. Construction quality defects refer to the phenomenon that technical indicator of construction fall short of the allowance of technical standards. Common problems refer to the common quality injury affecting construction structures, functions and form, while quality accidents refer to the quality damage with larger loss and influence of the safety of building construction structures, functions and form, in the procedure of construction or after delivery for use. Accordingly, the above listed quality problems have been observed in construction projects located in Addis Ababa and presented as follows.



Misalignment between wall and beam Bended beam because of improper form working



Figure 2. 3 Construction of structural quality problems and defects (Addis Ababa)



Figure 2. 4 Material handling and storage management problem (Addis Ababa)



Figure 2. 5 Finishing work and sanitary pipe lines failure happened immediately after completion of the work (Addis Ababa)

2.6 Evolution of Total Quality Management System

Total quality management did not come from vacuum instead; it is an evolutionary process in organizational theory and behavior. It started with quality inspection then moved to quality control followed by quality assurance which lay a foundation for TQM as elaborated below.

1. **Inspection:** -Quality of work inspection is aimed at checking, measuring, or testing of one or more product characteristics and to relate the results to the requirements to confirm compliance. This task is mostly done by specialized personnel and does not fall within the responsibility of production workers. Products that do not comply with the specifications are rejected or returned to improve (Saurin and Pratik, 2014). Most of construction jobs, the inspection are one of the last things to be done if it gets done at all.

Contrariwise, 'Inspection' works as an effective and efficient way of discovering defects of the product and service at the required level. And thus, inspection requires organization to keep product quality same time committing resource to measure how it has been successful in improving quality (Suganthi et al., 2017).

2. **Quality Control (QC):** - Quality control is concerned with operation techniques and activities that are used for checking and reviewing work in order to manage quality. Quality control contains product design, operation process and outputs to ensure all activities are mainly done according to the required standard. Additionally, quality control is a regulatory process required in an organization to achieve the quality requirements so as to meet the quality standards. Quality control focuses more on operational processes to measure actual quality performance and check whether products can meet the desired requirements (Suganthi et al., 2017). Quality control involves verifying the product or evaluating a product with the requirement specification. It is oriented to detection i.e. finding defects in products. Testing is the key technique used to perform product evaluation. Quality control is work result oriented; it measures the product, identifies deficiencies and suggests improvements (Saurin and Pratik, 2014).The quality control procedure in construction projects is based on tender documents, specifications, working drawings etc., so that, the pre tender stage quality and standards of the work should be properly maintained. So, it is important to maintain quality control of the building projects from the inception of its design stage up to the completion of construction including the maintenance period (Mallawaarachchi and Senaratne, 2015).

3. **Quality Assurance (QA):** - Quality assurance involves the entire development of process, monitoring and improving the process, making sure that the agreed upon standards and procedures are followed throughout the life cycle and ensuring the problems are found and dealt with. It is oriented to prevention i.e. preventing the defects from occurring in the products. Audits are key techniques for process monitoring (Saurin and Pratik, 2014). On the other hand Quality Control is the specific implementation of the Quality assurance program and related activities. Effective Quality control reduces the possibility of changes, mistakes (Mallawaarachchi and Senaratne, 2015). Thus, quality assurance is important in the engineering and construction industry because of the risk involved in any project. The quality system required for Quality assurance is based on the meeting of the requirements through a set of standards and defined procedures rather than cultural change (Khalid, 2003).
4. **TQM** -Total quality management (TQM) is the continual process of detecting and reducing or eliminating errors in manufacturing, streamlining supply chain management, improving the customer experience, and ensuring that employees are up to speed with training. Total quality management goals to keep all parties involved in the production process accountable for the overall quality of the final product or service. Total quality management (TQM) is an ongoing process of detecting and reducing or eliminating errors. It is used to streamline supply chain management, improve customer service, and ensure that employees are trained. The focus is to improve the quality of an organization's outputs, including goods and services, through the continual improvement of internal practices. Total quality management goals to keep all parties involved in the production process accountable for the overall quality of the final product or service. It is greater than sum of quality inspection, quality control and quality assurance. Thus, TQM has been depicted by a model developed by (Tang, 2005) pictorially as follow:

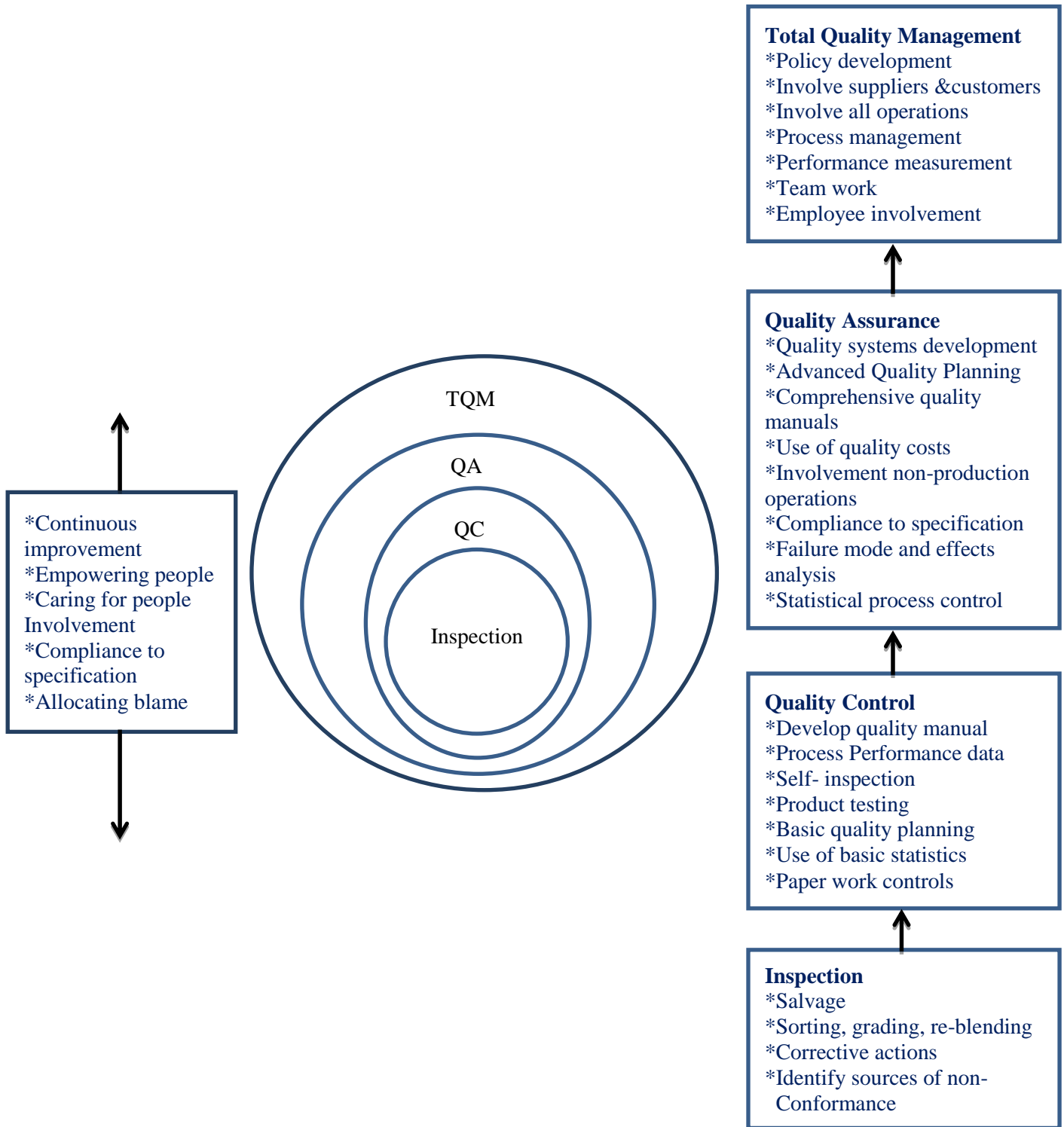


Figure 2. 6The four stages of quality management (Tang, 2005)

2.7 Defining the concept of Total Quality Management

Many authors have provided definitions and clarifications of the concept of Total quality management. Hence, there are many definitions and interpretations of TQM due to the wide perceptions of quality. (Ayman, 2016) cites (Lassaad et al. 2006) and express Total quality management as a collective, interlinked system of quality management practices that are associated with organizational performance. As (Hellsten and Klefsjo 2000) Total quality management is “a continuously developing management system consisting of values, methodologies and tools, the aim of which is to increase external and internal customer pleasure with a reduced amount of resources” (Ayman, 2016). However, (Kenneth, 2011) and (Boaden, 1997) claimed that “to define Total quality management is like shooting at a moving target.” For this reason, many have asserted that the term of “TQM” does not express to any one theory but encompasses any quality-focused principle.

But, the easiest way to define Total quality management is by analyzing its three single elements: ‘Total the participation of everyone; ‘Quality’ meeting customer’s needs and expectations; and ‘Management’ the system for achieving qualified products and services (Anas and Gözde, 2018). Furthermore, TQM is about continuously improving customer satisfaction by quality-led companywide management system. This goes beyond the mere application of total quality as a form of management itself; thus, TQM is a journey and not a destination.

2.7.1 Features and Elements of TQM

TQM is the mutual co-operation of everyone in an organization and associated business process to produce value for money, products and services which meet and hopefully exceed the needs and expectations of customers (Bani, 2012). It can also be defined as the application of quality principles for the integration of all functions and processes within the firm. Accordingly, TQM has the following features and elements.

- **Process-centered**-unlike traditional management, Total quality management is process Oriented, not result oriented. It develops the traditional view of quality from looking only at the quality of the final product to the quality of the whole process (Firas, 2015). The emphasis of the system is to classify the cause of defects rather than the rectification of the defects (Kenneth, 2011).
- **Fact-based decision making**- In order to know how well an organization is performing, data on performance measures is necessary. TQM needs that an organization repeatedly collect and analyze data in order to develop decision making accuracy, achieve consensus, and allow prediction based on past history (Saurin& Pratik, 2014). The information collected from customers can be analyzed to decrease the gap between the customer needs and the performance of the present process (Khalid, 2003).
- **Customer satisfaction**- Quality focused organizations must identify their customers (both internal and external), determine the specific needs of these customers, integrate all activities of the organization including marketing, production, finance and Human resource management , to satisfy the needs of these customers, and finally, follow up to ensure the customers have been satisfied. Accordingly, Total quality management effectively determines the requirements of the clients and provides the framework, environment, and culture for an organization to meet these requirements at the lowest possible cost. When the qualities at each stage in the design and construction processes are assumed, the final facility will in turn satisfy the customer (Khalid, 2003).
- **Continuous improvements**: continuous improvement means a commitment to constant examination of the technical and administrative process in search of better methods, and relentless pursuit of improvement in the delivery of value to customers. The concept of continuous improvement can be achieved through enhancing values to the customer by the deployment of modern, new and innovative products and services, through minimizing wastes and their related costs, through effective utilization of resources for boosting productivities and finally through improving responsiveness and minimizing customer complaints and poor quality of inputs to the construction activities.
Continuous improvement is part of the management's responsibility in an organization and under TQM, the management has two functions: to maintain and incrementally improve current work procedures through process control, and to direct efforts to achieve major

advances in the technology of the design and construction processes through innovation. Hence, during the permanent assessment and enhancement of products, processes, procedures and attitudes, an environment can be developed where all team members strive for greater levels of quality and customer service (Khalid, 2003).

- **Supplier relationship-** organizations are made up of a series of internal and external suppliers and customers. This forms the quality chain of the company and it implies that every employee is a potential customer and supplier in the course of construction works and production. The process of construction and production is structured in a way where each process has needs and expectation which must be fulfilled by others in the network of construction and production. The effective fulfillment of these needs leads to the production of quality works and services.

Hence, the quality of work done by the contractor is mainly related to the parties: the designers, the suppliers and the subcontractors. The quality of the specifications and drawings comes from the designers; the quality of the materials and equipment comes from the suppliers and the quality of the work performed by the subcontractors. Then, the long-term associations with the supplies are very important to the contractor in order to get a quality product (Khalid, 2003).

- **Organization for Quality-**The quality function should encourage and facilitate quality improvement. In large organization, a quality director will participate to the prevention strategy and in small organization; an external TQM advisor is usually required to support the quality director who works in a part-time basis (Khalid, 2003).

- **Teamwork-**Team work is a way of stimulating positive work attitude, which includes loyalty to the organization and a focus on organizational goals. Teamwork helps to the generation of improvements that are planned by employees. Thus, once the quality teams are established, the steering committee continues to provide direction for maintaining the TQM process. The application of the team approach to problem solving has many uses. It helps individuals to work independently on problems to resist a greater variety of problems, it exposes the problems to a greater diversity of knowledge, skills and experience, and it implements more likely the recommendations which come from team suggestions (Khalid, 2003).

- **Focusing on employees training and recognition-** as noted by (Khalid, 2003), TQM recognizes that every employee has significant potential to make improvement. Through motivation, encouraging the internal customer concept and training of employees are very important factors to satisfy and gain the attention and effort of employees. Simultaneously, the work environment should be safe, clean and stimulating to satisfy the employees. Also, encouraging two-way communication and employee's suggestions are needed. It is important that to remove barriers inside and outside the organization, to allow employees in participation, problem solving and decision making, and to provide individual and team recognition for quality improvement in order to achieve in implementing TQM in an organization.

2.8 Applicability of TQM in Construction Industry

The main driver behind the adoption of Total quality management philosophy into the construction industry was the successes within other sectors. (Yasin 2004). Although the construction environment is different; TQM can be useful and effective in construction. But, to assess the effectiveness of quality management model, cost of quality is the primary tool for measuring quality. In this methodology it is used to track the effectiveness of the TQM process, select quality improvement building projects and provide cost justification to doubters. By getting together these easily assembled costs of review, customer satisfaction, inspection and testing, scrap, and rework, one can convince management and others of the need for quality improvement.

As it has been discussed earlier, there are different models for managing quality. But, as expressed by (Ayman, 2016), the similarities, differences, and inter-relationships between different QM models in terms of objectives, concept, methodologies and scope have remained confusing to industry, as each technique has its strengths and weaknesses, and in some cases they overlap. Thus, the selection of an appropriate process improvement methodology depends on the culture of the organization, and the speed at which the methodology will be accepted by the organization is a function of how closely the QM and the organizational culture fit together.

Since construction industry is often criticized for its poor performance on quality, cost, safety and speed and it has numerous problems because of its complicated nature of operation, requiring implementation of QMS to stay at this highly competitive industry. Accordingly, a

guide to the project management, states that project quality management is a subset of project management that includes the process required to insure that the project will satisfy the needs for which it was undertaken. It consists of quality planning, quality assurance and quality control. Quality system is expressed as “organizational structures, procedures, processes and resources for implementing quality management.

Due to quality problems observed within the sector, integration of QM in the industry, thus as a mitigation action, TQM is considered as one of the most important approaches to achieve quality in construction industry not only in developing Countries but the world over. This is because; TQM is a QM approach where the quality of the products or services is the major concern (Ayman, 2016).

Hence, (Khalid, 2003) defines (Oakland & Aldridge, 1995) implication “if ever an industry required to take up the concept of TQM it is the construction industry”. Even though, the success of the implementation process depends on how well the organization understands the process and the strategies adopted. Thus, as a guiding principle in implementation of TQM is that the process must be organization wide; everyone and every function in the organization must be involved in the process with the management taking a leading role.

Furthermore, it is important to note that any organization can implement TQM irrespective of the size or operations. And many sectors have assessed and deployed different QM models and gained satisfactory result. However, despite its highly competitive environment, the construction industry has lagged in its acceptance of quality management programs compared with other industries. However, study conducted by (Yusoff et al., 2006) and quoted by (Bani, 2012) depicts that; TQM is increasingly being adopted within the construction industry as an initiative to solve quality problems within the industry and to meet the continual needs of customers. It has been seen that TQM has the potential to improve business results, worker involvement and fulfillment, greater customer orientation and satisfaction, team working and better management of workers within the organization but, despite the various benefits of TQM adoption, companies have been continually struggling with its implementation, since it is requiring long time and culture change (Bani, 2012).

In view of the fact that construction is a multifarious process, Quality of construction projects is linked with proper quality management in all the phases of project life cycle. From different stakeholders in the industry, the contractor's, consultant's and client's roles are pivotal for the

success of any project. As contractors work as the interface between the public and the industry and they demonstrate the real performance of the industry. They are the public face of the construction industry. Their performance focuses on, policies, processes and methods have a direct impact on all stakeholders in the industry. So that, any process that makes the performance of the contractors efficient and effective will have a positive impact on the whole industry.

As this paper focuses on the practice of quality management in the execution phase of building construction projects it is critical to concentrate on execution of the project phase, literature's reveal that TQM can be successfully implemented within contractor firms.

2.9 Advantage of TQM for Construction Industry

In a very competitive and complex industry like the construction industry with demands for quality product efficient quality management is essential for companies' long term operation. TQM in the construction industry has long been discussed. As suggested by (Oakland & Aldridge, 1995) 'if ever an industry needed to take up the concept of Total Quality Management, it is the construction industry'. Subsequently, quality management has increasingly been adopted by construction firms as part of fulfilling customer needs and quality improvement.

Even though, quality is perceived as 'the quality of final product' but in reality, it brings many benefits to firms, e.g. reduced waste, saved time, increased profit and reduced occupational health and safety problems (Anas and Gözde, 2018). In construction stage it is essential to implement TQM for controlling the process and reduce defects, rework, time, cost, and increase the quality of the product to meet the customer satisfaction.

Accordingly, the implementation of the TQM elements should promote project quality performance which will be indicative of client satisfaction, cost of quality, construction efficiency (minimal defects, rework and wastage), conformance to specification and project delivery time (Nongiba and Frank, 2015). Thus, the overall objective of TQM is to ensure continuous improvement in the organization's people, systems, processes and environment so as to achieve improved customer service and increased profits through efficiency and effectiveness in the entire organization. Furthermore, TQM has the following role when it is effectively implemented.

2.9.1 The role of TQM in achieving competitiveness

The growing impact of globalization has put more strain on international and local companies to improve their services and, thus, move towards quality management to reduce the overall cost, improve flexibility, better communication and manage supply chain effectively. Competitiveness refers to the organization position within the market against its competitors, by providing higher quality products and services that differentiate a firm from its competitors by this result it will develop market share, profit and added value to the business. Accordingly, construction organizations can shape their strategies in response to the demands of competitive environments. Thus, organizational performance should be enhanced by creating a fit between the available resources to competitive strategies (Bani, 2012).

Therefore, competitiveness can be achieved through improved profitability, increased market shares and quality outputs (Bani, 2012). Consequently, TQM works to improve the competitiveness of an organization by ensuring that the right things are done right the first time (Kenneth, 2011).

2.9.2 The role of TQM in improving profitability

As improvements in inner quality may raise productivity and minor inner costs which will result in increasing profitability indirectly. Moreover, improving output quality to exceed client requirements can raise customer satisfaction and, in return, that will improve customer retention and loyalty and, thereby, increase future sales and sustain competitive advantages. And better quality is proven to contribute to a greater return on investment by increasing sales (Bani, 2012).

2.10 Barriers for Implementing TQM in Construction

Despite its great achievement in manufacturing sector, there are some features of the construction industry differing from the other industries which might prevent the proper application of TQM in the industry.

A. Construction industry-specific factors

Unlike many sectors CI, has the below listed unique features which might be listed as a barrier in implementation of TQM;

- **Unique product delivery:** almost all construction projects are unique. They are single-order, single-production products. This makes lack of clear and consistent standard in evaluating overall construction quality as there is in manufactured items and materials; hence, construction projects usually are evaluated subjectively. In the expression of (Poh et al., 2016) cites many author's finding that, non-standardization is one of the main barriers of implementation of quality tools in construction (Nesan and Holt, 1999); (Karim et al., 2005) and (Peter et al., 2010).
- **Dispersed production site:** unlike other industries, which usually have a fixed site with similar conditions for production, each construction production site always displays different conditions like variations in labors, different stakeholders, and effect of various parameters such as climatic conditions.
- **Multi-phase life-cycle:** the life-cycle of a construction project is much longer than the life-cycle of most manufactured products. Furthermore, the participants in the construction project-owner, designer, general contractor, subcontractor, material supplier, etc. differ for each project making the sector tough for partnership.
- **Temporary:** the temporariness in the construction industry are posing a serious problem in knowledge harvesting and continuous learning; which will facilitate for fact based decision making.

B. Contractual arrangement

Total Quality Management needs a contractual arrangement that provides interrelated sub-systems, facilitates cross-functional co-operation, and removes barriers between the participants that impede the progress. It should involve everyone in the process and make them feel that quality is everyone's business (Hakim, 1997).

Thus, the contractual arrangements in the construction industry define the functional and contractual relationships between the various participants. There are a number of product delivery methods currently being practiced in construction industry. Unfortunately, the contractual arrangement (product delivery method) widely used in Ethiopia is a traditional one called Design Bid Build in which the design and implementation of construction project is undertaken by multiple independent parties. But, the traditional contract arrangement is by itself barrier for establishing cooperation which hinders establishing TQM.

C. Procurement method

Problems also tend to spread along every interface in the procurement. As the construction industry is continuing age old practice of selecting the construction firms mainly on the lowest bid rather than experience or reputation for quality, it is the biggest hurdle in the implementation of TQM. So the construction firms give less importance to adoption of TQM principles (Gupta and Khitoliya, 2019). This is because traditional procurement encourages the participants to concentrate more on administering the contract than on managing the process.

Theo et al, 2016, cites (Yong and Wilkinson, 2001), specifically advises that the practice of awarding business on price tag alone should be ended. Similarly, most of the firms (74%) reported that low bid subcontracting presented a serious challenge to the successful implementation of TQM on construction sites.

D. Controlling one over the other

Another obstacle is the old paradigm "controlling one over the other". This results in everyone undertaking checks and inspections of the same items of work. In traditional management systems, the role of the Client's Project Managers is often based on a policy of 'management by control' to achieve or complete the project by the required date within budget, and to the required quality. On the other hand, the aim of TQM philosophy is that quality should not be inspected, but can be achieved through participation. This again stresses the importance of teamwork. According to Juran , two obstacles that impede establishing joint teams are the state of legal independence between the companies, and their traditional methods of working together (Hakim, 1997).

However, these obstacles can be overcome by adopting a partnering arrangement. Partnering will highly develop the interface between the Client and the Contractor, and the execution of projects. It also provides an ideal environment to implement TQM (Hakim, 1997).

E. Lack of Top Management Commitment:

Ever since TQM is top-down management philosophy focused on monitoring process, employee involvement, and continuous quality improvement in order to convene customer requirements (Ayman, 2016). Accordingly top management commitment is an essential element for ensuring successful Total Quality Management implementation. The top management must be on the front line of the quality management process starting from the beginning. As said by (Ephantus, 2015)

citation from (Omware, 2012), adoption of TQM for the first time is related with development of new organizational policy, new procedures and new tools that should be learned.

On construction related research (Low et al. (2004) commented that top lack of top management commitment as one of the elements that would affect TQM implementation in construction firms (Pravin and Jalindar, 2015).

F. Lack of Understanding TQM

(Anas and Gözde, 2018), noted that, Turkish construction firms don't have sufficient knowledge and experience about TQM and they apply it for prestige purposes. Another study conducted in India by (Firas, 2015) concluded lack of knowledge regarding TQM and not knowing the effectiveness of TQM is pointed as an obstacle of implementation of TQM.

G. Too much paperwork

Thong, 2016, refers a study conducted by (Anup, 2015), the biggest obstacle is too much of paper work in implementing quality management system (QMS). Too much paper work will lead to employee unwilling to adopt QMS. The documentations or paper works include work procedures, quality periodic records, work instruction and checklist form which may daily usage on site.

H. Less investment in employees training:

Employee training is one of the most important requirements in a successful TQM implementation; as it equips people with the necessary skills and techniques of quality improvement. Accordingly, investment in employee training and development is a critical component to successful TQM implementation (Ephantus, 2015).

Throughout training, employees are can identify enhancement opportunities as it is directed at providing necessary skills and knowledge for all employees to be able to contribute to ongoing quality improvement process of production. However, due to the transient work force in construction industry (CI) and temporariness construction projects, of training is not getting the required attention.

I. Organizational Culture:

Organizational quality culture affects Total Quality Management implementation process as it communicates quality practices and norms that employees are expected to engage in (Ephantus, 2015).

J. Subcontractors and Suppliers Not Interested in TQM

As a construction project extensively rely on sub-contracting to specialized firms, willingness of the sub-contractors to adopt TQM has a great role. However, most of the time sub-contractors are not willing to adopt TQM which is being an obstacle too. But, if there will be a cooperation and common understanding, by being part of quality team's subcontractors and suppliers will be more responsive to the needs of the general contractor, becoming more cooperative and displaying a better performance record (Theo et al, 2016).

Apart from factors embedding adoption of TQM, (Gupta and Khitoliya, 2019) cites a finding listed by M. Strange and Vaughan that, the construction leaders believe that due to the following five "cant's", TQM cannot be implemented in the construction industry:

- Industrial management solutions cannot be applied to construction, because of the unique nature of the construction industry.
- Statistical analysis cannot be done for construction processes, because they are unique and non-repetitive.
- Invest in training at the job level cannot be done much, because individual employment is short-term, the people have no company loyalty and the environment is too difficult.

Money cannot be spent on management training programs, because there is too much competition and the margins won't allow it.

- Much time cannot be spared for organizing the seminars/conferences, retreats or symposia.

2.11 Theoretical framework for implementation of TQM in CI

In order to assimilate the quality management system within the context of construction management, the need to study the elements in standard guidelines of quality management system is essential to ensure the standardization of the quality management system is successful (Pravin and Jalindar, 2015). TQM usually starts in construction with the Client's commitment, and it requires an interdependence between the companies and that the parties adopt a long term strategies of co-operation, therefore, participation by the Client is essential (Hakim, 1997). Accordingly, an outline for TQM might follow (Low and Peh) structure as cited by (Anas and Gözde, 2018) and presented in the below table.

Table 2. 4 Steps of TQM application in the CI adopted from (Anas&Gözde, 2018)

Steps	Actions
1.	Obtain the commitment of the client to quality
2.	General awareness, educate, and change the attitudes of staff
3.	Develop a process approach toward TQM
4.	Prepare project quality plans for all levels of work
5.	Institute continuous improvement
6.	Promote staff participation & contribution using QC circles & motivation
7.	Review quality plans and measure performance

Similarly, (Saurin and Pratik, 2014) cites a research by (Low (2010) which outlined the following basic framework for implementing TQM in construction firms namely: customer feedback system, continuous improvement, encourage teamwork, reduce number of suppliers, process management and improvement through productivity study, effective communication system, top management, review organizational culture, produce training plans, establish monitoring process.

However, in developing a total quality culture in construction, one important step is to develop a construction team of a main contractor, subcontractors and suppliers who would commit to the quality process and develop a true quality attitude.(Asher, J.M 1998)

CHAPTER THREE

3. Research Methodology

This chapter focuses on the methodology adopted for the study, data collection, research tools, sample size and method of analysis used for this research.

The adopted methodology to accomplish this study uses the following techniques: review of literature that related to Total Quality management practice in the building construction, the information about the research design, research population, research sample size, research location, questionnaire design, statistical data analysis, and pilot study. Accordingly this chapter covers the research methodology followed to achieve the eventual goal of the research to draw up findings in a way to make conclusions and to forward recommendations. According to Rajasekar et al (2006) the basic and applied research methods could be either qualitative or quantitative approaches.

According to De Vos et al (2002) cited in (Burn and Grove, 2003), qualitative research refers to any research that elicits participant's accounts of meaning, experience or perceptions. It produces descriptive data in participant's own written or spoken words.

A quantitative study is concerned with non-statistical methods and small purposively selected samples. Polit and Hungler (1999) maintained that a qualitative method is especially useful in exploring the full nature of a little misunderstood phenomenon. Rajasekar et al. (2006) discoursed that quantitative research is an approach used by researchers in the social sciences that is more formalized in nature than qualitative research, as well as explicitly controlled, with a more carefully defined scope. Burns and Grove (2003) also described quantitative research as formal, objective, rigorous and systematic process for generating information about phenomenon. Evidences for quantitative study are gathered according to specific plan in which formal instruments are used to collect the needed information. This information is translated into numeric information and analyzed using statistical procedure (Polit and Hungler, 1999).

3.1 Research Method Adopted for the Study

This research was carried out using quantitative analysis to obtain data in order to assess total quality management practices in private building construction firms in Addis Ababa, Ethiopia.

3.2 Research Design

According to Burns and Grove (2003) a research design is a blueprint for conducting a study with maximum control over factors that may interfere with the validity of the findings.

This study was carried out based on the literature review and questionnaire survey with seven phases as seen in Figure 3.1 with each of the phases representing each of the chapters one to five. The stages are highlighted and explained below;

The first phase of the research is thesis proposal included identifying and defining the problems and establishment objective of the study and development research plan.

The second phase of the research included a summary of the comprehensive literature review.

The third phase of the research includes a field survey which was conducted with contractor's project managers, project engineers, and top and middle management engineers.

The fourth phase of the research focused on the modification of the questionnaire design, through distributing the questionnaire to pilot study, where expert academic, contractors, consultant and client management engineers were contacted.

The purpose of the pilot study was to test and prove that the questionnaire questions are proper for the subject, addition or omission some questions and it is clear to be answered in a way that help to achieve the target of the study. In addition, to ensure that all information received from expert panel would be useful in achieving the research objective. Modification has been conducted based on the results of the pilot study.

And the fifth phase of the research focused on distributing questionnaire. This questionnaire was used to gather the necessary data in order to accomplish the research objective. 55 contractor's 110 questionnaires were distributed to the research population, but 93 questionnaires filled by contractor (84.55%) and were received.

And the sixth phase of the research was data collection and result identification.

Finally the seventh phase of the research was data analysis and discussion. Statistical Package for the Social Sciences was used to perform the required analysis.

The final phase includes the conclusions and recommendations:

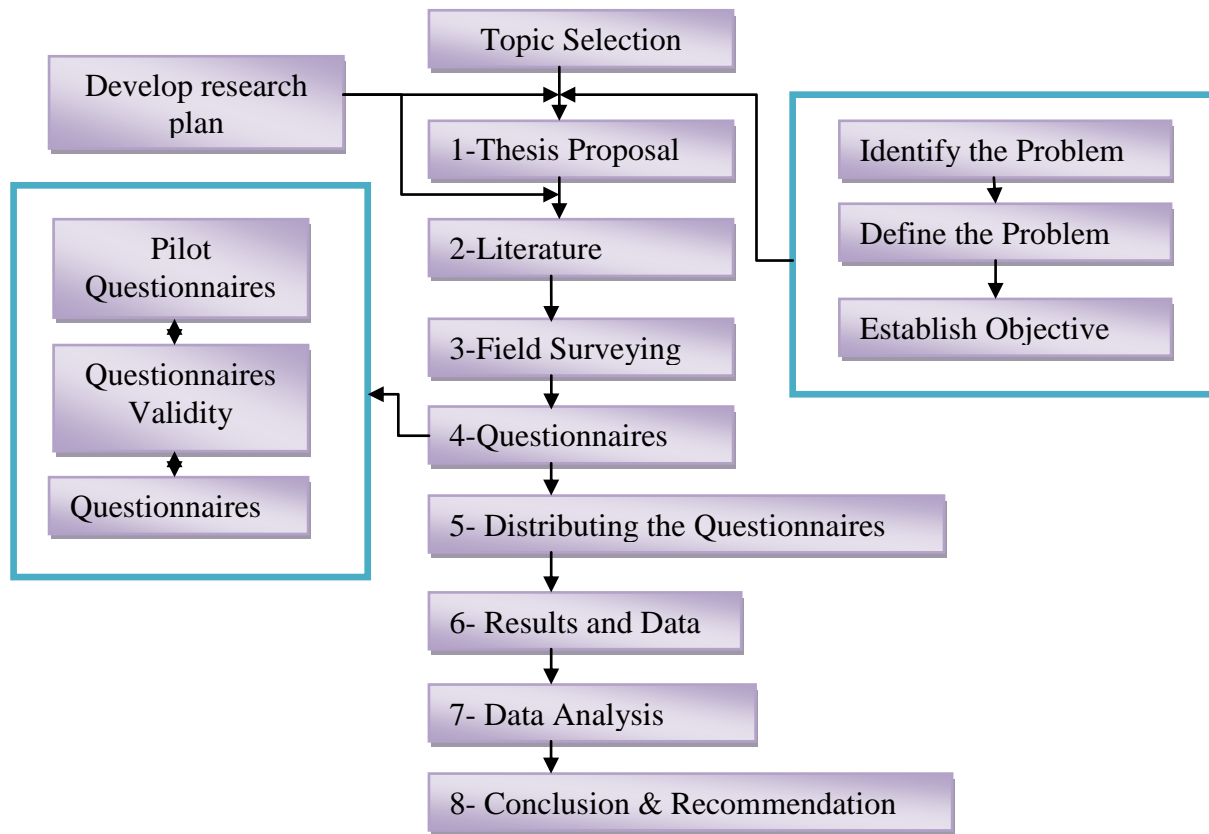


Figure 3. 1Flow chart of Methodology

3.3 Data Collection Technique

Primary data will be collected concerning evaluation of TQM implementation in the private construction companies. The respondents for this study will be selected employees from various functional areas in different construction companies. Data will be gathered using structured questionnaires which were self-administered. Questionnaires (Appendix) will be preferred because of the simplicity in their administration and low cost associated. Research questionnaires served as the primary sources of data. Questionnaires were administered to building construction firms registered with F.D.R.E Construction and Housing development ministry office within Addis Ababa for this research.

3.4 Questionnaire Design

The questionnaire was designed in such a way that each section of the questionnaire contains questions that helped in achieving each of the objectives. The questionnaire was grouped into five sections.

The first section focuses on the respondent's profile; it was targeted at gathering useful information about the respondents ranging from the educational background and years of experience to the category of company the respondents belongs to.

The second section deals with the respondent's knowledge and involvement in the quality management practices and Assessment of Total Quality Management awareness. This section collected information about the building construction firm's best define total quality management, level awareness on total quality management in the firms.

The third section focuses on quality management practice evaluation and comprises quality improvement program to evaluate the types of quality improvement program that the firms practicing, Data acquisition which focuses on how construction firms and projects collect data to measure the performance of construction operations and how does the firms and projects measure performance and what data acquisition methodology do the firms follow. In addition it contains quality audit and gathered information about the firms' internal quality audit. Finally this section contains both training and quality policy which to identify the firm have quality policy or standard manuals and others.

The fourth section contains the assessment of total quality management deployment in relation with top management commitment ,customer centeredness, human resource development, firm's construction process oriented management ,continuous improvement and etc.

The fifth section contains the factors affecting quality management in construction firms and practices that conform to quality management in the various building construction firms.

The target respondents were General manager of firms, project managers ,construction engineers, office engineers, quality control engineers, planning engineers and site engineers according to (Kado, 2011) this is necessary because they are in the right position to have adequate knowledge for the study regarding total Quality management practices and status in construction companies. Most of the questions in the research instrument entailed ranking some identified variables on a five (5) point likert scale that assessed either frequency of use, significance of the factor and availability of inputs.

The numbers assigned to the agreement or degree of influence (1, 2, 3, 4, and 5) doesn't indicate that the interval between scales is equal, nor do they indicate absolute quantities.

Table 3. 1 Likert Scale of Evaluation

Classification	Very low	Low	Medium	High	Very high
Degree	1	2	3	4	5

Classification	Strongly Disagree;	Disagree	Indifferent	Agree	Strongly Agree
Degree	1	2	3	4	5

In order to achieve the objectives of the paper managers, project managers, construction engineers, office engineers, Planning engineers, Quality control engineers of construction companies in the city of Addis Ababa were selected to be the population. The repetitive nature of the process in the construction makes the choice suitable, the design and construction process will make lesson easily learnt to be incorporated in construction practices.

The population of the study consists of Grade 1 and 2 private building construction firms in Addis Ababa. According to F.D.R.E ministry of construction industry development and regulatory bureau assessment and competency certification bureau (2019), there are about 58 BC-1, 9 BC-2, 36 GC-1 and 1 GC-2 registered private construction firms in Addis Ababa. Therefore, the sample frame of the study was 104 private construction firms.

3.5 Sample Size

Purposive sampling so called deliberate sampling or non-probability sampling was used. This sampling method involves purposive or deliberate selection of particular units of the population for constituting a sample which represents the population.

In many cases purposive sampling is used in order to access knowledgeable people, top management Staff of firms i.e. those who have in-depth knowledge about particular issues, maybe by virtue of their professional role, power and, expertise or experience (Kado,D. 2011).

The sample size for firms was calculated using Glenn (2003) formula based on equation for 95% confidence level.

$$n = \frac{n1}{[1+(\frac{n1}{N})]} \quad \text{Equation - 3.1}$$

Where:-

n = sample size from finite population

n^1 = sample size from infinite population

$$n^1 = \frac{S^2}{V^2} \quad \text{Equation.3.2}$$

Where

S^2 is the variance of the population elements

V^2 is a standard error of sampling population, $S= 0.1$ to 0.5 and $V = 0.06$

N = total number of population, $S= 0.5$ was chosen

Therefore: - $n^1 = \frac{S^2}{V^2} = 69.44$, N is total number of available construction firms

$$n = \frac{n^1}{[1 + (\frac{n^1}{N})]} = \frac{69.44}{[1 + (\frac{69.44}{N})]} = N = 104 \text{ have been identified from FDRE construction minister (grade}$$

1 and 2, general and building private contractors)

$$n = \frac{69.44}{[1 + (\frac{69.44}{104})]} = 42$$

Add at least 30% of n to compensate for non-response of questionnaire (Glenn, 2003)

$n = \text{calculated} + 30\% \text{ of calculated} = 55$

Therefore the sample frame for this study considered 55 respondents

3.6 Research Location

The research was carried out in Addis Ababa, Ethiopia, which consists of ten sub cities. The contractors involved in this research are 1st and 2nd grades in private general construction (Gc) and building construction (Bc) contractors, who participated in building construction projects in different regions. Post title distributed as follow: Managers of organization/ company, project managers, project /senior engineers, office engineer, quality control engineers, planning engineers and etc.

3.7 Relative Important Index (RII)

The relative important index and the mean values were used in this research. Egemen and Mohamed (2005) explained that the relative index technique has been widely used in construction research for measuring attitudes with respect to surveyed variables. Several researches used the relative important index in their analysis. Likert scaling was used for ranking questions that have an agreement levels. The respondents were asked to give their perceptions in group of questions on five-point scale (1, for the strongly disagree to 5 for the strongly agree),

which reflects their assessment regarding Total quality management practice in private building construction firms in Addis Ababa.

Having identified factors critical for implementation of Total Quality Management in building private construction firms in Addis Ababa through factor analysis, it is necessary to rank these factors according to their relative importance (significance) from the construction firm's professional's point of view and it was determined by the formula below.

The Relative importance index was computed using the following equation:

Formula Relative importance Index =

$$N = \frac{\sum W}{AN} = \frac{(5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1)}{5N} \quad \text{Equation 3.3}$$

Whereas W is the weighting given to each factor by the respondent, the ranking is from 1 to 5, where (n1 = number of respondents for strongly disagree), (n2 = number of respondents for disagree), (n3 = number of respondents for neutral), (n4 = number of respondents for agree), (n5 = number of respondents for strongly agree). A is the highest weight, i.e. 5 in the study and N is the total number of samples. The above relative importance index formula result ranges from 0 to 1. The main factors which are used in analysis were the mean and the percentage weight. The analyzed data was finally presented using descriptive methods for easy interpretation of data.

Ranking of the things under consideration was based on their Relative Important Index (RII) values. The item with the highest Relative Important Index (RII) value is ranked first (1) the next (2) and so on.

Ranking of all the factors for degree of significance was based on the value of their respective Relative importance index (RII).

According to Mbamali and Okotie (2012), the Relative Important Index (RII) Values Interpreted as follows:

- Relative importance index (RII) < 0.60, item is assessed to have a low significance.
- $0.6 \leq$ Relative importance index (RII) < 0.80, item assessed to have high significance.
- Relative importance index (RII) \geq 0.80 item assessed to have very high significance.

3.8 Pilot testing of the instrument

An initial test will be conducted on the data collection tools and procedures to identify likely problems. This test will be conducted at some construction firms in Addis Ababa, whereby ten questionnaires will be administered to the employees in the respective departments of firms. The completed questionnaires will later be checked for evenness.

3.9 Validity and Reliability of the instrument

Though the survey tools used in this research are standard, the validity and reliability of the instrument were confirmed.

Validity is the degree to which a test measures what it purports to measure (Creswell, 2009). Validity defined is the accuracy and meaningfulness of the inferences which are based on the research results. It is the degree to which results found from the analysis of the data actually characterizes the phenomena under study. He contends that the validity of the questionnaire data depends on a crucial way the ability and willingness of the respondents to provide the information requested.

A pilot study was conducted in the study area to refine the methodology and test instrument such as a questionnaire before administering the final phase. Questionnaires was tested on potential respondents to make the data collecting instruments objective, relevant, suitable to the problem and reliable as recommended by John et al. (2007). Issues raised by respondents were corrected and questionnaires were refined. Besides, proper detection, by the advisors had been taken to ensure validity of the instruments. Finally, the improved version of the questionnaires were printed and dispatched.

The reliability of instruments measures the consistency of instruments. Creswell (2009) considers the reliability of the instruments as the degree of consistency that the instruments or procedure demonstrates. In this study each statement rated on a 5 point Likert response scale which includes strongly agree, agree, undecided, disagree and strongly disagree. The reliability test was conducted with a sample of 10 respondents of the targeted different building construction companies and the Cronbach's alpha coefficient for the instrument was found above 0.8, which is reliable.

Table 3.2 Some of Reliability Coefficients obtained from SPSS

Scale	Cronbach's alpha coefficient	No. of Items
Top management commitment	0.794	5
Customer centeredness	0.779	6
In relation to human resource development	0.962	6
Company's construction process-oriented management	0.844	7
With regard to Supplier management	0.762	6
With regard to Continuous improvement	0.900	5
Information analysis and evaluation	0.891	4
With regard to Evidence-based decision-making	0.809	3
Factors hindering implementation of TQM	0.826	7

Source: SPSS result of pilot test, 2020

The pilot test result was encouraging that the proposed questionnaires were reliable for measuring that the extent to which it was without bias (error free) and the researcher ensured that had consistent measurement of the instrument.

Design of the Instruments

The reliability the instrument is essential in research data collection. Therefore, the correct data will be determining true the results of research quality, while true or not the data is highly dependent on true or not the research instrument.

The instrument were designed in such ways that can strength the validity of the study

Reliability Test Method Alpha Method using SPSS

Reliability is a measure to indicate that a reliable instrument to be used as a means of collecting data for the instrument is considered good. Good instrument will not be biased directing the respondents to select certain answers. Reliable means trustworthy also reliable. So several times repeated whatever the outcome will remain the same or consistent. Reliability test instrument can be done by using Cronbach's Alpha. The instrument has a high degree of reliability if the value of Cronbach's Alpha obtained as follows:

1. If Cronbach's Alpha > 0.90 = very high reliability
2. If Cronbach's Alpha 0.70 to 0.90 = high reliability
3. If Cronbach's Alpha 0.50 to 0.70 = Reliability is quite high
4. If Cronbach's Alpha < 0.50 = low reliability

Basic Decision Making in Test Reliability

There are said that the basis for a decision in the reliability test's as follows.

1. If the value of Cronbach's Alpha > 0.600 the questionnaire items dictated reliable
2. If the value of Cronbach's Alpha < 0.600 then dictated questionnaire items unreliability

Test Reliability Questionnaire Using SPSS

The researcher used Performance Data. The data can be seen in the appendix

Specification

1. N= 10 respondents
2. Item questioner total = 61
3. Using a Likert scale as follow : 5= Very good, Very agree, 4= Good , Agree 3= Fair, 2=Not good, disagree, 1=Very not good, very disagree

To check the reliability of research instrument all questions with Likert scale were analyzed.

First output (case processing summery)

Case Processing Summary

	N	%
Cases Valid	10	100.0
Excluded ^a	0	.0
Total	10	100.0

- a. List wise deletion based on all variables in the procedure.

Second output (Reliability statistics)

Reliability Statistics

Cronbach's Alpha	N of Items
.911	61

SPSS result for the Assessment of Total Quality Management deployment research instrument questionnaire

Case Processing Summary

	N	%
Cases Valid	10	100.0
Excluded ^a	0	.0
Total	10	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.913	51

Interpretation of Reliability Test Results Output

First Output (case processing Summary)

N or the number of valid data (valid for at process) is 10 units, while the missing data is zero. Here means that all the data is processed

Second Output (Reliability statistics)

From the output of Reliability statistics obtained Cronbach's Alpha value of $0.911 > 0.600$, based on the basis of decision making in the reliability test can be concluded that this research instrument reliable, where as a high level of reliability is having tested the validity of reliability of the proved results of the questionnaire is valid and reliable performance

3.10 Data Analysis Technique

The data collected will be coded, and analyzed through SPSS (statistical package for social sciences) version 21. Descriptive statistics such as percentages, RII means and standard deviation will be used to describe evaluation of total quality management implementation practice in private contractors in Addis Ababa Ethiopia.

3.11 Summary

In order to achieve the objectives of the study, the research methodology has been established. This study was carried out based on literature review, and questionnaire survey. Such approach is depend to be suited to the aim of this study which is concerned primarily with the ascertaining the perception and experience of practitioners in the industry. All the sample organizations are building construction companies, some involves also in infrastructure work actively at the moment. Before the questionnaire session was conducted, the author had communicated the construction companies about the nature and purpose of the study, this was to make possible for the organizations to assign the most appropriate stake holder for the questionnaire.

The research adopted quantitative approach spanning on four processes. In the preliminary process, an extensive literature review on the subject was undertaken .The literature review covered the concepts of quality and Total quality management in the construction sector to surface and ultimately establishing constructs for implementation of TQM in the Construction Industry. Based on the literature review, a standardized questionnaire was developed to collect data from members of construction industry about their quality management practices and their perception of factors contributing to the successful implementation of TQM. The targeted respondents were project managers, project engineers, Quality managers. Different construction firms were targeted to respond to a set of close-ended questionnaires.

The third process was data analysis. The data were analyzed the data were analyzed using Statistical Package for Social Scientist (SPSS.21). Factor Analysis, and Ranking Analysis using importance index. Finally, the information was obtained, regarding the quality management practices and critical success factors contributing to the successful implementation of TQM.

CHAPTR FOUR

Data Presentation, Analysis, and Discussion of the Results

4.1. Introduction

This part of the research considers with the analysis and discussion of the data gathered from the desk study and questionnaire survey. The results from the desk study and questionnaire survey will be presented, interpreted and analyzed in detail in this part and finally discussions will be made on the basis of the findings.

The outputs of the survey are presented in the form of charts and table to allow for easy Interpretation.

4.2. General Information

Data of questionnaire survey were collected from professionals of 55 private building contractors in Addis Ababa. They were asked to provide information about the current practices in Total Quality management in their firms, and give suggestion on how to improve the quality management. The building contractors were also asked to give an information related to total quality management awareness, Quality management practice, quality management program: Audit: Training: Policy ,Assessment of total quality management deployment is related to top management commitment: customer centeredness: human resource development: Company's construction process-oriented management: Supplier management, and etc., and factors hindering implementation of Total Quality Management in private local building construction firms in Addis Ababa.

4.3. General information analysis Results

4.3.1. Questionnaire Response

To accomplish the objectives of this research, 110 questionnaires were administered to Private local building and general construction firms within Addis Ababa.

Table 4. 1 Distribution of Questionnaires

Types of response	Frequency(No.)	Percentage (%)
Number of distributed	110	100
Number properly completed and returned	93	84.55%
Number not returned	17	15.45%

Table 4.1 shows the number of questionnaires administered to Private Building Construction Firms. Hundred ten (110) questionnaires were administered and Ninety-three (93) were properly completed and returned representing Eighty four point fifty five percent (84.55%) response. This percentage can be regarded appropriate and an adequate representation of the population of this study and therefore valid for consideration and use for the study based on the assertion of Albinu and Jagboro (2002) that the result of a survey could be considered as biased and of little significance if the response rate is lower than 30% to 40% of the distributed questionnaire.

4.3.2. Organization establishment

Table 4. 2Years of Organization established

	1-5 years	5-10 years	10-15 years	More than 15 years	Total
Frequency	28	49	16	0	93
% of Response	30.1	52.68	17.20	0	100
Total	28	49	16	0	93

It was important to how long has the organization been stayed in the construction industry and its background in order to ascertain the information provided for this research work. The greater the experience of the respondent in this sector the greater the understanding of the questions and necessary requirement for this sector. The highest frequency for the response was (5-10 years) as shown in Table 1. This group accounted for 52.68 % of the respondents. Critically looking at Table 4 30.1 % of the respondents have less than 5 years of experience, and 17.20% have over 10 years' experience. In summary, the information and analysis detailed above indicates that the respondents and respondents' firms have reasonable experience in the real estate industry. For that matter it is accurate to conclude that those who responded to the survey are sufficiently experienced in the real estate industry to provide data which is reliable and valid.

4.3.3 Academic Qualification of respondents

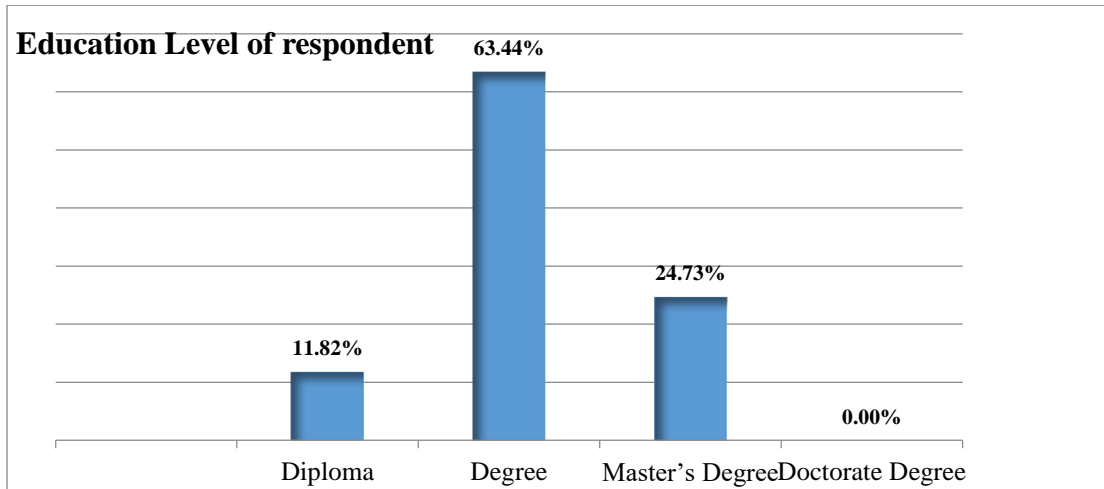


Figure 4. 1 Academic Qualification of respondents

The academic qualifications of respondents are summarized in Figure 4.1 of which 63.44% are University degrees holders, 24.73% are Master's degree holders and 11.82% are Diploma holders. None of the said respondents was Doctorate degree Graduates. The researcher can deduce that managers and supervisors on construction sites have the basic tertiary education where they acquire relevant and necessary knowledge in construction works. The academic qualification of the respondents is important and supports the fact that they are knowledgeable and capable of providing the much needed professional judgment required for the credibility of the data collected for the research.

4.3.4 Occupation

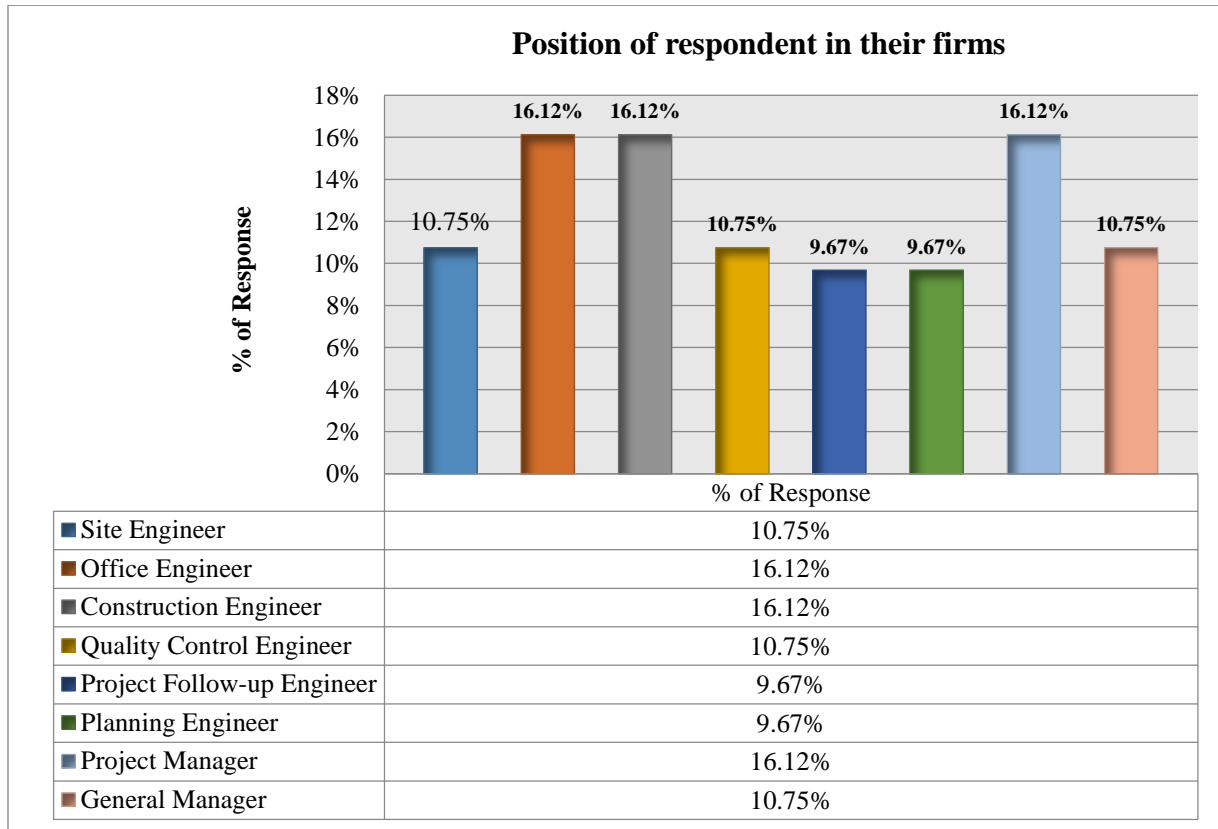


Figure 4. 2Occupation of respondents in their firms

On Figure 4.2 the results show that 16.12% are project managers, Office Engineers and Construction Engineers respectively. The above Table further shows that respondents representing 10.75% are General Manager, Site Engineers and Quality Control Engineers respectively. The remaining respondents from table result show 9.67% are Project follow-up engineers and Planning Engineers individually. The position held by respondent in their respective company is detailed in Table 4.4. The evaluation of position by respondent was necessary to confirm the validity and reliability of response and to understand the perspective of respondents and it gives an indication of the level of respondents understanding of Construction quality Management issues that arise in the Ethiopian Building Construction Industry.

4.3.5 Respondents work experience

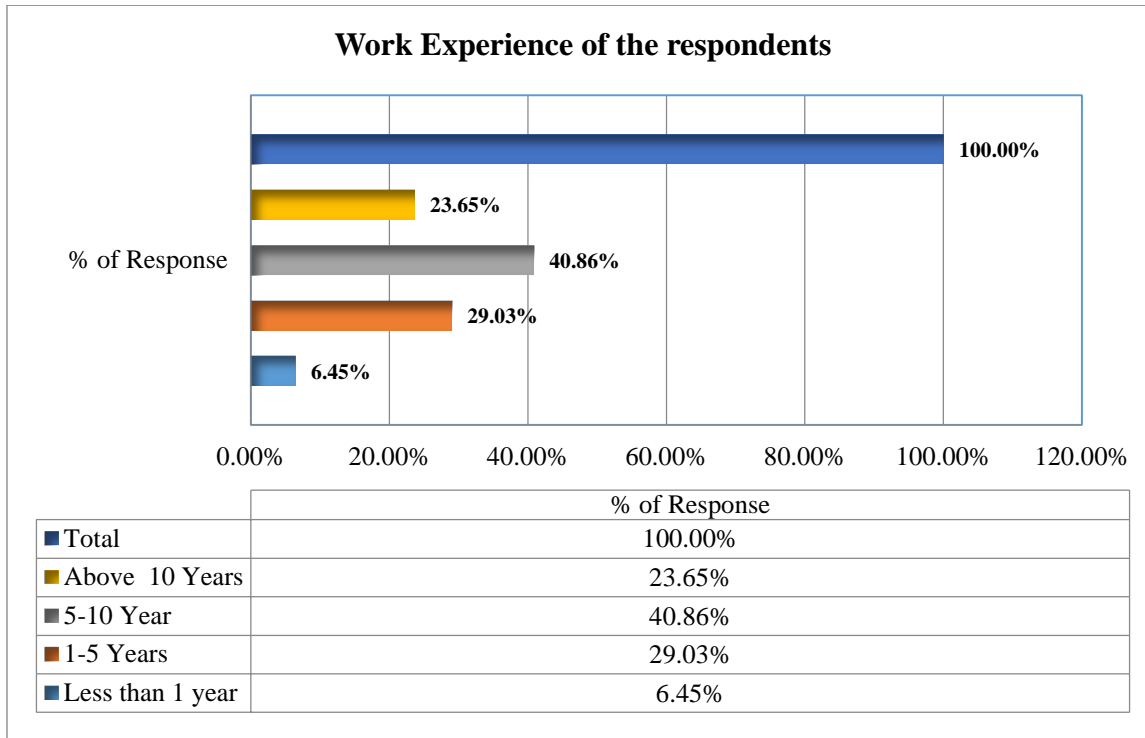


Figure 4. 3Occupation/Position of respondents in their firm

Respondents indicated the number of years they had worked in the construction industry.

Figure 4.3 denotes the number of years respondents have worked in the industry. Majority had worked between 5-10 years representing 40.86% of the respondents. 29.03% have worked between 1-5 years, 23.65% have worked above 10 years. Only 6.45% had less than one year working experience.

The high retention of employees according to data collected (40.86%), indicates that employees in the Construction Industry do not leave the industry quickly. This is apposite sign for employees who would want to maintain their trained employees. The data shows that respondents have worked in the industry under the study for quite a long time to be able to assess and provide reliable data on TQM practices in the building Construction Industry.

4.4 Section II Assessment of Total Quality Management awareness results

A. Aspect scale

4.4.1 Definition for Total quality management

Please rank the following definition for Total quality management using 1 to 6, 1 being the best similar word, 6 being the least word. This section deals with data collected and analyzed in accordance with the objectives to identify total Quality Management awareness and practice in general and Total Quality Management in particular.

Table 4. 3 Respondents response on definition of Total Quality Management

No.	Value for money	Elimination of defects	Customer satisfaction	A tool to increases productivity and profit	Inspection and correction action	Continuous improvement	Appearance
1	29	19	48	7	0	8	3
2	15	32	19	8	0	20	9
3	35	25	14	14	14	14	12
4	12	14	7	20	18	27	20
5	2	3	5	32	24	24	24
6	0	0	0	12	37	0	25
N	93	93	93	93	93	93	93

Table 4. 4 Analyzed result and ranking on definition of Total Quality Management

No.	Analyzed Data	Summation	Mean	Rank
a	Value for money	222	2.38	2
b	Elimination of defects	229	2.46	3
c	Customer satisfaction	181	1.94	1
d	A tool to increases productivity and profit	377	4.05	5
e	Inspection and correction action	456	4.90	7
f	Continuous improvement	318	3.41	4
g	Appearance	407	4.38	6

Table 4.3 and 4.4 denotes the detailed responses on how respondents ranked the words that they think define total quality. Results from the survey proved that respondents gave the best equivalent word to define total quality as Customer satisfaction with mean rank of 1.94. The least description for Total Quality is Inspection and correction action with mean rank of 4.90. As shown in the Figure 4.3 and 2nd and 3rd positions are Value for money and Elimination of defects with mean rank of 2.38 and 2.46 respectively. Value for money in construction is achieved by completing a project on time, cost and a level of quality that meets the users need. This quality definition by respondents is ultimately the purpose of TQM i.e. satisfying a customer.

4.4.2 Attention given by your firm

Please rank the following in order of their attention given by your firms 1 to 4, where 1 is the most important and 4 is the least.

Table 4. 5 Respondent’s Response on attention given by construction firms

Ranking	Time	Quality	Cost	Safety
1	12	27	39	0
2	30	44	27	0
3	44	14	18	20
4	7	8	9	73
Total respondents	93	93	93	93

Table 4. 6 Analyzed Results and ranking on attention given by construction firms

No.	Analyzed Data	Summation	Mean	Rank
a	Time	232	2.49	3
b	Quality	189	2.03	2
c	Cost	183	1.97	1
d	Safety	352	3.78	4

Table 4.6 shows the detail rankings, respondents ranked cost as 1 with mean rank of 1.97. The data shows that respondent ranked Quality and Time as 2 and 3 with mean value of 2.03 and 2.79 respectively. From table 4.6 respondents ranked safety. Finally safety was not considered a successful project management as compared to quality, time and cost.

4.4.3 Yes or no questions related to level of awareness of Total Quality Management

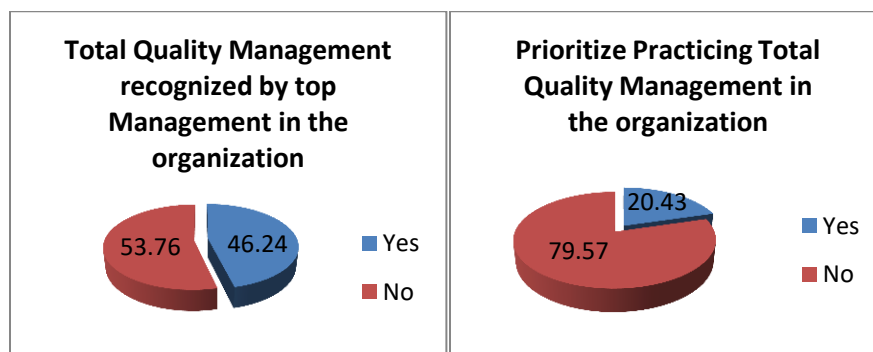


Figure 4. 4Response rates related to level of awareness of Total Quality Management

Figure 4.4 representing that level of awareness of TQM in the organization, 46.24 % of the respondent said that their organizations top management recognizes the benefit of Total quality management; however the remaining 53.76% of the respondent answered no. from the data gathered 20.43% of the respondent said that their organization prioritize practicing the TQM; but the remaining 79.57% answered that their organization does not prioritize practicing the TQM.

4.5 III. Quality management practicing evaluation

4.5.1 Quality improvement program

Table 4. 7Response rates related to companies quality improvement program

Statements	Percentage
Yes such as a plan is under consideration	11.83%
Yes such as a plan has been implemented recently	24.73%
Yes such as a quality improvement plan has been a part of your company policy	31.18%
No	32.26%

As per the above table 4.7 presentation about 32.26% of respondent’s response they do not have a quality improvement program in their construction firms. And almost 11.83% of respondents said such a program is under consideration. Only 24.73% or respondents said a quality improvement program has been implemented recently. Almost all 31.26% responded that a quality improvement program has been a part of company policy. Therefore we can consider that more than 67% of construction firms have quality improvement program.

4.5.2 Factors in order of their importance in quality program of firms

Main objectives of the quality improvement plan

Table 4. 8Respondent’s responses, analyzed results and ranking on their importance in quality program.

No.	Customer satisfaction	Cost reduction	Increase productivity	Improvement of employees..	Compliance with contractual...
1	32	12	14	0	27
2	25	20	17	5	22
3	14	32	28	15	15
4	15	24	20	30	19
5	7	5	14	43	10
N	93	93	93	93	93
Sum	219	269	282	390	242
Mean	2.35	2.89	3.03	4.19	2.60
Ranking	1	3	4	5	2

Table 4.8 shows the ranking and a summary of major importance of quality program from most to least important. From the given data above, customer satisfaction with mean of 2.35 is the most important objective of quality program. The second most important is Compliance with contractual, statutory, environmental and safety requirement with mean ranking of 2.60. Cost reduction is averagely ranked important for quality program with mean value of 2.89. The fourth important for quality program is Increases productivity with mean ranking of 3.03. As a final point Cost reduction is averagely ranked important for quality program with mean value of 4.19.

The results in the table above depict that Improvement of employees in the quality building efforts are not major objectives in Quality Programs.

4.5.3 Types of Quality improvement practicing in firms

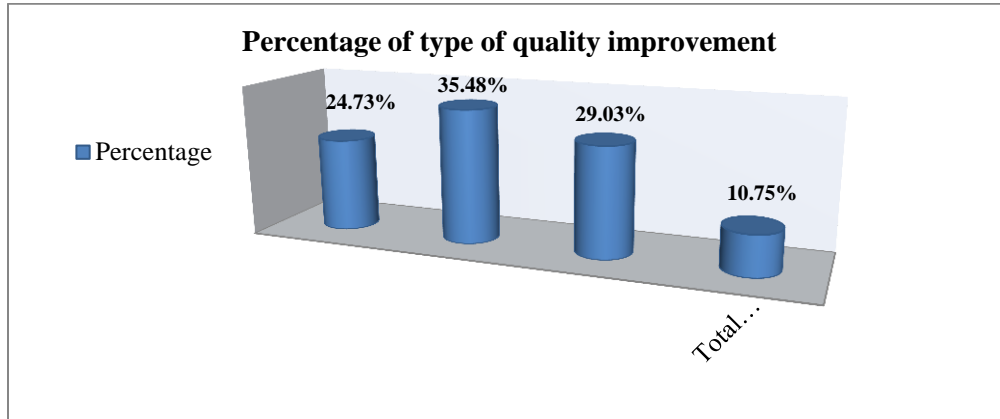


Figure 4. 5 Respondents response on practicing Quality improvement types
According to Figure 4.5, a total of 33 respondents which represents 35.48% have been considered Quality control is the first type for quality improvement program implementation. Results from the survey verified that respondents considered quality assurance and inspection is the second and third type for quality improvement. Out of the 93 respondents who answered the questioner 10 respondent have been considered that the last type for quality improvement in their company.

4.5.4 Full support of top management in quality improvement program

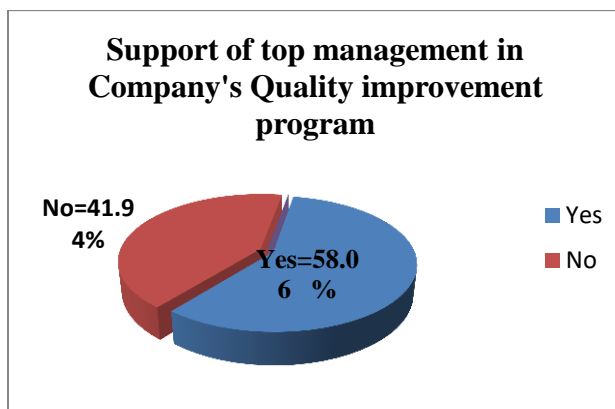


Figure 4. 6 Response on full Support of quality improvement program
Out of 93 respondents who answered that they have a full support of quality improvement program from their top management has 58.06% with a total number of 54 respondents. In view

of fact from the above figure 41.94% which representing 39 respondents said that, their quality improvement program has a full support from their top management for the program.

4.5.6 Firms practicing in total quality management

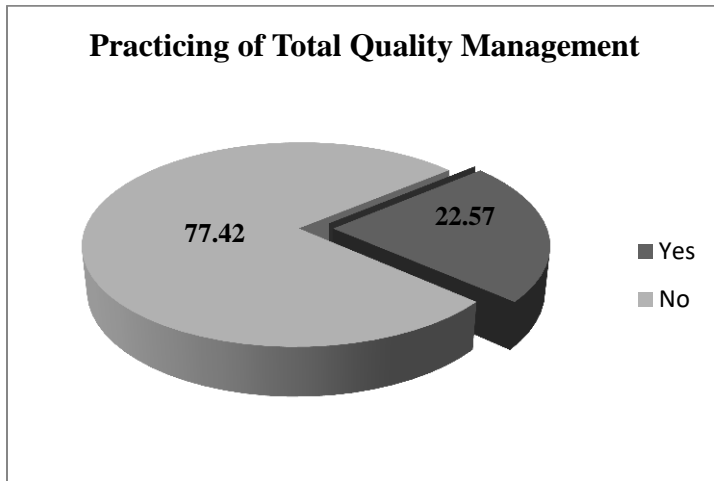


Figure 4. 7 Respondent's response of firms practicing in total quality management

As per the above figure 4.8, 22.57% of respondents opined that their firm practicing Total Quality management. And 77.42% of respondents are of the view that their firm is not practicing total quality management.

4.5.7 Data acquisition

4.5.7.1. Collection of data to measure the performance of construction operation

Table 4. 9 Response of respondent's on data collection to measure the performance of construction operation

Aspect	Frequency	Percentage
Yes	79	84.95%
No	14	15.05%
Total	93	100%

Seventy nine (79) respondents out of the (93) representing 84.95% said that they collect data to measure the performance of operations. Only 14 of the respondents representing 15.05% said they do not collect data to measure the performance of operations. Hence this shows us most of construction firms collecting construction related data to measure the performance of their construction.

4.5.7.2. Performance measurement ways by the firm and or project

Table 4. 10 Respondent's response on company and project performance measurement ways

Aspect	Frequency	Percentage
Customer complaint	13	13.98%
Increase work productivity	10	10.75%
Profit margin	24	25.81%
Standard output evaluation	17	18.28%
Timely completion of project	29	31.18%
Total	93	100%

It can be deduced from Table 4.10 above that, 31.18 % representing majority of respondents' measure performance through Timely completion of project, 25.81% measure performance by the increase in Profit margin, 18.98% measure performance through Customer complaint while 10.75% measure performance through Increase work productivity.

4.5.7.3 Data acquisition methodology within the firms and projects

Table 4. 11 Respondent's response on data accusation methodology within the firms and projects

Aspect	Frequency	Percentage
Progress report	52	55.91%
Client's feedback forms	27	29.03%
Employee feedback forms	9	9.68%
Maintenance of database	5	5.38%
Total	93	100%

When the respondents were asked about the data acquisition methodology they follow within their company, Majority of 52 respondents representing 55.91% stated that the data collection methodology they follow is Progress report. Those respondents which representing 29.03% use Client's feedback forms as the data acquisition methodology they follow within their company and project. The last two methodologies representing 9.68% and 5.38% use employee feedback forms and maintenance of database a data acquisition methodology they follow within their company and project.

4.5.7.4 Customer suggestion gathering system

Table 4. 12 Respondent's response on system for gathering customer suggestion

Aspect	Frequency	Percentage
Yes	73	78.49%
No	20	21.51%
Total	93	100%

Based on the above mentioned table 4.12 about 73 respondents which representing 78.4% have a system for gathering customer suggestion while 20 respondents representing 21.51% do not have a system for gathering customer suggestion.

If yes, how do you gather customer suggestion?

Table 4. 13 Response of respondent's on gathering of customer suggestion

Aspect	Frequency	Percentage
Customer's feedback forms/Inspection checklist /	64	68.82%
Complaint forms/handover checklist, site book/	25	26.88%
Questionnaire surveys	4	4.30%
Total	93	100%

Out of the (93) respondents who said they have a system for gathering customer suggestion, (64) of them representing 68.82% said they gather customer suggestion through customer feedback forms (inspection checklist). Twenty five (25) of the respondents constituting 26.88% said they use Complaint forms/handover checklist/. While four (4) of the respondents representing 4.30 % said they gather customer suggestion through Questionnaire surveys.

Rendering to the respondents, their organizations collect data to measure the performance of operations. By majority, progress report and client's feedback forms are the preferred methodology in collecting data in their organizations. In addition both employee and customer suggestions are welcomed by the organizations since they have a system for gathering both employees' and customers' suggestions. Many views are solicited since the majority of organizations use customer's feedback forms like inspection checklist and approval submittals and complaint forms like site book instructions, handing over check lists system of gathering suggestions where a lot of views are expressed. This helps the construction firms to receive inputs, complaints and feedbacks to improve upon their policies, construction methodologies and quality of construction.

4.5.8 Review on Quality Audit

4.5.8.1 Well-established internal quality audit

Table 4. 14Response of Respondent’s on well-established quality audit procedure

Aspect	Frequency	Percentage
Yes	41	44.09%
No	52	55.91%
Total	93	100%

As per the table 4.14 presented about 44.09% of respondents said that they have a well-established internal quality Audit procedure while 55.91% said that they do not a well-established internal quality Audit procedure in their construction company.

If yes, how often do you ensure that internal quality audits are carried out effectively?

Table 4. 15 Response of respondent’s on ensuring internal quality audits effectively

Aspect	Frequency	Percentage
Daily	49	52.69%
Once a month	21	22.58%
Quarterly	13	13.98%
Once a year	10	10.75%
Other	0	0%
Total	93	100%

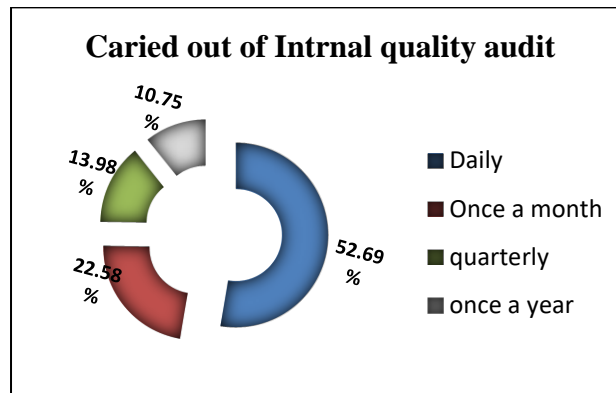


Figure 4. 8 Respondent’s response on ensuring internal quality audits effectively

From table 4.15 about 52.69% respondents said they ensure that internal quality audit is carried out every day, While 22.58% of respondents said they ensure that internal quality Audit is carried out effectively once a month and those who said quarterly were 13 respondents representing 13.98% answered that, it is done. The last number of respondents representing 10.75% answered that; it is done once a year. It is observed that 89.25% of the respondents carried out internal quality audit in their firms effectively at least from daily up to three months period.

4.5.8.2 Project review after closeout

Table 4. 16 Response on carry out of project review after close out

Aspect	Frequency	Percentage
Yes	52	55.91%
No	41	44.09%
Total	93	100%

From table 4.16 it is seen that about 55.91% of respondents said that they carried out project review after close out of projects, while 44.09% of respondents have not carried out project review after closeout.

4.5.9 Training related to quality and quality improvement

Quality culture is achieved and maintained with the employees through regular education and training that a firm provides. Employee training plays a vital role in any organization/company's quality building efforts and its importance is recognized by every quality expert. Employee training must be targeted for every level of the company. These programs are attempted to teach employees how to perform particular activities or a specific job. Employee education, on the other hand, is much more general and attempts to provide employees with general knowledge that can be applied in many different settings. (Zhang, 2000).

Table 4. 17Response on training in quality improvement to employee

Aspect	Frequency	Percentage
No (If no please skip Q. 2 and 3)	49	52.69%
Some training is available	24	25.81%
A formal training program is in effect	20	21.50%
Total	93	100%

From the 93 respondents, 44 representing 47.31% indicated that a formal training and some form of training is given to the employees. While 52.69% of respondents said that they didn't given any training in quality improvement.

Table 4. 18Response on method of training

Aspect	Frequency	Percentage
On the Job/Site training	43	46.24%
Seminars/ Workshop	37	39.78%
Short Courses	13	13.98%
Other (Please specify)	0	0
Total	93	100%

From table 4.17 about 58% of respondents said that related to quality and quality improvement training or some form of training is given to the employees. From that and as per table 4.18

majority of the respondents 46.24% pointed out that employees are trained on the job or site. And 39.78% of the respondents said that their company organizes seminars/workshops for their employees while 13.98% of respondents said that their company provides short courses related to construction quality and quality improvement.

Table 4. 19 Training organized related to quality

Aspect	Frequency	Percentage
Every 3 Months	4	4.3
Every 6 Months	22	23.66
Once a Year	67	72.04
Other (Please specify)	0	0
Total	93	100

The unfortunate aspect is that the training given to the employees is not regular, 72.04% of respondents said that, training is organized for employees once a year. 23.66% stated twice a year and 4.3% said in every three months.

4.5.10 Quality related Policy in the construction firms

Table 4. 20 Respondent's response on the availability of quality policy and standard manual

Aspect	Frequency	Percentage
Yes	28	30.11
No	65	69.89
Total	93	100

From Table 4.20, 30.11% of respondents said that there is the availability of quality standard manual or document while 69.89% respondents said that their companies do not have standard quality manual. It is therefore observed that majority of the respondent's firm has not quality standard manual for the work except contractual technical specifications and quality control procedures.

Table 4. 21 Company mission statement in relation to quality

Aspect	Frequency	Percentage
Quality is taken in the mission statement	71	76.34%
There is a separate policy for quality	15	16.13%
Mission statement does not capture quality	7	7.53%
Other (Please specify)	0	0
Total	93	100%

Out of 93 respondents 7.53% of respondents stipulated that their firms' mission statements do not capture quality while 16.13% said there is a separate policy for quality. More than half which is

about 76.34% of respondents said that quality is captured in the mission statement when it comes to the question of what the firms’ mission statements in relation to quality are.

Quality policy in general is the intentions and directions of an organization’s relationship to quality as formally expressed by top management (Tricker and Sherring-lucas, 2001).

The policy outlines how management intends achieving quality and dictates the organization’s quality management system. Surprisingly, most organizations do not have separate manual documents for quality. This suggests that, they do not follow any laid down policy or have no standards to meet. However, majority of them do have quality captured in their mission statements.

4.6 Section IV: Assessment of TQM deployment

This section aims to identify the critical success factors and rank them in order of importance. The respondents marked the Critical Success Factors that were applicable in their construction firms on basis of strongly agree or strongly disagree. The average of the Likert scale is three (3) therefore, a mean below 3 shows overall disagreement, while a mean above 3 shows overall agreement

Table 4. 22Critical success factor the implementation of Total Quality Management

	Frequency Response						Total Score	Score			
	1	2	3	4	5	N		Sum	Mean	RII	Ranking
A. Top management commitment										0.619	
1. Top management consider strategic importance of quality and incorporate it in company’s vision, mission and goals take a leading role in work quality and management	5	12	12	43	19	93	332	3.57	0.714	1	
2. Management provides comprehensive policy for promoting customer satisfaction	12	19	27	22	13	93	284	3.054	0.611	3	
3. Management’s dedication to continues quality improvement by allocating appropriate resource (for employees training, quality improvement research and adaption of new technologies and work methodologies)	19	17	27	19	11	93	265	2.849	0.570	4	
4. Top management ensure involvement and integration of all departments in order institutionalize quality culture and are communicated and clarified to employees	11	15	23	28	16	93	302	3.247	0.649	2	

EVALUATION OF TOTAL QUALITY MANAGEMENT PRACTICE OF BUILDING CONTRACTORS, THE CASE OF ADDIS ABABA BASED PRIVATE LOCAL CONTRACTORS

5. Management's active engagement in quality policy execution and review	21	20	23	18	11	93	257	2.763	0.553	5
	Frequency Response						Total Score	Score		
	1	2	3	4	5	N	Sum	Mean	RII	Ranking
B. Customer centeredness									0.671	
1. Availability of reliable means of communication platform in order to collect and consider customer's continuing complaints and remarks regarding quality to assess customer satisfaction.	8	9	7	46	23	93	346	3.72	0.744	1
2. Supervise and follow-ups with customer or client on project construction activities to receive prompt and actionable feedback	8	11	15	39	20	93	331	3.559	0.712	2
3. Preventive and corrective actions undertaken to delight/happiness customers	8	12	25	34	14	93	313	3.366	0.673	3
4. Responsiveness of company to external customer's remarks and complaints related to quality and other.	9	14	23	33	14	93	308	3.312	0.662	4
5. Responsiveness of company to internal customer's remarks and complaints related to quality and other.	16	17	24	25	11	93	277	2.978	0.596	6
6. In your company customer requirements are used as the foundation for quality	12	13	27	27	14	93	297	3.194	0.639	5
	Frequency Response						Total Score	Score		
	1	2	3	4	5	N	Sum	Mean	RII	Ranking
C. In relation to human resource development									0.615	
1. Human resource management policy align and facilitate implementation of quality policy	17	28	30	13	5	93	240	2.581	0.516	6
2. All managers and construction engineers assuming activity roles as facilitator of continues improvement, couches of new methods and leader of empowering employees and provide support for execution of quality requirement	9	13	14	33	24	93	329	3.538	0.708	1
3. Availability of organization wide training and development process, including carrier path planning for all employees	14	22	25	21	11	93	272	2.925	0.585	4
4. Training organized for all employees and management staffs in quality principles,	16	29	28	14	6	93	244	2.624	0.525	5

EVALUATION OF TOTAL QUALITY MANAGEMENT PRACTICE OF BUILDING CONTRACTORS, THE CASE OF ADDIS ABABA BASED PRIVATE LOCAL CONTRACTORS

tools and techniques, quality improvement skills, team works and other technical skills in problem identification and solving											
5. Providing technical and managerial training to subcontractors to enhance their projects managements and quality of works	10	14	16	31	22	93	320	3.441	0.688	2	
6. Availability of individual performance evaluation and reward system in order to gain maximum of employee's potential to wads quality	11	14	20	29	19	93	310	3.333	0.667	3	
	Frequency Response						Total Score	Score			
	1	2	3	4	5	N	Sum	Mean	RII	Ranking	
D. Company's construction process-oriented management									0.679		
1. The firms manages activities as process rather than inspecting the quality of final product	12	13	17	32	19	93	312	3.355	0.671	4	
2. Availability of well-defined responsibility and job description for every employee regarding work process of construction	5	7	9	44	28	93	362	3.892	0.778	1	
3. Availability of guideline for clarity of all construction work processes and given to project's and companies all staffs	10	22	17	34	10	93	291	3.129	0.626	5	
4. Employments of value engineering technique before commencement of construction in order to highlight potential cost, time saving proposal.	19	16	22	21	15	93	276	2.968	0.594	7	
5. Testing, reviewing and inspection of incoming construction products or works for specification compliance	5	10	14	40	24	93	347	3.731	0.746	2	
6. Inspection and test plans, including checklist for completion of the construction project or pre- determined stage of the work	7	10	12	46	18	93	337	3.624	0.725	3	
7. Availability of system o ensure clarity, uniformity of drawing and specification	15	16	25	22	15	93	285	3.065	0.613	6	
	Frequency Response						Total Score	Score			
	1	2	3	4	5	N	Sum	Mean	RII	Ranking	
E. With regard to Supplier management									0.605		
1. Selection of Suppliers and Sub-contractors based on their capability and commitment to product and service quality	8	12	25	30	17	93	312	3.355	0.671	1	

EVALUATION OF TOTAL QUALITY MANAGEMENT PRACTICE OF BUILDING CONTRACTORS, THE CASE OF ADDIS ABABA BASED PRIVATE LOCAL CONTRACTORS

2.Offering closer and long-term working relationship to Supplier and Sub-contractors	7	15	33	19	19	93	307	3.301	0.660	2
3.Provision of Technical and Managerial assistance for suppliers and Sub-contractors by the organization	27	25	17	16	8	93	232	2.495	0.499	6
4.Responsibility and Accountability of purchasing department for quality of incoming products/services	8	19	30	19	17	93	295	3.172	0.634	3
5.Provision of clear specification and guidelines to suppliers	15	15	26	21	16	93	287	3.086	0.617	4
6.Management encouraging the usage of few suppliers, emphasizing quality rather than price	15	24	32	14	8	93	255	2.742	0.548	5
	Frequency Response						Total Score	Score		
	1	2	3	4	5	N	Sum	Mean	RII	Ranking
F. With regard to continuous improvement									0.609	
1.Practicing bench marking process in order to improve activities in the firm with subsequent improvement to delight customers	14	17	25	27	10	93	281	3.022	0.604	3
2.Tracking cost of quality (rework, waste, damages, rejects) for continuous improvement	8	11	21	34	19	93	324	3.484	0.697	1
3.Practicing continual review on the construction quality plans & execution with a view of continuous quality improvement	11	15	30	28	9	93	288	3.097	0.619	2
4.Practicing continual review on the construction safety work plans & work place environment with a view of quality improvement	17	21	28	22	5	93	256	2.753	0.551	5
5.Practice to encourage project quality improvement discussions at top Management discussion & with Stakeholders	17	17	27	25	7	93	267	2.871	0.574	4
	Frequency Response						Total Score	Score		
	1	2	3	4	5	N	Sum	Mean	RII	Ranking
G. Information analysis and evaluation									0.634	
1.Review of drawings and specification prior to authorization for construction works	5	14	27	32	15	93	317	3.409	0.682	1
2.Establishing internal quality audit	10	17	22	29	15	93	301	3.237	0.647	2

EVALUATION OF TOTAL QUALITY MANAGEMENT PRACTICE OF BUILDING CONTRACTORS, THE CASE OF ADDIS ABABA BASED PRIVATE LOCAL CONTRACTORS

3.Documenting procedure for implementing corrective and preventive actions	10	20	26	27	10	93	286	3.075	0.615	3
4.Continual use of internal or external audits ensure delivery of quality product and service	12	19	27	32	3	93	275	2.957	0.591	4
	Frequency Response						Total Score	Score		
	1	2	3	4	5	N	Sum	Mean	RII	Ranking
H. With regard to evidence-based decision making									0.651	
1.The company and project ensures the accessibility of accurate and reliable data and documentation for decision making	7	15	30	30	11	93	302	3.247	0.649	2
2.Decisions taken by the company or project are made based on organized documentation and analysis of data	3	10	24	38	18	93	337	3.524	0.718	1
3.The project balance data analysis with practical experience	12	24	25	22	10	93	273	2.935	0.587	3

Respondents indicated their agreement level on the criteria for identifying successful Implementation of Total Quality Management principles as applied in their companies. In assessing the views of these criteria, relative importance index was used to rank the variables that are highly weighted (strongly agree) in relation to the other factors. The mean ranking of all the critical success factors are significantly high showing that there is a general agreement that these factors can be applied in assessing successful implementation of total quality management in the construction industry. As observed from the Table 4.22, the most important factor is Company’s construction process oriented management with importance index of 0.679. The indices of the other factors follow the order as listed below.

Rank of Importance Index

1. Company’s construction process oriented management = 0.679
2. Customer centeredness = 0.671
3. With regard to evidence based decision making = 0.651
4. Information analysis and evaluation= 0.634
5. In relation to human resource development= 0.625
6. Top management consider strategic importance of quality =0.619
7. Continuous improvement = 0.609
8. With regards to supplies management = 0.605

1. Process oriented management

According to the Literature Review, Harris et al (2006) and Tang et al (2005) stated that process management is one of the main factors needed to ensure an excellent product. Within the process management, respondents believe that carefully reviewing drawings and specifications prior to construction lead to success in QM in construction. Almost all the statements under Process Management had a mean greater than three (3) implying that respondents agree that drawings, check sheets, and clarity of work processes play a vital role in improving the quality of construction works. These results found from the respondents are same as results by Harrington and Voehl (2012) who concluded in his study on TQM application in the building Construction Industry that a focus on process and measurement would greatly facilitate reductions in cost, defects, and time delays.

2. Customer centeredness

Concerning TQM, customer centeredness should have received the first Importance Index and not the second as indicated in the survey data. Giving attention to customer needs/centeredness received the highest index of 0.671. Respondents perceived data collection from customers to know their level of satisfaction as not very critical and therefore indexed it at 0.671. For ISO 9000 certified organizations, customer focus and satisfaction received the highest rating (Tari, 2006). By Oakland (2004) confirmation giving attention and meeting customer needs is paramount in customer loyalty.

3. With regard to evidence-based decision making

Evidence based decision making get the 3rd highest index 0.651. This idea connects to the concept that effective decisions are centered on the analysis of data and information, rather than guess work or instinct. These decisions are based on the insights gained from analyzing and evaluating data. This will help to produce desired result.

4. Information analysis and evaluation

This principle has got the importance index of 0.634, it concerned with the evaluation of different policies and strategies, quality audit, quality cost, department or function performance evaluation, documentation and control of documents, and employee and supplier performance evaluation. In order to sustain a customer focus, the organization should guarantee timely feedback of customer survey outcome to distribute functions to functional areas.

Based on Sila and Ebrahimpour's (2005) study examined the relations among TQM factors including leadership, strategic planning, customer focus, information and analysis, human resource management, process management, supplier management and the outcome of the practices in the form of human resource results, customer results, organizational effectiveness, and financial and market results.

5. Human resource development

Human resource development received the 5th highest index of 0.625. It is one of the factors which affect TQM. Mostly training topics typically include quality awareness, teamwork, leadership, interpersonal communication, job related technical skills, and problem-solving techniques. Under Total Quality Management, quality is every individual's responsibility and the training must be targeted for every level of the company. There should be customized training plans for management, engineers, technicians, home and field office staff, field labors and support personnel. Human resource has a vital role in the execution process as the middle managers and the employees need to be motivated, trained and involved in an in-depth manner. By the support of quality awareness, the employee's attitude as well as their mindset has to be modified for positive outcome.

6. Top management consider strategic importance of quality

According to the respondents view top management has a clear vision for implementation of quality goals with importance index of 0.619 ranked sixth. Respondents also consider that management commitment and support for quality policy and technology are critical factors that affect management/leadership regarding quality of work and management should create quality awareness among employees at all level in the company structure. The above result indicating management consideration strategic importance of quality and leadership commitment as the sixth most critical factor is contrary to other studies. As indicated in the literature review, Oakland (2004), consider management/leadership commitment in the importance of quality as the most critical factors that promote quality management in the construction industry.

7. Continuous management

Company evaluates performance and take measures to improve on it was the least ranking within continuous implementation with index of 0.609. Encouraging creativity and more innovative methods of improving work processes are other factors that respondents highly agreed. Continuous improvement implementation in the management of everyday activities is

imperative to the employees working towards the success of the organization. According to Anderson et al. (1994), continuous improvement has its basis on the practices of process management that produces incremental improvement and innovation of products, services and processes. Continuous improvement involves the systematic measurement and focus on product/service, excellence teams, cross-functional process management, and the attainment, maintenance and improvement of standards. Owing to the global competition based on customer demand, modification of acceptable standards took place. What look to be the popular best products or services currently may become obsolete tomorrow. This is due to the increase in customer expectations that stem from the changes in the global environment. As a result of these changes, organizations are benchmarking the processes from one another to delve into and discover the secrets behind their successes.

8. Supplier Chain Management

Within supplier chain management, the factor that was ranked first was ‘supplied materials are examined thoroughly before being used with an index of 0.605. Company maintains regular suppliers to ensure consistency was ranked second with an index of 0.737. Dr.Kulkarni and Khutale (2013) and Harrington and Voehl (2012) identified that relationship building is the key to good supplier management that causes an increased efficiency in delivery and quality of materials. It is essential for organizations to seek competitive supply chain management (SCM) capabilities that enable them to exceed customers’ expectations and enhance market and business performance (Tracy, Lim, and Vonderembse, 2005).Organizations must follow Supply Chain Management capability to develop competitive performance by closely integrating the internal functions within a company and effectively linking them with the external operations of suppliers, customers, and other channel members. The benefit of supply chain integration can be attained through efficient linkage among different supply chain activities, and the linkage should be subject to the effective construction and utilization of different supply chain practices for an integrated supply chain (Kim, 2006). In the international marketplace, the integration of TQM and SCM is a developing field of interest for many researchers and practitioners from past decades.TQM and SCM have both played an increasing role in strengthening organizational competitiveness and customer value.

4.7 Section V: Assessment of factors hindering implementation of TQM

Table 4. 23Reponses on Factor affecting implementation of Total Quality Management

	1	2	3	4	5	N	Sum	Mean	RII	Ranking
Factors hindering implementation of TQM									0.628	
1.Construction industry –specific factors (like uniqueness of product, dispersed production site, many stakeholders)	7	12	32	30	12	93	307	3.301	0.660	4
2. Least bidder procurement method	14	19	29	24	7	93	207	2.903	0.581	6
3. Lack of top management commitment	5	14	15	37	22	93	336	3.613	0.723	2
4. Lack of understanding of TQM by top management	14	17	30	22	10	93	276	2.968	0.594	5
5.Firm’s emphasis on short term objective	5	12	16	36	24	93	341	3.667	0.733	1
6.Lack of expertise/ resource for applying TQM	12	29	34	15	3	93	247	2.656	0.531	9
7.Lack of Communication in company	15	20	27	24	7	93	267	2.871	0.574	7
8. Lack of education and training	8	11	19	36	19	93	326	3.505	0.701	3
9. Lack of employee commitment and understanding	12	24	35	19	3	93	256	2.752	0.551	8

From Table 4.23 the problems affecting TQM presented in an ordered rank from one to nine and the data above shows, Firm’s emphasis on short term objective is the primary problem of TQM. Following closely is the lack of top management commitment and the third and fourth leading problems are lack of education and training and construction industry specific factors like uniqueness of product, dispersed production site, many stakeholders respectively .The least two problems affecting TQM in the private building construction companies are lack of employee commitment and understanding and lack of expertise and resources.

Researchers have different views on the problems affecting TQM. According to Polat et al, (2011) lack of management support and leadership were the most critical barriers to TQM implementation in the Turkish construction industry. In the study on Real Estate Companies in Ghana, Imbeah (2012) concluded that the absence of expertise/resources in Quality Management Systems is the most critical barrier to TQM implementation.

1. Firm’s emphasis on short term objectives

Companies may actually have to take short term loss to make the strategy work; this may require the involvement and cooperation between top management and the major stakeholders with the probability of long-term growth and profit, problem occurs when attempting to continue to convince impatient, profit driven owner.

2. Lack of top management commitment

Quality issue has become of great importance to every organization and no management can afford to let nature take its course when it comes to quality. The top management must play a

leading role by making available the critical resources, establishing an organization wide quality policy that is well communicated to all stakeholders, forming a good quality management structure and managing the entire process through close monitoring and evaluation. If there is lack of top management in an organization the quality management is highly affected, so lack of top management is one factor which affects the implementation of total quality management.

3. Lack of education and training

Training is as an important factor that boosts employees' efforts towards improvement. Quality training comprises educating and training of employees at all levels in the organization with an intention of broadening their knowledge on quality issues and programs and providing them with information about the organization's quality mission, vision and general desired direction. According to Jamali et al. (2010), employee training is one of the most important requirements in a successful TQM implementation. Supervisors, management personnel and other employees need skills and knowledge on quality dimensions and management as well as their roles in TQM implementation. Lack of education and training to the employee has negative influence on the implementation of total quality management.

4. Construction industry

Construction industry is a very wide and complicated firm due to this the construction industry has been slow to embrace the concept of TQM. Building construction firms have been continually struggling with its implementation. Because of its complexity the firm and different factors the industry by itself has a negative influence on the implementation of TQM.

5. Lack of understanding TQM by top management

The overall objective of TQM is to ensure continuous improvement in the organization's people, systems, processes and environment in order to attain better customer service and increased profits through efficiency and effectiveness in the entire organization. If the top management doesn't understand the idea and principle of TQM the quality management will be hindered.

6. Least bidder procurement method

Least bidder procurement method is a serious challenge to the successful implementation of TQM on construction sites. The construction industry's inherent competitive bid process and competitive environment has led to an emphasis on quick work and short time horizons, and a lack of long term viability and quality, so least bidder procurement method has an influence on the implementation of total quality management.

7. Lack of communication in company

Communication is the exchange of ideas, messages, or information between people through speech, signals, or writing. Success of an organization depends on communication such that when the process is hampered, the entire organization suffers. Each and Every organization should therefore put into place proper communication systems that facilitate horizontal, vertical, upward and downward exchange of information. Total quality management is governed by the lack of communication in the company.

8. Lack of employee commitment and understanding

Employee commitment and understanding is one of the factors which affect the implementation of TQM. The building construction companies could make journal or other informatics sources available in the company to help develop knowledge about TQM programs. Quality awareness education will need to be conducted in order to improve employees' quality understanding and sense of responsibility.

9. Lack of expertise/ resource for applying TQM

Some of the respondents were of the opinion that the building construction industry as a whole lacks expertise in TQM. Expertise has to be hired to train managers on the concept of TQM operation. The experts will help in drafting the critical parameters to quality features that are specific to the need of the company. Hence, defining a system that is fit for purpose and address the quality at all levels.

CHAPTER FIVE

Conclusion and Recommendation

5.1 Introduction

Research into Quality Management practices in the construction Industry needs to be increasing to improve on competitiveness, performance, and client satisfaction. This study has added up to the researches on implementation of Total Quality Management in the private building construction companies in Ethiopia.

This study had three basic objectives relative to the Ethiopian private construction companies' evaluation of total quality management practice. They were to analyze the implementation of total quality management practice in Addis Ababa based local private building contractors.

- To identify current quality management practices employed in the grade one and two private building Construction companies in Addis Ababa Ethiopia.
- To evaluate the extent of TQM awareness within the Addis Ababa based local private building contractors.
- To determine the external environmental factors and obstacles that affect TQM implementation within the Addis Ababa based local private building contractors.

The study identified some issues that have been summarized and this led to the conclusion and recommendation in this chapter.

The study showed that Total Quality Management practices in the Construction Industry were very essential for companies that intend improving competitiveness, productivity and customer satisfaction. For that reason all construction companies should have to adopt quality as a culture to increase on management commitment, training, teamwork, customer and employees' satisfaction and emphasizes on the way tasks are accomplished and not just on what tasks are completed.

5.2 Conclusion

Perception of Total Quality management

The analysis of this section reveals that the majority of these firms perceive total quality as a customer satisfaction, value for money, elimination of defects ranked 1st, 2nd and 3rd respectively. Value for money in construction projects is achieved by finishing a project on time, a level of quality and cost that meets the users need. This quality definition by respondents is ultimately the purpose of TQM i.e. satisfying a customer. Generally they feel that customer satisfaction is their main goal and attention.

The most three definitions for total quality in the construction industry are customer satisfaction, value for money and elimination of defects as stated by the respondents. The analysis of this section tells that the majority of respondents perceive total quality as an elimination of defect next to value for money. They feel that customer satisfaction is their main goal in their construction operation.

Attention given by construction firms

The study shows that out of the four factors affecting successful project management that means from Quality, Time, cost and safety, Cost and quality are the most important factors to safeguard a successful completion of project works. So that Quality Management in construction has become very critical in increasing performance and competitiveness in Ethiopian Building construction works.

Level of awareness of Total Quality Management in the organization

As per the majority of firms top management are unaware of application and recognize the benefit of TQM in the construction industry. The evidence is from the majority of respondents recognize the benefit of TQM and minority of respondent's organization prioritizes practicing Total Quality Management that trying to implement TQM principles in their effort to improve the quality of construction works.

Quality improvement in the Organizations

It was observed from this section that Majority of the respondents said that they do have a Quality Improvement Program (QIP) in place with almost half of their top management full support. And also, the survey showed that Quality Control, and quality assurance were the most popular quality management approach. The Main objectives of the Quality improvement plan are

customer satisfaction, Compliance with contractual, statutory, environment and safety requirement and cost reduction that ranking 1st, 2nd, and 3rd respectively.

Types of Quality improvement practicing in the organization

In order to improve on quality, the study discovered that the targeted respondents improved on quality works as follow quality control, quality assurance and inspection methods. By these methods such as, Quality control involves verifying the product or evaluating construction product with the requirement specification. It is oriented to detection i.e. finding defects in products. Testing is the key method used to perform product evaluation. Quality assurance involves the entire development of process, monitoring and improving the process, making sure that the agreed upon standards and procedures are followed throughout the life cycle and ensuring the problems are found and dealt with, It is oriented to prevention i.e. preventing the defects from occurring in the products. Audits are key techniques for process monitoring. Whereas regarding Inspection supervisors issue site instructions to works foremen to rectify any observed defects occurring on site. Construction works and Products that do not comply with the specifications are rejected or returned to improve.

Performance measure of construction operation

As per the response of respondents most of their companies have collect data to measure the performance of construction operation and in addition, the study shows that performance of construction operation is measured by collecting data and by recording the timely completion of works.

From the findings, less than half of the firms measure performance through timely completion of project. The remaining small amount measure performance by increase work productivity and profit customer complaint respectively.

It was also identified that in most of these construction firms progress report and client feedback forms are the preferred methodology in collecting daily and monthly data in their building construction firms. Also both employee and maintenance of database welcomed by the companies since they have a system for gathering both employees' and customers' suggestions.

And about more than half of companies have a system for gathering customer suggestion but about a few of companies have not a system for gathering customer suggestion.

Many views are solicited since the majority of organizations use customer's feedback forms like inspection checklist and complaint forms like handover checklist and site book system of gathering suggestions where a lot of views are expressed. This helps the organizations to receive inputs, complaints and feedbacks to improve upon their quality policies for construction works.

Quality Audit

From the response given some of respondents said that they have a well-established internal quality Audit procedure and from which more than half and the remaining few are internal quality audit carried out every day and once a month respectively, while almost half of the respondent said that they do not a well-established internal quality Audit procedure in their construction company.

It can be realized that, a little bit less than average of organizations ensure adequacy and evaluate the need for improvement action through systematic examination , to determine whether quality activities results comply with planned arrangement to maintain standards.

Training related to quality and quality improvement

From findings, majority of the companies do not give formal training to their employees. About half of the respondents indicated that training or some form of training and formal training are given to the employees respectively.

Majority of the respondent pointed out that employees are trained on-site or on the job. And minority of respondents said that their company organized seminars/workshops for employees while small amount of the respondents provide short courses. During the discussion made with, most managers' stress that when employees are formally trained many times, they do not stay long to enable the firm appreciate the benefits of their investment, hence, the common training offered are on- the -job training and seminar/workshop and they are mostly once every other year usually for a new worker. However, the managers acknowledged that employee training and education is important. Effective and efficient human resource management is the key to improved performance of a company. With this in mind, the study investigated on plans made to develop the human resource available and observed that on the job training was the predominant type of training.

Quality related Policy in the construction firms

Regarding quality policy about minority of respondents said that there is the availability of quality standard manual or document in their company while majority of respondents said that their companies do not have standard quality manual. Therefore it is observed that majority of the respondent's firm has not quality standard manual for the work except contractual technical specifications and quality control procedures. But more than half of respondents said that quality is captured in the mission statement when it comes to the question of what the firms' mission statements in relation to quality are.

Assessment of TQM Deployment

The research identified eight critical factors and analyzed them using the Relative Importance Index Analysis to know the importance index for each factor. After the analysis, the ranking order in order of importance for the factors were Company's construction process oriented management, Customer centeredness, evidence based decision making, Information analysis and evaluation, human resource development, Top management regards strategic importance of quality, continuous improvement and supplies management. This study proved that Company's process management and customer focus are the prime aim of TQM was considered the most significant factor.

The major factors influence implementation of total quality management of building construction firms include; Firm's emphasis on short term objective is the primary problem of TQM.

Following closely is the lack of top management commitment and the third and fourth leading problems are lack of education and training and construction industry specific factors like uniqueness of product, dispersed production site, many stakeholders respectively. The least two problems affecting TQM in the private building construction companies are lack of employee commitment and understanding and lack of expertise and resources.

5.3 Recommendation

The recommendations set out for this research have been derived in a manner which makes them feasible, tangible and can be acquired as steps and procedures project managers and Quality control managers and related practitioners may follow in order to manage their quality of work.

The purpose of the following recommendation is not to deeply address areas that need improvement but the intention is only to point out some major issues that need consideration to enhance the current practice of quality management in private building contractors in Addis Ababa. It indicates what the current private building construction companies can learn from construction quality management processed on the reviewed companies/ projects.

With the current inspection method, the construction industry developmental progress will be gradual. One tested and tried method of improving quality that places value on its products and satisfies the customer is through the implementation of TQM in the industry.

It is recommended that: -

- Construction companies develop a Quality Culture as an organizational behavior.
- The Management has to be committed and dedicated to the application of TQM in order to improve Quality.
- Firms need to invest more in the education and training of employees on quality management systems and the need to adhere to suitable quality management practices, also firm need to ensure all employees in charge of supervision on site are adequately qualified for such positions, firms should also embark on frequent quality appraisal of their activities and comply to laid down industry standards.
- A frame work needs to be developed for effective quality management to ensure uniformity in Ethiopian building construction project delivery by firms.
- Management must lead the drive for the establishment of team building activities that understand and utilize TQM principles by making guideline framework. Training, motivation, and recognition are some of the factors that can improve internal customer satisfaction that achieves high productivity. Additionally, the use of accurate collected data should be encouraged to monitor performance of the construction activities.

- Building Construction companies should create the flexible and conducive organizational atmosphere which encourages the development of quality management practices in all aspect of the construction industry.
- Managers of the various construction firms should be encouraged to used quality management techniques in the execution of projects.
- Managers of those private local construction companies need to be fully committed and supportive of quality management efforts. Managers should not just talk about it but rather ensure that they are implementing and undertaking these practices themselves. Unless, it is difficult to imagine that managers can provide the vision and leadership necessary to change the culture of the organization.
- Managers at all levels and all staff should have a positive attitude towards quality improvement to ensure that there is an organizational commitment to the TQM philosophy and the tools or techniques of quality improvement. This describes that responsibility is not allocated just to a specialized quality department or person, but rather that everyone in the organization must collaborate and take ownership of the TQM philosophy within their everyday activities and decision making.
- Construction companies should employ quality officers as part of their integrated teams in the management of their projects.
- Construction companies should provide a suitable infrastructure for the effective implementation of TQM. Therefore, they will realize that implementing TQM takes time, effort and change throughout the entire organization; thus, managers need to convince staff that real individual and organizational benefits can be obtained through the implementation of TQM as part of the business strategy
- Construction firm should institute training procedures or refresher courses in quality management as part of their annual plan for their employees.
- All professional associations such as Ethiopian civil engineering associations, Ethiopian Architect associations and other related associations should institute award scheme for the best firm which adhere to quality practices as a way of encouraging construction firms to use quality management techniques.

In general the study shows that quality management practice in private building construction industry in Ethiopia is at very low (average) and infancy stage and need great input for improvement. At last the writer would like to recommend that since the subject of quality management is very wide and could not be totally addressed by one M.Sc. thesis; further detail study is required to address current problems and practice of quality management and to suggest solutions.

Finally, Ethiopian building construction industry needs more research to improve contractors' knowledge and attitudes towards Quality management practice process and to make them more competitive in the international markets.

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Appendix

QUESTIONNAIRE

Dear Sir/ Madam

This questionnaire is designed to collect information for **Evaluation of Total Quality Management Practice of Building Contractors; the case of Addis Ababa based private local Contractors**. Its responses will contribute towards the fulfillment of the researcher's **Degree of Masters of Art Degree in Management** from Addis Ababa University School of Business and Economics. Accordingly, the researcher will expect willingness, cooperative and commitment of you to provide full information based on ethical manner to the best of your ability.

The questionnaires are designed only for academic purpose and your response will be kept confidential and solely used for the purposes of academic research. And you are expected to return the questioner within 3 days of receiving the questionnaire.

Finally, the researcher would like to thanks you to your unique contribution. And if you have any questions regarding this survey, please do not hesitate to contact me.

Directions:-

- No need of to write your name
- The respondents will be expected to give answers for all questions.
- The respondents will be expected to put “x” for selected answer.
- Give more explanations according to the nature the questions.

Section I: Respondent's Background Information

1. How long has the organization been operating?

- 1-5 Years
- 5-10 Years
- 10-15 Years
- More than 15 Years

2. Your Qualification?

- Diploma
- Degree
- Master's Degree
- Doctorate Degree
- Other, please specify

3. Your Occupation?

- Site engineer
- Office engineer
- Construction Engineer
- Quality control engineer
- Project follow up engineer
- Planning engineer
- Project Manager
- General Manager
- Other

4. How long have you worked at your company?

- Less than 1 year
- 1-5 Years
- 5-10 Years
- Above 10 years

Section II: Assessment of Total Quality Management awareness

A. Aspects scale

1. Please Rank the following definitions for **total quality management** using 1 to 6, 1 being the best similar word, 6 being the least word.

No.	Aspect	Rank
a.	Value for money	
b.	Elimination of defects	
c.	Customer satisfaction	
d.	A tool to increases productivity and profit	
e.	Inspection and corrective action	
f.	Continuous improvement	
g.	Appearance	

2. Please Rank the following in order of their **attention** given by your firm 1 to 4, where 1 is the most important and 4 is the least.

No.	Aspect	Rank
a.	Time	
b.	Quality	
c.	Cost	
d.	Safety	

B. Yes or No questions

This part helps the researcher to identify basic information regarding the level of **awareness of TQM**. Please respond to each of the listed statement by saying yes or no and put your comment on it as per your organization.

No	Statement	Yes	No	Comment
1	Does your organization's top management recognize the benefit of total quality management?			
2	Does your organization prioritize practicing total quality management?			
3	Does your organization consider customer's feedback as an input for quality improvement?			
4	Does your organization view quality management as a continues process?			

III Quality management practice evaluation

1. Does your company have quality improvement program?
 - Yes such a plan is under consideration
 - Yes such a plan has been implemented recently
 - Yes such a quality improvement plan has been a part of our company policy.
 - No
2. Rank the following factors in order of their importance in **quality program** of your company 1 to 5, where 1 is the most important and 5 is the least important.

No.	Aspect	Rank
a.	Customer satisfaction	
b.	Cost reduction	
c.	Increase productivity	
d.	Involvement of employees in the quality building effort	
e.	Compliance with contractual, statutory, environment and safety requirement	

3. What types of **quality improvement program** do you practicing in your company?
 - Inspection
 - Quality control
 - Quality Assurance
 - Total Quality Management
 - Other, please specify.....
4. Does your company's quality improvement program have the full support of top management?

Yes No
5. Do you believe your firm is **practicing Total Quality Management**?

Yes No

Data Acquisition

1. Do you collect data to measure the performance of construction operations?

Yes No

2. How does your Construction Company and projects measure performance?
 - Customer complaints
 - Increase work productivity
 - Profit margins
 - Standard output evaluation
 - Timely completion of projects
 - Other methods (please specify).....
3. What data acquisition methodology do you follow within your company and projects?
 - Maintenance of data base
 - Employee feedback forms
 - Client's feedback forms
 - Progress report
 - Other methods (please specify).....
4. Do you have a system for gathering customer suggestion?
 - Yes No
5. If yes, how do you gather customers' suggestion(s)?
 - Customer feedback forms / inspection check list/
 - Questionnaire surveys
 - Complaints forms /handover check list/
 - Other methods (please specify).....

Review/ Audits

1. Do you have a well-established internal quality Audit procedure?
 - Yes No
2. If yes, how often do you ensure that internal quality audits are carried out effectively?
 - Daily
 - Once a month
 - Quarterly
 - Once a year
 - Other (please specify).....
3. Do you carry out project review after close out of every project?
 - Yes No

Training

1. Is formal training in quality improvement given to employees?
 No (If No please skip Q. 2, 3)
 Some training is available
 A formal training program is in effect
 Other (please specify)
2. How do you train your employee for quality and quality improvement?
 On the job/site training
 Seminars /workshops
 Short courses
 Other (please specify)
3. How many times are training organized for employees related to quality?
 Every 3 months
 Every 6 months
 Once a year
Other (please specify).....

Quality policy

1. Does your company have quality policy or standards manuals?
Yes No
2. What is your company's mission statement in relation to quality?
 Quality is taken in the mission statement
 There is a separate policy for quality
 Mission statement does not capture quality
 Other (please specify).....

Section IV: Assessment of TQM deployment

The following questions are pertaining to the extent the firm currently **practices total quality management**. Please indicate the degree to which you agree or disagree scaled from 1-5 (Where: 1 =Very disagree 2=Disagree 3=Average 4 =Agree 5 = Very Agree); with the following statements as per your organization. *(Please tick only one box.)*

A. Top management commitment	1	2	3	4	5
1. Top management consider strategic importance of quality and incorporates it in company's vision, mission and goals takes a leading role in work quality and management					
2. Management provides comprehensive policies for promoting customer satisfaction					
3. Management's dedication to continuous quality improvement by allocating appropriate resources (for employees training, quality improvement research and adaption of new technologies and work methodologies)					
4. Top management ensures involvement and integration of all Departments in order institutionalize quality culture and are Communicated and clarified to employees					
5. Management's active engagement in quality policy execution and review					
B. Customer centeredness					
1. Availability of reliable means of communication platform in order to collect and consider customer's continuing complaints and remarks regarding quality to assess customer satisfaction					
2. Supervise and follow ups with customer or client on project construction activities to receive prompt and actionable feedback					
3. Preventive and corrective actions undertaken to delight/happiness customers					
4. Responsiveness of company to external customers' remarks and complaints related to quality and others					
5. Responsiveness of company to internal customers' remark and complaints related to quality and others					
6. In your company, Customers' requirements are used as the foundation for quality					

C. In relation to human resource development					
1. Human resource management policies align and facilitate implementation of quality policy					
2. All managers and construction engineers assuming active roles as facilitators of continuous improvement, coaches of new methods and leaders of empowering employees and provide support for execution of quality requirement					
3. Training organized for all employees and management staffs in quality principles, tools and techniques, quality improvement skills, teamwork and other technical skills in problem identification and solving.					
4. Providing technical and managerial training to subcontractors to enhance their projects management and quality of work					
5. Availability of individual performance evaluation & reward system in order to gain maximum of employee's potential towards quality issues					
6. Safeguarding, occupational health and safety and security of employees at construction project sites and offices					
D. Company's construction process-oriented management					
1. The firm manages activities as processes rather than inspecting the quality of final product					
2. Availability of well-defined responsibility & job description for every employee regarding work process of construction					
3. Availability of guidelines for clarity of all construction work processes and given to project's and company's all staffs					
4. Employment of value engineering technique before commencement of construction in order to highlight potential cost ,time saving proposals					
5. Testing, reviewing and inspection of incoming construction products or works for specification compliance.					
6. Inspection and test plans, including checklist on completion of the construction project or a pre -determined stage of the work					
7. Availability of system to ensure clarity, and uniformity of drawings and specification					
E. With regard to Supplier management					
1. Selection of suppliers & sub-contractors based on their capability and commitment to product and service quality					

2. Offering closer and long-term working relationship to Suppliers and sub-contractors					
3. Provision of technical and managerial assistance for suppliers and sub-contractors by the organization					
4. Responsibility and accountability of purchasing department for quality of incoming products / services					
5. Provision of clear specifications and guidelines to suppliers					
6. Management encouraging the usage of few suppliers, emphasizing quality rather than price					
F. With regard to Continuous improvement					
1. Practicing Bench marking process in order to improve activities in the firm with subsequent improvement to delight customers					
2. Tracking cost of quality (rework, waste, damages, rejects) for continuous improvement					
3. Practicing continual review on the construction quality plans & execution with a view of continuous quality improvement					
4. Practicing continual review on the construction safety work plans & work place environment with a view of quality improvement					
5- Company encourages employees to be creative and innovative in improving work process.					
G. Information analysis and evaluation					
1. Review of drawings and specification prior to authorization for construction works					
2. Establishing internal and external Quality Audit					
3. Documentation and Documenting procedure for implementing corrective and preventive actions					
4. Continual use of internal or external Audits to ensure delivery of quality products and service					
H. With regard to Evidence-based decision-making					
1. The company and project ensures the accessibility of accurate and reliable data and documentation for any decision making process					
2. Decisions taken by the company or project are made based on Organized documentation and analysis of data					
3. The project balance data analysis with practical experience					

Section V: Assessment of factors hindering implementation of TQM

In Your view, what are the problems affecting total quality management in your company

Where; 1= very disagree; 2=Disagree; 3=Average; 4=Agree; 5=Very Agree

Factors hindering implementation of TQM	1	2	3	4	5
1. Construction industry-specific factors (like uniqueness of product, dispersed production site, many stakeholders)					
2. Least bidder procurement method					
3. Lack of Top Management Commitment:					
4. Lack of Understanding of TQM by top management					
5. Firm's emphasis on short term objectives/gains					
6. Lack of expertise/resource for applying TQM					
7. Lack of communication in company					
8. Lack of education and training					
9. Lack of employee commitment and understanding					

Thank you!