ADDIS ABABA UNIVERSITY
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Analysis of Total Quality Management (TQM) Implementation in Addis Ababa Construction Road Authority (AACRA)

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Declaration

This is to certify that the thesis prepared by Mariam Tadesse entitled ―Analysis of TQM implementation in Addis Ababa Construction Road Authority submitted in partial fulfillment for the requirements of the Degree of Master of Science in Management complies with the regulations of the University and notes the accepted standards with respect to originality and quality.

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Chair of the Department of Graduate Coordinator

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ATable of Contents

LIST OF TABLES

LIST OF FIGURE

ABBREVIATIONS

AACRA	Addis Ababa Construction Road Authority
CSF	Critical Success Factor
SPSS	Statistical Package for Social Sciences
TQM	Total Quality Management
ERC	**Ethiopian Road Construction**

ABSTRACT

The study analyzed the implementation of TQM in Addis Ababa Road construction industry. Specifically it focused on TQM dimension such as supply management, training and education, process management, continuous improvement, contract selection and top management commitment practice in consultant offices, contractor offices, and owner force (AACRA). The study conducted mixed approach and used exploratory survey design. The target group of the study was AACRA, consultant offices, and contractors, those registered by Ethiopia Road Authority. There were 23 contractors, 14 consultants and owner force. Furthermore, the study used stratified sampling techniques to select 11 contractor companies, 7 consultant offices and Owner force. Thus, the study selected 207 participants, which represented a response rate of 94.09%. from the 515 participants by using simple random sampling method. In addition, questionnaires and interview used to gather data from owner force (AACRA), contractor, and consultant offices. Inferential statistic (One way of ANOVA) and descriptive statistical techniques (mean, standard deviations, percentages, and frequency) used for data analysis by using SPSS software version 26. The data was presented in tables, charts and researcher's interpretation. The study result revealed poor practice of TQM dimensions such as supply management, top management commitment, process management, contract selection and, training and education, in Addis Ababa Road construction stakeholders. However, awareness of TQM, understanding of TQM and continuous improvement highly practiced in Addis Ababa Road construction industry. Additionally, lack of effective supervision, lack of effective communication, lack of proper equipment available for use, insufficient technology, and lack of collaboration were the major barrier for CSFs of TQM in Addis Ababa Road Construction made it difficult to implement it. Finally, the study drawn recommendation such as Addis Ababa road *construction companies should improve employees' involvement and commitment to TQM, and eliminate the barrier to have a smooth implementation process, share experience from homogeneous company who has been best practice of TQM, review and analysis daily reports and activities, well documented, and share experience, discuss, and evaluate TQM implementation in the industry.*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Now a day, effective management of quality is important for construction processes and building and civil engineering products. Then, clients selecting of companies' reputations for good quality work (Kheni & Ackon, 2015). In addition, it is vital that the construction industry developing economies TQM help for global competition (Kheni & Ackon, 2015). Beside of this, TQM helps to satisfying the needs of internal, external customers, and suppliers (Kanji & Wong, 1998). TQM provides a real opportunity to improve construction firm effectiveness (Sherif & Khaled, 2010) and useful tool to promote the achievement of set standards and successful productivity in the construction industry (Bakar, Ali and Onyeizu, 2011)

In the construction industry, developing countries quality assurance has become the norm and practice therefore they have more attention to the implementation and improvement of TQM in construction industry in general (Bakar et al., 2011). Construction industry products are highly complex, and most construction companies have difficulty in maintaining the expected satisfaction required by its customers such cost, time, and quality (Giri, 2014; Sherif & Khaled, 2010) due the problem of TQM in the construction industry across the globe.

On the other hand, the construction industry is being considered as comparatively having one of the poorest quality emphases among different manufacturing and service sectors (Wong & Fung, 1999). One of the main reasons is if a construction organization fails to change its culture, then TQM may not provide the benefits as initially expected (Griffis, 1992 cited in Kululanga, Fotwe, McCaffer, & Price, 2002). Beside of this, the failure is attributed to the incomplete implementation of the crucial TQM practices and the absence of the assisting assets that must be simultaneously used with TQM for the achievement of competitive advantage (Alotaibi and Islam, 2013).

According to Alotaibi and Islam (2013) noted that competitiveness in several organizations is failing to achieve through TQM practices implementation while others have succeeded. While some construction organizations may be uncertain about the benefits to be gained from TQM.

Contrary, most organizations have enjoyed significant performance improvements via TQM such as reduced rework and increased profits (Love & Li, 2000). In addition, continuous improvement has become an ever-present reality to construction companies as they seek to adapt to their changing business environment. One major factor driving this continuous improvement agenda is the latent role played by organizational learning (Barnett 1994 cited in Kululanga et al., 2002). In a Total Quality Management approach there is a need for managerial leadership to create the appropriate characteristics of total quality culture (Ali, 2016).

TQM is one better solution to overcome the problems and considered the most important approach to success of construction industries Syaj (2015) as well as quality-based road construction have become reputable and satisfy customer needs through the provision of higher quality service than non-quality-based road constructions. Similarly, Ali (2016) stated that all aspects of TQM practices should be effectively managed in a firm because each factor in TQM practices improves different aspects of firm performance. The combined effect among the TQM factors brings about exceptional or crucial improvements in the firm performances.

Most Addis Ababa Road construction industries practiced total quality management. However, according to AACRA report show that city authorities have allotted 15.5% of the total budget to road development work for 2018. While, almost all project performance in terms of quality, cost and time has been poor. Due to this, there has been cost and time extension in the project due to different problems. Generally, city's roads are surfaced with asphalt around 44% of the total area of the city (AACRA, 2018).

Imbeah (2012) stated that most studies examining the implementation of TQM have been based on advanced construction and trade industrial environments notably in United States of America, United Kingdom, Australia and Japan, and the subject of these investigations has largely been big companies with advanced management systems. Beside of this Wiengarten (2013) cited in Aletaiby (2018) stated that TQM focuses on the operational excellence on their business activities in order to improving the performance of the organization by emphasizing both the internal and external stakeholders. Many developed organizations and developing countries organization such as Libya, Jordan, Kuwait, Qatar, UAE, Saudi Arabia, Iran and Pakistan have adopted various versions of the TQM framework and they were successful. However, only a relatively small

proportion of them have been able to do so successfully by achieving continuous improvement and greater efficiency (Taylor & Wright, 2003 cited in Aletaiby, 2018).

1.2 Statement of the Problem

Globalization, powerful worldwide competition, and ever-changing customer demands have dramatically changed the business environment during the past few decades. Beside of this industrial revolution carried major changes thus they developed interchangeable parts in production changed the economy (Goh, 2000). Due to this, public sectors attempt to fulfill customer requirements and satisfy its customers by doing better quality of work. Construction industries are one of the public sectors to give quality service for the customers.

Road infrastructure has always played a key role in the progress and economic growth of a nation, through both direct effects of higher mobility for citizens and indirect benefits derived from the process of building infrastructure (Vatanen, 2007). Beside of this, most of the countries have been evolved to implement quality standards to ensure construction quality. However, poor quality in construction projects is a common phenomenon in the world (Ali & Wen, 2011). Similarly, organization in the construction industries provide infrastructure for the economy, but organizations are face problems of low productivity, instability, poor quality and lack of standard in road construction (Al-Musleh, 2010). Furthermore, Kazaz and Birgonul (2005) stated that the satisfaction of quality level in the construction projects is a serious problem and has not been achieved.

When we come to our country, Ethiopia. Addis Ababa City Roads Authority (AACRA) was established in March 15,1998 by regulation no 7/1998 to be administrated by board of directors to construct, maintain and administer the road works in Addis Ababa by the city administration (AACRA, 2004). Addis Ababa societies are constantly developing and require quality structure and design of the road infrastructure. While AACRA do not fulfill customer requirements and satisfy its customers. For instance, AACRA 2016 annual report shows that total length of road constructed in the city till the establishment of the authority was 4148 Kms the road network coverage has reached 15.64% compared with the built plot area of the city. Similarly, traffic flow in the city is dense and increased day to day. In addition, AARCA focus on short-term repairing rather than takes into account the future environmental and human aspects throughout its lifetime

and reliable road infrastructure stand is less focused on later maintenance and rehabilitation expenditure.

Khaled (2010) stated that the construction industry has numerous problems because of its complicated nature of operation. However, David and Murat (1997) cited in Khaled (2010) Stated that TQM concepts in construction have pulled the industry out of a crisis mode that existed for quite some time and the management philosophy of TQM directs all strategic and operational policies in which the company engages. Effective approach of TQM provides high quality of service and product by reducing problems. It focusses on the entire organization and all of the employee in providing service that satisfy the customers (Talha, 2004). Similarly, to achieve the intended project objective and benefits, applying effectively TQM enable a company to improve long term relationship by create a good team spirit, and encourage to address the problem (Lombard, 2006).

According to AACRA report on road construction performance 2015-2017 shows that there was no one project complete on the given schedule. Which indicated that time overrun, cost overrun in occurred all project performance. Almost all road projects were not complete based on the agreement with the client which is AACRA (AACRA, 2018). This may affect total quality road work. Sill the problem has been affect the project and the development of the city.

Furthermore, many studies conducted on implementation of TQM in different industries in different countries including Ethiopia. While, there are a few studies conducted on road construction industries but not in our country Ethiopia.

Hence, this study tries to fill this gap by identifying critical success factor of TQM implementation in road construction sectors in AACRA. The end of the study tries to identify critical success factor of TQM implementation and challenges of quality management in order to enhance the performance of in road construction in Addis Ababa.

1.3 Research Questions

The specific questions to the study include:

i. What is the current practice of TQM in Addis Ababa road construction in owner force (AACRA), contractors' companies and consultants' office?
ii. What is the CSF for implementation of TQM based on in road construction industries in Addis Ababa?
iii. What are barriers to the implementation of Quality Management in the Addis Ababa Road construction industry

1.4 Objectives of the Study

1.4.1 General Objectives

The general objectives of the study are investigating the influence of total quality management practices on the construction industry performance in AACRA.

1.4.2 Specific Objectives

The specific objectives of the study are:

i. To assess current practice of TQM in road construction industries from the perspective of owner force (AACRA), contractors and consultants in Addis Ababa.
ii. To identify critical barriers for the implementation of quality management in road construction industries from the perspective of contractors and consultants in Addis Ababa.
iii. To critically evaluate the critical success factors of implementation of Total Quality Management practices in the Addis Ababa Road construction industry.

1.5 Significance of the Study

Proper and effective implementation of TQM in construction industries play a key role for economic development and firm comparativeness to develop their performance within the country and in the world.

Therefore, the study will contribute to the development of TQM disciple and adds to road construction project body of knowledge by providing new information in Ethiopian context. The study result is relevant input to the management of AACRA in identifying the existing strength and weakness of quality management and CSFs of road construction projects in order to apply the existing projects in Addis Ababa. Moreover, other projects can also use the result of the study to improve the quality related problems in construction projects. Furthermore, the study provides crucial information to AACRA, project designers, and contractors bout barrier of successful TQM implementation as well as CSFs of TQM in road construction to encounter better TQM implementation in Addis Ababa Road construction industry. In addition, the study will help managers to better understand the strong bond between effective TQM implementation & organization performance thus they can take best effective decisions about the development and implementation of TQM.

The study may contribute to regional construction industries in order to enhance their quality. In addition, the study will use as reference for further studies for other similar related projects to improve quality problems through successful implementation and management of projects in the area at regional and national levels.

1.6 Scope of the Study

The study was concerned the challenge for road construction industries in the implementation TQM success in Addis Ababa. The study was consisting of contractor companies, consulting engineering offices, owner force (AACR) to gather the information on challenges for road construction industries in implementation of TQM success that work with AACRA and participated in road construction in Addis Ababa in 2016-2021. In addition, the study focuses on barrier and challenge of TQM implementation success in road construction in Addis Ababa.

1.7 Limitation of the Study

This study considers the Road construction company projects. It has been decided to focus on those who have located in Addis Ababa, the capital city of Ethiopia, because most construction projects are situated in Addis Ababa. However, most of the studies found in the literature review related to TOM studied the general implementation issues where most of them are from western

countries and related to TOM. There is a shortage in empirical studies that were carried out specifically to understand in-depth the barriers affecting the implementation of the TOM in literature specifically in Addis Ababa, Ethiopia.

1.8 Organization of the Study

The researcher has organized the entire study into five chapters. Chapter one introduction to the study. This provides a background to the study, statement of the problem, research questions, objectives, and significance of the study, scope and limitations. Chapter two is literature Review. Which is discusses about critical success factors for implementation TQM and its barrier, benefit and other related topics provides literature previously done by other authors'. Chapter three is research design and methodology. This chapter discusses the research design, sampling procedures, data collection methods and analyses that would have been used in the research. Chapter four is presented finding of the study the in relation to the research questions. Finally, chapter five are discussion, conclusions, and recommendations.

CHAPTER TWO

LITERATURE REVIEW

In this chapter, related literature on definition of Quality, definition of total quality management in construction industries, benefit of TQM, and barrier of TQM, development and implementation of total quality management: concept of quality and others described detail.

2.1 Theoretical Background of Total Quality Management

There are several theories of TQM which explain how quality management principle interact. Among of them are Ishikawa's theory, Deming's theory, Juran's theory, Crosby's theory, Six Sigma as well as many others.

Many successful companies have been adopted different approaches of total quality management based on their own requirements because one approach suitable for one organization may be not suitable for another organization. Therefore, this study used Deming's theory (1986), ad Juran theory (1993) which has been frequently used in the construction industry by different studies.

Deming's theory

Deming's theory increases total quality management awareness and provide an insight into the practical way of applying Total Quality Management.

In 1950, Deming developed 14 points of management practices to help companies increase their productivity and quality. The 14 principles include: constancy of purpose, improve every process, drive out fear, adopt the new philosophy, institute training on the job, end lowest tender contracts, break-down barriers, permit pride in workmanship, eliminate arbitrary numerical targets, eliminate exhortations, cease the need for mass inspection, encourage education, top management commitment to action, and institute leadership (Walton, 1993).

Deming (1986) noted that companies should focus on improving the process rather than the outcome of the process Farooqui and Ahmed (2008) stated that many construction companies focus on inspection of tasks completed in the construction project. Similarly, Githenya and Ngugi (2014) observed that supervision is the most often conducted after completion of stages of construction process. Therefore, Deming's 14-point model has been practiced successfully in construction industry in in Japan and the United States (Walton, 1993)

Deming (1986) argued that the choice for lowest bidder may not be the best quality supplier and contracts. Deming suggested that contractors should focus on the long-term relationship with the supplier. Deming (1986) asserts on training and retraining for each employee of the company will reduce the variation in the process.

Juran's theory

Juran (1992) noted that quality refers to meeting fitness product for use. Therefore, he proposed quality trilogy for organization to achieve and maintaining quality management from both external and internal perspectives. This trilogy consists of quality planning, quality improvement, and quality control. The trilogy focusses the developing and changing of quality management on top level management in a company.

According to Juran (1992) described that quality planning comprises of designing a procedure that meets set goals. This process needs to determine goals, performing a resource plan, creating a quality plan and planning implementation. The quality control process involves amending and operating the process so as to attain highest effectiveness by monitoring.

ISO theory

In 1987, international organization for released the standard ISO 9000 quality series. The ISO quality standard are a series of international acceptance guideline as how companies should set up QA system (Willar, 2012). The standard is designed to guarantee a consistent level of quality of product and service providing by companies via the use of procedures, controls, and documentation, to identify mistake and streamline its operations (Ibid).

The ISO quality management system is generic in nature and application to all companies. Regardless of the type and size of the companies. it can be used successfully in construction

companies. The new ISO standard are based on eight principles that emphasize the core value and concept of QM. The eight principles as define by ISO are: customer focus, leadership, involvement of people who are the essence of an organization, process approach, system approach to Management, continuous improvement, factual approach to decision-making and mutually beneficial supplier relationship (Al-Musleh, 2010).

2.2 Concept of Quality

The word quality come from Latin ‘‘*qua litas’’,* which means “of what kind” on the other hand it is consider quality as ‘good’. Deming (1982) defines quality as “a predictable degree of uniformity and dependability at low cost and suited to market”. In general, quality of customers as per specified standards desire one, which satisfies customer needs and continuously keeps on performing its functions (Zakuan, Muniandy, Saman, Ariff, Sulaiman & Jalil, 2012)

Dahlgaard, Kristensen, & Kanji, (2002) stated that quality is an important for any organization boarding on quality improvement journey. Thus, it is enhancing employees and management efforts on their company vision and their quality improvement goal. The definition of quality thoughts has support through a range of facts, perception of excellence. Palaneeswaran and Kumaraswamy, (2005) also defines as ‘‘the totality of characteristics of a product or service that bears on its ability to effectively and efficiently meeting the outlined requirements/specifications as well as satisfying the stakeholders’ needs.’’

Juran (1992) describes that "*fitness for use by the customer"* and definition of Crosby (1980) defines quality as “*Conformance to requirements or standard”* and Feigenbaum, (1991) cited in Imbeah (2012) defines quality as *"the total composite product and service characteristics of marketing, engineering, manufacture and maintenance through which the product and service in use will meet the expectations of the customer."*

2.3 Definition of Quality in Construction

Quality defines in construction industries noted by Sun (2000) it is defining by client to represent the products and customers’ satisfaction and interpret it as compliance with requirements. Moreover, quality was defined as the totality of features and characteristics of a product or service

that bear on its ability to stated and implied needs (Ibid). In addition, Juran (1992) stated that quality has existed at the beginning of time meeting client needs for managing quality.

Quality in construction projects define as by Hart (1994) cited in Khaled (2010) quality has a three-fold meaning in construction first job done on time, job done within budget, and final project fall within the required specifications Crosby (1992) defined quality as "conformance to requirements".

Kanji and Wortg (2012) stated that, quality in construction is directly connected with fitness for use. According to Wong and Fung (1999) stated that higher customer satisfaction, better project quality and higher market share often come with the adoption of TOM by such companies.

Arditi and Gunaydin (1997) stated that construction industry quality defined as meeting the requirements of the designer, constructor, and regulatory agencies as well as the owner. Quality can be characterized as follows:

- Meeting the requirements of the owner as to functional adequacy; completion on time and within budget; life cycle costs; and operation and maintenance.
- Meeting the requirements of the design professional as to provision of well-defined scope of work; budget to assemble and use a qualified and necessary work within adequate time allowance.
- Meeting the requirements of the constructor in the provision of contract plans in detail to permit the constructor to prepare priced proposal or competitive bid; timely decisions by the owner and design professional.
- Meeting the requirements of customers safety and health; environmental considerations; and protection of public property.

2.4 Quality Management (QM) in Construction

Quality management has been an important component of the overall organizational movement for the past twenty years (Lee and Chen, 2011).

Quality management is defined by Gryna (2001) determined it is a system for controlling the tasks and activities, and formally managing in the firm in order to ensure consistently in effective

and efficient manner. Similarly, Lam, Low and Teng (1994) define quality management in the context of construction determine overall management activities and quality policy implementation in the firm.

Thorpe and Sumner (2004) describe that QMS is formal declaration of an organization's business policy, processes and their controls, management responsibilities that help to reflects the most effective and efficient ways to meet their prime business objectives. In other word, every construction industry wants to win the trust and acknowledgment of customers in order to gaining business competitiveness and making greater profits through the prime focus on QMS for the fulfillment of customers' satisfaction.

The construction cost and time of delivery are also important characteristics of quality." (Chang, 1999 cited in Anane, 2017). For Rumane, construction project quality management is defined as the fulfillment of owner's needs per defined scope of works within a budget and specified schedule to satisfy the owner's / user's requirements. The phenomenon of these three components can be the construction project trilogy (Rumane, 2011). Construction projects are custom oriented and custom designed, having specific requirements set by the customer to be completed within a finite duration and assigned budget. Every project has elements that are unique that means no two projects are identical. It is always the owner's desire that his project be unique and better. To a great extent, each project has to be designed and built to serve a specified need. Construction projects are more customized than a routine and repetitive business (Rumane, 2011).

2.5 Definition of Total Quality Management (TQM)

TQM is the most permanent management innovations in recent decades. TQM is defined by several authors as a systems approach, furthermore, TQM is considered by many other authors as a management philosophy that strives for the involvement of organization's stakeholders to attain its set goals (Aletaiby et al., 2016).

TQM is the mutual cooperation of everyone in an organization in order to produce products and service to meet the needs of customers (Dale, 1999 cited in Hansson, 2003). On the other hand, Oakland (1998) cited Hansson, (2003) describe TQM as an approach to progress competitiveness, efficiency, and flexibility for total organization. Similarly, Dahlgaardet al., (1999) cited Hansson,

(2003) describe TQM is increasing customers gratification via continuous improvement involving all employees in the organization.

Total Quality Management is considering every interaction between the various elements of the organization for overall effectiveness and its outcome is greater than the sum of the individual outputs. The management subsystems also require integration, including strategy, with a customer focus, the tools of quality, and employee involvement (Omachonu and Ross, 1994 cited in Shafiq, 2011).

Total Quality Management is often stated that endless journey. It means continuous improvement of service for both internal and external customers. Beside of this, Total Quality Management is a process that actively involves every employee in satisfying customer needs by continuously improving all aspects of work activity through structured control, improvement, and planning methods. It requires a transformation of the roles of all employees empowering them to continuously improve their work processes (Amaniampong & Salakp, 2014).

2.6 Barrier of Quality Management in Construction Industry

Companies are constantly moving ahead towards improving the quality of overall activities to serve the market in a better way (Dahiya and Bhatia, 2013) but still there are challenges that pause the purpose of quality management.

To implement the TQM effectively in any organization, an investigation and assessment of the existing organizational culture and management approach appeared a very important factor and should be taken in consideration in any organization. The organizational culture is how an organization's employees behave with the change of an existing management system (Shegaw, 2019). In addition, Dahiya and Bhatia, (2013) stated that the lack of genuine organization culture poses threats in terms of resistance to change as it is unwilling to accept the techniques that makes a variation in its present style of working.

Dahiya and Bhatia, (2013) stated that all the information flow in the organization at right time and in right manner is necessary. But loopholes in the communication channel act as a barrier in achieving the quality results. Similarly, Fuentes et.al (2000) cited in Shegaw (2019) noted that lack of information and communication routes where this necessary information could flow is a

barrier to implement TOM in Spanish organizations. According to Dahiya and Bhatia, (2013) stated that employees are directly related with the production process, a lack of commitment on their part can render the whole process of quality management useless.

Individual performance and achievement recognition by the top management and the key element in the cycle is that of rewards in order to retain and motivate the staff, especially in work areas facing major competition. While inconsistent reward systems and lack of recognition are other obstacles in implementing TQM in many organizations; they increase the difficulty of consolidating the implementation of the new managerial approach and associated quality practices (Soares & Lucas 1996; Ngai & Cheng 1997 cited in Shegaw, 2019).

2.7 Total Quality Management in Construction Industries

Total Quality Management (TQM) is generally considered to be a higher-level concept of strategic achievement than that provided by a QMS. McGregor and Palmer (2002) describe TQM in three ways of view, firstly it ensures the whole organization is changing every works in to high quality. Secondly, in improving continuous quality management implementation and lastly, achieving its prime objective which is customer satisfaction. The prime objective of construction industries is generating qualified activities and achieve the desired outcomes through improving an effective TQM-based set of values.

Some construction companies have positive achievements from the implementation of QMS in construction companies. While, wrong motives for developing and implementing a TQM have led to a low level of quality work in many construction companies for instance Indonesian construction industry. Body of Construction Development and Investment (BAPEKIN) in Indonesian report shows that Pelita VI road infrastructure project was planned 50% reduction in road infrastructure's, due to this 6% in total damage to completed road works. Therefore, the project loss 7.68 trillion rupiahs by serious damage of project quality (Andi and Chandra 2007).

2.8 Benefit of TQM Implementation

According to Giri 2014) noted that all companies reported that the benefits of TQM were not visible during the early stages of implementation. Companies that had started their TQM initiatives in the late 1980s and early 1990s had not realized the financial benefits/rewards

inherent within TQM until the late 1990s and early 2000. Similarly, Bardoel and Sohal (1999) cited in Giri (2014) reported the benefits achieved adopting TQM in seven Australian construction organizations based on case study research.

Love, Love, Edwards, and Sohal (2004) stated that described by eight Australian construction firms reported the major benefit of initiating a TQM program was increasing awareness and focus by all employees on satisfying both internal and external customers. In addition, they added that there was greater focus by top management on the activities, lower-level employees in the organization, a reduction in the quantity of goods damaged in transit and construction, delivery time, improvement in customer perceptions, better control of processes, organizational competitiveness, reductions in rework, waste and client satisfaction. In the competitive environment, organizations are forced to formulate and implement strategies within global context. Total Quality Management has been described as a management philosophy and a way of thinking that has helped many organizations move towards achieving excellent businesses. TQM helps create a culture of trust, participation, teamwork, quality-mindedness, enthusiasm for continuous improvement, continuous learning and eventually, a working culture that contributes towards a firm's success and existence (Yusof and Aspinwall, 2000).

2.9 Critical Success Factor of Total Quality Management

Different scholars identify different factors to implement TQM successfully. Saraph et al., (1989) cited in Syaj (2015) identify eight success factors of TQM such as top management; role of quality department, training, employee relations, information and analysis, supplier quality management, service design and process of management. However, later some scholars develop different success factor of TQM. For instance, Dale (2003) develops eight factors based on different TQM approaches such as: leadership, strategic planning, customer and marketing focus, human resource focus, process management, continues improvement and supplier management. Similarly, Al-Tayeb (2008) noted 9 success factor of TQM top management; training, employee relations, information and analysis, process management, customer management, continues improvement, planning and employee involvement, communication, material and equipment, finance issue, site layout system and surrounding environment.

Haupt, and Whiteman (2004) asserted that CSF of TQM as follow: management commitment and involvement; customer focus, contractor selection; participative management style; transient nature of workforce; field employees regard TQM as irrelevant; difficulty in measuring results; subcontractors and suppliers not interested in TQM. In addition, determinants of TQ practices for construction firms (Giri, 2014) stated that the result TQ practices can be classified into ten basic areas of management including: top management commitment; employee empowerment and involvement; sub-contracting and vendor involvement; cost of quality; process improvement; continuous improvement; training; customer and shareholder focus; vision, mission, and guiding principles; and quality control policies. Kazaz, and Birgonul, (2005) researched the implementation factors and found out the following success ones ranked in their order of importance: management commitment and involvement; customer focus; well-developed planning; participative management style; continuous improvement measurements; and workers trained in TQM.

Kheni and Ackon (2015) conducted a study on the effect of TQM Practices on construction projects in developing countries and found that TQM practices such as supplier management, process management, planning, top management leadership and commitment, human resource management, teamwork, information analysis and evaluation, quality culture and customer focus had a positive impact on the quality performance of construction projects.

The literature review has identified different CSFs for TQM implementation. Then, selecting criteria of CSFs of TQM for the study has selected nine factors for the purpose of this study based on the investigation of effective implementation of TQM within the Addis Ababa construction industry, it is important to consider the background and environment of the construction sector in the study area.

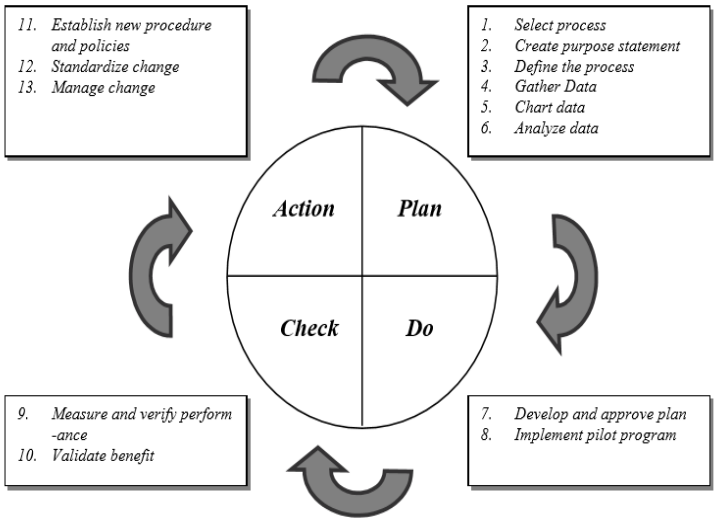
2.9.1 Continuous Improvement

According to Oswald and Burati (1992) stated continuous improvement is the journey of TQM and there is no defined destination. Because it is a collection of improvement centered processes and it became routinely used planned, organized and systematic process of continuing, incremental and company-wide change of current practices meant to enhance company performance (Sherif & Khaled, 2010). In addition, they noted that continuous improvement is one

of the basic principles of TQM and it is the main phase that ensure TQM implementation. Therefore, many companies like construction industries used continuous improvement process in order to provide quality management (Dam, 2010). Similarly, Heath (1989) cited in Sherif and Khaled (2010) asserted that continuous improvement is a necessary objective of TOM implementation. According to Dean and Bowen (1994) cited in Aletaiby et al., (2016) noted that it is also the key factor of organization's better performance and organizational processes.

In the literature of Sherif and Khaled (2010), McNair and Leibfried (1992), Kanji (2012) and argued that continuous improvement is very crucial to achieve quality. According to Claver et al. (2003) continuous improvement mainly focuses on construction improvement related activities in terms of time, cost and product. In addition, Tsang and Antony (2001) noted that employees performance needs to be monitored and improved in a continuous manner. Furthermore, Colling and Harvey (1995) in literature of Sherif and Khaled (2010) stated that quality improvement should be enhance mutually beneficial to clients and construction professionals. Sherif and Khaled (2010) asserted that continuous improvement in the construction sector exploring the expectation and the need of customer and involving to re-assessing the effectiveness of the project in quality.

According to Ahmed (2010) noted that to achieve TQM, continuous improvement consists of nine specific process that emphasizes on focusing the progress, measuring the process, brainstorming for improvement and verification and re-measurement. However, there are four basic element that removing the root cause of problems in order to establishing or/and revising new standards which illustrated in Plan-Do-Check-Action (PDCA) diagram shown (Deming 1986) as follow:



Deming's (2000) noted that PDCA cycle help to improving methods and procedures of continuous improvement by focusing on preventing and correcting defects and construction quality is usually less costly. Similarly, Harrington and Voehl (2012) stated that PDCA cycle can maintain any improvement and prevent deterioration.

Giri (2014) described that continuous improvement is gradual change and improvement and generally refer to incremental changes. Pheng and Ke-Wei (1996) and Giri (2014) argued that improvements may take any one of several forms in construction process such as built teamwork and sprit, reducing waste, defects, errors, and their related costs, increasing effectiveness use of all resources, reduce customer complaints and enhancing value to the customer, meeting singular goal clients' expectations, and examine malfunction or project process and its root cause (Ibid).

Generally, continuous improvement is essential for construction companies to develop better and more direct relationships with employers, to initiate more teamwork at the jobsite, and to produce better quality work (Dam, 2010).

2.9.2 Training and Education in Construction Industry

Employee are contributing to improve TQM by committed to deliver quality, detecting and elimination bottleneck, improve design and setting realistic challenging performance targeted (Al-Tabey, 2008) this is employed by provide resource for employees.

In the current world, training and education are become most famous in any company in order to succeed their goal and survive in the market. Which means, training and education is becoming a necessity for organizations that wish to perform well. Then employee are the main resources to any organizational therefore, employee's competence is a very vital factor for determining the achievement of their prime set, in order to have this, the employees need to be trained and given more education.

Zhang, Waszink, and Wijngaard (2000) believe that training and education is very important for TQM success. In addition, it is essential for developing skills relating to an organization's beliefs and values, and for uniting a culture that places a high value on quality (Rad, 2006 cited in Ahaotu, 2018). While Metri (2005) noted that education and training is not only develop employee's knowledge and skills to perform their jobs, but also to possess specific values, knowledge, and skills associated with TQM issues and activities. Beside of this, Agnaia (1996) stated that training and education is preparing and qualifying organizational employee by providing necessary skill and knowledge for TQM which contribute towards achieving the goals of development plans. Similarly, Rad (2005) cited in Ahaotu (2018) asserted that to implement the TQM philosophy successfully, training is crucial to change the performance of people and their behavior. However, training should be delivered in the form of awareness programs, improvement techniques, cultural change programs, teamwork, use of statistical tools, then all are an important for the development of organizational members and the success of TQM (Arasli, 2002 cited in Ahaotu, 2018).

Any training program on TQM should include disciplined, and organized approach to improving the process. As well as it covers the topics as cause - effect analysis, cost of quality measurement, team problem solving, interpersonal communication and interaction, and gather and evaluate quantitative information (Harrington & Voehl, 2012).

Organization managements should train all their employees for TQM in order to improve their competences in their tasks thus improvement in quality bring success for the firms (Goetsch & Davis, 2009). On the other hands, Deming (1986) stressed that the importance of education and training for continual updating and improvement employees' intrinsic motivation at work more generally, growing, learning, and developing oneself. While lack of appropriate training and inadequate knowledge about TQM lead to fail the company success

Continuous education and training needed in construction industry regarding on its complex nature with work specifications from planning, construction techniques, design to completion stage, Software program, source of materials, workmanship quality…etc (Kulkarni, Sakharale, & Maharashtra, 2002). Particularly, David and Murat (1997) noted that construction industry professionals like engineering, architecture and construction management are take education and training in TOM theory and practice at all operational levels and all phases like design, construction, and operation phases. Similarly, Mahisa Giri (2014) noted that field and office staff, management, technician, engineers, support personnel, and field labor take training for every level with regarding to quality objective and goal of the organization.

The international quality study was conducted research on quality training among 584 companies which was representing four industries found that training and education was the great impact on company success (Kulkarni et al., 2002).

Kulkarni (2002) described that top companies are commonly include in quality training curricula such as:

- Quality understanding and awareness.
- Quality measurement such as performance, cost, and data analysis.
- Management activities and process and defect prevention.
- Team sprit building and quality circle training.
- Customer service and markets.
- Statistical methods.

The important of training

Menon (1992) noted main importance of training for effective implementation of TQM are as follow:

- Change employees' attitude toward quality measurement.
- Make all employees view on quality from the perspective of customers' views.

- Develop management commitment and help to continuous their improvement.
- Employees' skill improved and helped to give best solution for the particular problem.
- Improve employees' decision making in each operational and staff level.
- Encourage group cooperativeness that leading to develop problem-solving skills.
- Understand how to deliver necessary tools for quality performance and measurement.
- Build a team spirit among the workers in different staff.

2.9.3 Supply Management

From the first stage most, firms established partnership with suppliers in order to received high quality products. Therefore, the suppliers should adopt TQM to deliver consistent and high-quality products and/or services timely (Sadikoglu & Oclay, 2014)

In construction industry, quality product mainly depends on the relationship among the more two parties involved in the process. Particularly, quality of the construction largely depends on the constructor that directly related to the quality of the plans which prepared by designer, the quality of the construction equipment and materials supplied by the merchants, and the quality of work that performed by subcontractors (Oberlender, 1993). In addition, Oberlender described that long term commitment between suppliers and construction organization help to maximizing the efficiency and effectiveness of organizational performance and constructor is to achieve the best economy and quality.

Close and long-term relationships with suppliers to the construction process should be based on dedication to common goals, trust, and an understanding of each other's individual expectations and values (Burati, 1992). In addition, supply management before signed contract with suppliers, they try to assure two main issues such as: supplier have a full understanding of the construction material and equipment usage through communicating usage requirements and supplier has the capability to provide a product that meets all fitness for use according to the partner requested on time and requirements (Kulkarni et al., 2002).

Supply management are select qualifying the supplier for achieving their goal and meet their customer need with quality product. Therefore, supply management should assessment of supplier quality capability through the evaluation of product samples and meet their quality requirements

on production through supplier quality survey and supplier's construction industry process (Kulkarni et al., 2002). While poor quality of supplier items the main cause of quality problems.

Contractors are requiring their suppliers to implement TQM if they wish to be considered for future work (Burati, 1992) and constructors are achieve the best economy and quality. Because suppliers have a large and direct impact on quality, cost technology, and project time duration. Therefore, various companies stimulated engineering to learn the system, procedures, and processes of suppliers in order to improve communication, reduce errors, and understand capabilities (Rabaya, 2013).

Peters (1987) stated that successful projects are based on quality, life-cycle costs, and partnership relationships which is expected to be based on mutual trust and those truth proved in certain areas of the construction industry market (Burati, 1992).

Suppliers should recognize the construction firm's real need and expectation through participate in the designing, planning, and production stages. Thus, some companies try to train personnel from suppliers in order to improve their own quality practice (GAO, 1991). Training for suppliers help improving quality and perform to achieve their strategies (Hong, 1993) due to this, suppliers able to supply higher-quality components at a reasonable cost for construction organization. Therefore, the suppliers can adopt TQM and supply management practices assist the suppliers to implement quality management and deliver reliable and high-quality products and/or services timely for according to the partner requested (Sadikoglu & Oclay, 2014).

2.9.4 Understanding of TQM Implementation

All employee in a construction industry contributes to the quality product because each employee controls the project that they are working on. Therefore, each employee fully understands his or her role within the project that led positive attitude (Dam, 2010). Beside of this, Syaj (2015) described that better understand of TQM is able to prepare appropriate methods for poor quality and rework.

According to Brown (1991) stated that employees need educating and training about TQM concepts to understand the importance of what they do and how they can improve their role as part of the functioning of an organization. While employees have a exposure for understanding of

the TQM concepts lead to implement TQM effectively. The reverse is true that employees have lower levels of exposure to TQM lead to do not implement TQM effectively or at all.

When construction company employee begins to understand what kind of management and organization needs, the company become qualified in quality product and meet customers need in line to international competitive standard (Dam, 2010).

Employees also understand the main aim of TQM such as who their customers are; how to implement TQM to give goods and services for customers; what the customers need, want, and expect; how to improve the basic work processes; how to develop quality measurements, and how to keep constant improvement of work processes (Ogbari & Borishade, 2015). Beside of this, Dam (2010) stated that when the employees understand how they can reduce waste and reduce defective of construction companies they able to save money.

2.9.5 Process Management

Within the TQM, Howarth and Greenwood (2018) defined the word "process" as: how work activities are performed. In addition, it involves in all activities and support maintenance, service planning, and training activities. Thus, this process can improve operational activities, increase their productivity, enhance organization service, product, and delivery (Ibid).

A process management refers to a way of getting things done. A process management activity includes of the tasks, plan, procedures, and policies necessary to carry out the customer need. Therefore, the organization should work to improve the process management activities which lead to improve the end product or service (Syaj, 2015).

Rosemann and vom Brocke (2015) and Dumas, Rosa, Mendling, and Reijers (2013) design and argue the implementation of process management for construction industry. Process management implementation designed was applied by Frener and Reifer to the construction of the hospital of Bolzano in Italy. According to Rosemann and Brocke (2015) and Dumas et al., (2013) noted that process management implementing steps are process design, process implementation, continuous monitoring and measurement of the progress.

Process design: as a first step, starting from the approval plan of the activity that locate the tasks to be performed Dallasega et al., (2015). As well as production of a product such as process

design, material flow, and resources planning, is undertaken. Secondly, the the construction companies' employee should discuss how to the main tasks to be performed through their coordinate activities.

Each task is defined as description of the job content, skills required to perform it, resources desired, locations where it must be executed, and expected output (Dallasega, 2016).

Process Implementation: This step should define short term schedule such as number of employers per a day in a given task within duration of the tasks, individual and group task, and others. This help to a way of things done or to achieve process design plan based on actual data on the progress of the work (Marengo et al., 2017).

Monitoring of the Construction Process: is to collect data on the progress of the work on-site from starting point for the scheduling in order updated information on the completed or incomplete tasks based on the data from the monitoring. The data from the monitoring used to update the expected productivity of the tasks (Marengo et al., 2017). In addition, collected data determine the process management is unstable or stable (Orsini, 2000).

2.9.6 Top Management Commitment

According to leadership theory, top management has ability to establish practice a long-term vision of the organization driven by changing customer requirement.

Sharma, Gupta, and Singh (2014) stated that top management has to lead from the front in TQM by taking individual responsibility for implementing, nurturing and refining all TQM activities. Top management commitment is crucial for organization to successfully implement TQM as resources and management leadership are required (Goh, 2000). Then, managers should make sure people are properly trained, capable, and actively participate in achieving organizational goals for long term success (Sharma et al., 2014).

Good management commitment could create quality policy alongside objective, mission and vision for the quality of the company's products and services and its commitment to customers (Goh, 2000). Indeed, the top management should support the TQM implementation by providing all basic and necessary resources, giving strategic direction and creating favorable environment due to these employees become motivated and participate in quality management activities

(Shegaw, 2019). Flynn et al (1995) and Anderson et al (1994) cited in Shegaw (2019) indicated the necessity of top management commitment to influence on the overall attitude and strategic direction of the organization.

Sharma et al., (2014) describe those employees of the firm must be committed for development and a clearly support TQM as the same time commitment needed top management provided. As well as TQM is not a responsibility of a single employee or top managements but both employees and managements are committed for TQM implementation in addition it become normal part of everyone's job and can bring fruitful results in the organization. Contraries incorporate of employees and managements breaking down and barriers to quality (Sharma et al., 2014). Similarly, everyone is responsible for producing quality goods and services, meeting customer requirements, and achieving a company-wide TQM organization (Yusuf, Gunasekaran, & Dan, 2007).

2.9.7 Awareness of TQM Concepts and Purposes

Awareness refers to employee in an organization understands management's quality policy and procedure on current status of QMS (Chin et al., 2000 cited in Ahaotu, 2018). In addition, Crosby (1979) and Dam (2010) argued that the main aim of awareness of TQM is to encourage every employee to feel responsible, have a positive attitude, and can contribute to quality management in their organization as well as (Dam, 2010) noted that employee feel belong to quality organization management. Furthermore, Yahya and Goh (2001) cited in Ahaotu (2018) stated that awareness on TQM the most crucial facilitator for the implementation of quality management. Therefore, every employee in a construction company contributes to the quality of the finished product (Dam, 2010).

AI-Zamany et al., (2002) described that low awareness of QMS issues in a construction company is the main cause of poor implementation of TQM in the organization. Moreover, awareness of TQM related to top and middle management particularly related to middle management (Dopson, Risk, & Stewart, 1992; Wilkinson et al., 1993 cited in Giri, 2014). Because Ishikawa (1985) noted that middle managers are the key players in quality management and they are the regulator for the implementation of TQM in the organization rather than top management. Furthermore, middle managers emphasized, people management skills, teamwork, and technical knowledge (Giri,

2014). Therefore, Giri (2014) asserted that middle management awareness of TQM help to upgrade their communication and presentation skills, group leadership skills, and skills for working with groups and they become the role models in a TQM implementation in organization.

2.9.8 Contractor Selection

There are different types of contracts in construction industries. However, types of contracts in construction industries are affect TQM implementation and also influences both client and contractor (Vangsted, 2009). Client awarding construction projects on different basis. The selection criteria of contract are normally based on price of the project. Such types of contractor selection (Egan, 1998) put the client at risk of quality and standard work. Because project infrastructure has always unpredictable that affect completion within budget, delivery time, meeting the standards of quality expected (Ibid).

Low bid strategies have been the basis for awarding the majority of construction projects, especially subcontracts (Yong and Wilkinson, 2001; Ngowi, 2000; Rwelamila, Talukhaba & Ngowi, 1999) asserted that the lowest bidder reflect low price means low cost and often leads to poor delivery of projects. Most contractors are not willing to take a risk bid attachment like design, maintenance and finance the consequences in order to to prevent any problems that clearly defined in contract. Due to this, public clients agree and understand getting risk to choosing contractor requirement so as such types of contractor selection influence TQM (Vangsted, 2009). Thus, awarding lower bid types of contract agreement provide contractor selection puts the client at risk of quality work and affect quality management of construction project (Ngowi, 2000). Similarly, the impact of low bid subcontracting has negative impact on the implication of TQM on construction sites (Rwelamila et al., 1999)

In the public project, the client choosing profession contract help to control the project and able to get the lowest prices of the work and able to save money. However, public project contract encourages the contractor make better solutions for saving money, but the client has very little influence in use of methods and solutions (Nouban & Abazid, 2017). Generally, lowest-bid tender award processes influenced by corruption-collusion and nepotism that inevitably affect the quality of subsequent construction work (Nouban & Abazid, 2017; Lahndt, 1999).

2.10 Empirical Evidence

This study is focused the implementation of TQM in construction industry and affect the performance of the organization.

The study conducted on construction industry in Pakistan by Nawaz and Ikram (2013) result shows that the main constrain of the industry has been lack of economic while contractor can overcome by taking advantage of TQM philosophy. However, construction companies which was included in the sample are lack of consensus on the implementation of TQM such as absence of quality manuals, lack of management commitment and support, lack of training in TQM, awareness in TQM Philosophy. Additionally, their studies revealed low bidding is the critical factors for Pakistani Construction Industry. Similarly, Al-Sabek (2015) conducted a study on critical factors affecting the implementation of TQM in the construction industry in United Arab Emirates. Al-Sabek result indicated that the main constraints in TQM implementation were lack of education, suppliers and subcontractors and tight scheduling, and nature of construction.

Kheni and Ackon (2015) study on TQM implementation in Ghana's construction industry, identified factor affecting implementation of TQM such as low bid mindset top management commitment and understanding, lack of effective communication, lack of expertise, and lack of training and education to drive construction improvement process. While Ahmed (2010) found lack of employee understanding on TQM, lack of employee understanding on TQM lack of resources/expertise in TQM, lack of training and education to improving their skill, changing attitude and behavior on TQM were the main barriers to TQM implementation. Ahmed (2010) revealed that the cost and schedule taken as major priorities barriers for TQM implementation.

Kazemi (2016) finding shows that most significant factors in TQM implementation in construction firms were lack of client focus, lack of proper training for all workers at all levels, insufficient top management commitment, low bid subcontracting culture. Due to those factors' construction firms were poor performance.

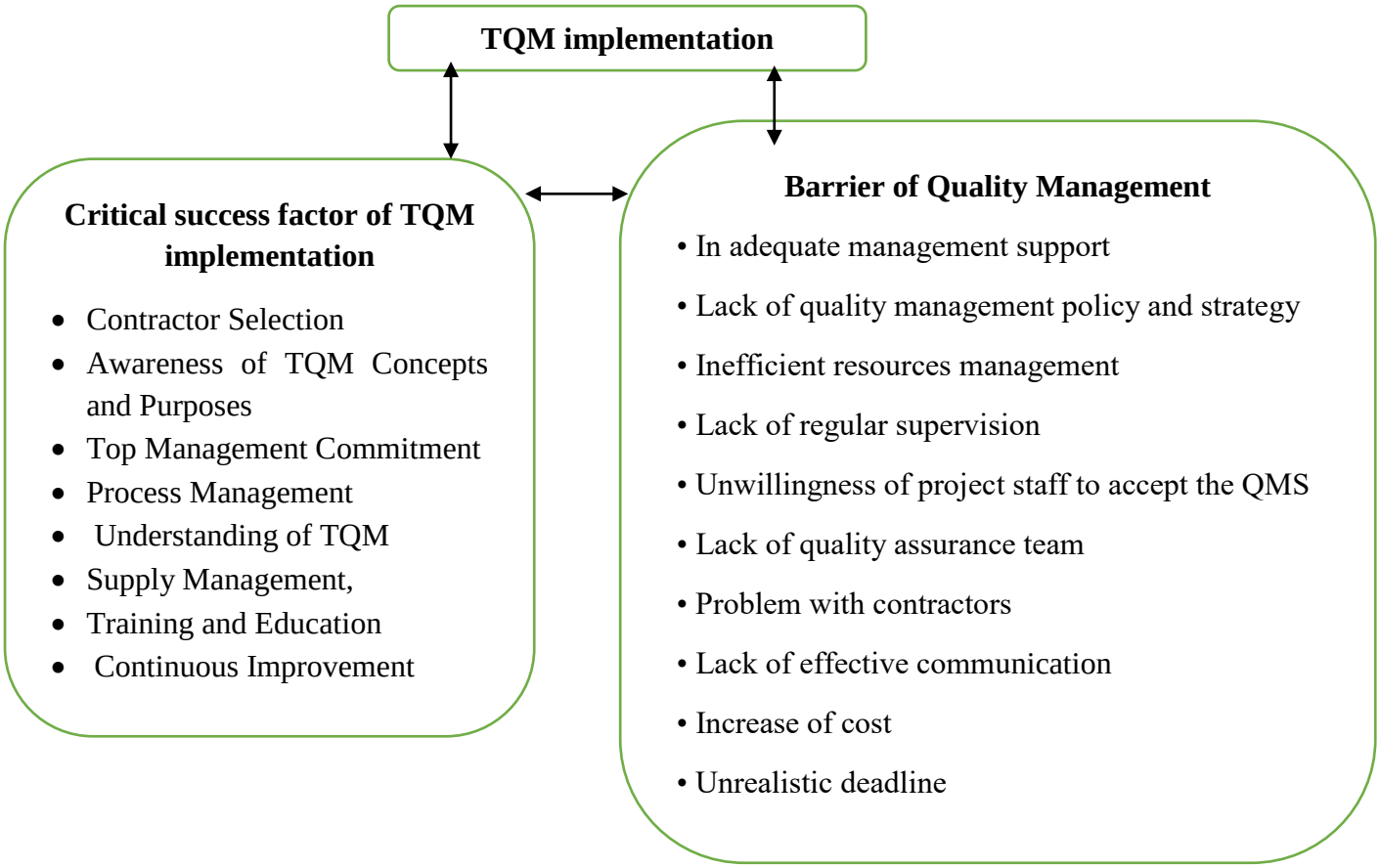
Suganthi et al., (2017) found that supplier related factors affect TQM implementation in the construction industry. Indeed, Ke et al., (2013) study found relationships among partners in terms of higher quality during project implementation leads to improve good project quality and client become satisfied with the project. On the other hand, Raja and Mubeena (2017) studies indicated

that lack of training programs at the top and middle managers' level and contractors lack of gathering facts and records were factor affecting of firm overall performance of operations.

The study conducted on contractor's implementation of TQM in Indonesian by Susilawati, Salim and Soesilo (2005) finding indicated that the main factor affecting of ISO 9001 certified on QMS implementation include lack of top management commitment, lack of appropriate training and education, lack of effectiveness of supplier to supply equipment and material, and lack of applying continuous improvement. Because contractors assumed that the system is only appropriate for manufacturing processes.

2.11 Conceptual Framework

Present literature review indicated that the generally accepted elements of TQM practices that affect construction project quality performance on project sites are: Top Management Commitment and Continuous improvement, Suppler Management, Process Management, Training and education, contract selection, and awareness and understanding of TQM. The interrelationships of the aspects of TQM are represented in the conceptual framework represented by Figure 1. The framework consists of two parts: TQM elements and barriers to the implementation of TQM.



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CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

Research methodology was very crucial that helps the researchers how to address the research problems and provides the overall structure for the procedures that researchers should follow. It was also very important to get meaningful data to achieve objectives of the study. Thus, method of the study consisted such as research design, population of the study, sampling techniques, instruments of data collection, data analysis pilot study, validity and reliability, and ethical consideration.

3.1 Research Design

Explanatory research design could help to clarify, as well as give in depth understanding of, an existing situation to ascertain the problems and to create avenues for more accurate future investigations (Saunders, Lewis, & Thornhill, 2012).

This study used an explanatory research as the study needs to investigate the challenges that face road construction industries implementation of TQM success in Addis Ababa. Exploratory research helps to the researcher seeking guidance, to test ideas, or even to gain ideas about a subject of interest and collecting the information on this basis that leads to achievement of the objectives of the research. In addition, the study was mixed approach which is both qualitative and quantitative approach.

3.2 Population of the Study

According to AACRA data, there are 29 contractor companies, owner force (AACRA), and 19 consultant office who had valid registrations from ERC in road construction field and work with AACRA. The third population was the owner consists of Addis Ababa municipalities (AACRA).

The targeted populations were considered companies had been work within 2016-2021 in road construction in Addis Ababa. Therefore, there are 23 contractor companies, and 14 consultant offices has been participated in road construction in Addis Ababa within 2016-2021. The researcher was selected contractor companies and consultant office based on their partnering and work with ACCRA within five years between 2016-2021.

3.3 Sampling Size and Technique

The study was selected 11 contractor companies and 7 consulting office from 23 contractor companies and 14 consulting respectively. By using stratified sampling technique, strata were made based on contractor companies and consulting offices. Almost 50% of contractor companies and consulting office was selected from each stratum and this help to manage the data for analysis in the main study.

Table Sample size of the firm

Types of organization	Number of organizations	Selected organization
Contractor	23	11
Consultant	14	7
Owner	1	1

Participants was selected from AACRA own force and contractor staff (project manager, site engineer, supervisor engineer, lab assistance, and administration) and consultant staff (Project director, material engineer, structural engineer, and quantity engineer, electric engineer, and surveyor engineer).

Table sample size of the participants

	Contractors		**Consultants**		**Owner**	
		Staff No		Staff No		Staff No
1	Afro Tsion	32	Eng. Zewdie Eskinder	11	AACRA	86

					Own Force	
2	G/Hiwot	25	Classic Consulting Engineers Plc	9		
3	Yotec Construction	35	TDSWS-BDE	12		
4	HAFCON	43	Net Consulting Engineers	9		
5	RAMA	28	Best Consulting Engineers Plc	13		
6	**IFH**	38	Beza Consulting Engineers Plc	8		
7	Macro	31	Omega Consulting Engineers PLC	12		
8	Diriba Defersha	35				
9	Yemaneh Girmay	28				
10	Eshetu Lema	36				
11	Enyi	24				
	Total	355	Total	74	Total	86

The study was selected the respondents within equal chance from each contractor companies and consulting engineering offices. A simple random sampling technique was employed to select participants from each AACRA owner force and contractor companies and consulting engineering offices.

The sample size of the study was determined based on the Krejcie and Morgan (1970) formula recommend in order to determine the sample size of the participants in the study.

The formula as follow;

$$S = \frac{x^2 NP(1-P)}{d^2(N-1)} + x^2 P(1-P)$$

S= require sample size

X^2= the table value of the chi-square for 1 degree of freedom at the desire confidence level (3.841)

N= population size

P= the population proportion (assumed to be 0.5 since this would provide the maximum sample size)

d= the degree of accuracy expressed as proportion (.05)

whereas:

N = 515

$$S = \frac{x^2 NP(1-P)}{d^2(N-1)} + x^2 P(1-P)$$

$$S = 3.841 \times 515 \times 0.5(1-0.5) \div 0.05^2(515-1) + 3.841 \times 0.5(1-0.5)$$

- 494.5 ÷ 1.29 + 0.960
- 494.5 ÷ 2.25
- 219.8 ≅ 220

Table selected sample size

Contractor				**Consultant**			**Owner**		
No	**Name**	Staff No	Selected staff	**Name**	Staff No	Selected staff	**Name**	Staff No	Selected staff
1	Afro Tsion	32	14	Eng. Zewdie Eskinder	11	5	AACRA Own Force	86	37
2	G/Hiwot	25	11	Classic Consulting Engineers Plc	9	4			
3	Yotec Construction	35	15	TDSWS-BDE	12	5			
4	HAFCON	43	18	Net Consulting Engineers	9	4			
5	RAMA	28	12	Best Consulting Engineers Plc	13	6			
6	**IFH**	38	16	Beza Consulting Engineers Plc	8	4			
7	Macro	31	13	Omega Consulting Engineers PLC	12	5			
8	Diriba Defersha	35	15						

9	Yemaneh Girmay	28	12						
10	Eshetu Lema	36	15						
11	Enyi	24	10						
	Total	355	151	Total	74	32	Total	86	**37**

Therefore, the study was selected 151 contractor engineer, 74 consultant engineer, and 37 owner force engineers.

The study was used purposive sampling to select 3 top managements and/or senior engineers in contractor companies and 2 consultant office and 2 owners for the in-depth interview. The above Participants was selected based on their specific positions of hierarchical authority in order to gain information on implementation and barrier of TQM. Because it given a chance for the researcher to apply his/her expertise knowledge to select samples which he/she thinks represent the population.

3.4 Tools of Data Collection

In this study, the data was gathered using two tools which includes:

Structured Questionnaire

Questionnaires was the main data collection instruments to conduct the study. In this particular study questioners were utilized to assess quality management implementation and barrier for road construction industries for the implementation of TQM success in road construction industries in Addis Ababa.

The study consisted of two types of questionnaire such as CSF dimension of TQM and Barrier of TQM implementation. Therefore, 8 CSF dimension of TQM implementation questionnaire was adapted and constructed according to Al-Tayeb (2008); Dale (2003); Syaj (2015), Kheni and Ackon (2015) that argued main critical success factor for TQM for construction industries such as training and education, continuous improvement, understanding of TQM, Contractor Selection, top management commitment. Those TQM dimensions are constructed by the researcher.

Barrier of TQM implementation, supplier management, and process management measurements adapted as follow;

Process management items are adapted from Kheni and Ackon (2015) and Syaji (2015). Similarly, 4 items and 3 items of Supplier Management are adapted from Kheni and Ackon (2015) and Syaji (2015). On the other hand, Barrier of TQM implementation measurement items adapted from different scholars like Tatikonda (1996); Wilson (2003), Low and Pan (2004), Sun (2000); Sherif and Khaled (2010).

Interview

Interview was the second data collection instruments to conduct the study. During this particular study interview was utilized to assess the implementation of TQM and its barrier in the study firm. Then, the interview was developed for top and senior managers of owner constructor, contractor company and consultant office to explore the implementation of TQM dimension and its barrier.

The study was used Semi-structured interview style so as to deal with key themes of the study topic. In addition, it helps to allows flexibility for the researcher to reply to the answers of the interviewees.

The interview provided face to face interaction Top and senior management of participants. The interview was included open ended questions. The interview guide for in-depth interviews consisted of open-ended inquiring to provide clarification on the implementation of TQM and its barrier in their company.

3.5 Data Analysis

This section describes how each study variable was measure then explains the data analysis techniques was employed to achieve the study objectives.

In this study data analysis method was employed to answering the research question. The quantitative data was analyzed with the help of SPSS version 26. One way of ANOVA Inferential statistic was used for construction companies' difference on CSFs of TQM implementation. The

major descriptive statistics technique was used for the questionnaire, such as: frequency distributions and percentage, mean and standard deviation for CSFs of TQM implementation, barrier of QM and TQM in road construction, and for respondents profile the study area. Company profile was presented in figure.

On the other hand, Qualitative data from the open-ended interview part was analyzed using thematic analysis methods. According to Creswell (2014), thematic analysis which is based on the frequent theme of data can be used to make sense of qualitative data. It can be used to analyze qualitative information and to systematically gain knowledge about a person, an interaction, a group, a situation, an organization, or a culture. This study was administered qualitative data in terms of content and where applicable and a quotation form analyze source of challenges on house project in the study site.

3.6 Validity and Reliability

Creswell, (2014) stated that validity is a quality of data gathering instrument that enables it to measure what it is supposed to measure. In addition, Creswell describe validity is about whether one can draw meaning and useful inferences from score on the instrument. To ensure the content validity, the instrument was reviewed by researcher advisor and other experts. In addition to these, the study questionnaire found unsuitable for measuring the variables in the study was either rejected or adjusted to ensure that the right data was gathered for the study.

On the other hand, Reliability is measure of the degree of questionnaire consistent result by coefficient Cronbach Alpha of 0.70 and above (Creswell, 2014). Thus, Cronbach Alpha was employed to test the reliability of the study instrument in pretest and main data gathering process.

It is commonly used as a measure of the internal consistence or reliability of a psychometric test score for a sample of examinees (Creswell, 2014). Cronbach alpha reliability coefficient normally ranges between 0 and 1. The following table shows the reliability decision rule.

Cronbach’s Alpha	Description
>= .9	Excellent
>= .8 but < .9	Good

>= .7 but < .8	Acceptable
>= .6 but < .7	Questionable
>= .5 but < .6	Poor
<= .5	Unacceptable

Source: Zikmund, et al., 2010.

In this study the Cronbach alpha test result is above 0.7. In addition, towards validity and reliability, the questionnaire was pre-tested based on pilot study, and minor improvements were made on the questionnaire following the feedback from the pilot test.

3.7 Pre-testing

The purpose of pre-test is to find out unclear word, instruction of the instrument as well as its comprehensiveness to the respondent.

Pre-testing was conducted using a convenience sample of 10 participants, who was exclude from the final sample, after they finished doing so, a discussion was held with respondents to point out clarifying ambiguous questions and eliminating redundant ones in order to ensure measuring study variability. Pilot study participants asked question clarity and applicability and asked to provide additional comments or concerns regarding the survey instrument. This is to check the applicability of the questions design for the major study to be conducted.

3.8 Ethical Consideration

The researcher clearly explains the purpose of the study to the participants before data gathering. The researcher also secured the informed consent of the participants before collecting the data and ensured that confidentiality concerns are considered following data collection.

The Confidentiality was explicitly written as part of the instruction on the questionnaire and verbally indicated at the time of data collection in that the data was only used for the intended purpose of the study. In addition to this, the researcher informed participants not to write their names on the questionnaires to keep their level of confidence and trust and secure genuine data.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the results of the study with data analysis and interpretation. The part of data analysis and interpretation conducted on the information gathered from primary data sources through the distribution of printed questionnaire to AACRA, contractor office, consultant office.

4.1 Response Rate

220 questionnaires were distributed to 11 Construction Company, 1 owner force, 7 consultant office in Addis Ababa. 215 questionnaires were returned but 5 questionnaires were not returned. However, among 215 the researcher was rejected 8 questionnaires because of incomplete. Therefore, total response rate was 207 (94.09%) that used to analysis the response of participants.

4.2 Participants Profile

Table 4.2.1: Participant profile

	Characteristics	Freq.	%
Gender	Male	167	80.7
	Female	40	19.3
	Total	207	100.0
Education	Diploma	15	7.2
	Degree	118	57.0
	MA	74	35.7
	Total	207	100.0
Work Experience	>-5 year	60	29.0
	5-10 Year	71	34.3
	10-15 Year	61	29.5
	>15 Year	15	7.2
	Total	207	100.0
Age	20-30 year	82	39.6
	30-40 year	66	31.9
	40-50 year	53	25.6
	>50 year	6	2.9
	Total	207	100.0

From the above table age profile of the participants, 39.6% of participants are between 20 and 30 age which was the majority age group and 31.9% of participants are between age of 30 to 40. Regarding on work experience the majority 34.3% of participants have between 5–10-year experience, 29.0 % of participants have between less than 5-year experience. In addition, most 57.0 % of participants were degree holder and secondly 35.7 % of participants have MA degree. There was 80.7% of male and 19.3% of female participant of the study.

4.3 Reliability Test

The researcher used questionnaire to investigate the CSF of Total Quality Management dimension. Then, the researcher asses the reliability and validity of the questionnaire in order to get confidence in comparing the sample with help of SPSS V-26 the most frequently used Cronbach's alpha. The reliability of the items is presented below table 1.

Table 4.3.1: Reliability analysis score

	Types of questionnaire	**Cronbach's Alpha**	**N of Items**
1	Supply management	.79	7
2	Process management	.67	6
3	Training and education	.85	7
4	Contract selection	.80	6
5	Top management commitment	.87	10
6	Understanding of TQM	.88	5
7	Awareness of TQM	.90	8
8	Continuous improvement	.75	7
9	Barrier of TQM implementation	.71	10

The reliability indicated that all question items were > .65 and it is acceptable.

4.4 Critical Success Factor of TQM

TQM is set to be examined using five scales, answering CSF of TQM. Each of the scales are presented separately based on its mean score.

The respondents were asked to rate barrier of TQM implementation and CSF of TQM such as supply management, process management, education and training, awareness of TQM, understanding of TQM, top management commitment, continuous improvement, and contract selection.

4.4.1 Analysis of Supply Management practice

Table 4.5.1: Responses of Supply management Practice

	Items		1	2	3	4	5	Mean	SD
1	Suppliers have good products and services for our firm	Count	13	132	59	3		2.25	.59
		%	6.3	63.5	28.4	1.4			
2	Suppliers are accepting our regular feedback in order to for accomplishing our firm goals	Count	7	153	36	11		2.25	.60
		%	3.4	73.6	17.3	5.3			
3	Suppliers are able to meet our firm quality management requirements	Count	24	142	32	10		2.14	.67
		%	11.5	67.8	11.5	4.8			
4	Suppliers are selected based on their quality specifications such as capability and commitment to product and service quality	Count	16	131	44	16		2.29	.72
		%	7.7	63.0	21.2	7.7			
5	Supply material for the project in a time manner	Count	13	122	57	14		2.35	.70
		%	6.3	58.7	27.4	6.7			
6	My company offers closer and long-term working relationship to suppliers	Count	15	135	47	10		2.25	.66
		%	7.2	64.9	22.6	4.8			
7	My company' purchasing department assumes responsibility for the quality of incoming products	Count	7	112	86	2		2.41	.61
		%	3.4	53.8	41.3	1.0			

Note. 1 = Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; and 5= Strongly Agree.

The above table result revealed regarding on ‘‘Suppliers have good products and services for our firm’’ shows that majority 69.8% of participants were inclined to disagree on the issue and the participants response agreement confirm mean value 2.25. However, 73.6% (153) of participants were disagree on suppliers are accepting our regular feedback in order to for accomplishing our firm goals with mean value of 2.25 and which was significant.

Concerning on ‘‘Suppliers are selected based on their quality specifications’’ shows that 70.7% of participants response were inclined to disagree and response their agreement confirms with mean value of 2.29. Which means Suppliers was not select material based on quality specifications because the mean value was below the threshold. Regarding on ‘‘Suppliers are able to meet our firm quality management requirements’’ shows that 79.3% of participants were inclined to disagree and the participants response agreement confirm mean value 2.14 and significant.

The greatest agreement was achieved for the item stating that ‘‘Supply material for the project in a time manner’’ (M=2.35), which showed that about 65% of the participants disagreed or strongly disagreed with this statement. This indicated that supplier did not deliver material and equipment on time. This was followed by almost 73.1% who disagreed or strongly disagreed that ‘‘my company offers closer and long-term working relationship to suppliers’’ requirements or pressures’ (M=2.25) which was significant. This is close ranked, were 57.2% who disagreed that, ‘’My company’ purchasing department assumes responsibility for the quality of incoming products’’ (M =3.47) and significant.

4.4.2 Analysis of Process Management practice

Table 4.4.2: Response of Process management

	Items		1	2	3	4	5	Mean	SD
1	Clarity of work or process instruction giving to employee, and site staff	Count	24	94	43	35	11	2.59	1.06
		%	11.6	45.4	20.8	16.9	5.3		
2	Clear procedure for accepting performed activities	Count	39	44	113	11		2.46	.86
		%	18.8	21.3	54.6	5.3			
3	Using of a comprehensive and continuous supervision system	Count	19	35	142	11		2.70	.709
		%	9.2	16.9	68.6	5.3			
4	My company conducts inspection on completion of the construction project work	Count	23	22	143	19		2.76	.768
		%	11.1	10.6	69.1	9.2			
5	My company uses flow chart, inspection and supervision for activities that directly affect quality	Count	32	112	58	5		2.17	.710
		%	15.5	54.1	28.0	2.4			
6	My company practice process management include quality measures	Count	13	141	52	1		2.20	.544
		%	6.3	68.1	25.1	.5			

Note. 1 = Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; and 5= Strongly Agree.

Concerning on ‘‘Clarity of work or process instruction giving to employee, and site staff’’ shows that 57.0% and 22.1% of participants response were inclined to disagree and agree respectively. The participants agreement confirms with mean value of 2.59. The result revealed that employee did not get clear work.

At the other end of the scale, the two statements to have generated more disagreement than agreement, and these were, ‘‘My company uses flow chart, inspection and supervision for activities that directly affect quality’’ (M=2.17) and ‘‘My company practice process management include quality measures’’ (M=2.20). The agreement was 54.1% and 68.1%, respectively.

Regarding on ‘‘Customers trust effective implementation of organization rule and regulation’’ show that 49.88% of participants response were dissatisfy and 36.9% of participants response were satisfy on the issue. The participant response agreement confirms with result mean value of

2.99. Participants were 18.8% strongly disagree, 21.3% disagree, 54.6% Neutral, and 5.3% agree on Clear procedure for accepting performed activities. Their response agreement confirms with mean value of 2.46.

Participants were 27.1% inclined disagree, 5.3% inclined agree, and 68.6% neutral response on using of a comprehensive and continuous supervision system. The participants response agreement confirms mean value 2.70 and significant. This is close ranked, were 21.7%, 9.2% and 69.1% who inclined disagreed, agree, and neutral respectively that, ‘‘My company conducts inspection on completion of the construction project work’’ (M =2.76).

4.4.3 Analysis of Training and Education implementation

Table 4.4.3: Responses of Training and education

	Items		1	2	3	4	5	Mean	SD
1	Training was adequate to work on quality improvement	Count	42	44	106	15		2.45	.89
		%	20.3	21.3	51.2	7.2			
2	Training is given for developing team spirit	Count	28	149	19	10	1	2.07	.67
		%	13.5	72.0	9.2	4.8	.5		
3	Training is given work with new technology or equipment	Count	28	161	5	12	1	2.02	.66
		%	13.5	77.8	2.4	5.8	.5		
4	Training is given to work with new methods, systems or procedures	Count	22	152	9	24		2.17	.77
		%	10.6	73.4	4.3	11.6			
5	Training is given for adding skills to basic job	Count	49	150	8			1.80	.48
		%	23.7	72.5	3.9				
6	Training is given for work with new methods systems	Count	18	69	107	13		2.56	.74
		%	8.7	33.3	51.7	6.3			
7	Training courses is given for employees in quality improvement skill and techniqual	Count	36	149	8	14		2.00	.69
		%	17.4	72.0	3.9	6.8			

Note. 1 = Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; and 5= Strongly Agree.

The above table result illustrated on concerning on ‘‘Training was adequate to work on quality improvement’’ shows that participant response was 41.6% inclined disagree, 52.1% neutral, 7.2% agree. While participant response agreement confirms mean value of 2.45 and significant.

Majority 85.5% of participants were inclined to disagree on training is given for developing team spirit. While participant response agreement confirms mean value of 2.07 which was significant.

This is close ranked, were 57.2% who inclined disagreed that, 'Training is given work with new technology or equipment'' (M =2.02) and significant.

The two statements to have generated more disagreement and these were, ''Training is given to work with new methods, systems or procedures'' (M=2.17) and ''Training is given for adding skills to basic job'' (M=1.80). The disagreement was 73.4% and 72.5% respectively. This was closely followed by 72% who agreed that "Training courses is given for employees in quality improvement skill and techniqual'' (M=2.00).

With regarding to ''Training is given for work with new methods systems'' shows that 8.7%, 33.3%, 51.7%, and 6.3% of participants were responded strongly disagree, disagree, neutral, and agree on the issue. Participant responses confirm their agreement with mean value 2.56.

4.4.4 Analysis of Contract Selection PRACTICE

Table 4.4.4: Response of contract selection

	Items		1	2	3	4	5	Mean	SD
1	Level of technology use	Count	12	67	105	22	1	2.68	.76
		%	5.8	32.4	50.7	10.6	.5		
2	Written contract document is clear and fair	Count	35	118	4	30	20	2.43	1.20
		%	16.9	57.0	1.9	14.5	9.7		
3	Bill of quantity is very detailed and accurate	Count	23	119	42	23		2.31	.81
		%	11.1	57.5	20.3	11.1			
4	The amount of contractor's cash flow	Count	23	108	39	20		2.39	.95
		%	11.1	52.2	18.8	9.7			
5	Skill and experience of contractor's staff, and using labors with high experience	Count	26	116	30	21	14	2.39	1.05
		%	12.6	56.0	14.5	10.1	6.8		
6	Procedure of selecting contractors and awarding to the lowest evaluation bidders	Count	29	60	87	31		2.58	.91
		%	14.0	29.0	42.0	15.0			

Note. 1 = Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; and 5= Strongly Agree.

With regarding to ''Level of technology use'' shows that 38.2% and 50.7%, and 11.1% of participants response were inclined disagree, neutral and agree, respectively. Participant responses confirm their agreement with mean value 2.68.

The two statements to have generated 57.0% and 57.5% disagreement on ''Written contract document is clear and fair'' (M=2.43) and ''Bill of quantity is very detailed and accurate''

(M=2.31) and which was significant. Participant were responded 33.0% inclined disagree, 42.0% neutral, and 15.0% agree on procedure of selecting contractors and awarding to the lowest evaluation bidders: result mean value of 2.58 and significant.

With regarding to ‘‘The amount of contractor’s cash flow’’ shows that majority 52.2% of participants response were inclined to disagree on the issue with mean value of 2.39. Similarly, majority of the 56.0% of participants were disagree on skill and experience of contractor’s staff and using labors with high experience. Participant responses confirm their agreement with mean value 2.39 and insignificant.

4.4.5 Analysis of Top Management Commitment

Table 4.4.5: Response of Top management commitment

	Items		1	2	3	4	5	Mean	SD
1	Top management is the driving force behind our quality improvement efforts	Count	16	145	41	5		2.17	.59
		%	7.7	70.0	19.8	2.4			
2	Top management actively participates in quality management and improvement process	Count	23	139	17	28		2.24	.82
		%	11.1	67.1	8.2	13.5			
3	Top management allocates adequate resources to quality improvement	Count	18	149	39	1		2.11	.533
		%	8.7	72.0	18.8	.5			
4	Top management is strongly committed to improving product quality to meet our customers' expectations	Count	20	157	12	18		2.14	.69
		%	9.7	75.8	5.8	8.7			
5	Top management regularly held meetings discusses and reviews quality-related issue	Count	29	125	25	28		2.25	.86
		%	14.0	60.4	12.1	13.5			
6	Top management encourages quality related concepts and skills	Count	21	107	30	49		2.52	.97
		%	10.1	51.7	14.5	23.7			
7	Top Management sets the company quality policy and implements it by providing resources and training	Count	10	6	87	46		2.82	.83
		%	4.8	30.9	42.0	22.2			
8	Top management follows long-term quality improvement process	Count	11	59	106	31		2.76	.77
		%	5.3	28.5	51.2	15.0			
9	Top management is visibly involved in the development of an effective quality culture	Count	1	52	119	35		2.91	.66
		%	.5	25.1	57.5	16.9			
10	Top Management reviews the TQMS functioning	Count	1	46	95	65		3.08	.74
		%	.5	22.2	45.9	31.4			

Note. 1 = Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; and 5= Strongly Agree.

With regarding to ‘‘Top management is the driving force behind our quality improvement efforts’’ shows that majority 70.0% of participants response were inclined to disagree on the issue

with mean value of 2.17. Participant were responded 11.1% strongly disagree, 67.1% disagree, 8.2% neutral. and 13.5% agree on Top management actively participates in quality management and improvement process. Participant responses confirm their agreement with mean value 2.24 and significant.

Majority of 72.0% participants response were inclined disagree on top management shares information about the organization; result mean value 2.11. Similarly, 75.8% of participant response inclined to disagree top management is strongly committed to improving product quality to meet our customers' expectations; result mean value of 2.14 which was significant.

The two statements to have generated 60.4% and 51.7% disagreement on ‘‘Top management regularly held meetings discusses and reviews quality-related issue’’ (M=2.25) and ‘‘Top management encourages quality related concepts and skills’’(M=2.52) and which was significant. Participant were responded 35.7% inclined disagree, 42.0% neutral, and 22.2% agree Top Management sets the company quality policy and implements: result mean value of 2.82 and significant.

Concerning on ‘‘Top management follows long-term quality improvement process’’ shows that participants were 33.8% inclined to disagree, 51.2% neutral, and 15.0% inclined to agree: result mean value of 2.76 and significant. While, with regard to ‘‘Top management is visibly involved in the development of an effective quality culture’’ shows that majority of 72.4% of participants response inclined to agree: result mean value of 2.91 and significant. Majority of 72.3% participants response were inclined agree on Top Management reviews the TQMS functioning; result mean value 3.08.

4.4.6 Analysis of Understanding of TQM

Table 4.4.6: Response of understanding of TQM

	Items		1	2	3	4	5	Mean	SD
	TQM helps to strengthen the control over operations	Count	3	43	44	81	36	3.50	1.05
		%	1.4	20.8	21.3	39.1	17.4		
2	TQM can be used to demonstrate that this is a total quality organization	Count	1	36	65	87	18	3.41	.89
		%	.5	17.4	31.4	42.0	8.7		
3	TQM can reduce resource wastage	Count	3	40	65	80	19	3.35	.99
		%	1.4	19.3	31.4	38.6	9.2		
4	TQM can provide a disciplined means of producing goods/services for customers	Count	8	36	70	73	20	3.29	.87
		%	3.9	17.4	33.8	35.3	9.7		
5	TQM can help to improve customer satisfaction	Count	3	25	65	96	18	3.49	.85
		%	1.4	12.1	31.4	46.4	8.7		

Note. 1 = Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; and 5= Strongly Agree.

The above table shows that 56.5% of participants were agree on TQM helps to strengthen the control over operations with mean value of 2.60. With regarding to ‘‘TQM can be used to demonstrate that this is a total quality organization’’ shows that 50.7% of participants were agree 3.50 and significant.

Participants were 19.3% disagree, 31.4% neutral, 38.6 % agree on TQM can reduce resource wastage. Participant responses confirm their agreement with mean value 3.35 and significant. The two statements to have generated 45.0 % and 21.3% inclined to disagreement on ‘‘TQM can provide a disciplined means of producing services for customers’’ (M=3.29) and ‘‘TQM can help to improve customer satisfaction’’(M=3.49) respectively.

4.4.7 Analysis of Awareness of TQM

Table 4.4.7: Response of awareness of TQM

	Items		1	2	3	4	5	Mean	SD
1	TQM is associated with a cultural change	Count	6	42	71	88		3.16	.85
		%	2.9	20.3	34.3	42.5			
2	TQM approach involves everyone in an organization	Count	13	34	34	99	27	3.45	.85
		%	6.3	16.4	16.4	47.8	13.0		
3	TQM leads to employee empowerment	Count	5	49	27	88	38	3.51	1.14
		%	2.4	23.7	13.0	42.5	18.4		
4	TQM emphasizes teamwork	Count	5	33	56	77	36	3.51	0.91
		%	2.4	15.9	27.1	37.2	17.4		
5	TQM is related to continuous improvement	Count	3	29	80	85	10	3.34	.83
		%	1.4	14.0	38.6	41.1	4.8		
6	TQM's primary focus is on customer satisfaction	Count	3	24	77	80	23	3.46	.89
		%	1.4	11.6	37.2	38.6	11.1		
7	TQM needs committed leadership and strong top-management support	Count	6	31	84	68	18	3.29	.93
		%	2.9	15.0	40.6	32.9	8.7		
8	TQM requires increased and continuing education and training	Count	3	35	92	69	8	3.21	.82
		%	1.4	16.9	44.4	33.3	3.9		

Note. 1 = Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; and 5= Strongly Agree.

Concerning on ''TQM is associated with a cultural change'' shows that 23.2%, 42.5%, and 34.3% of participants response were inclined to disagree and agree and neutral respectively and their agreement confirm with mean of 3.16. majority 60.8% of participants were agree on TQM approach involves everyone in an organization; result mean value of 3.45 which was significant. Similarly, majority 60.9% of participant were inclined to agree on TQM leads to employee empowerment: result mean value of 3.51.

45.0 % and 21.3% of participants were inclined to disagreement on ''TQM emphasizes teamwork'' (M=3.51) and ''TQM is related to continuous improvement'' (M=3.49) respectively. With regarding on ''TQM's primary focus is on customer satisfaction'' shows that majority 49.7% of participant were inclined to agree on the issue with mean value of 3.46.

Participants were 17.9% inclined to disagree, 40.6% neutral, 41.6% inclined to agree on TQM needs committed leadership and strong top-management support. Participant responses confirm

their agreement with mean value 3.29 and significant. Concerning on ‘‘TQM requires increased and continuing education and training’’ shows that participants were 16.9%, disagree, 444% neutral, 33.3% agree; result mean value of 3.21.

4.4.8 Analysis of Continuous Improvement practice

Table 4.4.8: Response of continuous improvement

	Items		1	2	3	4	5	Mean	SD
1	Company policy in relation to quality	Count	9	106	67	21		2.49	.74
		%	4.3	51.2	32.4	10.1			
2	Change the firm policy in relation to quality gradually	Count	18	90	73	18	8	2.56	.91
		%	8.7	43.5	35.3	8.7	3.9		
3	Identification of area for quality improvement and implement	Count	7	56	64	53	27	3.18	1.07
		%	3.4	27.1	30.9	25.6	13.0		
4	Finding the root cause in the diagnosis of problems and defects	Count	3	23	38	103	40	3.74	.94
		%	1.4	11.1	18.4	49.8	19.3		
5	Identification of quality tools	Count	15	39	9	90	54	3.62	1.25
		%	7.2	18.8	4.3	43.5	26.1		
6	Organization reinforces continuous study and improvement of its services	Count	5	78	77	38	9	2.85	.90
		%	2.4	37.7	37.2	18.4	4.3		
7	Program aimed at finding time and cost losses in all internal processes	Count	4	17	91	4		3.36	1.25
		%	1.9	8.2	44.0	44.0			

Note. 1 = Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; and 5= Strongly Agree.

With regarding to ‘‘Company policy in relation to quality’’ shows that majority 55.5% of participants response inclined to disagree on the issue with mean value of 2.49. Participant were responded 82.2% inclined to disagree, 35.3% neutral, and 12.6% agree on change the firm policy in relation to quality gradually their response confirm agreement with mean value 2.56.

Concerning on ‘‘Identification of area for quality improvement and implement’’ shows that participants were 30.5% inclined to disagree, 30.9% neutral, and 38.6% inclined to agree: result mean value of 3.18. While, concerning on ‘‘Finding the root cause in the diagnosis of problems and defects’’ shows that majority of 70.0% of participants response inclined to agree: result mean value of 3.74. Similarly, 69.4% of participants were agree on identify quality tools for road construction; result mean value of 3.62.

Participant were responded 40.1% inclined to disagree, 37.2% neutral, and 22.7% agree on the organization reinforces continuous study and improvement of its services and their response confirm agreement was mean value 2.86. Majority of 44.4% of participants response inclined

agree on program aimed at finding time and cost losses in all internal processes; result mean value 3.36.

4.5 Analysis of Barrier of TQM Practice

Table 4.5.1: Respondents of barrier of TQM

The respondents were asked to rate barrier of TQM implementation. Each of the scales are presented separately and each item presented based on their mean score as follow:

	Items		1	2	3	4	5	Mean	SD
1	Company employees are appointed to positions with having the skills to undertake the role effectively	Count	4	4	36	115	48	3.74	1.07
		%	1.9	1.9	17.4	55.6	23.2		
2	The employees see the total quality management system as a tool to criticize employee performance	Count	19	87	88	13		2.38	.814
		%	9.2	42.0	42.5	6.3			
3	Insufficient technology and poor-quality management practices ' currently exist in the organization	Count	2	70	81	41	13	2.81	.96
		%	1.0	33.8	39.1	19.8	6.3		
4	There is government financial support to help ' the organization to implement a TQM system	Count	30	107	64	6		2.17	.76
		%	14.5	51.7	30.9	2.9			
5	Communication between organization departments is effective	Count	13	600	75	51	8	2.82	1.02
		%	6.3	29.0	36.2	24.6	3.9		
6	There is low general sense of morale in the organization	Count	1	38	103	56	9	3.01	.93
		%	.5	18.4	49.8	27.1	4.3		
7	Quality objectives are clearly identified to employees	Count	44	87	38	28	19	2.31	1.11
		%	21.3	42.0	18.4	13.5	4.8		
8	There is a cooperation from customers	Count	27	116	46	17	1	2.20	.87
		%	13.0	56.0	22.2	8.2	.5		
9	TOM systems are too difficult to learn and implement	Count	24	115	64	3	1	2.17	.73
		%	11.6	55.6	30.9	1.4	.5		
10	There is expertise in Total quality management in the industry generally	Count	45	120	38	3	1	1.95	.73
		%	21.7	58.0	18.4	1.4	.5		

Note. 1 = Strongly Disagree; 2= Disagree; 3= Neutral; 4= Agree; and 5= Strongly Agree.

According to table 4.6.1 result majority 78.9% of participants response inclined to agree on company employees are appointed to positions with having the skills to undertake the role effectively; result mean value of 3.74. However, 51.2% of participant response inclined to disagree on employees see the total quality management system as a tool to criticize employee performance. And participant response confirms their agreement with mean value 2.38.

Participant were responded 1.0% strongly disagree, 33.8% disagree, 39.1% neutral and 19.8% agree on insufficient technology and poor-quality management practices in their organization. Participant responses confirm their agreement with mean value 2.81 and significant. Majority of 66.1% participants response were inclined disagree on there is government financial support to implement TQM system to the organization; result confirm mean value 2.17 which was significant. Regarding to ‘‘Communication between organization departments is effective’’ shows that 29.0%, 36.2% and 24.6% of participants were disagree, neutral, and agree respectively and the result confirm their agreement mean value of 2.81.

Participant were responded 18.9% inclined disagree, 49.8% neutral, and 31.4% inclined to agree on there is low general sense of morale in the organization: result mean value of 3.01 and insignificant. The two statements to have generated 63.3% and 68.0% inclined disagreement on ‘‘Quality objectives are clearly identified to employees’’ (M=2.31) and ‘‘There is a cooperation from customers’’(M=2.20) and which was significant. Similarly, On the statements ‘‘TQM systems are too difficult to learn and implement’’ and ‘‘There is expertise in Total quality management in the industry generally’’ shows that 67.2% and 79.7% of participants response inclined to disagree with mean value of 2.17 and 1.95 respectively.

4.6 Organizational Type Difference in Implementation of TQM

This section presents the relation between the organization type and CSF of TQM that have significant difference in implementation of TQM dimension. One way of ANOVA was employed to identify CSFs of TQM practice between construction companies.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Supply Management	Between Groups	.276	2	.138	.721	.487
	Within Groups	39.041	204	.191		
	Total	39.317	206			
Process Management	Between Groups	.546	2	.273	1.144	.321
	Within Groups	48.644	204	.238		
	Total	49.189	206			
Training and Education	Between Groups	.810	2	.405	1.470	.232
	Within Groups	53.719	195	.275		

	Total	54.529	197			
Contract selection	Between Groups	51.123	2	25.562	114.865	.000
	Within Groups	45.397	204	.223		
	Total	96.521	206			
Top Management	Between Groups	.001	2	.000	.001	.999
	Within Groups	53.639	204	.263		
	Total	53.640	206			
Understanding of TQM	Between Groups	58.891	2	29.445	174.725	.000
	Within Groups	34.379	204	.169		
	Total	93.270	206			
Awareness of TQM	Between Groups	97.184	2	48.592	713.056	.000
	Within Groups	13.902	204	.068		
	Total	111.086	206			
Continuous Improvement	Between Groups	52.676	2	26.338	239.455	.000
	Within Groups	22.438	204	.110		
	Total	75.114	206			

Table 4.7.1 shows that there was a significant difference road construction companies on Continuous Improvement implementation in their organization, F (2,204) = 239.45, p=. 000. In addition, there was significant difference of construction companies on awareness of TQM practice, F (2, 204) = 713.056, p=. 000. Lastly, construction companies in Addis Ababa were significant difference on Understanding of TQM, Contract selection practice at F (2, 204) = 174.725, p=. 000 and F (2, 204) = 114.865, p=. 000 respectively.

As we see the above table construction companies were not significant difference on Supply Management, Process Management, Training and Education, Top Management practice (P>0.05).

4.7 Ranking of CSFs of TQM

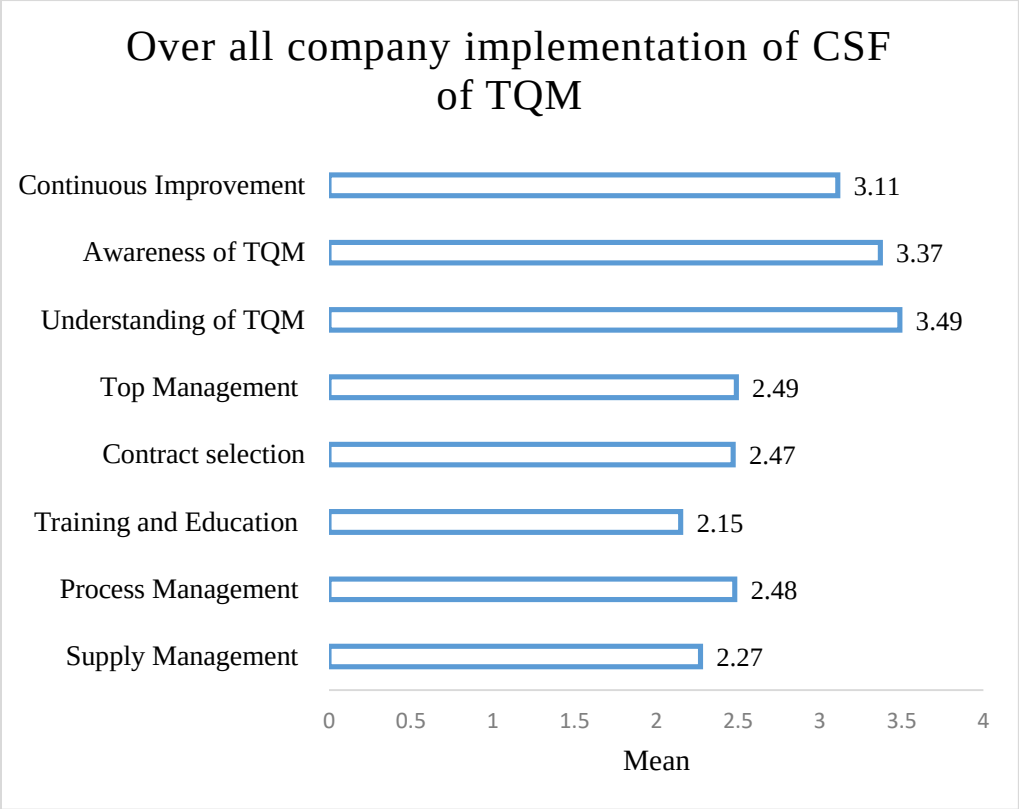

Figure 1: Implementation of CSFs of TQM in all company

As we see the above figure training and education for TQM, supply and process management, contract selection, top management commitment on TQM were low practice in road construction in Addis Ababa. While all company had high practice on understanding of TQM, awareness of TQM and continuous improvement.

4.8 Qualitative Data Analysis

The eight interviewee participants from consultant, contractor and owner office were conducted in the study and interested to give their perspectives a bout TQM implementation and its barrier. Their view and opinion are described in two themes which is CSFs of TQM implementation and barriers of TQM implementation in their company presented as follow.

Most interviewees participant supported the view that this caused the improve of practical methods through TQM. As interviewees opinion most respondents understood quality improvement from expert point of view. As contractor interviewees (I) stated as follow:

> ''….. *international performance standards guide is important to improving company performance. Then we need to understand what and what way to improve each level of company employee performance. Our company was awarded with an ISO 9001 and it indicates that how important is total quality to us*.''

Moreover, from the consultant of our interviewees describe that TQM used particular associated with technical aspects of management and it's on department which is quality department. In addition, from owner force interviewees they believe and understand TQM in a wrong way. This shows as ''you can get more information about TQM from road quality experts''. Similarly, owner employee understood TQM is important for specific department particularly for technical works but not need for whole organization department. In addition, most interviewee agreement that contractor, consultant, and owner force (client) are aware and understand TQM philosophy. However, participants argued that most employee in private contractor and owner company has not equal awareness and understanding on TQM philosophy implementation.

All interviewee argued that employee receive training in the quality procedures relevant to their own work. But sub-contractor did not get TQM. Participant contractors describe the reason why sub-contractors did not received TQM training because training program for sub-contractor is seen as an added cost.

All interviewees argue that they are not identify a new skill are needed in order to develop each level of employee. Generally, all interviewee argued that TQM are integrated properly into the road construction industry but difficult implement it. Due to this contractor interviewee raise the consequence as ''time, money and resources are wasted on construction projects because of poor-quality management due to lack of commitment to implement TQM''. Particularly, contractor interviewee describes importance of TQM for construction industry but as business company especially in Ethiopia it is difficult to implement TQM because the company have not guaranty to service in the market due to internal and external barrier/pressure.

Regarding on supply management, all interviewee argued the relationship between contractor and supplies are short term. Contractors award bid for material and equipment supplier, therefore contract administration team focused on low bid of supplier. However, suppliers deliver material and equipment are mostly do not meet contractor requirement as they expected. Alongside, construction material and equipment cost are increase day to day and suppliers did not deliver material and equipment on time. Contractors try to handle supply by their own whether prepare form local resource like sand or purchased material from foreign suppliers. Generally, contractors noted that contractors are could not perform supply management as expected. Deliver material on time, quality material and equipment are the main obstacle for supply management in road construction industries.

Clients award bid for contractors based on contract selection criteria. However, contractors stated that bid award specification are not consider our country status and contractor capacity which is difficult implement in the country. Client contract administration mainly focus on contractor previous performance and financial and technical capacity. Client contract administration select contractors starting from 50-60% and above financial award to complete the project, then they select lower bid contractors. Therefore, contract selection process influence TQM implementation in the contractor company. Not only that, it influences contractor that select sub-contractor. The main work of road construction project activities is performed by sub-contractor. Indeed, contractors award bid for sub-contractor and contract management team set criteria to select sub-contractor bid depend on their previous performance, recommendation, and mainly focus on lower bid due to their financial capacity. Lastly, as they said they select 2^{nd}, 3^{rd}, and 4^{th} lower bid of sub-contractor and made barging with those sub-contractors to fulfil contractor criteria requirement as much as possible.

The cost of construction is ever increasing due to different condition for instance lack of currency exchange. In addition, contractor and consultant interviewee argued contract selection award from client the main obstacle for quality production in the industry. Because, based on the client selection and contractors low bid is one of the standard criteria that contractors select sub-contractors. Moreover, contractor interviewee said as:

"To be honest, our company profits depend on the government to give us the road project. Then, we are trying to implement TQM for promotion in order for us for profit and winning market to survive in this business.''

Most contractors certified International Standard Organization (ISO). However, from participants interviewee their company try to implement TQM and but not yet meet its standard.

Top management understand and aware the benefit of TQM system applies in the road construction industries. Contractor participants described top management particularly company owner commitment on the implementation of TQM in the company as follow:

''they give more attention to meet and follow client interest and client's political agenda instead of committed to implement TQM in order to get other bid award and get early and enough money for project performance from owner of the project office. In short, good relationship with clients who are top management make his company profit.''

Road construction company included in the study has policies and procedures to perform their work effectively. In addition, each department and employee responsibility and construction quality are set their policies and procedures. Furthermore, each work and activities have in all department of the company. However, participants argued that most process management are only paperwork than implementation.

Some participant of the study stated that they set plan with schedule and record each report include site activities. Supervisory are trying to inspect the project activities and give immediate solution. Therefore, recording activities and follow up help for top management to make decision. While, from the consultant side and owner force describe activities based on set schedule did are not get early follow up and recording information in well manner. Generally, participants argued that all documents are documented but the management did not analysis those documents immediately to reduce wests and other problems.

Barrie of TQM implementation

The barrier of TQM implementation in Addis Ababa road construction sectors was explored in the interviews and clearly described as follow.

Most of the participant agree lack of adequate training systems in their organization and which is the main cause barrier of TQM. Many organizations tend give training once in the year due to financial problems created by external constraints. Ans also, many trainings focused on specific departments rather than train all the firm's employees in methods of TQM.

On the other hand, communication (one way) and collaboration of consultant, contractor and owner force were poor. Those Without proper communication and collaboration of stakeholders the main hinder of TQM implementation.

Almost all interviewee described the potential barriers to TQM implementation among construction firm include lack of management's commitment to quality assurance, lack of effective supervision, lack of effective communication, lack of proper equipment available for use, insufficient technology, and lack of a quality assurance team. Additionally, employee and human source also the other factor that limit the practice of TQM who work in Addis Ababa Road construction.

Generally, company participants particularly from contractor company describe barrier of TQM more influence by internal factors which is corruption, qualified human power, lack of equipment and material quality and delivery on time, lack project owner commitment. Similarly, financial problem which means contractor company did not got project financial from owner of the project on time. In addition, lack of equipment and material quality and delivery on time from suppliers are the direct cause of the lag of road construction company in Addis Ababa in implementing TOM.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The study assesses Total Quality Management Practices of Addis Ababa contractors, consultant and owner office those work between 2016-2021 in Addis Ababa Road construction.

The main findings of the study revealed that practice of CSFs of TQM such as supply management, process management, contract selection, top management commitment, continuous improvement, training and education, awareness and understanding of TQM.

Training and education practice in three companies who participated in Addis Ababa Road Construction was poor. Additionally, the training was not strengthening employee skills, and all acquire skills and knowledge of the work. The finding shows that training for employee in each level is not adequate. While contractors were highly prepared training and education for their employee to enhance site engineer, and specific company department. Contrary, consultants and owner force company were low to give training and education for employee thus this affects their performance.

Awareness and understanding of TQM of contractor, consultant, and owner force were the main critical factor of TQM practice in Addis Ababa road construction. While those company and individuals had different Awareness and understanding of TQM. Therefore, top management, and all company had good awareness and understanding of TQM. Contractor had higher awareness and understanding and consultant and owner force lower understanding and awareness of TQM. Therefore, consultant and owner force awareness and understanding of TQM affect their organization performance.

The other dimension of CSFs of TQM is supply management that practice in companies the study result indicated that low implementation in road construction industry in Addis Ababa. In addition, companies had short term relationship with supplies because of inadequate and lack of equipment and material quality. Due to this all companies did not properly get basic equipment and material on time. Beside of this, supplies were not getting any training about TQM to deliver

quality supply as expected and delay to deliver the material to the on time for their partners. All companies who work road construction in Addis Ababa were suffered to get quality equipment and material with constant cost. Companies included in the study had short term relationship with their partners and supplier did not deliver quality material and delay deliver supply to their partners. So as the project become delay, cost overrun and influence on road quality.

Contract selection practice in road construction companies in Addis Ababa the study result revealed that owner contract administration bid selection criteria mostly based on low bid rather than focusing quality and contractor performance. Which indicated that project quality performance had not any value for awarding bid. Similarly, contractor awarding bid to sub-contractor and supplies was more focused on lower bid. Therefore, the overall result of contract selection was poor and lag implementation of TQM.

Generally, company participants particularly from contractor company describe barrier of TQM more influence by internal factors which is corruption, qualified human power, lack of equipment and material quality and delivery on time, lack project owner commitment. Similarly, financial problem which means contractor company did not got project financial from owner of the project on time. In addition, lack of equipment and material quality and delivery on time from suppliers are the direct cause of the lag of road construction company in Addis Ababa in implementing TOM.

The barriers to TQM implementation among construction firm include lack of management's commitment to quality assurance, lack of effective supervision, lack of effective communication, lack of proper equipment available for use, insufficient technology, collaboration of consultant, contractor and owner force were poo and lack of a quality assurance team.

5.2 Recommendations

One established method of improving Total Quality Management implementation in Addis Ababa Road construction industry to satisfy and meet customer and client need. Based on these recommendations were made that

- Road construction companies should be frequently trained on the employment of Total Quality Management on road construction activities in each level. This should also be

transferred to their relations with subcontractors and suppliers to always ensure a well-trained workforce.

- That contractors and owner force contract administrators should be set standards like that focus on quality and contractor's performance and their quality management experience rather than use of low bid contracting to tender for subcontractors, contractors, and supplies.
- Addis Ababa road construction companies should share experience from homogeneous company who has been best practice of TQM.
- Addis Ababa road construction companies should review and analysis daily reports and activities and well documented.
- All stake holder of AACRA should be share experience, discuss, and evaluate TQM implementation in the industry.

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APPENDICES

Addis Ababa University

College of Business and Economics

Questionnaire to be Filled by

AACRA, contractor, consultant employee

Dear

The questionnaire is designed to collect data for the research entitled on *"*Analysis of TQM implementation in Addis Ababa Rod Construction Industry*"* as a partial fulfillment of M.Sc. Degree in Management. The study is intended to investigate the impact of TQM dimension practice such as: supply management, training and education, process management, top management commitment, and contract selection, continuous improvement, understanding and awareness of TQM as well as barrier of TQM practice. The questionnaires need your exact feeling of answers, which makes my study sound and complete. Whatever you answer is considered right; so, feel free and give your true feelings on in each item. Your response remains confidential and not transferred to other bodies. Hence, I kindly request you to fill this questionnaire honestly and genuinely. You are not required to write your name at any place in the questionnaire.

Thank you very much for your kind cooperation!!!

PART I: Personal Information

Instruction: Please indicate your answer by making a"√" mark or writing where it is necessary in space provided.

1. Gender Male ☐ Female ☐
2. Education status Diploma ☐ Degree ☐ MA/MBA ☐ Phd ☐
3. Experience in year 2-5 ☐ 5-10 ☐ 10-15 ☐ >15 ☐
4. Age in year 20-30 ☐ 30-40 ☐ 40-50 ☐ >50 ☐

PART II: CSFs TQM Questionnaires

Instruction: Putting a Tick (√) in Space Provided that assess CSFs of TQM implementation such as supply management, training and education, process management, top management commitment, and contract selection, continuous improvement, understanding and awareness of TQM in Addis Ababa Road Construction projects.

No	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	Supplier Management					
1	Suppliers supply good products and services					
2	Suppliers are accepting our regular feedback in order to for accomplishing our firm goals					
3	Suppliers are able to meet our firm quality management requirements					
4	Suppliers are selected based on their quality specifications					
5	Supply material for the project in a time manner					
6	My company offers closer and long-term working relationship to suppliers					
7	My company' purchasing department assumes responsibility for the quality of incoming products					
	Process management					
1	Clarity of work or process instruction giving to employee, and site staff					
2	Clear procedure for accepting performed activities					
3	Using of a comprehensive and continuous supervision system					
4	My company conducts inspection on completion of					

	the construction project work					
5	My company uses flow chart, inspection and supervision for activities that directly affect quality					
6	My company used quality measures					
	Training and Education					
1	Training was adequate to work on quality improvement					
2	Training is given for developing team spirit					
3	Training is given work with new technology or equipment					
4	Training is given to work with new methods, systems or procedures					
5	Training is given for adding skills to basic job					
6	Training is given for work with new methods systems					
7	Training courses is given for employees in quality improvement skill and techniqual					
	Contract selection					
1	Level of technology use					
2	Written contract document is clear and fair					
3	Bill of quantity is very detailed and accurate					
4	The amount of contractor’s cash flow					
5	Skill and experience of contractor’s staff, and using labors with high experience					
6	Procedure of selecting contractors and awarding to the lowest evaluation bidders					
	Top management commitment					
1	Top management is the driving force behind our quality improvement efforts					
2	Top management actively participates in quality management and improvement process					
3	Top management allocates adequate resources (finance, time, equipment, and people) to quality improvement					
4	Top management is strongly committed to improving product quality to meet our customers' expectations					
5	Top management regularly held meetings discusses and reviews quality-related issue					
6	Top management encourages quality related concepts and skills					
7	Top Management sets the company quality policy					

	and implements it by providing resources and training					
8	Top management follows long-term quality improvement process					
9	Top management is visibly involved in the development of an effective quality culture					
10	Top Management reviews the TQMS functioning					
	Understanding of TQM					
1	TQM helps to strengthen the control over operations					
2	TQM can be used to demonstrate that this is a total quality organization					
3	TQM can reduce resource wastage					
4	TQM can provide a disciplined means of producing goods/services for customers					
5	TQM can help to improve customer satisfaction					
	Awareness of TQM					
1	TQM is associated with a cultural change					
2	TQM approach involves everyone in an organization					
3	TQM leads to employee empowerment					
4	TQM emphasizes teamwork					
5	TQM is related to continuous improvement					
6	TQM's primary focus is on customer satisfaction					
7	TQM needs committed leadership and strong top-management support					
8	TQM requires increased and continuing education and training					
	Continuous improvement					
1	Company policy in relation to quality					
2	Change the firm policy in relation to quality gradually					
3	Identification of area for quality improvement and implement					
4	Finding the root cause in the diagnosis of problems and defects					
5	Identification of quality tools					
6	The organization reinforces continuous study and improvement of its services					
7	Program aimed at finding time and cost losses in all internal processes					

PART III: Barrier for TQM implement

Instruction: Putting a Tick (√) in Space Provided that assess barrier of TQM implementation in Addis Ababa Road Construction projects.

No	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Company employees are appointed to positions with having the skills to undertake the role effectively					
2	The employees see the total quality management system as a tool to criticize employee performance					
3	Insufficient technology and poor-quality management practices ' currently exist in the organization					
4	There is government financial support to help ' the organization to implement a TQM system					
5	Communication between organization departments is effective					
6	There is low general sense of morale in the organization					
7	Quality objectives are clearly identified to employees					
8	There is a cooperation from customers					
9	TOM systems are too difficult to learn and implement					
10	There is expertise in Total quality management in the industry generally					

Interviews questions

1. How your company implement quality management system in your organization?
2. Do your company training on project management? Especially on project quality management?
3. How do you see top management commitment and priority for project Quality implementation and management?
4. What are the main barriers facing your company that wish to start implementing TQM practices?