A FRAMEWORK TO ADDRESS BARRIERS TO TOTAL QUALITY MANAGEMENT (TQM) ADOPTION IN THE ZAMBIAN BUILDING SECTOR

BY

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Copyright Declaration

Declaration

I, **Mary Mabo Nyaywa** hereby declare that this work is my own, and that to the best of my knowledge, it has never been produced or submitted before at this university or any other institution for academic purposes, and that all sources of information have been duly acknowledged.

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Certificate of Approval

This dissertation by Mary Mabo Nyaywa entitled ‘A Framework to Address Barriers to Total Quality Management (TQM) Adoption in the Zambian Buildings Sector’ is approved as partially fulfilling the requirements for the award of the degree of Master of Engineering in Construction Management of the University Zambia.

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Dedication

This dissertation is dedicated to my beloved family who have been there for me through my academic pursuit. Thank you for the support Edward, Elizabeth and Blessing Kaluba.

To my mother, Christar Nyaywa and my late father, Eng. Joseph Nyaywa you shall always remain my heroes.

The Almighty God, take all the glory, for you, enabled me to complete my research despite the many hurdles I faced.

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List of Abbreviations

ABCECZ	Association of Building and Civil Engineering Contractors of Zambia
CSFs	Critical Success Factors
EFQM	European Foundation for Quality Management
EIZ	Engineering Institute of Zambia
GDP	Gross Domestic Product
GRZ	Government of the Republic of Zambia
ICT	Information and Communications Technology
ISO	International Organisation for Standardisation
LCC	Lusaka City Council
LPPA	Lusaka Province Planning Authtority
MBNQA	Malcome Baldrige National Quality Award
MSMEs	Micro, Small and Medium Enterprises
NAMSSC	National Association of Medium and Small Scale Contractors
NHA	National Housing Authority
NCC	National Council for Construction
OHS	Occupational Health and Safety
QA	Quality Assurance
QC	Quality Control
QM	Quality Management
QSRB	Quantity Surveyors Registration Board
RII	Relative Importance Index
SQC	Statistical Quality Control (SQC)
TQM	Total Quality Management
URP	Urban and Regional Planning

ZABS	Zambia Bureau of Standards
ZBS	Zambia Buildings Sector
ZCI	Zambian Construction Industry
ZIA	Zambia Institute of Architects

Abstract

The Zambian Buildings Sector (ZBS) has witnessed a significant growth in the number of building projects being undertaken at individual, corporate and government levels over the past decade. However, there has been a major outcry from clients (end-users) on the poor quality of buildings being constructed. Today, Total Quality Management (TQM) has been recognized as a successful management philosophy that can be implemented in construction to achieve quality. The objective of this study was to give insight on TQM practices, tools, techniques and highlight the barriers that affect successful adoption of TQM in ZBS. The study further proposed to develop a framework to address barriers to TQM adoption in construction projects, particularly buildings. A descriptive research approach was used to conduct this study. Primary data was collected through a questionnaire survey and unstructured semi-structured interviews while secondary data was obtained through a review of published literature. The questionnaire was piloted on 25 respondents to obtain preliminary insight into the research topic as well as ensure validity and reliability. This was followed by a final questionnaire administered to 125 respondents. The stakeholders included 50 contractors, 30 consultants, 30 regulators and 15 clients. Both local and foreign-registered building contractors that fell in the grades I to VI of the National Council for Construction were considered for the study. Research findings showed that the ZBS faced barriers in adopting TQM because few local authorities, construction professionals, contractors, subcontractors and suppliers fully understood TQM. The study revealed the major barriers to the full adoption of TQM as being lack of expertise and resources in TQM, difficulty in changing behaviour and attitude of stakeholders, lack of education and training to drive the improvement process;and lack of employee and top management commitment and understanding. To overcome the foregoing barriers, some Critical Success Factors (CSFs) were identified.These included: top management commitment and leadership, human resource management (employee involvement/teamwork); trainning/learning; client management; subcontractor and supplier quality management; process management; information analysis and evaluation;planning, communication and continous improvement. Finally, the study proposed a TQM adoption Framework for the ZBS to help build quality into building projects.The implications of the findings were that improved quality and productivity were needed to eliminate high levels of waste in the building sector.

Key words: Quality, Quality Management, Total Quality Management, Critical Success Factors, TQM barriers and TQM Framework

Working Definitions

Adoption : To accept a new ideology ,method, management style .

Critical Success Factor: A particular element contributing to the construction project success.

Construction Companies: Companies engaged in building, repair and alteration of houses and other structure.

Implementation: To apply and put into practice TQM principles in building and construction organizations.

Framework: A system of rules, ideas, or beliefs that is used to plan or decide something.

Quality: The degree to which the product or service meets specifications and needs of customers.

Quality Management: All activities that managers perform in an effort to implement their quality policy.

Total Quality Management: A management philosophy that seeks to integrate all organizational functions to focu on meeting customer needs and organizational objectives.

CHAPTER ONE : INTRODUCTION

1.1 Research Background

Globalization of market economies has urged corporations in all sectors to concentrate on maintaining a sustainable competitive edge directly related to the upkeep of quality both in terms of services as well as productivity (Kumar, 2014). The prevailing trends in the construction market are characterized by ever-changing customer expectations and demand. Thus, an organization must engage in competitive strategies, operations to produce unique goods and services that continually meet and exceed these demands and expectations (Salaheldin, 2008). Examples of existing management systems that have been tried and tested, with mixed results, include project management, partnership, Quality Assurance Plan, Quality Function Deployment, Jobsite Quality Planning, ISO 9000 and 14000 standards as well as Total Quality Management (Bubshait and Al-Atiq, 1999; Gamsby et al, 1996).

A number of well-known organisations had adopted quality initiatives towards achieving quality in the manufacturing industry. According to Omware (2013), the Toyota company developed philosophies of 'customer first' and 'quality first' through setting-up of quality assurance systems across various divisions and departments. In 1949, Toyota introduced Statistical Quality Control (SQC) followed by Total Quality Management (TQM) based on the unchanging principles of 'customer first' and 'total participation' which initiatives won them the Deming Application Prize in 1965 and the Japan Quality Medal Award in 1970 (Union of Japanese Scientists and Engineers, 2006).

Sony was another company which, in their quest to remain committed to delivering quality products and exceed customer’s expectations, implemented continous decisive efforts in enhancing product quality and continous improvement of its quality managemnt system (Sony Company, 2012). Further, the Coca-Cola Company focused on delivering consistency and reliability in their products leading to the developed a new management system in January 2010 called Coca-Cola Operating Requirements (CORE) in place of the initial Coca-Cola Management System (TCCMS). The integrated quality management program created by the Coca-Cola company is used in all operations thereby ensuring delivery of quality to its customers (Coca-Cola Company, 2012).

Stepping down from the several market economies to the construction market, there has been a major outcry of quality downfall. In the construction industry, consultants, contractors, specialists, sub-contractors and engineers have their own professional practices which may affect the building process. The construction industry is not like manufacturing which makes TQM more challenging (Al-Sabek, 2015). As pointed out by Anup (2015), failure in the quality of construction is the biggest failure of projects. Therefore, the concern of poor quality at global, international, regional and national levels remains a key issue that requires serious addressing. Harrington, et al. (2012) adds that the barriers to quality implementation have led to labelling the construction industry for poor performance and a history of waste and rework, coupled with chronically low levels of customer satisfaction. A similar view was held by Alotaibi (2013) who considered the construction industry as comparatively having one of the poorest quality emphases among different manufacturing and service sectors. Consequently, the intended economic contribution of the construction industry is often offset by the quality shortfalls, schedule overrun and cost escalation. It therefore becomes imperative to innovate and implement quality concepts and systems that minimize defects arising from poor workmanship; and ensure that projects are completed within agreed time and cost.

At an international level, Hoonakker (2010) observes that TQM implementation in the building and construction industry is not an easy matter. The researcher encountered the same attitude while conducting a study on measures taken by construction firms in the Netherlands to improve the quality of working life. Only 1 out of 20 building and construction firms interviewed had adapted TQM principles, including teamwork. The other companies knew about this attempt to innovate, but chose to 'lean backwards' and watch the results, making comments such as "This will never work in the construction industry". Hartmann (2006) highlights the same attitude in his study on the role of organisational culture in motivating innovative behaviour in construction firms and concluded that the main tendency in the construciton industry is to implement market-proven innovations. Both researchers had not only stressed the difficulties faced in implementing change in the building and construction industry but also the significance of best practices. In addition, the researchers proposed that providing companies with a roadmap for implementing TQM would increase their confidence and motivation to implement change.

At regional level, Harrington et al (2011) notes that many African countries face several barriers to quality implementation in the construction sector. The construction industry's poor performance is evident in waste, rework and low levels of customer satisfaction. However, Kikwasi (2011) argues that the problem is worse in Southern African region owing to lack of adequate research and quality management initiatives undertaken in this part of the world.

At national level, Zambia equally faces many quality shortfalls similar to those at regional level. Presently, the Zambian Construction Industry (ZCI) comprises both public and private sectors. Prior to Zambia's market liberalization in 1991, most construction work was managed by the Zambian government. However, following the transition, the standardization of quality systems became a problem due to the diverse interests of various stakeholders. The Zambian government's main role, has now been limited to public works only, despite the private sector being major stakeholders in almost all the upcoming building projects under Public-Private Partnerships. The Ministry of Transport, Communications, Works and Supply collaborates with the National Council for Construction (NCC) to ensure quality is attained. Moreover, in the absence quality standardisation, the local authorities and council inspectorates face challenges in TQM implementation due to lack of a TQM framework but are only guided by building regulations (Public health act 295 - statutory instrument number 105) which did not account for upcoming construction innovations and technologies.

In today's' world, the strengths of many industries rely on the extent of adopted and applied quality initiatives such as TQM (Zhang, 2000). In the foregoing, it was apparent that one of the tried and tested quality measures that the globalised market sectors followed was Total Quality Management. Additionally, there are few studies on TQM in the Zambian Construction Industry .For instance, in 2002, a student at Copperbelt University in Kitwe, Zambia researched on a topic: "TQM and its implementation in the Zambian construction industry". However, it must be noted that no published article had been found on developing a framework to address barriers to TQM adoption in the Zambian Building Sector.It was therefore imperative for the Zambian construction stakeholders to have a roadmap to improve the adoption of TQM and its programmes, tools, techniques and practices.

1.2 The justification of the research

The construction industry in developing countries, such as Zambia, has been slow to embrace the concept of TQM (Haruna,2011). Zulu and. Chileshe (2010) state that the Zambian Construction Industry is characterised by poor project performance. Many projects are completed late, over budget and are of poor quality. The work of Muya et al. (2006) provides an interesting overview of quality issues in the construction industry. The researchers found that quality of construction craft skills was one of the major concerns in the industry. Quality of craftsmanship would undoubtedly have an impact on product quality as well as service quality provided by contractors. According to Harrington et al (2012), the importance of TQM and its ability to gauge customer satisfaction, cost effectiveness, and defect-free work saved huge amounts of money spent on reworks through a relentless pursuit of "war on waste". Previous studies, such as Kanji and Wong (1998), show that quality management has increasingly been adopted by construction companies as an initiative to solve quality problems and to meet the needs of the final customer. In addition, providing companies with a roadmap for implementing TQM will increase their confidence and motivation to implement change.

If a brighter built environment and positive performing economic landscape is to be attained in Zambia; effective adoption of TQM strategies and frameworks cannot be overemphasised. This assertion is backed by Muya (2013) who indicates that the construction industry plays a central role in the creation of any nation's wealth hence future construction projects require more strict quality measures. Thus, adopting an efficient management initiative such as TQM can assist in the continuous progress and development of the Zambian Buildings Sector. Additionally, with the attainment of TQM knowledge and improved TQM adoption, contractors would subsequently upgrade their management systems to upcoming innovative technologies that meet quality and client's needs as well as sustain valuable resources.

It must be mentioned that similar research studies were conducted on TQM in Zambia's manufacturing industry investigating how quality management practices may affect productivity and profitability.Grayson (2016).A typical example is the "Cosac" project in Chambishi, where one of the Zambian contractors, had adopted TQM in 2000 as a competitive tool for business and services industries (Kasongo and Moono,2010). Findings of the preceding study provided a striking demonstration of the importance of quality

management practices for the manufacturing industry in Zambia and in turn leveraging the international competitiveness of the Zambian economy .

This study was justified by the current conditions of poor building quality outcomes in Zambian Buildings Sector as confirmed by previous authors and in the following statement of the problem. Furthermore, the researcher did not find published articles on the development of a framework to improve adoption of TQM in ZambianBuildings Sector.

1.3 Problem Statement

There exists a gap in quality infrastructure across Africa. The continent's growth objectives should be linked to bridging this gap. The World Bank has stated that by closing the infrastructural gap, Africa can increase its GDP per capita by over 2% annually (Africa Construction Trends Report, 2019; World Bank,2017).The construction industry is viewed as achieving poor quality when compared to other sectors such as manufacturing and service sectors (Kubal et al, 2009). Many criticisms have been directed to the construction industry for generally shoddy workmanship. Gunaydin (1997) affirms that attaining acceptable level of quality in the construction industry has long been a problem. This involves expenditure of resources such as time, money, material and human which are wasted annually because of inefficient or non-existent quality management procedures. Zambia has not been spared and has problems in attaining acceptable levels of quality in its construction sector, particularly buildings. Evidence on the existence of this problem was reported by Musanda Chaile in Zambia's Capital City, Lusaka on 25th July 2019 when part of the Woodlands Stadium wall collapsed killing one person and leaving two injured (Lusaka Sun Newspaper ,2019 available on - www.thezambiansun.com). Interim inspections carried out by Lusaka City Council (LCC) described the incident a result of negligence because the site was not secured by site hoarding and no permit for demolition was guranteed. Since simple quality aspects of building health sand safety were not adhered to, the final building product by the contractors in question left much to be desired.

Further proof of other underlying quality related problems and concerns were published in the Zambia's 2017 Auditor General Report. A glimpse into the Ministry of Agriculture records revealed that during November 2014 to June 2016, the ministry awarded 11 contracts totalling K3,487,752 for various infrastructure projects. As at 31st May 2017, the

contractors had made claims in amounts totalling K3,487,752 out of which payments amounting to K2,610,345 were made leaving a balance of K877,407. All the installations paid for were incomplete, poorly constructed with defects, and/or had no contractors on site.

The observed weaknesses in the management of infrastructure projects, poor quality outcomes as well as findings from Kikwasi (2011) confirmed that there was a problem of inadequate quality management initiatives undertaken in Sothern Africa including Zambia. In 2016, Zambias' Ministry of Fisheries and Livestock had infrastructure development projects worth K1,992,031. The Office of Auditor General carried out document review and physical inspections from March to July 2017 which revealed weaknesses in project management such as failure to complete projects on time, poor workmanship, and non-adherence to contract terms (OAG Report,2018).

Therefore, this study sought to look into TQM as a solution to resolve quality-related problems through the development of a framework to improve the adoption of Total Quality Management practices in the Zambian Buildings Sector.

1.4 Research Aim and Objectives

The main intention and goal of the study was explained in the next section.

1.4.1 Research Aim

To develop a framework to improve the adoption of Total Quality Management (TQM) practices in the Zambian Buildings Sector (ZBS). To achieve this aim, the following objectives were formulated.

1.4.2 Objectives

1. To review the philosophy of TQM and the Critical Success Factors (CSFs) to improve the adoption of TQM.
2. To identify the barriers affecting improved adoption of TQM practices in the ZBS.
3. To develop a TQM framework to improve adoption of TQM practices and quality output from upcoming building projects in the ZBS.

1.5 Research Questions

1. How did TQM evolve and what factors contribute to successful adoption of TQM?
2. What are the barriers to the adoption of TQM in the Zambian building sector?
3. What approaches can be drawn from tested TQM models to develop a TQM framework for Zambia's buildings sector?

1.6 Application of Research

This study was intended to be used by various construction stakeholders in the buildings sector. Application of this knowledge would enhance TQM adoption and heighten competitive advantage initiatives. The scope and significance highlighted in this study therefore helps build up the TQM implementation awareness.

1.6.1 Scope of the Research

The National Council for Construction (NCC) in Zambia has categorized the construction industry under the following groups:- General Building and Housing, General Civil Engineering Works, Roads and Earthworks, Mechanical Engineering Works, Mining Services, Electrical and Telecommunication Works and Specialist Works.

For purposes of this research, construction industry referred to General Buildings and Housing category only. The study identified the Total Quality Management (TQM) practices in use and the barriers to adoption of TQM unique to the ZBS. The formulation of a TQM framework was intended for improving adoption and subsequent implemenation of TQM practices in the buildings sector**.**

1.6.2 Significance of the study

A study by Harrington et al (2012) supports the importance of TQM and indicates that the ability to gauge customer satisfaction, cost effectiveness, and defect-free work is a relentless pursuit of "war on waste". Once the war is won, huge amounts of money could be saved from reworks. Thus, this study was significant to the Zambian Building Sector as it created an understanding and appreciation of the importance of TQM adoption and implementationas well as emphasized its relationship with customer satisfaction as a measure of quality. Furthermore, this study was important for the following reasons:-

1. It highlighted the challenges associated with current TQM practices in Zambia and the consequential implications on project delivery. Thus, it provides construction stakeholders with necessary information needed in dealing with issues concerning TQM implementation and appropriate trainings to improve quality in their product and service delivery.
2. It enhanced the performance, continuous improvement and quality output of building projects in the ZCI; through setting up preventive measures to avoid poor quality of building works in Zambia.
3. It challenged Contractors to assess and improve their quality systems, products and services to upcoming innovative technologies that meet Client's needs.
4. Increased awareness of the barriers associated with current TQM practices in the Zambian Buildings Sector and consequential negataive implications on project delivery could encourage quality innovations.

1.7 Delimitations of the Study

The study was limited to the establishment of barriers affecting adoption and implementation of TQM in the Zambian Construction Industry, particularly Buildings Sector. This study was based in Lusaka because the majority of head offices for contractors, construction regulators and authorities are based in Lusaka. Furthermore, it had a higher number of active construction works compared to other towns in Zambia.

1.8 Structure of the Dissertation

This dissertation consists of six chapters organized as follows:

Chapter one introduces the research topic, justifies the research, outlines the research problem, aim and states the objectives. It also states the research questions, scope, research process as well as the research methodology adopted.

The second chapter establishes the evolution, central theories and other critical considerations of TQM through reviewing existing literature. In addition, it describes the key factors required for TQM implementation as well as the main barriers and benefits of

TQM implementation. Finally, it highlights the major models and initial conceptual framework of this research.

Chapter three discusses the methodology adopted for this research. It starts by discussing the research approach, design and target population. Thereafter, the sample size, sampling process and justifications employed are discussed before considering methods of data collection, instruments, methodological reliability and validity.

Having laid the basis for the study the fourth chapter presents the actual findings and data presentation as obtained from the interviews and questionnaires administered to relevant research samples. The purpose of this chapter is to explore the state of TQM the perception of respondents.

The fifth chapter discusses and analyses the research findings in relation to the litreture review.

Chapter six provides the research conclusion in relation to the research findings and presents the recommendations which are intended to guide organizations willing to implement TQM at any level of management through a TQM pyramid linked to the themes of this researchs' findings.

See figure 1.1 for overall organisation and logical sequence of the dissertation

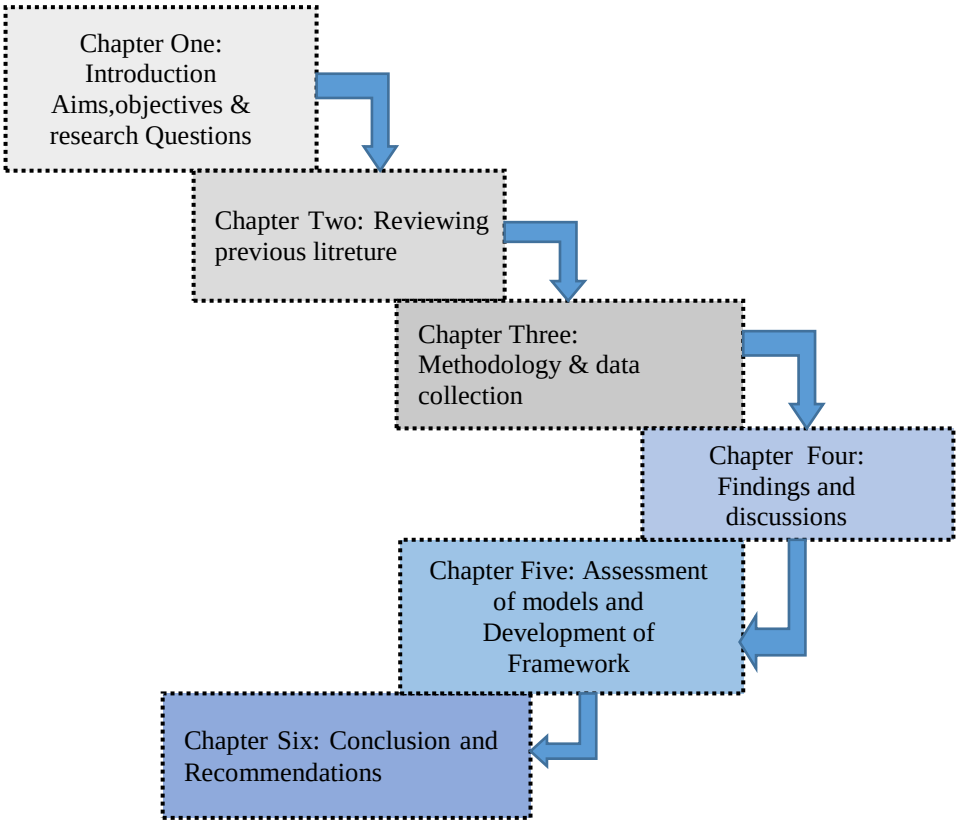


Figure 1.1: Dissertation layout

1.9 Chapter Summary

This chapter presented the background to the research. It defined TQM, stated the problem, and presented the research questions, aims, and objectives. It went on to present the significance of the study, scope of the study and the methodology of conducting the research. The next chapter presents reviewed literature on TQM.

CHAPTER TWO : LITERATURE REVIEW

2.1 Introduction

This chapter presents relevant literature, central theories and other critical considerations justifying the research aim, objectives and questions pertaining to barriers to TQM implementation in the construction industry. It begins by giving an overview of TQM history, purpose, principles, benefits and barriers to its adoption and implementation in the ZCI, particularly the building sector .

2.2 The History of Total Quality Management(TQM)

According to Polat (2011), the roots of TQM can be traced back to the early 1920s, when Walter Shewhart of Bell Laboratories first applied statistical process control to measure variance in production systems. This concept was further developed in the Japanese manufacturing industry in the 1940s led by American quality gurus such as Deming, Juran, and Feigenbaum. In the 1950s, the Japanese adopted, developed and adapted the methodologies introduced by the Americans and begun to develop distinctive approaches suited to their own culture led by Japanese quality gurus such as Ishikawa, Taguchi and Shingo, and achieved considerable performance improvements. An awareness of quality in western countries increased in the 1980s with a new wave of western quality gurus such as Crosby, Peters and Møller.

Different authors have divergent views on the basic elements of TQM since its inception in the 1920s. According to Al-Musleh (2010), the basic principles of TQM are based on these constructs as espoused by quality gurus, such as Deming and Juran in Japan after Second World War. Then Crosby, Feigenbaum, Ishikawa, and others developed this powerful management technique for improving business quality within the organizations. These theorists are regarded as the key founders of TQM philosophy, and the origin of TQM concept evolves mostly from their work.

Neyestani (2017) reported that Deming worked with statistical sampling to improve quality and also introduced the concept of "Variance" to the Japanese and a systematic approach to problem solving which eventually was called the Plan, Do, Check, Act (PDCA) Cycle.

Joseph Juran expanded the tool set available for producing quality products and managing organization-wide quality by introducing the 'Pareto Principle' as an application of statistics to prioritizing process improvements. Philip Crosby popularized the Cost of Quality concept. Feigenbaum was the first guru, who defined "Total Quality Control" as an effective system for integrating the quality-development, quality-maintenance, and quality-improvement efforts of the various groups in an organization to enable marketing, engineering, production and service at the most economical levels which allows for full customer satisfaction. Kaoru Ishikawa is considered by many researchers to be the founder and first promoter of the 'Fishbone' diagram (or Cause-and-Effect Diagram) for root cause analysis and the concept of QC circles. The different TQM approaches are summarized in the table below:

Table 2.1: The comparision of TQM patriachs and their principles

Guru/Patriarch	**Year**	**Definition**	**Emphasis**	**Dominant Factors**
E. Deming	1950	14 Principles in Quality, 7 deadly sins and diseases /PDCA. Customer-led	Process	Control of variation
A.V. Feigenbaum	1961	Concept: Make it right at the first time (One Basic TQM). Customer-led	Process	Total Quality Control
Phillip B.Crosby	1969	Top Management in Quality, 14 steps for quality improvement. Value-led	Performanc e	Zero defects
Korau Ishikawa	1969	Statistical Approach in Quality Control and Fishbone. Supply-led	People	Company quality wide control/circles
Joseph .M. Juran	1988	Cost of the quality, SPC Quality, and Juran's quality triangle. Customer-led	People	Fitness for purpose

Source: Neyestani (2017)

2.3 The Evolution of Total Quality Management (TQM)

The evolution is based on the theories and philososphies propagated by the quality gurus. The concept progressed from inspection to quality control, quality assurance, quality management and, finally, to total quality management.

2.3.1 Quality Control

Historically, quality was achieved entirely by reliance on quality control procedures in isolation; that is, by inspections of the product during manufacture, and/or on completion. Uncovered defects involved remedial work, often expensive in terms of time and cost. Not all defects were found before in-service failures occurred. With the increase in complexity of systems and manufacturing processes, the limitations of the historical approach have necessitated a different philosophy. Real evidence of quality in all processes and activities involved in the generation of the output (design, manufacturing, installation and commissioning) must now be demonstrated. Incorporating quality assurance into each of these processes using a systematic approach promotes the reliable achievement of quality objectives (IDC, 2012).

Lakshmi (2015) defines quality control in construction as monitoring specific project result to determine if they comply with relevant quality standards and identifying ways to eliminate cause of dissatisfaction. It also ensures that performance Contract documents comprise a clear, complete, and accurate description of the facility to be constructed, correctly conveying the intent of the owner regarding the characteristics of the facility needed to serve his or her purposes.

Quality Control consists of the operational techniques and activities used to fulfil requirements for quality (ISO 8402).

a) Inputs to the Project Quality Control function are: Project quality procedures, project inspection and test plans as well as inspection and measurement of product/service characteristics

b) Tools and techniques : Inspection, control charts, pareto diagrams, statistical sampling, flowcharting, trend analysis. The proceeding items elaborate on the aforementioned tools.

c) Outputs from this function are: Acceptance/reject/rework decisions, test documentation and adjustments to the process.

2.3.2 Quality Assurance

Quality assurance system is essential in preventing problems and the reoccurrence of problems. It refers to all those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy all requirements laid down by a given

quality policy (ISO 8402). Lakshmi (2015) further defines quality assurance as evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards. It is not an add-on to a process. Instead, its success depends on commitment to the philosophy of total integration of quality planning and implementation throughout all component activities. The Inputs to the project quality assurance function are (a) Project Quality Procedures - Result of quality control measurements and Project Quality Documentation - Quality management plan, Operational definitions. The tools and techniques include quality planning tools and quality audits whereas the output from this function is a quality improvement which relates to a program to define and improve revisions to project quality procedures.

2.3.3 Quality Management

Ashokkumar (2014) submits that quality management covers all activities of overall management functions that determine quality policy objectives and responsibilities for all members of the organization. According to Hamzah (2010), quality management was seen as an approach to deal with the low quality problem faced by the industry and achieve the required level of quality of the end product and had been given great attention world-wide over the past three decades. The philosophy was followed in order to improve quality of products. Quality Management refers to all activities of overall management functions, especially top management leadership, that determines quality policy objectives and responsibilities for all members of the organization. It includes all activities that managers perform in an effort to implement their quality policy. These activities include quality planning, quality control, quality assurance and quality improvement (Harris and McCaffer, 2013). It is an approach aimed at continuously improving the competitiveness, effectiveness and flexibility of the entire organization through total involvement of everyone in the organization led by the management (Kasongo and Moono, 2010).

2.3.4 Total Quality Management

Total Quality is the highest level of quality management that refers to a management process and set of disciplines that are coordinated to ensure that the organization consistently meets and exceeds customer requirements through continuous improvement (Alintah-Abel et al.,2019).

Pride et al, 2009 defines TQM as the coordination of efforts directed at improving customer satisfaction, increasing employee participation, strengthening supplier partnerships, and facilitating an organizational atmosphere of continuous quality improvement. In addition, Haupt and Whiteman (2004) proposed a working definition of TQM for construction firms as, "a continuous process whereby the top management of construction firms take whatever steps are necessary to enable everyone in the organization, especially construction field supervisors and construction workers in the course of executing all their activities on construction sites, to establish and achieve standards, which include completion on time, within budget, to optimum quality standards, and without loss of life or limb, and exceed the needs and expectations of their clients, both internal and external."

Zhang et al (2000) adds that TQM, like quality, has many conceptual and operational definitions and thus does not have a universal definition among its users. For instance, ISO 8402 (1994) defined it as the management approach of an organization, which concentrates on quality, based on the participation of its members which aims at long-term success through satisfaction and benefits to all members of the organization and society. Zhang et al (2000) described TQM as a management philosophy for continuously improving overall business performance based on leadership, supplier quality management, vision and plan statement, evaluation, process control and improvement, product design, quality system improvement, employee participation, recognition and reward, education and training, and customer focus.

Although TQM has been widely implemented in the construction industry of Japan since the 1970s and the United States of America since the 1990s; it has not been fully and adopted in the Zambian Buildings Sector.

2.3.5 Philosophical difference between ISO Standards and Six Sigma in relation to TQM

The american society for quality (2020) states that ISO 9000:2000 was updated in 2008 and 2015 based on seven quality manaagement principles that senior management can apply to promote organisational improvement. These include customer focus, leadership, engagement of people, process approach, improvement, evidence based decision making and relationship mangement. The ISO standards provide an excellent beginning point for a firm starting a

TQM program. A TQM system is the big picture concerned with customer satisfaction and all activities conducted by a firm.

The origin of ISO standards was asserted by Gunaydin (1997) iterating that a series of standards, known as ISO standards, were first published in 1987 by the Geneva-based International Organization for Standardization. The term ISO describes the series of international standards dealing with product design, production, delivery, service and testing. The ISO 9000 series comprises two basic types of standard: those addressing quality assurances and that addressing quality management. The quality assurance standards are designed for contractual and assessments purposes namely, ISO 9001, ISO 9002, and ISO 9003. The quality management standard is ISO 9004 and is designed to provide guidance for companies developing and implementing quality systems.

On the other hand, Waleed (2012) describes Six Sigma as a concept aimed at developing and delivering near-perfect products. It is premised on a process of measuring defects with a view to figuring out how to eliminate them and get closer to attainment of zero defects thereby assuring quality. Sigma refers to a statistical term that measures how far a given process deviates from perfection. Ozyasar (2012) adds that both Six Sigma and TQM focus on quality improvement systems and attempt to reduce defective products or poor service in an organization, while improving customer satisfaction; the two concepts are not the same. While the former aims at continuous improvement and is linked to strategy and related to customer requirements thus more fact-based, data-driven, results-oriented and provides measurable bottom-line results; the lattter concentrates on individual departments and is focused on maintaining existing quality standards and making incremental quality improvements.

In summary, the most common quality management implemented in recent history are ISO quality management system and TQM. This research only focuses on TQM and the barriers that affect its adoption in the Zambian Building Sector.

2.3.6 Tools and Techniques adopted for TQM implemetation

Nagarajan (2013) notes that the effective use of various TQM tools/techniques and their correct use as a part of the company wide total quality initiative have an impact on the quality of the products and services offered by the organisations An extract from

Hamidetal.(2019) depicts the various tools and techniques from Quality inspection to Total Quality Mangement.

Table 2.2: Tools and techniques from Quality inspection era to TQM era

Dimension	**Quality Inspection**	**Quality Control**	**Quality Assurance**	**Quality Management**	**TQM**
Approximate timings	1900s-1920s	1920s-1950s	1950s-1980s	1960s-1990s	1980s -present
Tools and Techniques	Inspection Moving assembly line	Statistical Quality Control (SQC) Inspection link to quality control Sampling Acceptable Quality Levels (AQL) Average Outgoing Quality Limit (AOQL) Total Preventive Maintenance	Plan-DoCheck-Act (PDCA) Extend PDCA to become Plan-Do-StudyAct (PDSA) Cause and Effect Diagram Failure Mode Effect Analysis (FMEA) Reliability Engineering Statistical Process Control (SPC) Kaizen Kanban Jidoka Just-In-Time (JIT)	Quality Loss Function Quality Functional Deployment (QFD) Poka Yoke Quality Control Circle (QCC) 7 Quality Tools (Pareto Analysis, Fish Bone Diagram, Stratification, Check Sheet, Histogram, Scatter Diagram, Control Chart) Benchmarking Lean tools and techniques Single Minute Exchange of Die (SMED)	Design of Experiments (DOE), 5S ,Six Sigma
Systems	Mass Production System	Mass Production System	Deming Model BS 5750 Quality Management series ISO 9000 Standards Total Productive Maintenance (TPM)	Toyota Production System (TPS) ISO 9000:1992 Ford Q1 System QS 9000 ISO 14000 ISO 18000 TickIT	Malcolm Baldrige Model Investors In People EFQM Excellence Model ISO 9001:2000; 2015 Lean concept ISO/TS 16949 ISO 14001:2015 ISO 31000: 2009; 2018

Source:Aletaiby (2018)

Researchers have identified a number of tools and techniques for quality improvement. A tool is described as a device with a clear function and usually applied on its own whereas a technique has a wider application and is understood as a set of tools (Zhang et al, 2000; Tari and Sabater, 2004). It is also known that measures, controls, quality tools and techniques

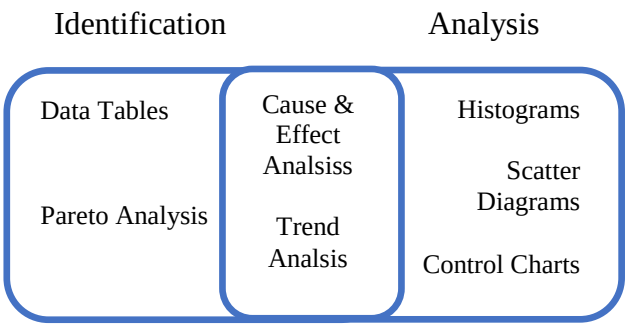
give the organisation a baseline for assessing performance, improvements as well as declines in performance.

Tari and Sabater (2004) observed that TQM has been developed around a number of critical factors. However, TQM is much more than a number of critical factors as it also includes other components such as tools and techniques for quality improvement which are vital to support and develop the quality improvement process. It was evident that some firms failed to implement TQM because suitable quality management methods such as tools and techniques for quality were not used.

In this study, the Zambian Building Sector was noted to have adopted some tools/techniques under quality assurance and quality management shown in Table 2. The proceeding text elaborated on some of these selected tools and their functions.

2.3.7 Seven Tools for Quality Control

Neyestani (2017) describes seven basic tools to help organsiations solve problems as well as manage improvement in processes vis-à-vis quality which tools were originally propagated in Karou Ishikawa's 1968 book themed 'Gemba no QC Shuho' and aimed at quality management through adoption of systems and practices by Japanese entities (Omachonu and Ross, 2004). The tools include check sheets, graphs, histograms, pareto charts, cause-and-effect diagrams, scatter diagrams and control charts. To appreciate how these tools can be employed in the analsis and improvement of quality, Kerzner (2009) categorised the tools into those for identification and those for analsis in order to highlight the interconnectivity among them:



Source: Adapted from Kerzner (2009)

Figure 2.1: Seven tools for quality Control

1. Check-sheet

As observed by Abdel- Hamid and Abdelhaleem (2019), the check sheet or tally sheet which can assist users to record the frequency of particular events during data gathering period. Events or non-events (non-conformance) are recorded capturing information such as position of event occurrence and any known causes. Check-sheets are normally prepared in advance by those undertaking the operations or monitoring progress in order to to assist in problem identification and solving. Montgomery (2009) adds that it helps users to organise data for later use as well as quality assurance auditing through checking and verifying process steps.

2. Histogram

Neyestani (2017) defines a histogram as a kind of bar chart displaying a product or processes'attribute and variable data by highlighting the data distribution and process variations. Measures of central tendancy such as mean, mode and average are exhibited. This tool provides a figurative representation of the individual measured values in a data set according to the frequency of occurrence. It helps to visualize the distribution of data and there are several forms, which should be recognized, and in this way they reveal the amount of variation within a process. Abdel- Hamid and Abdelhaleem (2019) rightly notes that the Histogram must be appropriately and well well designed to be easily applied and comprehended by people who carry out the operation.

3. Pareto Analysis

Promulgated by an Italian economist, Volfredo Pareto, in the 19th Century who observed that 80% of the wealth was controlled by 20% of the population, the 'Pareto Principle,' as later coined by Juran in 1950, is a statistical technique employed in decision making to choose a limited number of tasks that produce an overall significant effect (Abdel- Hamid and Abdelhaleem , 2019). In terms of improving quality and efficiency, attention is initially focused on problems having the greatest impact to ensure elimination of wastage and cost reduction (Kerzner, 2009).

4. Cause and Effect Diagram (Fishbone Diagram)

Developed and promoted by Karoa Ishikawa in 1943, the cause-and-effect diagram, also known as the 'Ishikawa or Fishbone Diagram' is a useful tool used to systematically investigate and analyze all potential or real causes that result in a single effect (Juran and

Godfrey, 1998). The shape of the diagram looks like the skeleton of a fish as the tool helps to identify quality problems on the basis of their level of significance with each potential cause traced back to identify its root cause (Neyestani (2017). Possible individual causes are gathered and organized in order to better understand a problem and fill any knowledge gaps so that the most probable causes are ranked accordingly. The cause and effect diagrams normally comprise six elements to do with environment, materials, machine, measurement, man and methods (Omachonu and Ross, 2004).

5. Scatter Diagram

Neyestani (2017) describes a scatter diagram as a quality control tool used to detect and analyse a pattern and nature of relationship (if any) between two variables on a two dimension display of information. Montgomery (2009) adds that the scatter diagram reveals the degree and direction of the relationship as well as the correlation between the variables whether positive, negative or no correlation.

6. Flowcharts

This chart is a problem solving tool which can be applied systematically to identify, analyse, and document process areas or points with potential problems in order to enhance quality in the process (Forbes and Ahmed, 2011). This is used to provide a diagrammatic picture using a set of symbols to show all the steps or stages in a process project or sequence of events (Neyestani, 2017). Analyzing the data collected on a flowchart can help to uncover irregularities and potential problem points (Tang, 2005).

7. Control Chart

Developed by Walter Shewhart in the 1920, the Control or Shewhart chart shows the amount and nature of variation in a process over time akin to a run chart (Montgomery, 2009). The control chart, as obseved by Abdel- Hamid and Abdelhaleem (2019) is one of the most effective management control tools as it graphically confirms variation in output quality characteristics against pre-fixed boundaries (limits). The chart can be employed in estimating process parameters in order to reduce vriability thereby achieving process stability (Juran and Godfrey, 1998).

In summary, the review noted that the ZBS ought to adopt and apply the various quality control tools to identify issues within productin processes in various establishements and

find effective solutions to quality problems during product or service production and delivery. As noted by Kerzner (2009), some of the tools are used for both identification and analysis of issues with a view to solving the problems and improving quality whereas other tools are best suited for either used in identification or analysis only.

2.4 Existing TQM Models selected for this study

There have been many attempts to construct quality initiatives and frameworks to help the organizations understand how to implement good quality management. In addition, Aletaib (2018) reports that the most prominent TQM models worldwide like MBNQA, EFQMA, Deming prize model and Oakland TQM models have been also utilised to enhance the identified TQM key factors. For purposes of this study, the Deming Prize model was not discussed in detail due to time constraints. Accordingly, these key factors set a base line from which a TQM framework in the Zambian Building Sector can be implemented.

2.4.1 Malcome Baldrige National Quality Award (MBNQA) Model

Aydın, et al (2019) observesthat MBNQA is the most known and most widely used national quality program for the evaluation of firms and was first launched in 1987 in America. The aim of the award is to encourage US organizations for the progress in quality awareness and achievement and to improve customers' satisfaction.

- The Malcolm Baldrige National Quality Award (MBNQA) as discussed by Wali and Boujelbene (2011) developed six criteria practices that can be used to measure TQM namely leadership, strategy and planning, customer focus, information and analysis people and process management. The requirements of the criteria were embodied in seven categories as follows: Criterion 1: Leadership (120 points): How upper management leads the organization, and how the organization leads within the community.
- Criterion 2: Strategic planning (85 points): How the organization establishes and plans to carry out strategic directions.
- Criterion 3: Customer focus (85 points): How the organization builds and maintains strong, lasting relationships with customers.

- Criterion 4: Measurement, analysis and knowledge management (90 points): How the organization uses data to support key processes and manage performance.
- Criterion 5: Workforce focus (85 points): How the organization empowers and involves its workforce.
- Criterion 6: Process management (85 points): How the organization designs, manages and improves key processes.
- Criterion 7: Results (450 points): How the organization performs in terms of customer satisfaction, finances, human resources, supplier and partner performance, operations, governance and social responsibility, and how the organization compares to its competitors.

(http://www.asq.org):

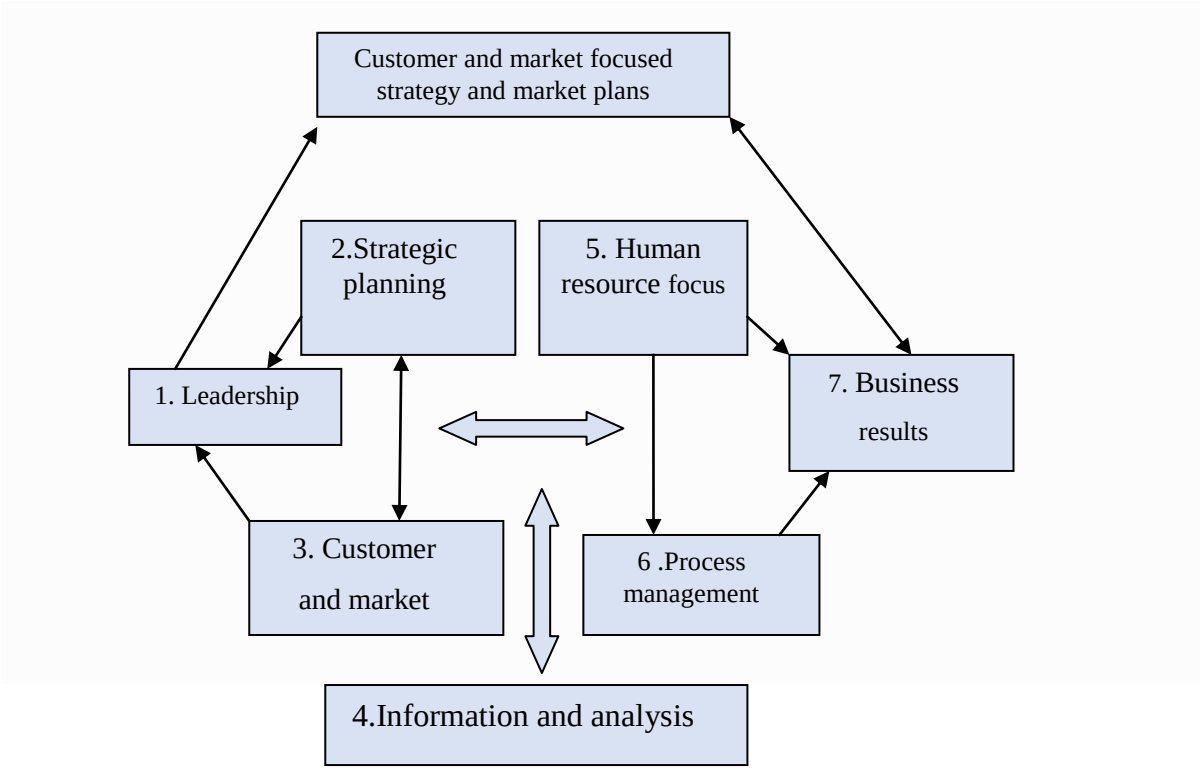


Figure 2.2: Diagrammatic Model of Malcome Baldrige National Quality Award (MBNQA)
Source:Oakland (2014)

The Baldrige Award led to a huge interest around the world in quality award frameworks that could be used to carry out self-assessment and to build an organization-wide approach to quality, which was truly integrated into the business strategy. In MBNQA, 55% of the

criteria are related to how an organization should be run and the remaining 45% of the criteria focus on the achieved results. Criterion 1 through Criterion 6 (550 points) focuses on the approaches or systems of firms. The remaining 45% of the points belongs to Criterion 7 (Oakland, 2014).

It was followed in Europe in the early 1990s by the launch of the European Quality Award by the European Foundation for Quality Management (EFQM). This framework was the first one to include 'Business Results' and to really represent the whole business model.

2.4.2 European Foundation for Quality Management (EFQM) model.

According to Oakland (2014), the EFQM publications on the Excellence Model capture much of this learning and provide a framework which organizations can use to follow ten steps:

1. Set direction through leadership
2. Establish the results they want to achieve
3. Establish and drive the strategy
4. Set up and manage appropriately their approach to processes, people, partnerships and resources
5. Deploy the approaches to ensure achievement of the strategies and thereby the results
6. Assess the 'business' performance, in terms of customers, their own people and society results
7. Assess the achievements of key performance results
8. Review performance for strengths and areas for improvement
9. Innovate to deliver performance improvements
10. Learn more about the effects of the enablers on the results

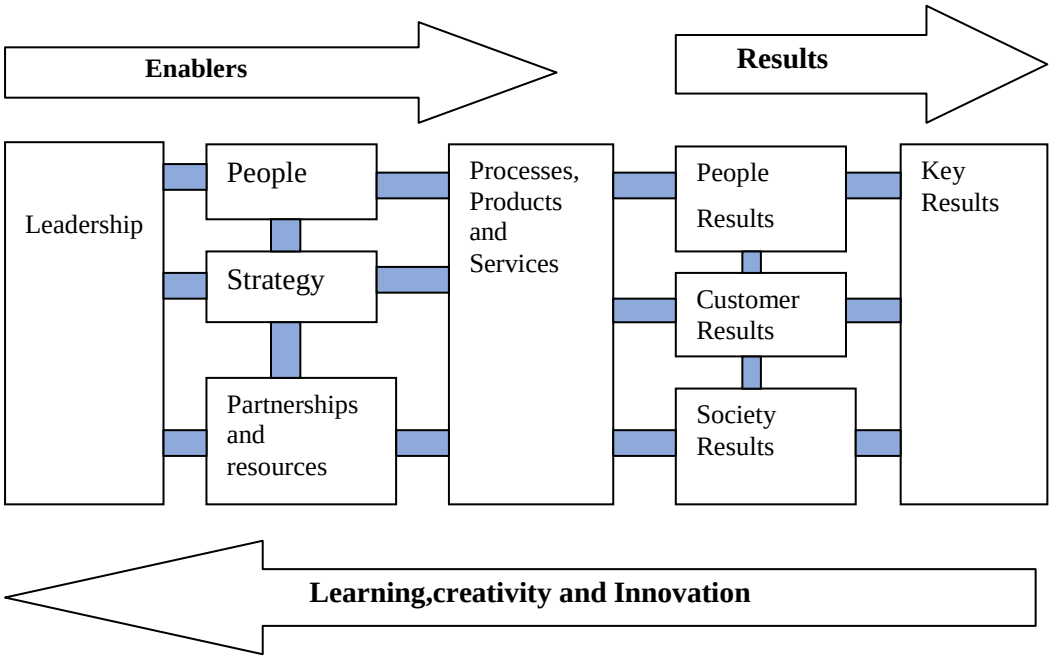


Figure 2.3: European Foundation for Quality Management (EFQM) model

Source: Oakland (2014)

From the diagram, the distinctive TQM enablers lead to the the desired TQM results. It is clear that it is a non-prescriptive framework for achieving good results–customers, people, society, key performance – through the enablers – leadership, strategy, people, processes, products, systems, partnerships and resources. The framework includes feedback loops of learning, innovation and creativity and proposed weightings for assessment.

2.4.3 Oakland TQM model

The model was developed by Oakland and Marosszeky (Oakland, 2014). The main purpose of the Oakland Model is recognition of managing processes within the company. The model processes are seen as a chain of improving performance that are managed effectively and efficiently (Aletaib, 2018).

According to Oakland (2014), the core of the model is the customer (both externally and internally). Management necessities (teams, tools and system) are represented in the surrounding triangle; the outer shell consists of communication, culture and commitment. The four hard factors addressed in this model are performance, people, planning and processes. It also includes three soft factors of TQM: commitment, communication

andculture. The central notion underlying the model is that performance improves and develops through managing and directing people, better planning and conducting appropriate processes. The model acts as a framework, which leads the company towards TQM and provides the basis of excellence in the industry and covers all aspects of a company and its operations.

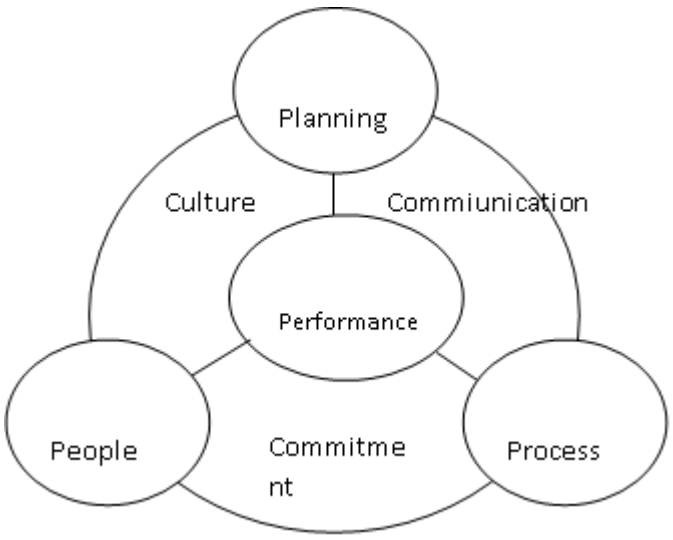


Figure 2.4: Oakland TQM Model

Source: Oakland (2014)

2.4.4 Common features of TQM models

The Oakland, EFQM and MBNQA have the following common features and criteria: leadership; strategic planning; customer and market focus; human resource focus; process management; and business results. The three models share the following criteria: leadership, strategies and human resources, market and customer focus/satisfaction (Aletaiby, 2018).

Sower, et al. (2016) have argued convincingly against attempts to make one model fit all situations and that it was preferable to consider a range of adaptations to fit particular contexts. Moreover, the degree of maturity and perception towards TQM in certain companies, especially in developed countries, is not at the same level as in other companies that exist in developing countries such as Zambia. This was due to the fact that the Countries have unique cultures as well as environments. Thus, this study endeavoured to develop a framework that fitted the current context of the building sector in Zambia whilst considering the existing regulatory framework in the ZCI, particularly, the building sector.

2.5.The initial conceptual framework for TQM

The choice of adopting or developing a TQM framework is a critical issue because it depends on the vision of the company. A conceptual framework is described as “a network or a “plane” of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena” (Abbas, 2018; Jabareen, 2009).

Based on the following, (i) a thorough analysis of the literature regarding the adoption and implementation of TQM in the Zambian Building Sector; and (ii) the identification of a knowledge gap regarding factors affecting the successful adoption of TQM through developing a framework specific to ZBS, there is a critical need to develop a conceptual framework in order to facilitate the successful deployment of these systems. As one of the major outcomes of this study, this framework highlights the critical impacts of factors on the successful implementation of TQM in the ZCI, particularly the building sector.

The conceptual framework drawn from the literature review is illustrated in Figure 2.5.

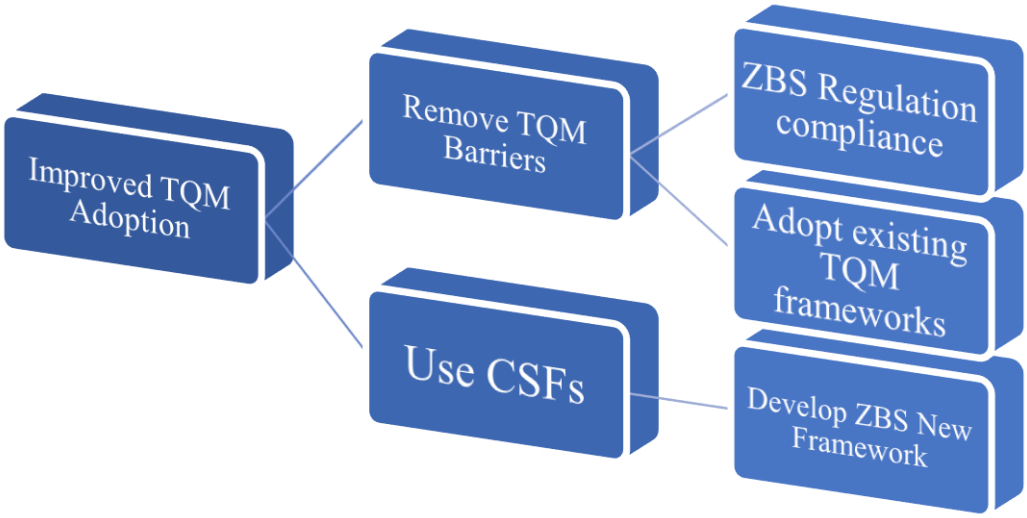


Figure 2.5: Initial Conceptual framework model.

2.6 Critical Success Factors (CSFs) for improved adoption of TQM

As highlighted by Abdullah (2010), TQM's aim is to establish quality enhancement as an organizational dominant priority and improve organizational effectiveness through eight principles, which include: customer focus, leadership, people involvement, process approach, systematic approach to management, continual improvement, factual approach to decision making and mutually-beneficial supplier relations. Furthermore, TQM embraces principles, processes, practices and procedures necessary for providing customer satisfaction and achieving improvement in productivity and business performance. Its' successful implementation is dependent upon key factors known as Critical Success Factors (CSF).

Love et al (2000) observes that TQM is different from traditional management as its philosophy seeks to integrate all organizational functions including marketing, finance, design, engineering and production, customer service whilst focusing on meeting customer (internal and external) needs, employees satisfaction and organizational objectives by ensuring that the processes being carried out is right, first time and every time.

The key factors that govern TQM implementation are all targeted at providing quality as well as customer satisfaction in an evolving constrution and business world. Each principle is discussed in detail as the chapter progresses.

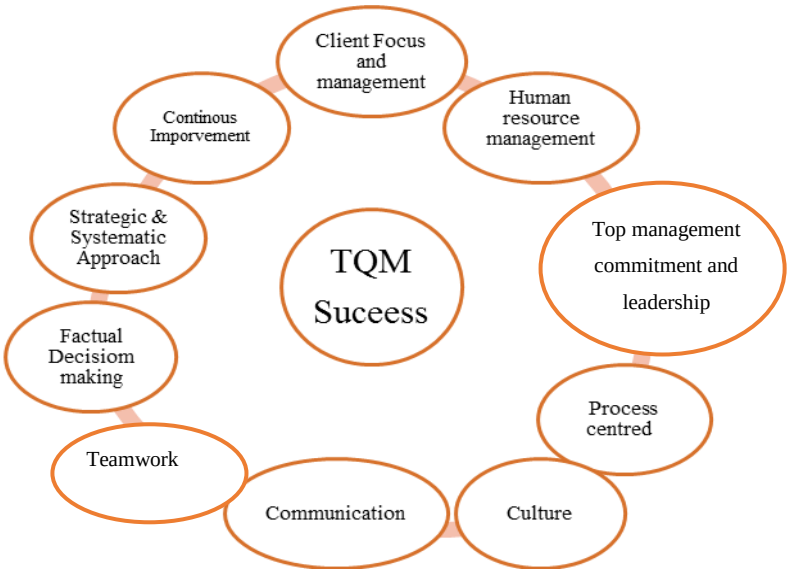


Figure 2.6: TQM Principles

Source: Van Vliet (2009)

The bubble diagram above summarizes the basic principles governing TQM success.

2.6.1 Top management commitment and leadership

The successful implementation of effective quality management is directly linked to the actions of a champion, the vision of senior management, and strong leadership which is essential and considered by many leading experts to be the most important factor. Quality management will only be effectively implemented where the chief executive is committed to its success. The task of the leader in a TQM organisation is to change the organisation and the employees in terms of their behaviour and attitudes (Kirst-Ashman and Hull, 2011). Leadership and top management commitment also should involve cross functional system approach, making decisions based on fact and motivating employees for TQM (Harrington et al., 2012; Fotopoulos and Psomas, 2010; Drew and Healy, 2006; Ahmed et al., 2005; Tari, 2005; Kumar and Sharma, 2017).

Dess and Lumpkin (2003) defines top management commitment and leadership as a practical, goal-oriented act that focuses on creating and implementing an original vision. In order to make important changes, and thereby inculcate cultural growth activities and quality culture determination, commitment must be observed by subordinates in their leaders. Haupt and Whiteman (2004) argue that high commitment by leadership and top management in the organisation is a strong prerequisite for successful TQM implementation in construction.

2.6.2 Human resource management

According to Kikwasi (2011) and Kulemeka (2010), human resource management relates to the employee involvement, development and training. A study done by Imbeah (2012) revealed that poor quality was linked to poor training efforts especially among contractors. This is better enhanced if resources are provided for employees for effective training and developmental activities. When employees are committed to delivering quality, they take greater initiative towards meeting product and process specifications; detecting and eliminating bottlenecks; improving product and process designs and setting realistic yet challenging performance targets.

2.6.3 Quality Culture

Boujelbene (2011) as cited in Mumo (2013) defines quality culture through an organisation as the set of organizational practices, values, norms and principles that guide daily operations of an organization. Furthermore, four (4) orientations of organistaion culture were discussed as follows: innovation orientation, stability orientation, results/outcome orientation, people orientation and communication orientation. An organization must come up with quality culture that must be integrated with other dimensions of culture if it has to succeed in TQM management.

Smirchich and Stubbart (1983) describe culture as: "The degree to which a set of people share many beliefs, values and assumptions that encourage them to make mutually reinforcing interpretations of their own acts and the acts of others". As a result of the system of shared norms, the culture creates shared meanings for the individuals, thus providing bonds between them.The culture may generate commitment to management values, and will provide a perception of the organization to people within and outside of it.

2.6.4 Client management and focus

The first step of client focus and satisfaction involves finding out what the client wants and expects and measuring the level of customer satisfaction so as to help eliminate dissatisfaction (Dilawo and Salimi, 2019). Client satisfaction can be measured using feedback, complaints, compliments, focus groups, surveys, questionnaires and interviews (Tari, 2005; Yang, 2006). Focus on the requirements of the customer at every stage in the process is fundamental to ensuring satisfaction. The customer-supplier relationship is therefore of great significance; every quality system should involve the customer, either directly or indirectly. Customer feedback provides the best inputs from which to define required improvements.

2.6.5 Sub-contractor and supplier quality management

Failure to meet the requirements in any part of a quality chain has a way of multiplying and a failure in one part of the system creates problems elsewhere, leading to yet more failure, more problems and so on (Oakland, 2014). Supply chain management is a relatively new term in the construction industry. It involves integrating the operations of all organizations involved with the delivery of a particular product or service. This extends from the primary

producer all the way to the end-user. In construction this will include the primary material suppliers, component suppliers, manufacturers, distributors and intermediaries, installers, trade contractors, lead contractors, designers and the client organization. (http://theconstructor.org).

The figure below shows how the building project is passed through different stages before completion (http://theconstructor.org):-

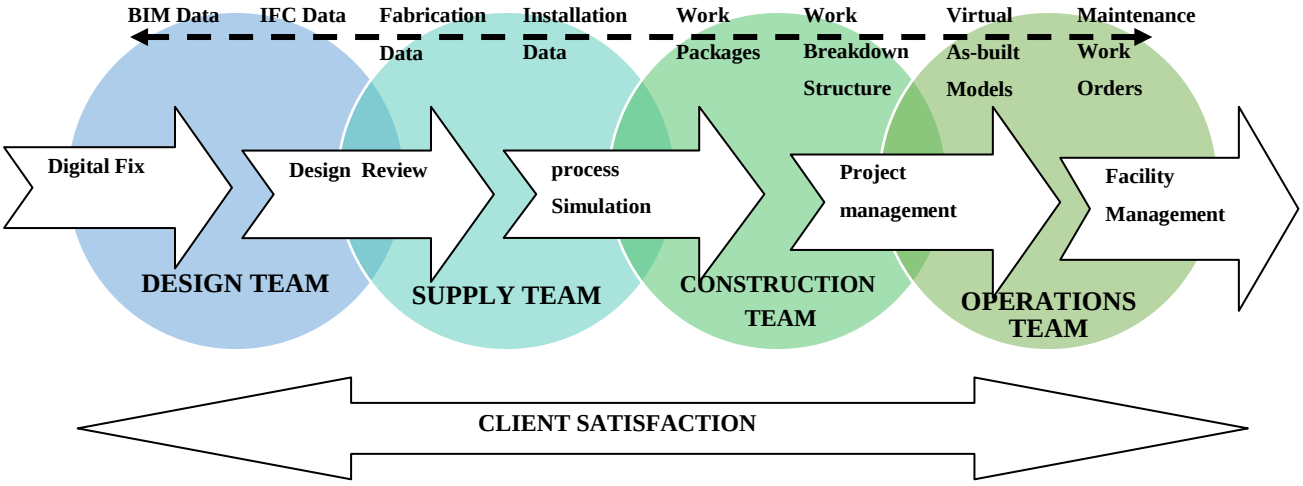


Figure 2.7: Quality systems – creating the customers/supplier chain

A supplier usually deals with three key issues: supply chain management, quality management, and knowledge management. During construction value is generated by producing construction works, either in terms of new structures or by improving the already built environment (Oakland and Marosszeky, 2006). Such value generation is highly dependent on the collaboration between numerous suppliers from early design stages up until completion of construction. This process is not owned by anyone and project progress is achieved by involved participants through continuous negotiations (ibid).

The business process of an organization may be defined in terms of chains and interactions between different activities and parts of the company, whereby customer demands are converted into goods and services that meet those requirements. Each part of the organization has a dual role; that of receiver and supplier, adding value/quality by the

processes undertaken. Therefore,the application to subcontractors and suppliers in the construction sector,particularly buildings was that the relationship between main contractors and subcontractors is a major aspect that contributes to the degree of success or failure of projects which are subcontracted (Mudzvokorwa, 2016; Jin et al, 2013; Okunlola, 2015; White and Marasini, 2014).

Eriksson and Westerberg (2011) showed that the strategic alliances between contractors and subcontractors produce superior client satisfaction because of the overall improvement of on-site construction activities. A study done in Zambia also identified that subcontracting is one of the causes of project schedule overruns (Kaliba, 2010). Kale and Arditi (2001) point out that the General Contractor to be successful must consider the subcontractors and suppliers on the project as a strategic asset critical to the project, and the ultimate perceived performance of the General Contractor by the customer.

2.6.6 Process management, information analysis and evaluation

Quality is achieved by putting in place a quality system that is intended to ensure that all component processes are subject to appropriate planning and control, not by inspection of the end product to see if it is conforming. In other words, quality is planned into the process, not inspected into the output. Imbeah (2012) reports documentation and control of document is an important element which facilitate in the review process, assessment and attainment of quality management in a firm.

It is pertinent that all project information must be organized in a logical manner to enhance process management and quality on any construction project. In addition,quality integration in the processes is required instead of quality checks of the final product is necessary to define, monitor and control the inputs to the building process.

2.6.7 Continuous improvement and planning

The process of ‘continuous improvement’ is an essential element of TQM. This process is one of continually involving all process participants in a team environment, reviewing and experimenting in order to make small changes and innovations in the process. Sheriff (2010) reported that Continuous improvement would yield excellence in design, ensure

communication in contracts and create a teamwork spirit in construction. The effectiveness of the continuous improvement process is a function of: Management commitment to the process; the skill, knowledge, expertise and creativity of the personnel involved; and the authority delegated to personnel as well as the resources available to them.

According to Alintah-Abel (2019), the principle behind the idea of continuous improvement is basically the idea that mistakes can be avoided and defects can be prevented. This can be achieved by the continuous identifying and eliminating those activates that add little or no value to products or services rendered thereby improve quality of product or services in the absence of customers' complain.

The "Plan-Do-Check-Act" cycle is an iterative four-step management method used in business for the control and continuous improvement of processes and products. It is also known as the Deming circle/cycle/wheel, Shewhart cycle, control circle/cycle, or plan–do–study–act (Ashokkumar, 2014).The "Plan" establishes the objectives and processes necessary to deliver results in accordance with customer requirements and the organisations policies; the "Do" implements the processes: the "Check" monitors and measures the processes and products against policies, objectives and requirements and reports on the results; and the "Act" takes actions to continually improve process and system performance.

2.6.8 Communication

Dilawo and Salimi (2019) reports that a major contributor to a project's poor quality performance is lack of effective communication and interaction between project stakeholders such as contractors, clients, consultants and suppliers especially on TQM related issues.

Willar (2017) asserts that project and organizational structures play a very critical role in the flow of information and communication action amongst stakeholders. This statement is true for the Zambian Building Sector. All project stakeholders need clear lines of reporting and project execution to avoid poor quality outcomes and conflict.

Good communication provides vital feedback to management on their quality efforts (Sharma and Kodali, 2008; oakland,2003). ZBS stakeholders ought create effecting lines of

reporting and communication among employees as well as with the client in thepursuit of quality attainment.

2.6.9 Teamwork

Imbeah (2012) asserts that the eventual aim of the team approach is to get everyone, including contractors, designers, vendors, subcontractors, and owners involved with the TQM process. Team work is necessary to encourage competitive activities internally among employees and externally with respect to suppliers and customers.

A well-structured team will be able to tackle a complex problem through the pulling of resources together, contributes to the generation of improvements that are proposed by employees, make recommendations which are more likely to be accepted and implemented and boost workers morale and ownership through participation in problem solving and decision making (Alintah-Abel,2019).

Teamwork is a key factor in improving adoption of total quality managemet in the ZBS. Construction stakeholders could adopt the following characteristics in the table below to develop effective project team. In addition, Imbeah (2014) states that Quality teams provide companies with the structured environment necessary for successfully implementing and continuously applying the TQM process (Arditi and Gunayadin, 1997).

The table 2.3 below gave a breakdown of characteristics of project teams for adoption in a quality emerging organisation.

Table 2.3: Characteristics of effective project teams

Variable	Characteristics
Goals and roles	Clearly defined responsibilities
Performance	Perfor,mance,satisfaction an dgrowth are valued and achieved
Leadership	Seen as shared responsibility
Communication	Clear,open,energetic
Processes	Processes that ensure alignment with team objectives
People	Individual goals are blended with team objectives

Source: Extract from Mower and Wilemon (1989)

The aforementioned factors worked in-tandem to achieve the successful implementation of TQM around the world. The ZBS could incorporate these factors in daily construction activities to achieve quality output and customer satisfaction in this new age of client centred industries.

2.6.10 Trainning

Jamali et al. (2010) in Mumo (2013), point out that employee training is one of the most important requirements in a successful TQM implementation. Lack of appropriate skills in construction and poor quality have been linked to poor training efforts especially among contractors (Kikwasi, 2011, Kulemeka, 2010). Management personnel, supervisors and other employees require skills and knowledge on quality dimensions and management as well as their roles in TQM implementation. Owing to the fact that market quality needs are very dynamic, organization must ensure continuous employee development and training on quality management. Kumar et al. (2009) explains that a systematic model of training consists of four main stages; assessment phase, planning and design phase, implementation and lastly the evaluation phase. Training also entailed educating all levels of staff in the organization with an intention of broadening their knowledge on quality issues and programs and providing them with information about the organization's quality mission, vision and general desired direction (Zakuan et al, 2012).

2.7 Discussions on Critical Success Factors (CSFs)

It is important to identify the factors required for the adoption process, to successfully implement TQM. Saraph et al (1989) defined CSFs as "critical areas of managerial planning and action that must be practiced to achieve effective quality management in a business

unit". These factors may be constructs with latent variables which cannot be measured directly, but can still be assessed indirectly from their manifestation. The researchers, in a pioneering study developed a quality management instrument, identifying eight (8) critical success factors of TQM. These include: role of divisional top management and quality policy; role of quality department, training, product/service design; supplier quality management; process management/operating; quality data and reporting and Employee relations. Their study had considerable influence on later studies, and subsequent research has resulted in the development of different frameworks and constructs based on varying perceptions and objectives (Zhang et al, 2000).

Although these frameworks or models have different TQM approaches, they all emphasize on leadership, strategic planning, customer and market focus, human resources focus, process management, continuous improvement, supplier management and business results in one way or the other (Dale, 2003; Conca et al, 2004).

The critical success factors identified in TQM frameworks point to two categories of factors namely soft and hard dimensions. 'Hard' components of TQM concentrate on the tools and techniques, systems and the supplementary measurement and control of the work process, ensuring conformance to performance standards and the reduction of variability whereas 'soft' components relate to areas behavioral concerns such as increasing customer orientation, employee management, organizational and quality culture. These dimensions are interrelated and together are very important for the successful implementation of TQM (Rahman, 2004; Powell, 2006; Dow et al, 1999; Oakland, 2000).

A great deal of research has been conducted in the field of TQM and its implementation. The study by Sila and Ebrahimpour (2002) reviewed 347 articles on TQM from 1989 to 2000 and identified seventy-six (26) studies that employed factor analysis to extract factors for successful implementation of TQM. Out of these, they compiled twenty-five (25) TQM constructs which are widely used by researchers to measure TQM implementation. Their study revealed eight common core factors specifically customer focus and satisfaction, employee training, leadership and top management commitment, teamwork, employee involvement, continuous improvement and innovation, and quality information and performance.

In this research, both the “Hard component” category of factors and the “soft component” were used to assess barriers to TQM implementation.The table 2.4 below explains the difference between hard and soft components of CSFs.

Table 2.4: Hard and soft componenets of CSFs

Key components	**Soft**	**Hard**
Dimensions	Total employee involvement, continous improvement, continous training, team work, empowerment, top management commitment and support, democratic management style, customer satisfaction and culture change	Statistical process control, quality function deployment, ISO 9000 series, pareto analysis, matrix diagram, histograms and process charts, tree decision diagrams, critical path analysis and fishborne or ishikawa diagram

Source: Vouzas and Psychogio (2007) as cited in Dilawo and Salimi (2019).

Metri (2005) discussed other critical factors when he analyzed the critical success factors (CSF) of the fourteen (14) most prominent total quality management frameworks. Based on this, he proposed the following ten (10) CSFs of TQM for the construction industry: Top management commitment; quality culture; strategic quality management; design quality management; process management; supplier quality management; education and training; empowerment and involvement, information and analysis; and customer satisfaction.

Further, Imbeah (2012) highlighted a list of nine (9) CSFs for TQM in contruction as follows: top management commitment and leadership; quality planning; customer focus; human resource management; process management; continous improvement; supplier management; information analysis and evaluation; and teamwork.

2.8 Empirical literature review

There are a number of similar studies that have been conducted by other authors regarding TQM and its CSFs in the construction industry. The following literature review supports the factors that gave insight into this studys’ developmet process of a TQM framework.

Table 2.5: Comprehensive list of literature review support to key factors of TQM

Key factors of TQM	Supporting Literature review
Top management commitment or leadership	Neyestani and Juanzon (2016); Zairi, (1999); Goetsch and Davis (2000); Dess and Lumpkin (2003); Nasseef (2009); Rao (2008); Tsang and Antony (2001); Lewis et al. (2006); Oakland (2003); Bosher and Hazlewood (2009); Vettori and Rammel (2014); Feigenbaum (1991); Crosby (1979); Motwani (2001); Saraph et al. (1989); Flynn et al. (1994); Al-Omaim (2002); Baidoun (2003); Lewis et al. (2006); Koh and Low (2010); Kumar et al., (2011); Hietschold et al., (2014); Ismail (2012); (2014); Dedy et al. (2016); Youssef, (2006).
Quality Culture	Hietschold et al. (2014); Black and Porter (1996); Gherbal et al. (2012); Rad (2006); Ismail (2012); Oakland and Marosszeky (2006); Temtime and Solomon (2002); Gotzamani and Tsiotras (2002); Watson & Howarth (2012); Tsang and Antony (2001); Evans and Linsday (2001); Oakland (2003); Tsang and Antony (2001).
Policy and Strategy	Zairi (1999); Black and Porter (1996); Motwani (2001); Al-Omaim (2002); Baidoun (2003); Lewis et al. (2006); Hietschold et al. (2014); Evans and Linsday (2001); EFQM, (2010); Oakland and Marosszeky (2006); Lee and Dale
Training and Development	Dedy et al. (2016); Crosby (1979); Vermeulen and Crous (2000); Motwani (2001); Al-Omaim (2002); Youssef (2006); Ismail (2012); Lewis et al. (2006); Kumar et al. (2011); Gherbal et al. (2012); Hietschold et al. (2014); Neyestani and Juanzon (2016); Tsang and Antony (2001); Kanji and Asher (1996).
Communication	ASQ (2015); Crosby (1979); Ismail (2012); Black & Porter (1996); Kumar et al. (2011); Gherbal et al. (2012); Hietschold et al. (2014); Dedy et al. (2016); Zairi (1999); Sila and Ebrahimpour (2002); Oakland (2003); Jabnoun (2005); Kanji (2012).
Process Management	Hietschold et al. (2014); Motwani (2001), Flynn et al. (1994); EFQM (2010); Black and Porter (1996); Youssef (2006); Ismail (2012); Lewis et al. (2006); Koh and Low (2010); Neyestani and Juanzon (2016); Tsim et al. (2002); Lee and Dale (1998); Kanji (2012).

Key factors of TQM	Supporting Literature review
Customer focus	Neyestani and Juanzon (2016); Flynn et al. (1994); Black and Porter (1996); Al-Omaim (2002); Baidoun (2003); EFQM (2010); Youssef (2006); Ismail (2012); Lewis et al. (2006); Kumar et al. (2011); Hietschold et al. (2014); Dedy et al. (2016); Tsang and Antony (2001); Richards (2012); Evans and Linsday (2001); Dean and Bowen (1994); Mandal (2009); Chin and Pun (2002).
Continuous improvement	EFQM (2010); Youssef (2006); Ismail (2012); Al-Omaim (2002); Pun (2002); Baidoun (2003); Lewis et al. (2006); Koh and Low (2010); Kumar et al., (2011); Chin & Pun (2002); Al-Khalifa and Aspinwall, (2001). Tsang and Antony (2001).

Source: Extract from Aletaiby (2018)

In addition to supporting literature highlighted in Table 2.5, the study embarked on reviewing other research work on TQM's critical success factors and elements used to develop the framework for improving adoption of TQM in the Zambian Building Sector (ZBS). Each factor was elaborated using previous publications as follows:

Management Commitment: Al-Sabek (2015) undertook an investigation of Critical Factors affecting the implementation of TQM in the Construction Industry in United Arab Emirates (UAE). A sample of 60 respondents from a construction company in Abu Dhabi was considered in the study and primary data collected using a questionnaire (survey). Using a quantitative method to analyse the data, the research findings revealed that top management committement was the most critical factor in the implementation of TQM and that project cost was the most affected outcome from implemetation of TQM. The research observed that the success of TQM was dependant on top management and this resulted in saving of money and reduction of costs if properly implemented by the project team.

The lessons drawn from Metri (2005) and Imbeah (2012) were that without involvement of top management including their commitment and leadership, a TQM program was bound to fail. Allocation of budgets, planning for change and provision of monitoring structures of progress of works comprised by top management duties which accentuated the importance of top management involvement in TQM implementation. In addition, continous

improvement enhanced performance of employees who aided implementation of TQM programs thereby leading to total customer satisfaction. It was also found that Employees must be empowered in decision making and quality improvement through training and effective communication within the organisation. This ultimately impacted positively on teamwork which unifies employees and organisation thus easing the implementation of quality improvements. The foregoing are necessary ingredients to ensure success of TQM adoption in the ZBS.

Cost of quality: Okuntade (2015) systematically reviewed previously published studies, rather than reporting new facts or analysis on barriers and benefits of TQM in the Nigerian Construction Industry. The research identified the major problem faced by most companies in Nigeria as bordering on how to adopt a strategy for high quality building; that would satisfy needs of the owners at a reduced and effective price while ensuring they remained in business. Therefore, there was a relationship beteween customer satisfaction,an aspect of CSFs and costs for achieving quality .

Furthermore, the cost of quality can be divided into two areas: costs related to not doing things right, and costs related to trying to prevent them from going wrong, as shown in formula: Cost of Quality = Cost of Non-conformance + Cost of Prevention.
The cost of nonconformance includes the direct and indirect costs and emerges from not doing things right the first time (Al-Musleh, 2010).

This scenario of non conformance is frequently observed in the ZBS, some examples are poor workmanship, accidents on sites, being late and errors which then lead to rework, penalties, increased insurance costs, and removal of defects. Therefore, improving the adoption of TQM practices is key to mitigate poor quality.

Culture: Alintah-Abel (2019) states that total quality culture implies the decentralization of responsibility to the lowest cadre. This makes quality central to every employee and management in the organisation. Ismail (2012) sought to assess the adoption of TQM factors in the Construction industry in the United Kingdom and Jordan. The sample size for the research comprised 18 interviews and 200 questionaires. Ten interviews were conducted with contractors and companies from 8 companies in UK and 8 companies in Jordan. self-administered questtionaires were targeted at 200 managers, project managers and

employees. Using both qualitative and quantitative research approaches and analysing the data using multiple regression analysis to test the effect of the independent variable (TQM critical success factors) on the dependent variables (profitability, market share and service quality), the study findings showed that time and cost, compared with non-implementation of TQM and learning practice, further compounded quality failure in the Jordanian Construction companies evidenced by customer dissatisfaction, rework, bad reputation and reduced turnover. However, the results in the United Kingdom showed an increased adoption of TQM in construction companies to solve quality problems. Therefore, a cultural and management behaviour change was neecessary for companies to adopt TQM in a bid to improve quality and ensure customer satisfaction.

Training, Communication and Culture: Oruma (2014) investigated the factors influencing the implementation of TQM in construction companies from Nakuru Country of Kenya. The research used simple random sampling and stratified random sampling to select 15 construction companies and 230 respondents respectively. Using SPSS program to analyse collected data, the study results revealed that top management committement was a critical factor in implementation of TQM as it positively influences implementation of TQM. Furthermore, employee training, appropriate organisational culture and communication had positive influence on implementation of TQM. The study recommended that top management ought to commit themselves to providing leadership and key resources necessary for succesful implementation of TQM.This was to be complimented by frequent training on quality management initiatives,development of effective communication systems at all levels of organisation and enshrine a culture of quality in the organisation structures.

Teamwork and ICT: A study by Waleed (2012) on TQM within the construction industry of Kuwait found that leadership, employee, teamwork and information technology had a significant role of TQM in the construction companies hence recommended that TQM be enhanced through practicing continous improvement, strenthening employee training, increasing and enhancing communication between managers and employers. The study involved collection of data from eight construction companies in Kuwait through distribution of 1,450 questionnares to employees. The collected data was entered into SPSS sofware and various statistical analses such as descriptive, crosstab, factor, regression, anova and t-test were used in the study. Reliabity of the data was checked using Conbach's Alpha.

Customer satisfaction, management commitment, communication, return business and skilled work force: Hoonakker et al (2010) examined the barriers and benefits of quality management in the US construction industry. Nine open-ended inteviews were conducted while two questionnare surveys were used to address quality issues in the construction industry on a sample of 208 and 148 contractors respectively. Over 75% of interview respondents stated that the primary measure of quality performance in the construction industry was a contractors reputation and satisfaction expressed by customers. As quality is often measured through customer satifaction,it follows therefore that quality can be improved through education and training of personnel .The questionnare survey results showed that contractors consider customer satisfactrion, management commitment to quality, return business and skilled work force as best measures of quality. Additionally, employee involvement and good communication were considered essential for quality improvement. The authors proposed that quality could be improved through overcoming conflict between actors in the contruction process through partnering; standardisation; competitive bidding bidding process and pre-qualification; changing culture in the construction industry.

Critical Success Factors identified: Syaj (2015) explored the challenges faced in the implementation of quality management in the construction sector in Palestine. A random sample of 174 managers and engineers from construction companies were selected in the study. Both qualitative and quantitative research methodoloy were employed in the study. Using SPSS and Ms Excel to analse the data, the research findings revealed awarding tenders on the basis of lower prices was the most important problem affecting quality management followed by lack of expertise in quality management systems, lack of education and training and lack of owner's awareness about importance of quality. The study identified twelve critical success factors which were needed for the successful implementation of TQM in Palestian construction companies. These included material and equipments, fianncial issues, site layout, systems used, surrounding environment, continous improvement, top management commitment/leadership, externl customer focus, process management/execution, suplier management, information analysis/evaluation and contract documents.

TQM framework: Adusa-Poku (2014) conducted an exploratory study aimed at assessing TQM in the construction industry of Ghana. Using random sampling method, a sample of 50

contractors registered in the D1K1 and D2K2 categories of the Association of Bulidng and Civil Engineering Contractors of Ghana (Kumasi) register were selected for the study. Questionnaires were admistered to project manager, site supervisors and technitans. Using SPSS to analyse the data, the research findings showed that inspection and quality control was the predominant quality management practice in Ghana and critical success factors rated in order of importance included process management, continous improvement, employee satisfaction/empowerment, supplier chain management, customer focus, management/leadership commitment and training. The author proposed a framework to guide management in the implementation of TQM with the aim of transforming the Ghanaian construction industry.

2.9. Understanding the Adoption and Implementation of TQM

As seen in the previous studies, TQM was considered to be an important manaagement philosophy,however,there exists extensive numbers of poorly performed implementation proceses of TQM. This is a problemmatic phenomenon,which negatively impacts organizations,irrespective of size,in their development towards business excellence and survival in a competitive world.Thus,there is need to understand that to adopt TQM, the organization must first accept the idea,philosophy before implementation takes place.

2.9.1 TQM Adoption

As there is a strong reliance in the construction industry on the ‘old way of doing things’, with the mantra of ‘what has worked in the past, will work again’, there is a requirement for more responsive thinking across organizations. This requires managing expectations of the workforce and equipping them to overcome the barriers of TQM adoption, especially when it is seen to threaten rather than to improve jobs. This requires that the workforce understands the entire end to-end project value chain and how they add value to a project; and it requires communication on what digital is, how it will affect the workforce, what tech is available and what changes should be anticipated.

TQM was broadly accepted as the stimulator for performance improvement in the construction industry (Hoonakker et al, 2010; Koh and Low, 2010; Ngowi, 2000; Love et al, 2004). In the construction industry, firms commonly adopted TQM through employee

empowerment, Just-In-Time (JIT), quality circles, Six Sigma, ISO9000 and extreme quality assurance.

2.9.2 TQM Implementation

Bahri et al. (2012) indicated that TQM's overall objective is to ensure continuous improvement in the organization's people, systems, processes and environment so as to achieve improved customer service and increased profits through efficiency and effectiveness in the entire organization. Since implementation of TQM is associated with benefits to both the organization and its clients, it is regarded a double sided competitiveness tool. It is important to note that any organization can implement TQM irrespective of the size or operations. However, the success of the implementation process depends on how well the organization understands the process and the strategies adopted. One guiding principle in implementation of TQM is that the process must be organization wide; everyone and every function in the organization must be involved in the process with the management taking a leading role (Schuurman, 2000).

Implementation of TQM is an elaborate process that takes time and resources. It is a process that must be initiated and managed by the top management. The top management must make available all critical resources required as well as the organizational structure and culture required. The process must focus on finding out, meeting and exceeding customer needs and expectations through total involvement of everyone in the organization and through continuous improvement. This process requires exceptional skills and team work that call for continuous employees training and development (Oluwatoyin, 2008).

Hassin et al (2007) identified training and education as key factors in the implementation of TQM. Other factors include customer satisfaction, employee participation and quality policy. Love et al (2000) advocated for a cultural and behavioral shift in the mind-set of practitioners, academics and professional institutions if the construction industry is to improve its performance and competitiveness. This view was reiterated by Ramachandran and Snehalatha (2010) as well as Mohammed (1997) who stated that the implementation of TQM requires a culture change and change in management behavior.

2.9.3 Benefits of TQM adoption and implementation to the Zambian building sector

Research conducted by Hoonakker (2010) on the benefits of TQM implementation in the construction industry, revealed that control process and prevention of defects before they happen ultimately saves millions of dollars in rework. For instance, the average number of defects in housing projects built by companies with ISO 9000 certification was significantly less than the number of defects in housing projects built by companies without ISO 9000 certification. Therefore, the ZBS could save from avoiding cost overruns and reworks arising from defective construction works through TQM adoption.

Apart from the cost aspect and savings, construction firms which successfully implemented TQM included reduced rework, reduced nonconformities, reduced workforce, reduced cost, improved overall project schedule, improved client satisfaction, increase in staff morale and increase of market share (Islam and Mustapha, 2008; Love et al, 2004; Polat et al, 2011).

Other benefits include repeat customers, improved employee job satisfaction, higher productivity, and improved budget performance and better chances in bidding process with pre-qualification.

In summary, the potential benefits offered by Quality Management techniques were varied and the consensus from various studies was that it had been successfully applied in other industries and could be very beneficial in the construction industry (Chindo and Adogbo, 2011). The application of quality management programs enabled companies to improve the following :

- Long-term relationships, product and process improvement,
- Harmonious team spirit, more customer focused, employee job satisfaction, increased revenues, reduction in quality costs, decreasing waste and rework,
- Coordination of activities, improved customer service and market competitiveness,
- Enhance professionalism and skills in all spheres of the construction sector, encourage open addressing of problems, better control over the construction process,
- Safety, subcontractors with proper quality management systems, and closer relationships with subcontractors and suppliers that help to achieve the intended project objectives.

Thus, the benefits of TQM outweighed the barriers. It takes a nations' construction industry to collaborate with its government to successfully implement TQM (Chindo and Adogbo, 2011; Low and Peh, 1996). Therefore, the ZBS was encouraged to improve the adoption of TQM in view of the fact that TQM had been embraced in construction industry organizations in developed nations to help raise levels of quality, productivity and customer satisfaction (Avsar et al. 2006; Brunn 2011; Oakland and Marosszeky 2006; Said et al. 2006; Sdiri 2010).

2.10 Awareness of Total Quality Management Barriers

Trigunarsyah (2015) as well as Pamulu and Husni (2005) consider quality as one of the key elements of methods and techniques of project management in construction work. In reality, no firm could fully implement TQM as it is a continuous improvement process which is never ending. Its culture and philosophy must infiltrate an organization, and would thrive only under senior management when it establishes it as a top management priority and commit itself to its success.

It is important to note that there are factors that may inhibit successful implementation of TQM. Therfore, it was vital to identify and remove the obstacles that block TQM adoption. Arshida and Agil (2012) referred to these factors as barriers of TQM implementation. These factors included: lack of top management commitment which was associated with lack of critical resources and poor leadership leading to poor employee empowerment and motivation, poor organizational vision and plan statement that diluted employee's efforts in quality programs. There is evidence of disappointing results in many organizations' attempt to implement quality management due mainly to obstacles in implementation (Yusoff et al, 2006).

In this research, the barriers were categorized into groups,namely procedural, cultural, employer/employee and authorities barriers. This categorization of barriers to adoption of TQM practices arose from improper attitudes/ perceptions of management and employees', inadequate resources and training as well as inappropriate environments for implementation.

Harrington et al (2012) noted that TQM is a well-known and recognized working method to improve the overall construction performance in terms of speed and quality in many countries. However, the industry still refused to fully adopt TQM system due to several barriers. Extensive studies have been carried out to find solutions for the possible barriers of TQM implementation (Lam et al, 2008; Ahmad et al, 2005).

TQM implementation in the construction industry is not easy due to the peculiarities of the industry such as one-of-a-kind product, lack of top management's leadership and support, unqualified workforce, lack of effective teams, et cetra are some obstacles to the full adoption of TQM practices in the ZBS. The aforementioned barriers that were categorized were further elaborated below:

a. Procedural driven barriers - The Nature of the Construction Process.

According to Hoonakker et al (2010), construction activities involve numerous activities and processes. which impedes application of TQM in the construction industry. Various stakeholders and participants, each with their own interests and perspectives, are involved to successfully execute bulidng projects using a number of delivery types such as Design-Bid-Build, Design-Build, Design-Build-Operate, Construction Managemnet at Risk and Turnkey Project Delivery (Roy et al, 2017). Furthermore, Dilawo and Silimi (2019) observes that the construction industry comprises self-employed, small, medium and large companies with one-off products occuring in different locations which makes standardisation a challenge. The process involves too much paper work, transient workforce and tight schedules which makes end-to-end quality build-in a challenge.

Hoonakker et al (2010) further idenfities the following basic construction steps:-

- The owner engages an architect/engineering firm for project design and tendering process to select contractors.
- Actual contruction work is undertaken by contractors. Despite the sharing of a common project goal, the participants have divergent views and goals. Nonetheless, owners often desire to complete a project at the lowest possible cost and good quality.
- The contractors attempt to provide the product as drawn by the designer as efficiently as possible, in order to maximise their profit. However, there are many other external

stakeholders such as suppliers and subcontractors such as ironworkers, carpenters, masons, plumbers, electricians, roofers etc which makes coordination a complex task.

In summary, the 'nature' of construction is a complex system in which several participants, each with their own perspectives and interests, are brought together to complete a project plan that typically changes several times during construction, while each tries to minimise the effects of weather, occupation hazards, schedule delays, and building defects. The many changes can lead to delays in completion of the construction project, complaints about quality, and rework, which in turn can lead to further delays and so forth (Dilawo and Silimi, 2019).

b. Procedural driven barriers - The Bidding Process

The bidding process, which normally starts with the release of a project description for public review by contractors, is another barrier. Femi (2015) notes that some contract tenders are open to general contractors only who in turn recruit subcontractors once succesful in the bid. Contractors gravitate towards maintaining a healthy profit margin for the job and thus may attempt to reduce allotted resources towards quality management.

c. Procedural driven barriers - Lack of integration between TQM and existing systems .

Another barrier to quality implementation is non-standardisation. During construction general contractors want to ensure quality throughout the project. However, according to Hoonakker et al (2010), the construction industry is characterised by its non-standardisation as products are often one-offs and the production processes differ from each other to some degree. The lack of universal universal standard or specification that can be applied to the product results in quality assurance difficulties.

d. Procedural driven barriers - Variations and reworks.

Al-Musleh (2010) emphasizes the significance of measuring the cost of poor quality as an important task in the quest for quality improvement. Quality should therefore be embedded in the design of systems and as a good design of plant and equipment not only helps prevent waste from defects and reworks but also enhances variabilty, ease of use and maintainace. While changes to project designs are inevitable during the constuction phases, reworks and variations must be justifiable to avoid compromise of quality (Dilawo and Silimi, 2019).

e. Employer /Employee barriers - Lack of Construction stakeholders' Interest in TQM.

Harrington et al (2012) acknowledges the imporatnce of employee empowerment to successful implementation of TQM. Since construction projects involves several participants broadly categorised into three namely owners or customers, the architect/designer /engineer, and the (general) contractor; management of these stakeholders and relationships among them is critical in order to align conflicting interests towards a common project goal. (Femi, 2015) adds that quality leadership is important at all stages in the construction process and their must be a commitment from top leadership and management in TQM adoption and implementation. Employees also need to have adequate traning and appropriate skills to avoid poor quality.

f. Cultural driven barriers - Resistance to change and cultural barriers.

Wali and Boujelbene (2011) describes culture as a set of organisational practices, values, norms and principles that characterise its day-to-day operations and governs behaviour. TQM can easily thrive in an environment characterised by senior managemnet commitment and where its culture and philosophy infiltrates an organaisation. Management should strive to change perceptions and attitudes within an orgarnisation in order develop a quality culture which influences the process of adopting TQM as it communicates quality norms and practices which employees are expected to engage in (Wanderi, 2015; Imbeah, 2012). The competitive advantage resulting from an organization's people can drive low cost and differentiation as pointed out by Ganapavarapu et al. (2015), A quality culture cannot be embedded in an organisation without employee buy-in. Achieving and mantaining quality culture by employees thus requires regular traning and upskilling due to dynamic market quality requirments (Rahaman and Siddiqui, 2006).

g. Authorities driven - Bereaucratic government influence

Government is as an important stakeholder in the adoption of TQM. Government and its implmenting agencies are often associated with bureaucratic tendancies and slow systems and processes. Wanderi ,2015 points out that adoption and implementation of quality initiatives are negtively impacted by a lack of favourable quality policies and low government support for quality programs. Arshida and Agil (2012) notes that the ability of a

company to implement quality tools and techniques in its response to customer needs is reduced by complicated procedures set by government departments. In Zambia, government policies for the construction industry are enforced through the National Council for Constructin (NCC) which regulates various categories of players in the construction sector to ensure quality. Since government regulates the quality of goods and products that are manufactured or imported into the country, it becomes imperative to ensure that construction players can access high quality products to use in their projects. For instance, there need to advocate for lower tax incitives on quality products so that cheap and low quality products do not end up in building projects.

2.11 Summary to barriers

The initial task was to group the barriers and TQM themes from the litreture review and then depict a conceptual map for easier understanding and development of the framework.Thebarriersweregroupedas follows:procedural,cultural,Employer/employee and authorities.

Table 2.6: Detailed barriers to TQM implementation in the construction sector

B1 Procudural driven barriers	B2 Cultural driven barriers	B3 Employer and Employee driven barriers	B4 Authorities driven barriers	T1 TQM Principles
• Lack of standardisation • Lack of document ability • Difficult in measuring results • High Cost of utilizing quality systems • Low bid subcontracting	• Multiple stakeholder • Conflicting interests • Conservatism	• Inadequate education and training • Lack of commitment • Lack of expertise • Lack of resources • Lack of top mgt.leadership • Lack of effective teams	• Government policies • Corruptiion • collusion	• Customer focus • Employee involvement • Communication • Process centered • Continous improvement • Integrated system • Systematic approach

2.12 Critique and review of the existing literatre/ body of TQM knowledge

The cause of inefficiency and poor quality is the system, not the employees, manager's responsibility to correct system to achieve desired results (Deming,2000).

This study endeavoured to summarize all the salients features surrounding TQM and grouped them into five (5) areas for critique. These were later used throughout the research to shape the study and develop the framework to improve adoption of TQM Practices in the Zambian Buildings Sector.

- **TQM Programs: Overzealous advocates may pursue TQM programs blindly, focusing attention on quality and less on other priorities that need attention to achieve it, that is, critical success factors**.

A publication on "Framework for the implementation of total quality management (TQM) in real estate firms in Ghana." by Imbeah (2012) asserted that although these firms are aware of the importance of quality, their knowledge about QM is limited and their perception about quality is of corrective actions (Quality control) rather than preventive actions (Quality assurance, process and continuous improvement approach). The author concluded that most firms do not provide any formal training for their employees and do not have effective quality management program in place to ensure customer satisfaction. Imbeah (2012) intended to identify the management areas that should be given attention for a successful quality management in real estate companies. Eleven critical success factors of quality management were empirically identified, which are, Top management commitment and leadership, Employee welfare and commitment, Employee training and development, Customer focus, Planning, process control and process evaluation, Supplier management, Continuous Improvement, Team Work, Information analysis and evaluation.

This study agreed with Imbeah (2012) findings that there was need for TQM training in all levels of management so that TQM programs and CSFs leading to TQM success are incorporated well. Another research by Nhabinde (2012) mentioned that some notable TQM programs were the development of certification programs involving all aspects of the construction industry, coupled with the training and capacity building of human resources at all levels, including management to overcome TQM barriers.

The positive highlight was the final development of TQM implementation framework derived from literature and empirically studies of fieldwork contributed to the knowledge gap in the Ghanaian construction industry, particular with the absence of any implementation framework and any national quality award .This was the case with the

Zambian Building Sector.The negative highlight was the limited access to organizational information faced during the research process; thus the contribution to research may have been affected.

The current study was influenced by the need to understand TQM programs and attain knowledge (training) before adopting them, as some programs may not be linked to organization in meaningful way. A TQM-Audit to assess the status of quality practice inthe ZBS was highly required. This was incorporated in the developed ZBS framework.
A studywere done by Al-Sabek,2015 .

- **Quality-related decisions not tied with market performance. Customer satisfaction emphasized to a point where cost far exceeds any direct or indirect benefits of TQM**

A study on Understanding TQM implementation barriers involving construction companies in a difficult environment by Dilawo and Salimi (2019) provided insight into the area of quality-decisions verses market performance. It was agreed that competitive advantage by application of TQM as well as other TQM benefits added profits from savings on reworks. However; this was not true in some cases as clients would demand higher quality materials while running on a limited budget. In turn, variations or changes often compromised quality if not handled well.

The positive aspect of the study was that the population was based on companies that undertook their trade in Southern Africa and mostly around Malawi, Zambia and Mozambique (Dilawo and Salimi ,2019). Therefore, identification of ten main barriers affecting TQM implementation would also applyto the ZBS .These were lack of quality support, poor TQM knowledge and TQM awareness, poor information sharing, temporary workers, overdependence on contract document, poor data collection measurement, undefined TQM roles and responsibilities, award to lowest bidder tendency, poor business environment and corruption The findings shaped this current research. On the other hand ,the weakness was that after the identification of barriers, the evaluation was that benefits of TQM outweighed those of barriers. It takes a nations' construction industry to collaborate with its government to successfully implement TQM (Chindo and Adogbo, 2011; Low and Peh, 1996). Therefore, the ZBS was encouraged to improve the adoption of TQM in view of

the fact that TQM had been embraced in construction industry organizations in developed nations to help raise levels of quality, productivity and customer satisfaction (Avsar et al. 2006; Brunn 2011; Oakland and Marosszeky 2006; Said et al. 2006; Sdiri 2010).

- **Failure to carefully plan a program before embarking on it leads to false starts, confusion and meaningless results**

Most attempts to adapt the quality management approaches fail because they were adopted with little comprehension of why they exist and with few attempts to understand in which particular culture or setting they would work. Many participants have been skeptical about quality because it had been brought into firms without careful consideration and had often failed to be adopted as core philosophy (Dilawo and Salimi, 2019). The aforementioned authors iterated this research's opinion that meaningless results arise from failure to plan.

The aforemetioned second and third critique, covered TQM barriers and benefits which guided and shaped the entire research. Quality planning which is a component of the Juran triology was incorporated in this study and final developed framework. Similar studies were conducted by Nhabinde (2012), Syaj (2015), Tey and Ooi (2004), McCollough and Benson, (1993), Magd (2008), Haupt and Whiteman (2004), Ankrah et al (2009) and Ngowi (2000).

- **Continuous/Incremental improvements when the organization needs dramatic improvements**

TQM is termed as a philosophy involving all organizations in an industry toward making some improvement in term of performance (Likita et al, 2017). The effectiveness of the continuous improvement process is a function of: Management commitment to the process; the skill, knowledge, expertise and creativity of the personnel involved; and the authority delegated to personnel as well as the resources available to them. Sheriff (2010) reported that Continuous improvement would yield excellence in design, ensure communication in contracts and create a teamwork spirit in construction. In addition, continous improvement enhances performance of employees who aid implementation of TQM programs thereby leading to total customer satisfaction.

A study on TQM within the construction industry of Kuwait by Waleed (2012) found that leadership, employee, teamwork and information technology had a significant role of TQM in the construction companies hence recommended that TQM be enhanced through practicing continous improvement, strenthening employee training, increasing and enhancing communication between managers and employers. The study's strenghth was that it had a wide coverage of sample size which gave better representation of the population. This review influenced the present study in that,information technology (ICT) was key to this digital age. Therefore, the research endeavoured to incorprate the need to invest into ICT quality tracking initiatives as shown in Figure 5.3.

Other authors that conducted similar studies on continous improvement were EFQM (2010); Youssef (2006); Ismail (2012); Al-Omaim (2002); Pun (2002); Baidoun (2003); Lewis et al. (2006); Koh and Low (2010); Kumar et al., (2011); Chin & Pun (2002); Al-Khalifa and Aspinwall, (2001). Tsang and Antony (2001).

- **TQM models/frameworks are a roadmap to TQM implementation. However, the adoption process comes before its' implemetation**

Harrington and Voehl (2012) states that TQM implementation is a never-ending exercise and a very challenging task that calls for a well-structured pragmatic approach.A study by Alitaiby (2018) looked at a framework to facilitate total quality management implementation in the upstream oil industry: an Iraqi case study. The study is carried out in one of the major oil companies in the Iraqi upstream oil sector, which is the Iraqi Drilling Company (IDC).

The reasearch by Alitaiby (2018) reviewed issues relevant to TQM in general and an exploration of the current levels of awareness of TQM in the oil company by identifying the presence or absence of certain recognised TQM key factors and barriers that impede TQM implementation as well as the expected benefits to be gained from TQM implementation. This study found that TQM has been widely researched and adopted in industrialised nations, but in the context of Iraq, no single study exists which adequately covers the TQM implementation in general and in the Iraqi oil industry in particular. The study also concluded by creating a conceptual framework to facilitate TQM implementation in Iraqi

upstream oil sector. The strength was that the developed framework was grouped into three themes namely key factors of TQM implementation, barriers that hinder TQM implementation and the desired benefits of TQM implementation.

An analysis of this study showed that the developed framework would facilitate the implementation of TQM practices within the Iraqi upstream oil companies which will in return have positive impacts on their overall performance. The research could be utilised or replicated by other researchers in other public or private sectors in Iraq such as health, education, tourism, etc., to study the phenomenon of TQM from the perspective of those sectors, and to suggest potential improvements in addition to providing the opportunity for comparisons.

One weakness of the study was due to the fact that TQM had not been completely implemented in the Iraqi oil industry; thus the review of the literature had to rely on studies in other contexts. Some of these studies, such as those based on developed countries, were characterised by issues which differed from those which were prevalent in Iraq. Furthermore, the validity of the study's findings in relation to other Iraqi oil companies was a limitation because the research employed a single case study research strategy in the context of Iraqi upstream oil sector.

According to Ismail (2012) an increased adoption of TQM in construction companies in the UK solved many related quality problems. The topic assessed the adoption of TQM factors in the Construction industry in the United Kingdom and Jordan. The sample size for the research comprised 18 interviews and 200 questionnaires.It was concluded that, a cultural and management behaviour change was neecessary for companies to adopt TQM in a bid to improve quality and ensure customer satisfaction. The weakness to Ismails' study was that it concentrated on the adoption without providing a future roadmap, structure or framework for TQM implementation. This research was influenced by comparing the different cases of TQM adoption and non-adoption followed with its implementation. In addition, the weakness propelled this study to develop a framework which accounted for improving adoption of TQM in the Zambian Building Sector. Similar publications on TQM frameworks was done by Alintah-Abel,2019; Oakland, (2014); Adusa-Poku ,2014; Al-Ahmed, 2017; Aspinwall, et al. 2008).

2.13 Research Gap

Having reviewed several studies conducted by various authors in different parts of the world vis-à-vis adoption of TQM, the research found that most individuals/organizations in developing nations, like Zambia, had not fully grasped and adopted the TQM philosophy. In addition, the similar studies conducted on TQM in southern african, where Zambia is located; had no published study on the development of a TQM framework for the Zambian Building sector. Thus, this study filled in the gap of knowledge in the Zambian TQM context.

2.14 Chapter Summary

This chapter presented the concepts of quality, quality management and TQM. The researcher took a deep-dive into TQM by discussing its history, philosophy, critical success factors, prinicples, benefits and barriers upto its implementation in the construction process particularly in the ZCI. Further, the author proposed approaches to overcoming the barriers through the use of CSFs and development of a TQM framework as the chapters progress. The proceeding chapter will discuss methodology used to achieve the objectives of the research.

CHAPTER THREE : RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodology which underlies this study.Accordingly, this chapter discusses the various possible philosophical research stances that guided the main research approaches, the research design and the research techniques required for data collection and data analysis to satisfy the research objectives,questions,theoritical,conceptual framework.

3.2 Research Methodology

In literature, research methodology refers to the procedures and principles of a logical process that is implemented in a scientific investigation (Aletaiby, 2018; Fellows & Liu, 2009). In other words, methodology involves a logical procedure, based on philosophical principles, which guides the design of the research so that it validly and reliably achieves its aims and objectives. The most comprehensive information regarding vital aspects of methodology illusttrated below:

Table 3.1: **An Overview of Methodology**

Goal Met	**Research Methods**	**Advantages/Disadvantages**
Description	Observational method Case study method Survey method	Allows description of behavior(s) Does not support reliable predictions Does not support cause-and-effect explanations
Prediction	Correlational method Quasi-experimental method	Allows description of behaviour(s) Supports reliable predictions from one variable to another Does not support cause-and-effect explanations
Explanation	Experimental method	Allows description of behaviour(s) Supports reliable predictions from one variable to another Supports cause-and-effect explanations

Source: Jackson (2011) cited in Saunders (2012)

In this study the goal was description oriented and followed the survey method research method as elaborated in the next sections in this chapter. Additionally, an illustration to show the flow of the research was depicted below:

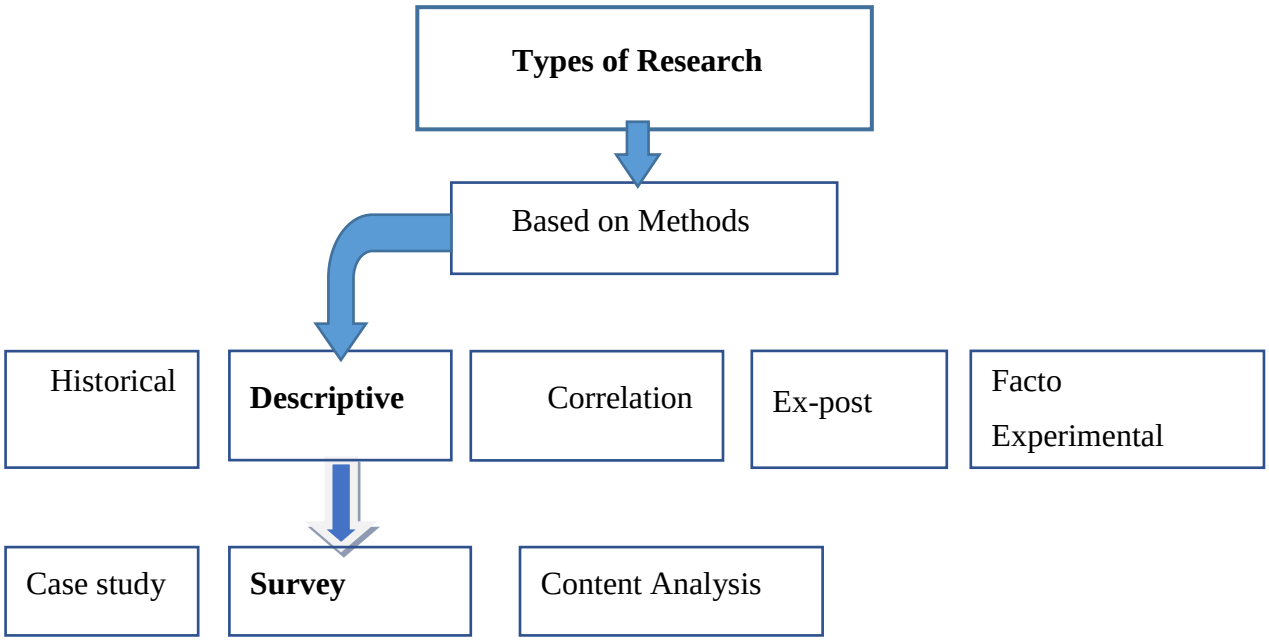


Figure 3.1: Type of research

The study followed a logical procedure, based on philosophical principles to choose the appropriate research design which finally guided the research methods section in order for its aims and objectives to have been achieved.

3.3 The Research Philosophy

Saunders et al. (2016) cited in Aletaiby (2018) stated that research philosophy refers to a system of beliefs and assumptions about the development of knowledge. It deals with the entirety of the epistemological, ontological and axiological issues and activities which guide research practices (Pathirage et al. 2008). In addition, it is the first step taken into consideration when designing the research method.

In this study, the philosophical stance guiding the research design was determined only after reviews on the ontological or epistemological orientation of the research were concluded. This was followed by selection of appropriate and applicable research methods for data collection and analysis.

3.3.1. The Research Ontological Assumption

Ontology refers to a philosophical branch of study that deals with the different views of the nature of reality (Creswell et.al. 2007). The main ontological positions are objectivism and subjectivism (Saunders et al., 2016; Easterby-Smith et al., 2012).

According to Abitaiby (2018) ontological position of objectivism is that the latter is based on the assumption of a mind-independent external reality which can be discovered through adopting various approaches based on observation. Theories or hypotheses must be tested by strict procedures of scientific observation which can be postulated to explain certain phenomena .This approach to testing theory is often called positivism or, more recently, post positivism.

On the other hand, the ontological position of subjectivism asserts that phenomena and their meanings are always accomplished by the actors. It explains that reality as such is unknowable and is perceived and interpreted in different ways by the various social actors.Subjectivism in social sciences is concerned with social phenomena, which involve social activity and it is most amenable to the approach which is called interpretivism (Saunders et al., 2016).

Due to the fact that this research identified and evaluated the TQM barriers, benefits and CSFs within ZBS, it involved gathering perspectives from responders regarding their perceptions and interpretations of TQM within the ZBS. Therefore, the research involved social activity and it focused on the interaction between user, phenomenon and process, and it was used to understand situations. Thus, this study leaned towards embracing a varied degree of commitment to objectivism and subjectivism.

3.3.2 The Research Epistemological Assumption

Epistemology refers to what should be regarded as acceptable knowledge and focuses on how one can acquire the truth of the matter under investigation and what constitutes valid knowledge (Grix, 2010; Saunders et al., 2016).

However, Koskela, et al., (2017), states that in philosophy of science such as engineering or construction management, there have been two different starting points for epistemology:

Platonism and Aristotelianism. These two alternative starting points have played a major role also in the formation of fundamental ideas of engineering and management generally as well as in relation to construction.

Furthermore, Rankine (the father of engineering) focused on what was intended, the ideal or optimal solution. Shewhart's (the father of quality) was more interested in reducing the gap between intended and achieved. In Rankine's scheme, reasoning proceeds forward, from ideas to the material world through deduction. Now, the difference between Rankine and Shewhart has interesting initial similarities to a much older opposition, namely views on science by Plato and Aristotle (Koskela, et al. 2017)

As exemplified through Rankine(the father of engineering), the very idea of engineering is to start from theoretical knowledge and deduction. The quality movement that emerged from Shewhart (the father of quality) and his seminal efforts could be seen as the flag-bearer of the Aristotelian approach. The related lean movement, foreshadowed by scientific management and essentially brought into completion as the Toyota Production System, is similarly Aristotelian. Especially, the concept of waste implied that one starts from the material world. All in all, it can be said that in the realm of productive activities, engineering, production and management, Platonic approaches have provided the dominant worldview in the latter half of the 20th century, and still in the beginning of this century.

Now, the difference between Rankine and Shewhart has interesting initial similarities to a much older opposition, namely views on science by Plato and Aristotle. It was noted that the Platonic epistemology has dominated in construction engineering and management, leading to various problems and triggering several correctives. It is opportune to remind that Platonism has its lasting value as an approach starting from concepts and ideas; it is thus a better balance between the Platonic and Aristotelian tendencies in construction engineering and management that is needed.

Thus, according to Plato, the most fundamental essence of reality does not belong to the material world, but to the realm of abstract concepts, the world of ideas. Platonism, also called rationalism, and Aristotelianism, also called empiricism, have then survived to the present time as two competing epistemological alternatives in science.

Lastly, Pragmatism is another epistemological position related to scientific enquiry (Creswell, 2007). He further asserted that researchers who hold worldviews feel that pure interpretivism and positivism do not entirely align with the objectives of their research. Additionally, he maintains that a participation worldview should contain an action agenda for reform that may change the lives of the participants. According to Robson (2011), pragmatism combines elements of multiple methods from philosophical positions. Researchers should employ the strengths of both approaches in order to understand better social phenomenon.

This research attempts to gain an understanding of the fundamental issues related to implementing TQM Zambian Building Sector. Hence, the researcher interprets some important aspects acquired from the top and middle as well as operational levels in the ZCI. Additionally, the research is based on these features of the philosophy and uses an epistemological perspective to look for meaning behind people's actions. Therefore, this study leans more towards adopting a varied degree of commitment to interpretivism and positivism. Therefore, the epistemological stance of this research is based on pragmatism position.

3.3.3. The Research Axiological Assumption

The last research philosophical assumption is axiology that studies judgments about values (Saunders et al., 2016). According to Creswell (2014), axiology is a value which is determined by objective criteria or human belief, interests, and experience. Different people have their different opinions due to their backgrounds, experiences and beliefs of what the truth should be. Therefore, an assumption has to be made about whether axiological philosophy is value-free and unbiased or value-laden and biased (Colis and Hussey, 2003). This study sought to find ways to improve adoption of TQM practices in the ZBS. Thus, research leaned more towards being value-laden as the research choices are determined by human interests, backgrounds, experiences and beliefs and the researcher hopes to add value to this research.

3.3.4. Conclusion of philosophical stance of this research

In conclusion, based on the aforementioned sub-sections in relation to philosophical stance, this research is based on pragmatism philosophical perspective which mainly falls between a combination of objective and subjective paradigms regarding ontological assumption and fall between interpretivist and the positivist paradigms from epistemological assumption. Furthermore, in construction engineering and management, a better balance between the Platonic and Aristotelian tendencies was observed .This is attributed to the fact that the research adopted a mix method approach to develop the TQM framework. Hence, pragmatically the research incorporates the strengths aspects of both quantitative and qualitative approaches.

3.4 Research Design

Saunders (2012) defines reserach design as a general plan about what you will do to answer the research question.Additionally, it is also reffered to as the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Kothari, 2004). For this study, the research design was mixed –method and decriptive in nature because it is effective to analyse non-quantified topics and issues as well as its ability to integrate the qualittaive and quantittaive methods of data collection. .

3.4.1 Descriptive Research

Descriptive studies are used to describe various aspects of the phenomenon. In its popular format, descriptive research is used to describe characteristics and/or behaviour of sample population.Moreover, “descriptive studies may be characterised as simply the attempt to determine, describe or identify what is, while analytical research attempts to establish why it is that way or how it came to be” (Ethridge, 2004). are closely associated with observational studies, but they are not limited with observation data collection method. Case studies and surveys can also be specified as popular data collection methods used with descriptive studies.In this case,A field survey was conducted by way of a self-administered questionnaires.

Survey Method

The essence of survey method can be explained as "questioning individuals on a topic or topics and then describing their responses" (Jackson, 2011). Alternatively, from the viewpoint of practicality, the most popular variations of surveys include questionnaires, interviews and documentation review.

The advantages and disadvantages of the survey method werer clarly explainde by Sanders (2016) as follows:

Advantages of Survey Method

- Surveys can be conducted faster and cheaper compared to other methods of primary data collection such as observation and experiments.
- Primary data gathered through surveys are relatively easy to analyse.

Disadvantages of Survey Method

- In some cases, unwillingness or inability of respondents to provide information.
- Human bias of respondents, i.e. respondents providing inaccurate information.
  Differences in understanding: it is difficult to formulate questions in such a way that it will mean exactly same thing to each respondent.

The figure 3.2 illustrates the entire framework for reseach design.

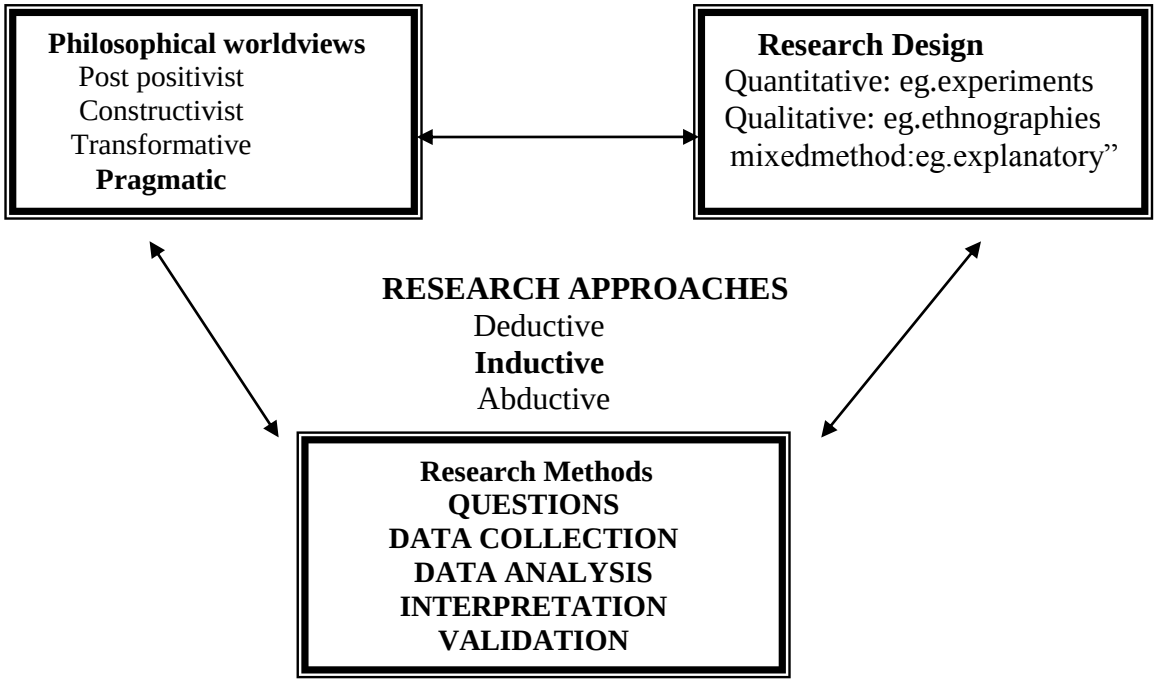


Figure 3.2: A Framework for Research Design Source: Aletaiby (2018)

3.5 Research Methods

Research methods are the tools one uses to collect data. These methods depend on the methodology adopted by the researcher as each methodology has its data collection tools (Kothari, 2004). Furthermore, data collecting techniques can be grouped into two broad groups namely, primary and secondary.

3.5.1 Data collection technique

This research involved collection of both primary and secondary data to achieve the set objectives. Primary data was collected through a survey questionnaire and interviews while secondary data was obtained through review of relevant literature and documents such as journals, websites, articles, published theses and books relating to Total Quality Management themes. Data was also obtained from the National Council for Construction (NCC) which is the main regulatory body for all construction matters in the country. The secondary data was significant in identification of gaps in work published on TQM in the construction industry.

- **Primary Data Collection Technique.**

  Kothari, (2004) defines primary data as that data which is collected for the first time and thus happens to be original in character and collected during experiments in experimental research while descriptive research this data is obtained through observation or direct communication with the respondents in one form or another (Ibid).

- **Secondary Data Collection Technique**

  Secondary data refers to existing body of knowledge namely journals,articles,disserttaions,reports and so forth.These may either be published or unpublished data. The technique which is used to collect this type of data is literature review. Before using this data, Kothari (2004) asserts that prior to using data,it must be checked for reliability, suitability and adequacy of data.

3.5.2 Data Collection Instrument

The main instrument used to collect primary data for the research was a survey questionnaire which was checked for validiy and reliability through a preliminary (pilot) study. Semi-structured interviews were also used for selected industry experts.

3.5.3 Questionnaire design

The questionnaire was developed from the literature review stage and allowed respondents to express themselves effectively and expound on their sentiments while maintaining a loose structure which allowed ease of analysis. Various organisational documents such as contract documents, accounting papers, test results, reports and organisational structure papers were visited by the authors so as to triangulate the information gathered.

The questionnaire was designed in three main parts in order to attain the set objectives. The first part deals with general information on TQM in order to establish the level of adoption of TQM practices by the stakeholders the second will focus on the barriers to TQM implementation. The third part looked at the approaches that can be adopted to enhance TQM implementation in the construction industry (see Appendix B for details).
A layout of the questionnaire was included under appendix.B

A pilot testing of 25 questionnaires was done prior to the administration of the final 125 questionnaires that were distributed to various stakeholders in the ZCI particularly the buildings subsector. These comprised contractors, consultants, clients and other experts. The questionnaires were emailed to the respondents out of which only 5 completed and returned them. Subsequenly, a follow-up distribution of questionnaires was conducted through physical delivery approach from which 45 responses were gathered bringing the total number of answered questionnaires to 50.

The questionnaire instrument was preferred as a number of respondents can be reached easily and economically. Further, the answers to the questionnaire are relatively easy to analyse notwistanding their disadvantage of allowing limited and varying choice of responses to questions which may provide limited additional insight into a topic and making it hard to correct mistakes and missing data.

The semi-structured interview method was also used in addition to the questionnaire as it helped in achieving the objective of exploring various barriers affecting TQM implementation in construction industry particularly buildings.

3.6 Research Approach

According to Bryman and Bell (2015) Research approach can be divided into three types namely; Deductive research approach,Inductive research approach andAbductive research approach. The relevance of hypotheses to the study is the main distinctive point between deductive and inductive approaches. Deductive approach tests the validity of assumptions (or theories/hypotheses) in hand, whereas inductive approach contributes to the emergence of new theories and generalizations. Abductive research, on the other hand, starts with 'surprising facts' or 'puzzles' and the research process is devoted their explanation.

In this study, explanation of the TQM phenomenon used both qualitative and/or quantitative methods of data collection and data analysis in an integrated manner,thus the abductive approach was adopted. This was done by survey as well as obtaining literature on the TQM principles, practices and guidelines in other countriesand thereafter conducting a survey in the Zambia Construction industry, particularly the building sector.

Table 3.2: Types of Research Approaches

	Deduction	**Indution**	**Abduction**
Logic	In a deductive inference, when the premises are true, the conclusion must also be true	In an inductive inference, known premises are used to generate untested conclusions	In an abductive inference, known premises are used to generate testable conclusions
Generalizability	Generalising from the general to the specific	Generalising from the specific to the general	Generalising from the interactions between the specific and the general
Use of data	Data collection is used to evaluate propositions or hypotheses related to an existing theory	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth
Theory	Theory falsification or verification	Theory generation and building	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory

Source: Dudovskiy (2011)

3.7 Population

The research population comprised stakeholders in the Zambian Construction Industry, particularly in the buildings subsector. This was limited to stakeholders based in Lusaka, the capital city of Zambia (Figure 3.1) as the majority of the construction firms have their Head Quarters in Lusaka where most of the construction projects are also taking place thus making it easier to access information. The stakeholders included contractors, consultants, regulators, clients and other experts. Both local and foreign-registered building contractors that fell in the grades I to VI of the National Council for Construction were considered for the study.

Figure 3.3: The research context -Lusaka

As per information obtained from the National Council for Construction, the following comprised the registered contractors as at 31st May 2018:-

Table 3.3: Registered Contractors as at 31st May 2018 - Countrywide

	Grade of Registration						
Category	1	2	3	4	5	6	Total
Buildings	66	59	38	209	387	1,395	2,154
Civil Works	47	22	9	33	88	351	550
Electrical Works	31	19	15	44	92	258	459
Mechanical Works	23	10	1	21	26	255	336
ME	4	1	1	2	6	104	118
Road Works	61	25	22	98	280	778	1,264
Specialist d-x	-	-	-	-	-	-	13
Total	232	136	86	407	879	3141	4,894

Source: National Council for Construction

Table 3.4: Registered Contractors as at 31st May 2018 – Lusaka Province

	Grade of Registration						
Category	1	2	3	4	5	6	Total
Buildings	60	48	27	133	194	472	934

Source: National Council for Construction

From the tables above, it is evident that the bulk of contractors fall under the building category and Lusaka City accounts for 43% of building contractors spread across all the ten provinces of the Zambia.

The reason data from the various construction professional bodies was not captured was because the researcher had constraints in time. Thus, the sample was purposively selected to achieve the objectives of the study and taking into consideration the time constraints. The stratified sampling technique was utilised so as to allow any minority to be represented.

3.8 Sampling

A sample is a smaller number or the population that is used to make conclusions regarding the whole population. Its purpose is to estimate unknown characteristics of the population. Sampling therefore is the systematic process of selecting a number of individuals for a study to represent a larger group from which they are selected. The process of sampling takes in to account various issues and will depend on the organization type, purpose, complexity, time constraints and previous research in the area (Creswell, 2015).

Sampling methods include: Multi-stage Stratified Cluster Sample, Unequal Probability Sample, Cluster Sample, Stratified Random Sample, Systematic Random Sample, and Simple Random Sample. Owing to the researchers objectives as well as vastness of some populations, it became imperative to consider the stratified random sampling method. The population elements were separated into non-overlapping groups, called strata, and then a sample was selected independently from each stratum. The initial step in choosing a sample, therefore, is to define the sample frame.

Stratified sampling is a probability sampling method and a form of random sampling in which the population is divided into two or more groups (strata) according to one or more common attributes.(saunders,2016) Accordingly, application of stratified sampling method involves dividing population into different subgroups (strata) and selecting subjects from each strata in a proportionate manner.This was depicted in Table 3.3 Application of stratified random sampling contains the following three stages:

a. Identification of relevant stratums and ensuring their actual representation in the population. -Specific patterns of categorization into different stratums depended on the aims and objectives of the study. In this caseit was divided into the construction stakeholders namely, regulators/plannning authorities,consultants,professional bodies,clients.
b. Numbering each subject within each stratum with a unique identification number.In this study-(ID A1 to ID A5).
c. Selection of sufficient numbers of subjects from each stratum.

3.8.1 Sample Frame

The SAGE encyclopedia of social science research methods (2004) defines sample frame as a list or other device used to define a researcher's population of interest. It outlines a set of elements from which a researcher can select a sample of the target population. This sample was selected using stratified random sampling because similar stusies used this technique.

The reasons stratified sampling was selected was because of the following advantages:

Stratified random sampling is superior to simple random sampling because the process of stratifying reduces sampling error and ensures a greater level of representation.

- Thanks to the choice of stratified random sampling adequate representation of all subgroups can be ensured.
- When there is homogeneity within strata and heterogeneity between strata, the estimates can be as precise (or even more precise) as with the use of simple random sampling.

  On the otherhand,mention was made that the Disadvantages of Stratified Sampling must be accounted for to avoid misinterpretation.
- The application of stratified random sampling requires the knowledge of strata membership a priori. The requirement to be able to easily distinguish between strata in the sample frame may create difficulties in practical levels.
- Research process may take longer and prove to be more expensive due to the extra stage in the sampling procedure.
- The choice of stratified sampling method adds certain complexity to the analysis plan.

According to the registration records of NCC, the total number of building contractors countrywide was 2,154 of which 934 were based in Lusaka. The target sample size for this study was 125 comprising of 50 contractors, 30 consultants whose database was not availed by professional bodies,30 authorities as well as 15 clients. Table 3.3 below depicts details about some of the sample size.

Table 3.5: Description of sample and numerical responses

Organisations/Individuals	**Sample Unit**	**Respondents**	**Sample size**	**Responses**
50 Contractors(Grade 1 to 6)		**-ID No.A1**		
National Association for Medium and Small Scale Contractors	Foreign/local contractors	Directors and Employees	25	4
Association of Building and Civil Engineering Contractors	Local contractors	Directors and Employees	25	6
20 Consultants		**ID No.A2**		
Project Management Firms	Foreign/Local	Directors	2	2
Architectural Firms/Practices	Local	Directors and Employees	9	6
QS Practices/Firms	Local	Directors and Employees	9	5
10 Professional bodies		**ID No.A3**		
Zambia Institute of Architects	Foreign/Local	Registered consultants /Non-registered architects	5	3
Engineering Institute of Zambia	Local	Registered consultants/ Non-registered Engineers and QS	5	3
30 Regulators/Planning Authorities		**ID No.A4**		
Lusaka City Council	Local	Urban and Regional Planners	15	4
		Quantity Surveyors		3
		Land Surveyor		1
		Construction Manager		1
Lusaka Province Planning Authority	Local	Urban and Regional Planners	5	2
Ministry of local government and housing	Local	Urban and Regional Planners	3	1
National Council For Construction	Local	Employees and Quantity Surveyors	7	4
15 Clients		**ID No.A5**		
Private individuals building their own properties	Local	Owner	8	3
Corporate entities with buildings under construction	Local	Employees	7	2
Total			**125**	**50**

3.8.2 Sample Design

As noted by Kothari (2004), sample design describes the technique adopted by the researcher in selecting some sampling units from the sampling frame on which to draw inferences about the population.This may be through probability and non-probability techniques. The former is also referred to as random or chance sampling as every item of the population has an equal chance of being included in the sample while the latter is also known as deliberate, purposive or judgement sampling as the researcher purposely selects particular units of the population to include in the sample.

In this research stratified random sampling was used. This is a method in which the heterogeneous population is first stratified by dividing it into a set of mutully-exclusive sub-strata from which random samples are selected for detailed study (Popoola, 2011). The respondents were stratified into specific construction professions as well as years of experience in order to group the results efficiently.

3.8.3 Sample Size

Molane (2016) states that a sample size is appropriate if it enables the researcher to make an unequivocal judgement that a statistical result is correct to a chosen degree of error and has sufficient power to detect a specified meaningful effect. In addition, Kothari (2004) concludes that an optimum sample must satisfy requirements of efficiency, representativeness, reliability and flexibility as well as take budgetary consideration into account. The justification of the minimal sample size of 125 was drawn from similar studies carried across the world as depicted in the table below.

Table 3.6: Similar Studies Conducted on TQM with the sample sizes used in Main Research Instruments

Study	Sample	Sample size	Research Instrument	Country of study	Author
Achieving Sustainable Development through Total Quality Management in Nigerian Construction Industry	Construction companies	30	Questonnaires and interviews	Nigeria	Alintah-Abel et al (2019)
Study of Quality Management System in Construction	Civil engineers	45	Questionnaire and case study	India	Anup et al (2015)
Critical Factors Affecting the Implementation of Total Quality Management in the Construction Industry of U.A.E	Construction companies	60	Questionaaire	UAE	Al-Sabek (2015)
Total Quality Management and Its Impact on the Level of Focus within Contruction Project Management in Ghana	Construction firm managers	50	Questionnaire	Ghana	Attakora-Amaniampong et al (2014)

The sample size ranged from a minimum of fourty-five (45) respondents to sixty (60) respondents in the table above. Thus, this research's sample of 125 particpants was considered justifiable. From this sample size only fifty (50) responded to the questionnare which excluded the twenty-five (25) participants in the pilot study.

3.9 Data validity and reliability

According to Phelan et al (2005) reliability refers to the degree to which an assessment tool produces stable and consistent results whereas validity refers to how well a test measures what it is purported to measure. To ensure data validity and reliability in the research, the questionnaires were designed to represent each aspect of the research objectives and later subjected to pilot testing so as to identify any probable challenges and reduce chance of obtaining incorrect responses and guarantee consistency.

3.9.1 Pilot Testing

Gass and Mackey (2000) explained that a pilot study is an important means of assessing the feasibility and usefulness of the data collection methods and making any necessary revisions before they are used with the research participants. Furthermore,pilot testing can help avoid

costly and time-consuming problems during the data collection procedure as well as the loss of potentially useful data. Thus,in this study, pilot testing was undertaken by distributing the questionnaire and semi-structured interview questions to a small size sample.The target was twenty five experts and contractors with experience of TQM. The aim for the choice of this sample was to provide the researcher with useful comments related to content and the structure of the questionnaire and interview. The sample responded in revealing ambiguities or misunderstandings in questions as well as recommendations. The changes included omitting irrelevant questions, rephrasing and adjusting the language to make the questions clearer and understandable.

3.10 Data Analysis

According to Dudovskiy ,2011 there are differences between qualitative data analysis and quantitative data analysis. In qualitative researches using interviews, focus groups, experiments etc. data analysis is going to involve identifying common patterns within the responses and critically analyzing them in order to achieve research aims and objectives.

Data analysis for quantitative studies, on the other hand, involves critical analysis and interpretation of figures and numbers, and attempts to find rationale behind the emergence of main findings. Comparisons of primary research findings to the findings of the literature review are critically important for both types of studies – qualitative and quantitative.

The latter was used in this study.Furthermore,the data obtained from the questionnaires was mainly descriptive. The data was reviewed and checked to rid of any unclear and inadequate output. The recorded data was coded for accuracy into Microsoft Excel 2010. Tables, graphs and charts were used to draw meaning from the descriptive data vis-à-vis the reasearch objectives and questions. The questionnaire was distributed to the respondents having minimum 3 years of experience in the company. They were given with a ranking scale from 1 to 5 with 1 being strongly disagree and 5 being strongly agree.

This research adopted the likert scaling instrument as the best tool for the questions which had data that was both qualitatitive and quantitative in nature. According to Kothari (2004), the likert scale offers a one-dimensional summated scale from which respondents chose an option that best fitted their opinion. In this research, a five-option scale zero to five (0 – 5)

was employed and each option assigned a number with the high score five (5) signifying a favourable response while a low score zero (0) indicated unfavourable response.

The researcher used Microsoft Excel to analyse respondent feedback captured in completed questionnaires. As applied by Rooshdi et al (2018), the relative importance index (RII) analysis was employed to rank the criteria in accordance with their relative importance. This was used as it best fitted the purpose of the study.

The formula used to determine the relative index is as shown under:-

$$RII = \sum \frac{W}{A \times N} \qquad [0 \leq RII \leq 1]$$

Where:

W = the weight assigned to each factor by the respondents and ranged from 1 to 5 (where "1" is *'the least implying Strongly Disagree'* and "5" is *'the highest implying Strongly Agree'*).

A = the highest weight (in this case 5 in a 5-point Likert Scale)

N = the total number of respondents

Johnson and LeBreton (2004) as cited in Somiah et al (2015) described RII as a weighting method that helps to ascertain a particular variables contribution to prediction of a criterion variable be it by itself or in combination with other predictor variables. It produces results raging from zero to one with one implying most important and zero least important.

According to Akadiri (2011) as cited in Rooshdi et al (2018), RI values depict five importance levels namely High ($0.8 \leq RII \leq 1$), High-Medium ($0.6 \leq RII \leq 0.8$), Medium ($0.4 \leq RII \leq 0.6$), Medium-Low ($0.2 \leq RII \leq 0.4$) and Low ($0 \leq RII \leq 0.2$).

3.11 Ethical Consideration

The researcher obtained prior clearance from the ethical committee endorsed under University of Zambia (UNZA) management. The clearance number Human and Social

Sciences Research Ethics Committee (HSSREC):2018-OCT-027 was given to progress with the reserach.

In addition, the respondents to the questinnaire survey were expressly assured of confidentiality and privacy of information provided.An introductory letter with an UNZA logo was attached to each questionnaire and all information obtained was to be used purely for academic purposes. The purpose of the study and the nature of the survey were made known to the respondents.

3.12 Chapter Summary

The chapter discussed the mixed approach used to research ,namely,the quantitative and qualitative.The components of the research methodology were explained as well as data needed to attain the resarch objectives,sampling,sample design and data analysis.

The following chapter looked at the findings and discussions relating to the results obtained from the survey taken on barriers to TQM implementation in Zambian Construction Industry.

CHAPTER FOUR : FINDINGS AND DISCUSSION

4.1 Introduction

The chapter presented the response rate, findings, analysis, interpretations and discussions of the study of the data collected.

A questionnaire survey (Appendix B) was prepared and it was used to assess the level of TQM implementation in the ZCI. It also identified barriers to TQM implementation and drew conclusions for the best approach to TQM implementation in the ZCI. Information drawn from the survey was outlined as follows:

4.2 Questionnaire collection and survey responses

The self-administered questionnaires targeted 125 respondents. Only 50 questionnaires were collected from the respondents, while 75 did not respond. The respondents comprised construction professionals, regulators, experts and clients based in Lusaka. This represents an overall response rate of 40% as depicted in Figure 4.1

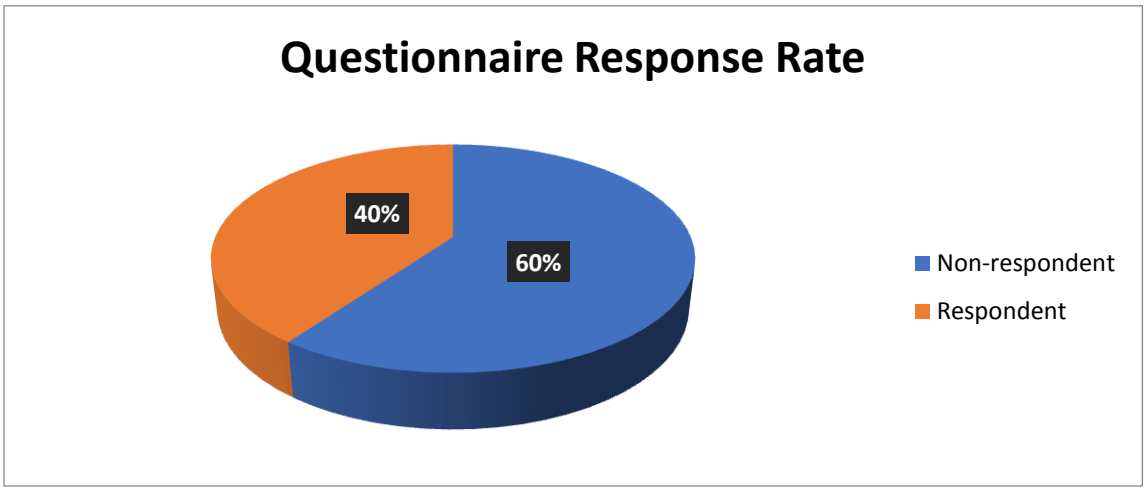


Figure 4.1: Response Rate

The distribution of collecting questionnaires among different respondent categories was shown in Table 4.1 below. Though the response level is low, it was considered acceptable and therefore analyzable (Kothari, 2008).

Table 4.1: Distributed and Collected Questionnaires

Stakeholder	Total Questionnaires Sent	Total Questionnaires Collected	Response Rate
Contractors	50	10	20%
Consultants	30	20	67%
Regulators/Planning Authorities	30	15	50%
Clients	15	5	33%
Total	125	50	40%

As portrayed in the table above, the highest respondents were consultants (67%) followed by regulators/planning authority (50%). Only 33% and 20% of clients and contractors respectively respondend to the questionnaires. The poor response rate by contractors and clients could be linked to limited understanding and knowledge of TQM as well as confidentiality in data availment.

4.2.1 Gender of the Respondents

The study sought to establish the gender distribution of the 50 respondents. The results presented in Figure 4.2 showed that 72% of respondents were male while 28% were female. The females represented the lesser number of respondents which is evident of low female employment in the Zambia Construction Industry. As noted by CIDB (2007), the construction industry is characterised by low female participation as it is perceived to be difficult, dangerous and dirty thereby preventing most females from playing active roles. Owusuaa (2012) adds that cultural norms support the perception that women may not perform to expectation owing to the physical demands of construction work. Therefore, adoption of construction management roles of females can only be advised if increased capacity building in TQM was introduced in training programs for TQM implementation to be successful.

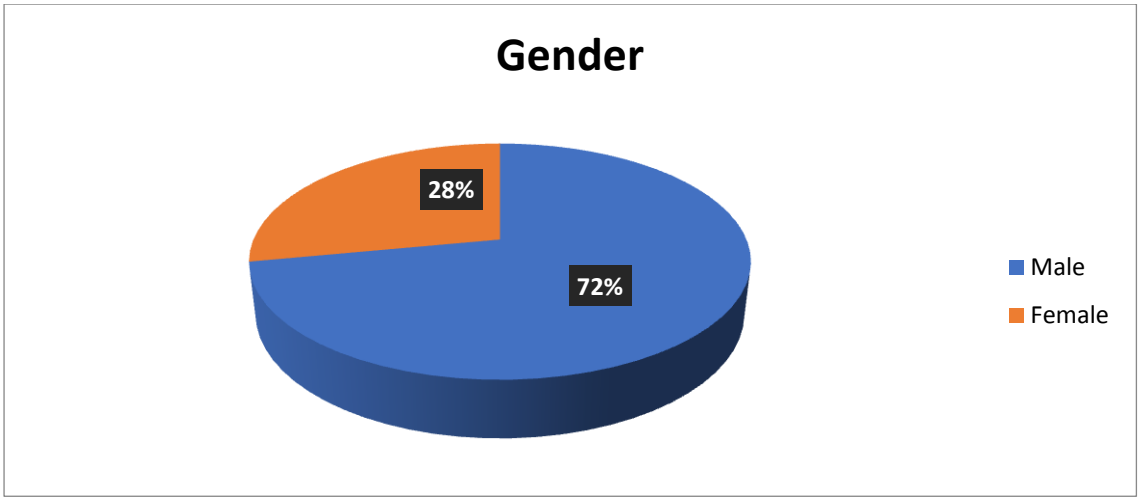


Figure 4.2: Gender of Respondents

4.2.2. The role played by Respondent in the Construction Industry

In terms of roles played in the Zambian Construction Industry (ZCI), the consultants accounted for 40% of the 50 respondents, while construction regulators and contractors represented 30% and 20% respectively. The clients accounted for only 10%.

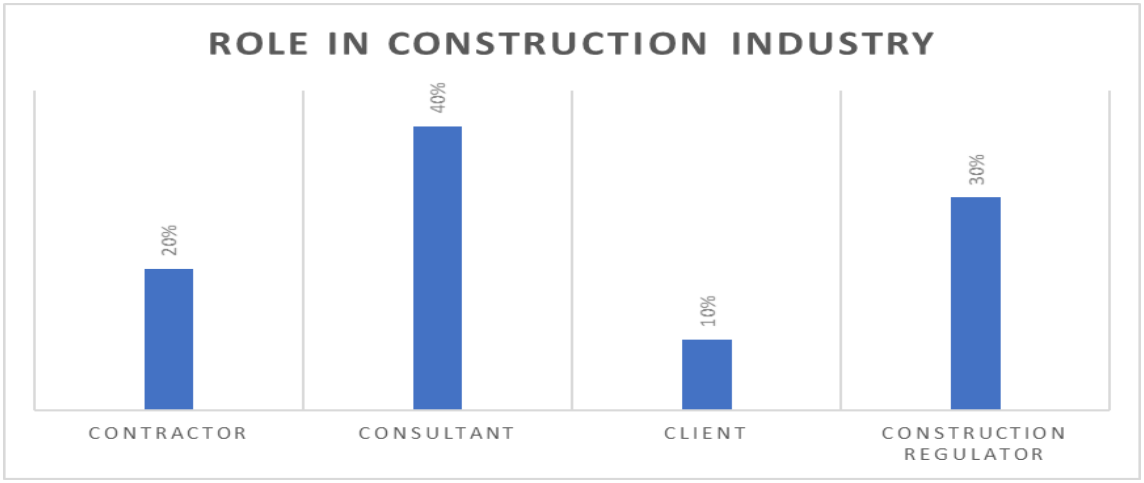


Figure 4.3: Role in Construction Industry

4.2.3 Respondents affiliations to professional bodies.

Further to the roles played in the Construction Industry, the researcher sought to establish the organizations to which the different categories of respondents were affiliated as this was significant to the study. These were represented as follows: 38% of the respondents were affiliated to ZIA, 28% to EIZ, 18% to QSRB, 8% to Others, 6% to National Association of Medium and Small Scale Contractors (NAMSSC) and Association of Building and Civil

Engineering Contractors (ABCEC).This showed that the majority of the respondents belonged to the Zambia Institute of Architects (ZIA) and Engineers Association of Zambia (EIZ) who work intandem with the authorities and clients in the Zambian Building Sector (ZBS).

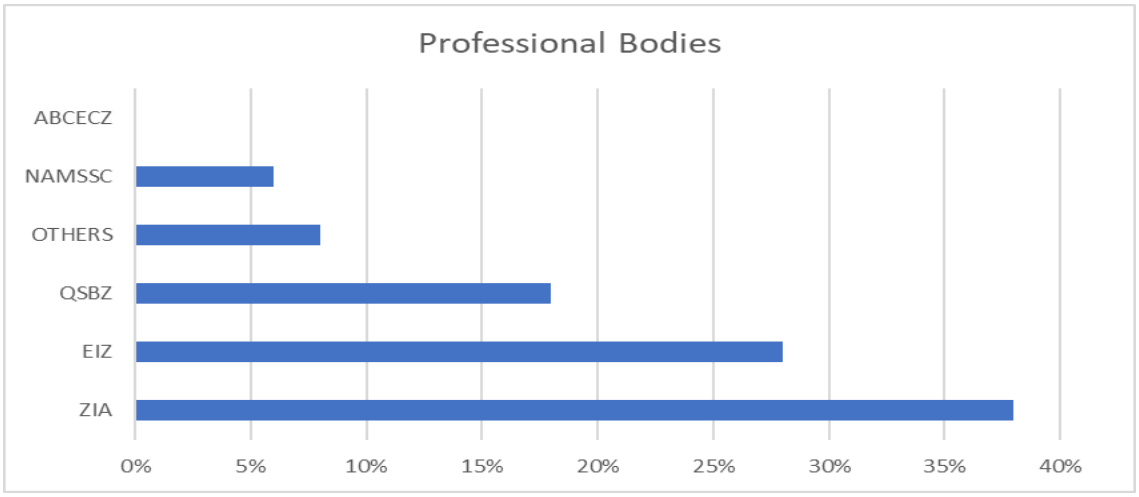


Figure 4.4: Respondents affiliations to professional bodies

4.2.4 Positions held by respondents

The researcher sought to establish the positions held by the respondents. The evaluation of positions held by respondents was necessary to establish the soundness of responses and to understand their perspectives. Figure 4.5 showed that the majority of respondents were in middle level management (40%) followed by junior level management (28%). Senior level management accounted for 16% of respondents, while owners and support staff accounted for 12% and 4% correspondingly. This meant that most of the respondents were at managerial levels with responsibility to make decisions and advise senior management. The lowest positions were those of support staff as these would ordinarily be expected to be not so educated and would therefore have minimal or no knowledge of TQM.

Figure 4.5: Positions held by respondents

4.2.5 Years of experience

In terms of the number of years experience in the Construction Industry, the highest proportion of respondents had less than 5 years experience in their positions as shown in Figure 4.6

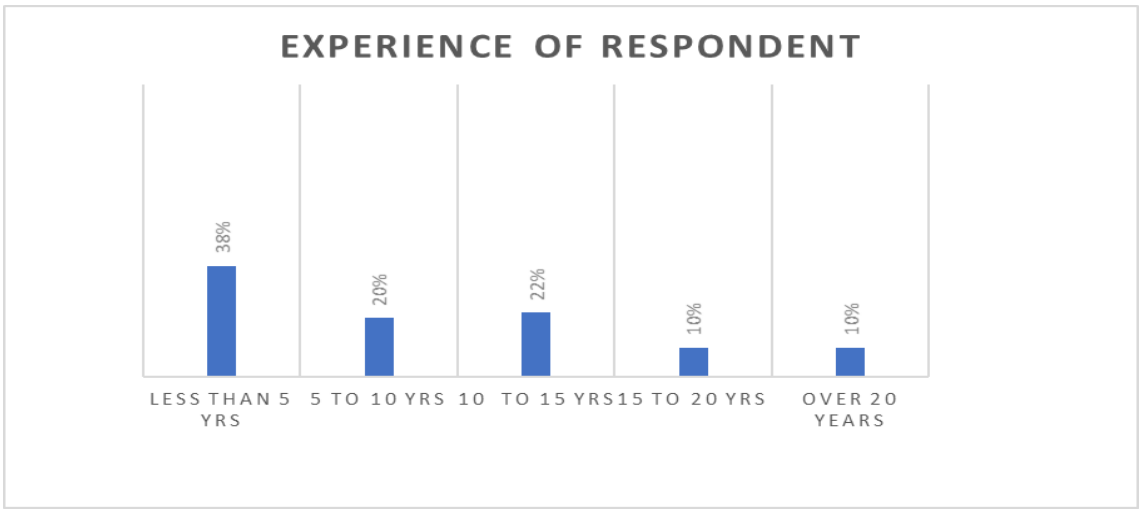


Figure 4.6: Years of experience in the construction industry

This group accounted for 38% of the respondents, while 22% of respondents had 10 to 15 years experience. 20% had 5 to 10 years and 10% had 15 to 20 years experience with another 10% reporting experience of over 20 years. This shows that the construction industry could be characterized by a low retention of employees as the minority had over 10 years aggregate experience. This would be a negative sign for employers who would want to

maintain their trained staff for many years, considering that most of these are in middle management roles. It is therefore expected that with more experience would come better and better understanding of the industry, which is essential for effective TQM implementation.

4.3 General understanding of TQM and level of implementation in organization

4.3.1 General understanding of TQM

In this section, the respondents' general understanding of TQM was probed further. Questions were asked to evaluate the knowledge of respondents on TQM in the construction industry, including its benefits and implementation in the ZCI. In terms of general understanding, Figure 4.7 gives the results from 24 respondents who answered the question. Further discussion on the non respondents (0%) on the item "TQM was doing the job right the first time" as defined by an eminent quality guru, Phil Crosby, was an anormaly because reduced rework/defects, (the highest selected with 38%), could mainly be achieved by doing the job right the first time with zero defects.

It was unfortunate that only 24 out of 50 respondents answered this particular question. This aspect showed that there was little knowledge on the TQM origins and the subject in general. These findings also backed the fact that there was low understanding of TQM and its' holistic approach.Therfore, it was essential that TQM trainning became a vital tool to improve the adoption of TQM practices in the Zambian building sector.

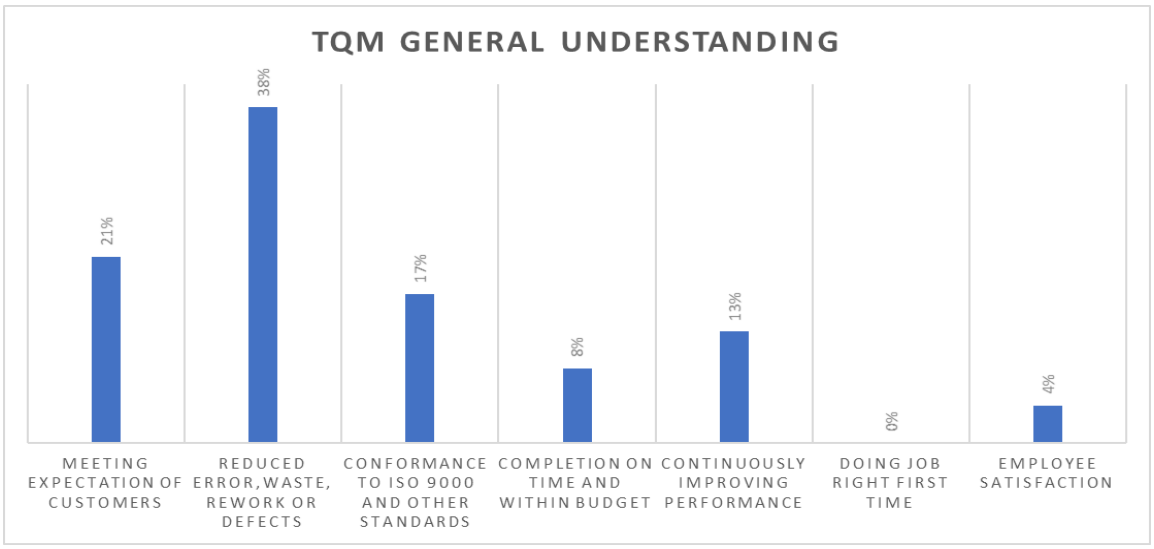


Figure 4.7: TQM Knowledge

From Figure 4.7, the results reveal that over 38% of the respondents understood TQM as reduced error, waste, rework or defects while 21% described it as meeting expectations of customers. 17% said TQM was conformance to ISO standards, whereas 13% said it is continuously improving performance. About 8% understood TQM as completion on time and within budget while 4% thought of it as employee satisfaction. Thus, a higher percentage implied that a more significant level the TQM general understanding was based on achieving quality through reduced defects.

4.3.2 TQM Specialists Available

The researcher sought to investigate if respondents had any TQM specialist employees in their organizations. Out of the 35 respondents to the question, 14 respondents (40%) said they had TQM specialists available while the remaining 21 respondents (60%) said they had no TQM specialists available. The responses are illustrated in figure 4.8 below.

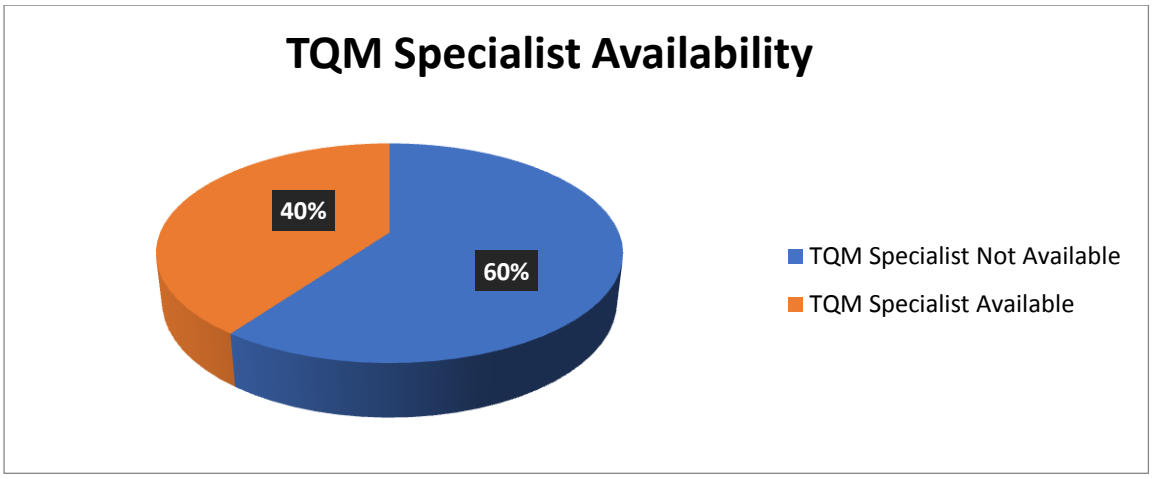


Figure 4.8: TQM Specialist Availability

The aforementioned finding implied that most respondents had no TQM specialists available in their organizations and this showed a knowledge gap in the application of TQM which necessitated the need for TQM training programs across the ZCI to overcome the barrier.

4.3.3 TQM Training Components

The respondents who indicated that they had TQM specialists were further asked to state the TQM components in which they were trained. The results are summarized in the figure below.

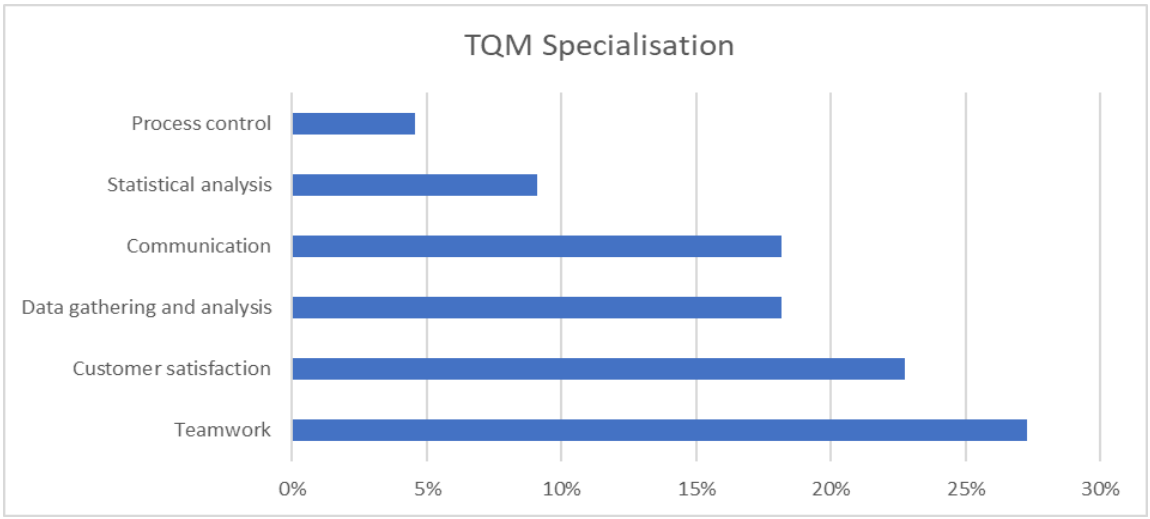


Figure 4.9: Area of TQM application 1

The figure above shows that 5 respondents (27%) were specilised in Teamwork, 5 respondents (23%) in Customer Satisfaction, 4 respondents (18%) in Data Gathering and Analysis, 4 respondents. This implies that the majority of the respondents were trained in application of Teamwork to achieve quality and TQM while a few had applied process control measures to achieve TQM.

4.4 Level of TQ Procedures and Practice

Respondents were requested to express their perceptions of the level to which the above TQM practices were adopted in their organization by rating the variables on a Likert scale ranging from 1 to 4 with 1 representing not fully implemented, 2 representing poorly implemented, 3 representing partially implemented and 4 representing fully implemented. The results, with a mean average above 2.5, showed that TQM was partially adopted in the Zambian Construction Industry, particularly the building sector. Using the Relative Importance Index to rank the level of TQM adoption in ZBS; the table above revealed that Top management commitment and support were the most important factor in the implementation of TQM as it ranked first with an important index of 0.811. This was followed by cost of quality and customer/shareholder satisfaction with importance indices of 0.769 and 0.763 respectively. The other highly ranked factors with mean above 3 were employee empowerment with an important index of 0.761 and continuous improvement in importance index for 0.756. The table below summarized these findings of the few organizations that had adopted TQM practices.

Table 4.2: Level of adopted TQM Practices

Procedure	N	Sum	Mean	I. Index	Ranking
Procedure for Top management commitment and support	45	146	3.244	0.811	1
Procedure to check Cost of quality	39	120	3.077	0.769	2
Customer and shareholder satisfaction	38	116	3.053	0.763	3
Procedure to ensure employee empowerment and involvement	46	140	3.043	0.761	4
Continuous improvement	40	121	3.025	0.756	5
Vision, mission and guiding principles	40	119	2.975	0.744	6
Quality control policies	40	114	2.850	0.713	7
Procedure for on-going Process improvement	41	116	2.829	0.707	8
Procedure to scrutinize Sub-contracting and vendor involvement	41	110	2.683	0.671	9
Training	41	102	2.488	0.622	10

4.5 Barriers to implementation of total quality management (TQM)

Respondents were requested to express their sentiments on the extent to which they agreed or disagreed with the identified barriers to the implementation of TQM in their organizations using a Likert Scale with 1 representing Strongly Disagree, 2 representing Disagree, 3 representing Agree and 4 representing Strongly Agree. The ranking of respondents' perceptions is summarized in Table 4.3.

Table 4.3: Barriers to implementation of total wuality management

Barriers	N	Sum	Mean	I. Index	Ranking
Procedural Barriers			**2.85**	**0.713**	**3**
Schedule and cost treated as the main priorities	34	107	3.147	0.787	1
The lack of standardization i.e. products differ widely in terms of size, appearance, location, techniques, space, quality etc.	35	109	3.114	0.779	2
Low bid subcontracting is a challenge to successful TQM implementation	35	100	2.857	0.714	3
Difficulty in measuring results on construction sites is problematic	34	95	2.794	0.699	4
The notion that TQM is costly and requires a long time of implementation	34	94	2.765	0.691	5
Emphasis on short-term objectives since most products are on/off specially designed for a specific purpose.	32	85	2.656	0.664	6
Too much documents are required (Lack of documentation ability)	34	89	2.618	0.654	7
Cultural Barriers			**2.873**	**0.718**	**2**
Multiple stakeholders with conflicting interests in construction, i.e.consultants (engineers), quantity surveyors, contractors etc in such a way one can be committed to quality while others not.	34	103	3.029	0.757	1
Conservative nature of the construction industry does not innovate rather copies ideas of pioneering firms or borrow experience from experience.	34	96	2.824	0.706	2
Creating and maintaining team spirit behaviour and attitude for TQM implementation is a challenge on construction sites	34	94	2.765	0.691	3
Employee Barriers			**2.938**	**0.734**	**1**
Lack or inadequate education and training programs on TQM	32	99	3.094	0.773	1
Lack of expertise/resources in TQM (cost involved)	32	94	2.938	0.734	2
Lack of top management and employee commitment	32	89	2.781	0.695	3

Table 4.4: Summary of barriers to TQM implementation ranking

Barriers	I. Index	Ranking
Employee/Employer Barriers	0.734	1
Cultural Barriers	0.718	2
Procedural Barriers	0.713	3

The average mean scores for the three categories of barriers, namely procedural, cultural and employee barriers, were above the average rating of 2.5 on the four-point Likert Scale which underscored the significance of all the factors in impeding the implementation of TQM in ZBS. However, after ranking the barriers using the relative importance index, it is evident that employee barriers were the most significant barriers as it ranked first with an average importance index of 0.734 followed by cultural barriers with an importance index of 0.718 and lastly procedural barriers with an important index of 0.713.

Under employee sub-barriers, barriers, the lack or inadequate education and training programs on TQM ranked first with an importance index of 0.773, seconded by lack of expertise/resources in TQM with an importance index of 0.734. Lack of top management and employee commitment ranked third with an importance index of 0.695. This is in line with the findings under the significant factors for TQM full implementation.

For sub-barriers under cultural barriers, multiple stakeholders with conflicting interests in construction ranked first with an importance index of 0.757 followed by the conservative nature of the construction industry, which ranked second with an importance index of 0.706 and lastly is creating and maintaining team spirit behavior/attitude which ranked third with an importance index of 0.691.

Under procedural sub-barriers, schedule and cost treated as a main priority ranked first with an importance score of 0.787 while too much documents required ranked last with an importance index of 2.618.

It must be noted that further investigation into authorities /other driven barriers to TQM must be undertaken by future researchers due to the limitation of time and inadequate feedback.

From the analysis results of data obtained from the survey, the research concluded that the ZBS has partially implemented TQM practices as top management was more reactive than proactive to implementation of quality management systems in their organizations and construction processes. The study found that the level of TQM implementation was low because most construction stakeholders had few TQM specialists in their organization .From the sample,only 40% had professionals with TQM technical knowhow.

4.6 Results and Discussion-linked to findings in litreture.

The discussions were categorized into three (3) sections, namely: understanding of TQM and level of adoption, the barriers faced in TQM implementation and proposal for the best approach to improved adoption to TQM prcatices in the Zambian Building Sector.

4.6.1 Understanding of TQM and level of its adoption

TQM Knowledge and CSFs :

The research identified that the general understanding of TQM in the ZCI was poor and that it was hindering TQMs' successful implementation in the ZCI. The research findings of poor TQM knowledge and lack of incorporation of TQM critical success factors (CSF) resulted in poor quality implementation. Ismail (2012) found that the Jordanian construction companies' poor quality implementaion was evidenced by customer dissatisfaction, rework, bad reputation and reduced turnover. However, the results in the United Kingdom showed an increasing adoption of TQM in construction companies to solve quality problems. Therfore, once TQM knowledge is improved in the ZCI, there is a likehood of attaining positive growth in TQM implementation.

Level of TQM adoption:

In relation to the population, the research found that 40% of the sample, which represented the population had adopted TQM tools,techiniques and practices.However, this percentage was below the building sectors expectation.Therefore, the low level could be attributed to little awareness on TQM and resistance to change to implement TQM. To improve the adoption of TQM, investment in trainning staff was key. Furthermore, top management needed to increase its level of commitment to TQM programs.

The lessons drawn from Imbeah (2012) and Metri (2005) were that, a TQM program could not succeed.without involvement of top management including their commitment and leadership Top management employees must be willing to accept and not resist change to the quality movement staff training and TQM programs.

The relationship between the previous adoption findings and the reviewed literature was that if the ZBS improves adoption of TQM practices; there is a high likelihood of attaining positive growth in TQM implementation.In Literature, Ismail (2012) found that increasing adoption of TQM in construction firms solved quality problems.

4.6.2 Barriers to the implementation of TQM in the ZBS

Based on the literature review and questionnaire survey, the barriers that the ZBS faced during the adoption of TQM prcatices were numerous but were categorized as follows:

- **Procedural driven barriers**

This research found that the following barriers hindered the implementation of TQM: The conservative nature of the construction process, the award of tenders based on low bidders who had not costed on quality systems (bidding process); lack of integration between TQM and existing construction systems (non-standardization) and many variations during the construction phase. These all contributed to the barriers to TQM adoption and poor quality.

- **Cultural driven barriers**

Resistance to change and cultural barriers, the notion that TQM was costly and required a long time of implementation and lack of Construction stakeholders' interest in TQM were noted as some of the causes at organizational level. The culture and commitment to the TQM process was significant to achieve TQM success at all levels of management ranging from senior management to junior level. This entailed to realign the company beliefs and visions to inorporate TQM systems and make it easier for the lowest level to implement.

Harrington et al (2012) noted the construction industry still refused to fully adopt TQM system due to several barriers. The high cost, especially initial cost; resistance to change at various levels in the organization were some of the barriers to TQM implemettaion (Bubshait and Al-Atiq, 1999). Therefore, this concurs with the research finding in the ZCI that culture ought to be addressed through awareness on TQM and emphasis on its benefits.

- **Employee/Employer driven barriers**

Lack of top-management commitment, understanding and poor quality involvement and input by employees were identified as barriers in the ZCI under this theme. Many

respondenets at lower manageemnt levels, especially artisans, confessed that they had no building qualifications but they had learnt the trade from someone.Thus not all aspects of quality systems were understood. Therefore,the lack of top management commitmnet to lead in the area of TQM awareness coupled this problem. The research by Al-Sabek (2015) concluded that the success of TQM depended on the top managementin the TQM pyramid and reduction of costs was observed if TQM was properly implemented by the project team. Therefore, top managemnet needed to show the lead example if TQM was to be implemented by lower managmenet. Deliberate policices had to be introduced into the organizations short, medium and long term plans.

- **Authorities/other driven barriers**

The ZCI is regulated by the National Council for Consruction (NCC) which serves to protect the Government of the Republic of Zambia and the public. Furthermore, councils were tasked to ensure that the general planning of regions as well as their infrastructure meet the set quality standards stipulated in the building regulations. In the review of literature, Adusa-Poku (2014) proposed a framework to guide management in the adoption of TQM with the aim of transforming the Ghanaian construction industry.Similarly, the Zambian Government through its regulatory body National Council for Construction (NCC) and authorities could adopt tested TQM frameworks to facilitate a TQM success roadmap with stricter quality measures .

This research found that there was an outcry by the local authorities to train more of its staff in qulaity management systems as well as introduce quality compliance certificate to artisans who were the main quality implementors at construction phase.Another contribution was that NCC could renew contractors certificates based on evidenced incorporation of quality personnel on their building teams.

4.7 Chapter Summary

This chapter presented the analyzed results obtained from the survey. This research also concluded that adoption of TQM in the Zambian Building Sector is practiced in a retrospective manner. The latter entails that management does not make frantic decisions to prevent quality problems, but rather to solve quality problems after occurrence. Furthermore, the research found that the adoption of TQM practices were not favourable and this implied

low implementation.In developed countries, it was noted that they could overcome barriers to TQM implementation because of TQM knowledge. The next chapter presents the developed TQM Framework to improve adoption of TQM in the Zambian Building Sector (ZBS)

CHAPTER FIVE : DEVELOPMENT OF TQM FRAMEWORK TO OVERCOME THE BARRIERS OF TQM IMPLEMENTATION IN ZAMBIAS BUILDING SECTOR

5.1 Introduction

In this twenty-first century competitive world, construction companies face the challenge of providing quality works to their clients to sustain their competitive advantage. Hence, there is the need for the principles of TQM in the ZCI to improve the quality of works. The first step towards this feat is to adopt a simple systematic framework to guide all stakeholders in the Construction Industry.

TQM implementation is a never-ending exercise and a very challenging task that calls for a well-structured pragmatic approach (Harrington and Voehl, 2012). This chapter therefore seeks to propose a framework that will guide Construction Companies in the implementation of TQM Principles. The proposed framework is based on the Literature Review and the critical factors in the previous chapter. This chapter unfolds the steps to the development of the TQM framework.

5.2 The Adoption of TQM Process in the Zambian Building Sector

The findings showed that that there was little awareness on the TQM philosophy and that 40% of the study's population had embraced the TQM ideology and philosophy. The causes and effects of low levels of TQM implementation in the Zambian Building Sector (ZBS) necessitated the developed TQM framework. Therefore, the study confirmed that most authorities had the powers to set the right environment for any TQM framework to succeed. Furthermore, the culture of the organisation had to be checked in line with the quality goals of each organisation.

The adoption process further involved understanding TQM benefits, barriers and its CSFs at, individuals and organisations level through attainment of training on the type of TQM tools and techniques to be adapted from inception to completion of a building project.

The implications of the research findings to the existing policies showed that TQM awareness though training and publications would improve adoption of TQM practices in the ZBS.

5.2 Purpose of Framework

Many researchers have given different definitions of framework. According to Merriam-Webster Dictionary, a framework is a set of ideas or facts that provide support for something. Generally, frameworks show the empirical relationships between aspects. Aalbregtse et al (1991) summarizes the purpose of frameworks as:

- Illustrating an overview and to communicate a new vision to the organization.
- Force management to address a substantial list of key issues which otherwise might not be addressed.
- Give valuable insights into the organization's strengths and weaknesses, and its overall strategic position in the market-place.
- Support implementation and to improve the chance of success because it will provide not only overview but also more detailed information describing the content of each framework element and its relationship to other elements.

5.3 Basic Design of Frameworks

According to Medori and Steeple (2000), the design requirements for developing a framework include the following steps:

- Procedures for selecting and implementing measures. In this research, the first step was to have a conceptual understanding that quality problems are caused by some elemnts which hinder quality to be achieved. The elements were referred as TQM barriers.
- Ability to identify whether existing measurement system is up to date and measuring critical issues (i.e. audit capability). Quality audits for each ZCI stakeholder or organization was a startting point in gauging the TQM level of an organization.The current measurement systems door ,from the Litreture review and field survey was hinged on critical success factors.

- Selected measures should be congruent with company strategy and have strong relationship with the six core competitive priorities (i.e. quality, cost, flexibility, time, delivery and future growth).
- Facilitates rapid selection of measures from a data bank; and workbook approach (i.e. step-by-step methodology).

5.4 Proposed Conceptual Framework

The proposed TQM framework is built upon a set of core values and factors, that is, the foundation for integrating the key performance requirements within the quality framework. The set of basic factors forming the building blocks of the proposed TQM framework in accordance with this study are Process Management, Continuous Improvement, Employees' Satisfaction/Empowerment, Supplier Chain Management, Customer Focus, Management / Leadership and Training.

The choice of a quality model or quality system is a critical issue because it depends on the vision of the organisation. There are many models, and each model can provide an idea to any organisation, but there is no model that can furnish all the solutions for all organisational requirements. Therefore, quality models or quality systems provide a concrete foundation to communicate as to how an organisation should work and identify the responsibilities of all members participating in the organisation.

During the period 1980s to 1990s many national and international quality awards (QAs) were established to provide guidelines for implementing TQM based on the suggestions and theories of TQM gurus. The Table below summarized some examples of quality models and awards.

Table 5.1: Examples of Quality Models and Awards

Model	Criteria	Focuses	Elements impacting constructiom
TQMEF (TQM Efficiency) Model	Process & Efficiency, Customer Focused Performance, People Management, Team Building & Business partner Development	Process & Efficiency	Processes, Customer, People management
Oakland Model	(3C) Culture, Communication, Commitment + (4P) Planning, Performance, Processes + People	Commitment	Commitment, Culture, people, processes
MBNQA (Malcolm Baldrige National Quality Award	Leadership, Strategic Planning, Customer & Market, Information and analysis, Human Resource Focus, Process management, Business Results	Leadership	Leadership, Human Resources, processes
EFQM (European Foundation Quality Management	Leadership, People, Policy & Strategy + Partnership & Resources + Processes + People Satisfaction+ Customer Satisfaction + Impact on Society + Key Performance	Leadership	Leadership, People, Customers, Processes, Society

Source:Oakland (2014)

In this research, the oakland model was adopted to develop the conceptual framework as its main focus is commitment. All quality guidelines can be set in place but with no commitment TQM adoption implementation may commence but not last long.Therefore,the need arose to examine the most important elemnets in the oakland model. The following are five requirements for effective leadership as observed by Oakland (2014):

1. Develop and issue defined documented vision, business values, purpose and a mission statement.
2. Develop clear and operative strategies and supporting plans for attaining the mission.
3. Recognise the crucial success factors and processes.
4. Analyse the structure of management.
5. Empowerment and encouragement of operational employee input.

An organisation cannot be transformed into a TQM organisation if the TQM practices have not been performed in the organisation by the top management or the leadership.

It is the task and responsibility of the leadership to guarantee this transformation and ensure its commitment towards the TQM activity. This can be translated into a commitment to the process of empowering people, continuous improvement, and raising the level of organisational goals (Seetharaman et al, 2006).

The solution to any problem can only be found once the root cause is discovered. In the development of the framework four steps where followed:

- Use of Cause effect diagram (Fishbone) showing barriers to TQM implementation which brought an effect of poor quality in the ZBS.

- The next step was to use the CSFs, Jurans' triology and a tested model by oakland to commence the TQM framework design.The third and fourth step combine the two inception steps.

STEP 1: Cause and effect diagram

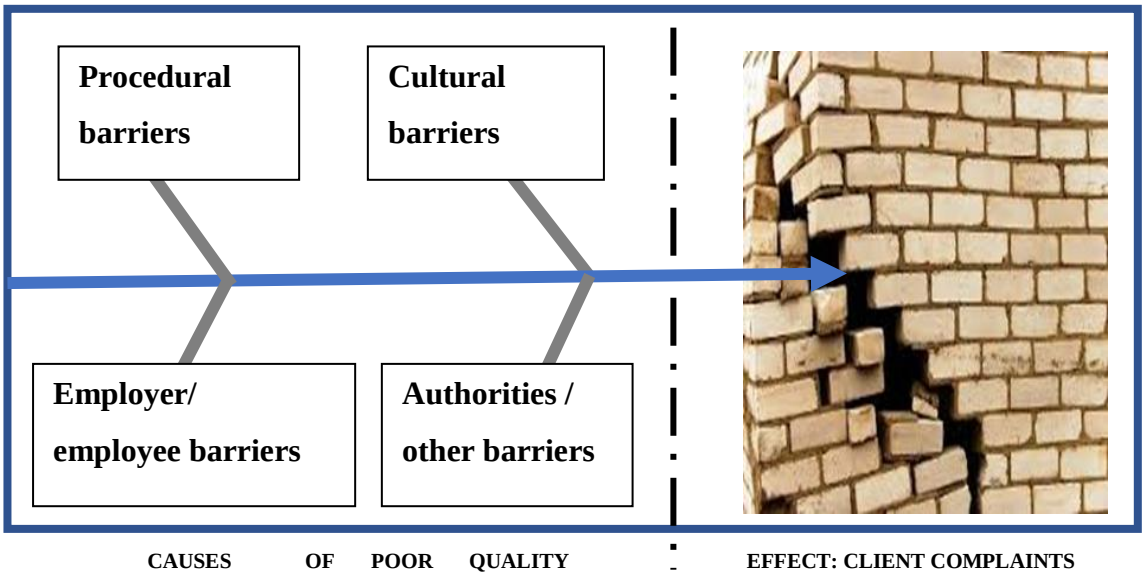


Figure 5.1: **TQM implemenatation cause and effect diagram**

The Zambia Construction Analysis report, 2014 confirmed that there were constraints /barrriers which lead to poor quality in the Zambian Building sector.The table below gave insight into some of the causes and effects related to quality,training and financial constraints experienced in the ZBS.This agreed with the research findings and shaped the elements of the framework.

Table 5.2: Extract of Building Construction Sector Core Constraint Analysis Summary

Constraint	Symptoms (effects of constraint)	Root (systemic) causes
Lack of consistent public contracts awarded to domestic contractors (Authorities driven barrier and Employers barriers)	• Inconsistent contracts minimise local contractors' incentive to employ permanent staff; such that employers are not willing to invest in training, OSH or social protection schemes for temporary employees. • Firms engage in other businesses outside the construction sector to generate other sources of income, which restricts their ability to specialise within construction.	• High entry costs for MSMEs to tender for public contracts including tender cost, bid bonds, and NCC membership fees. • Provision and quality of large road construction subcontracts not awarded to a sufficient number of subcontractors to help jump-start growth for MSMEs. • General dearth of smaller-scale contracts available relative to the demand from MSMEs. • Poor access to financial services – especially working capital - restricts contractor ability to participate in tendering process.
Building construction operate with a low profit margins (Procedural driven barriers)	• Working conditions suffer as contractors reduce perceived cost of social protection, safety and wages to gain a competitive advantage against other contractors. • MSMEs cannot grow and do not accumulate enough capital to invest in the productivity of the business. • Construction quality is poor as contractors attempt to cut corners to save money.	• Overabundance of general contractors without a specialised field of work. • Tenders commonly awarded on price submission with little regard for quality of work history and working conditions.
Lack of specialised domestic labour force (Cultural barriers)	• Poor quality work. • Incurs high turnover and absenteeism for MSMEs as skilled labour are in high demand and thus are highly mobile to find work opportunities elsewhere.	Lack of affordable training opportunities to meet demand. • Management and supervisory roles for large contractors are filled by international staff, hindering career progression and reducing the supervisory training opportunities for local workers.

Source: The lab-ILO (2014)

STEP 2: Jurans' TQM triology (Continous improvement) and Oakland's elements of CSF.

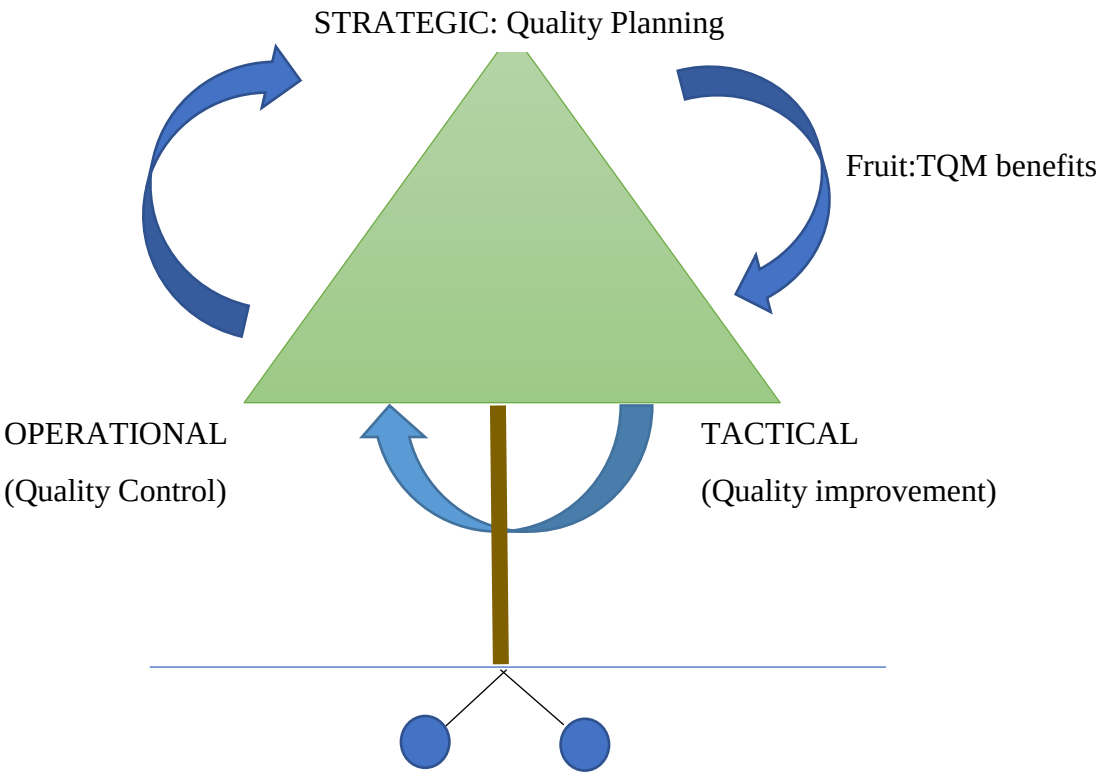


Figure 5.2: Concept development of TQM framework

STEP 3: Initial TQM framework during Litreture review

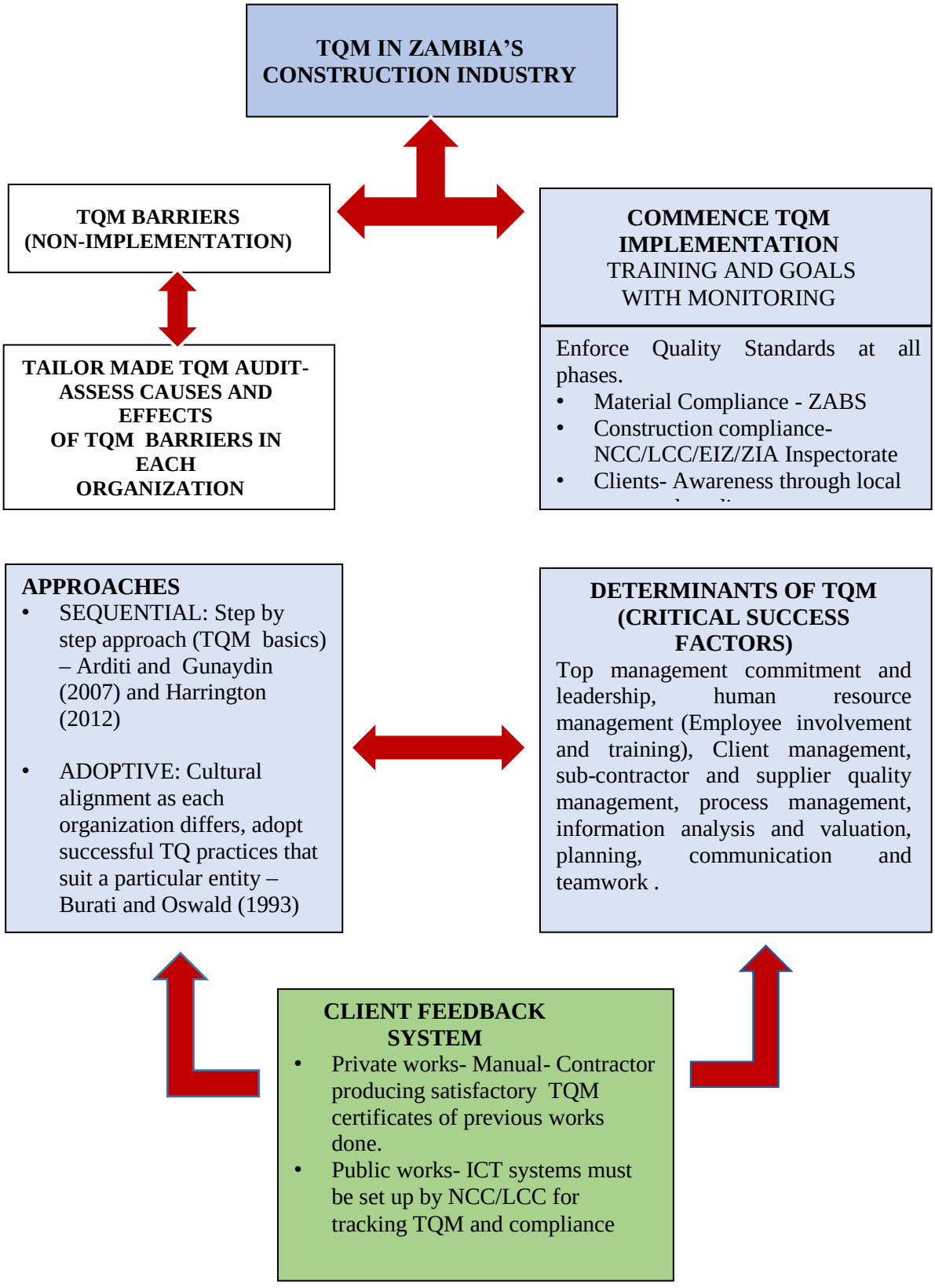


Figure 5.3: Initial draft framework during data collection

STEP 4: Draft Final TQM framework for the ZBS

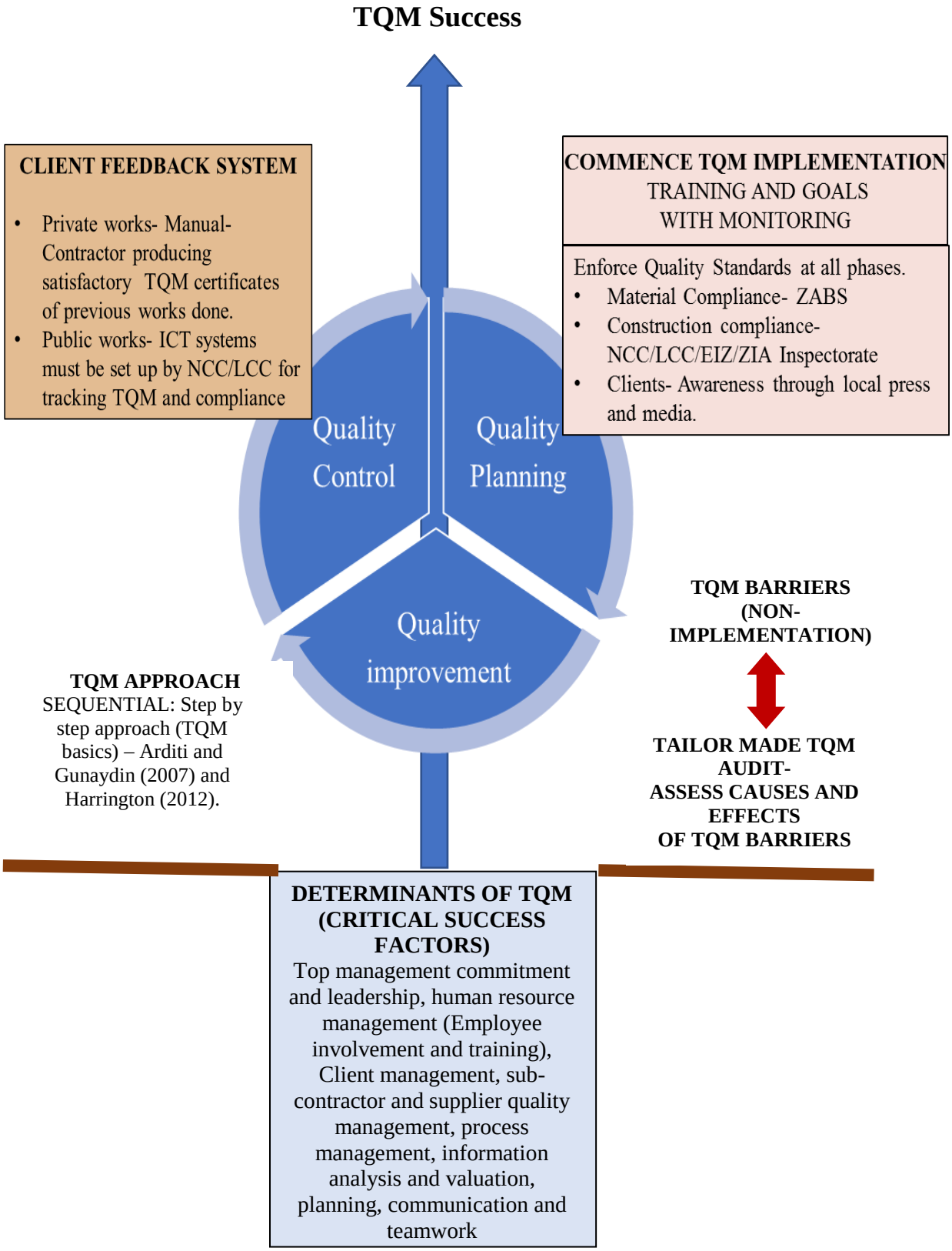


Figure 5.4: Draft final TQM framework for the Zambian Building Sector

To achieve TQM success ZCI stakeholders must start with CSFs as in figure 5.3 and figure 5.4 respectively.

5.5 Linakge of ZCI regulatory framework to construction process for incorpoartion into the framework.

The Zambian construction industry is goverened by at least twenty-nine (29) Acts of Parliament, several statutory instruments and circulars (Matakala, et al.,2015). In the developed framework Figure 5.5,the following acts were elaboaretd:

- **NATIONAL COUNCIL FOR CONSTRUCTION ACT NO. 4 OF 2011**

The main umbrella of the building sector is the National Concil for Constrcution (NCC). It is a statutory body that was formed under the National Council for Construction Act No. 13 of 2003. The NCC is responsible for registering contractors and providing the promotion, development, training and regulation of the construction industry in Zambia. Part of the duty of the NCC is to conduct inspections on both public and private contracts. The inspections are largely focused on work quality and progress, materials used, sanitation, safety methods, PPE, and environmental compliance. However, according to various contractors, the organisation is limited in its capacity to implement regular and extensive compliance inspections, and thus the NCC does not achieve its mandate of appropriately regulating the construction industry,particularly the building sector.

For this study,findings showed that there was limited trainning in TQM among construction stakeholders as illustrated in the figure 4.1.Therefore,as part of NCC's mandate to train and disseminate and regulate construction knowledge.It was proposed that the trainning module included TQM courses for improving adoption of all TQM practices.Furthermore,the NCC newletters could be sold to the public at a resaonble cost in the quest to increase TQM awarenesss.

This study only highlighted other regulatory provisions guiding the ZBS. These comprised: ZIA Act, Urban and Regional Planning Act;Housing Act and OSH Act.All the other acts are incorpoarted in the framweork under the wall symbol reflcetd as ZCI Regulatoin compliance.Other acts such as Public Procurement Act were significant in addressing bidding problems that contributred to poor quality. Future research must investigate into details concerning the link between these regulations and TQM in the construction industry.

- **THE ZAMBIA INSTITUTE OF ARCHITECTS act No.422 of 1995**

Zambia Institute of Architects (ZIA) was founded in 1954, as the Northern Rhodesia Institute of Architects (NRIA). It became the Zambia Institute of Architects in 1964 at independence. It was an association of Architects for a long while and the regulation and registration was done by Architects and Quantity Surveyors Registration Board (AQRB). The Institute became a statutory body in 1995 through the enactment of the Zambia Institute of Architects Act, Chapter 442 of the Laws of Zambia. The mandate of ZIA includes:

(a) To promote the general advancement of architecture and to facilitate the acquiring of knowledge in architecture and the allied professions;
(*b*) Provide for the registration of architects;
(*c*) Promote good architectural practice;
(*d*) Maintain and improve the standards and conduct of architects;
(*e*) Consider allegations of professional misconduct of architects; and
(*f*) Do all other things incidental, or conducive, to the attainment of the functions of the Institute.

For purposes of this study, item (c) good architectural practice entails ensuring that all parts of the construction process from engagement,briefing upto commission are executed with little or no variations.This builds quality into the process. Thererfore, in the framework, the foundation elements represent the tested models/frameworks.The foundations hold the existing policies in the Zambian Construction Indutry,particulary the ZBS.

- **URBAN AND REGIONAL PLANNING ACT No.3 OF 2015**

Some of the challenges faced in the ZCI are due to poor planning. Thus to curb these problems, the laws regulating planning must be respected. The Urban and Regional Planners' Act establishes the Zambia Institute of Planners and provides for the registration of planners and planning firms. It also regulates the professional conduct of planners and planning firms.
Section 2 (k) ensure that training and skills development are provided to planning committees; and

Section 10(b) advise and assist planning authorities within the region on the preparation of development plans to ensure compliance with the regional plan and the National Planning Framework; Section 10 (c) plan and co-ordinate the provision of infrastructure and facilities for the region;

Thererfore, all aspects of TQM could be built into the national planning frameworks; especially that the planning and co-ordination of infrastructure for each region required the planners input.

- **HOUSING AND THE NATIONAL HOUSING AUTHORITY (STATUTORY AND IMPROVEMENT) ACT,CAP 194 OF THE LAWS OF ZAMBIA**

The National Housing Authority Act regulates the development ,control and improvement of housing throughout the country. Section 40(1) states that every building erected and every improvement effected on any land to which this Act applies shall be in accordance with specifications approved by the National Housing Authority or by the municipal council in whose jurisdiction such land is situated.

The Act also established the National Housing Authority, whose powers include developing, building, managing and controlling housing estates (Section 21(1)(a)). Section 22 instructs that no one shall initiate detailed planning until a preliminary plan of the site and a written memorandum explaining the nature of the proposed development has been submitted to and approved by the National Housing Authority.Clients who do not respect this requirement have sometimes had their structures demolished by the State. Section 26 of the Act permits entry to any land, building or structure for purposes of inspecting it and ensuring that the law has been complied with.

From the survey findings,it was noted that there was an outcry by the local authorities /councils to train more of its staff in quality management systems as well as introduce quality compliance certificate to contrsctors/artisans who were the main quality implementers at construction phase. Thus,it applied to both the NCC Act as well as the other regulatory bodies.

- **OCCUPATIONAL HEALTH AND SAFETY ACT NO. 36 OF 2010**

It establishes the Occupational Health and Safety Institute; and provides for the establishment of health and safety committees at workplaces.The purpose of establishing the Institute and committees is to protect the health, safety and welfare of all persons at a workplace general staff to top management.

The functions of the Institute are outlined in Section 6 of the Act. One of them for organisations in the ZBS to provide for the protection of all persons on their premises (not only those at work) against risks to health or safety arising from the activities of persons at work. It was found that safety proceduers were considered to be part of quality mesaure in th review of literature and evidence of part of a structure that had collapsed showed the strong link between quality and saftey measuresThus,it is called for continous improvement in all organisations.

In summary, the provisions and research fingings were merged together with existing frameworks (EQFM, MBQFM, Oakland and Juran Triology) from literature in order to avoid bias and achieve the research aim. The construction process in the ZBS comprised of five (5) main stages. These included briefing; designing; bidding; construction and commissioning. Table 5.3 below elaborated the relationship between the regulatory framework and construction process

Table 5.3: Quality improvement methods for supporting the construction process in relation to the existing regulatory framework

Stage / ZCI regulations	**Brief description**	**Quality Improvement methods (groups)**
BRIEFING (4) (schematic design)	Customer needs are collected and a blueprint elaborated	Gathering customer needs, organizing customer needs and technology
ZIA Act., ZEMA Act, URP Act		
DESIGNING (5) (detailed design and construction documentation)	The facility that will satisfy the customer needs is designed. The specification documents that will help to assemble the full final product are developed.	Formal methods and technology
ZIA Act, NHA Act, Public Health Act, URP Act		
BIDDING (6)	A contractor is chosen to carry out the site construction work.	Planning programming tools and technology
Public Procurement Act		
CONSTRUCTION (7)	The facility is built in accordance with the drawings and specifications. Construction materials are selected.	Quality control and technology
NCC Act, OHS Act		
COMMISSIONING (8)	Users take over the facility	Performance measures and technology
OSH Act, ZIA Act, NCC Act		

Source: Part extract from Aspinwall (2008)

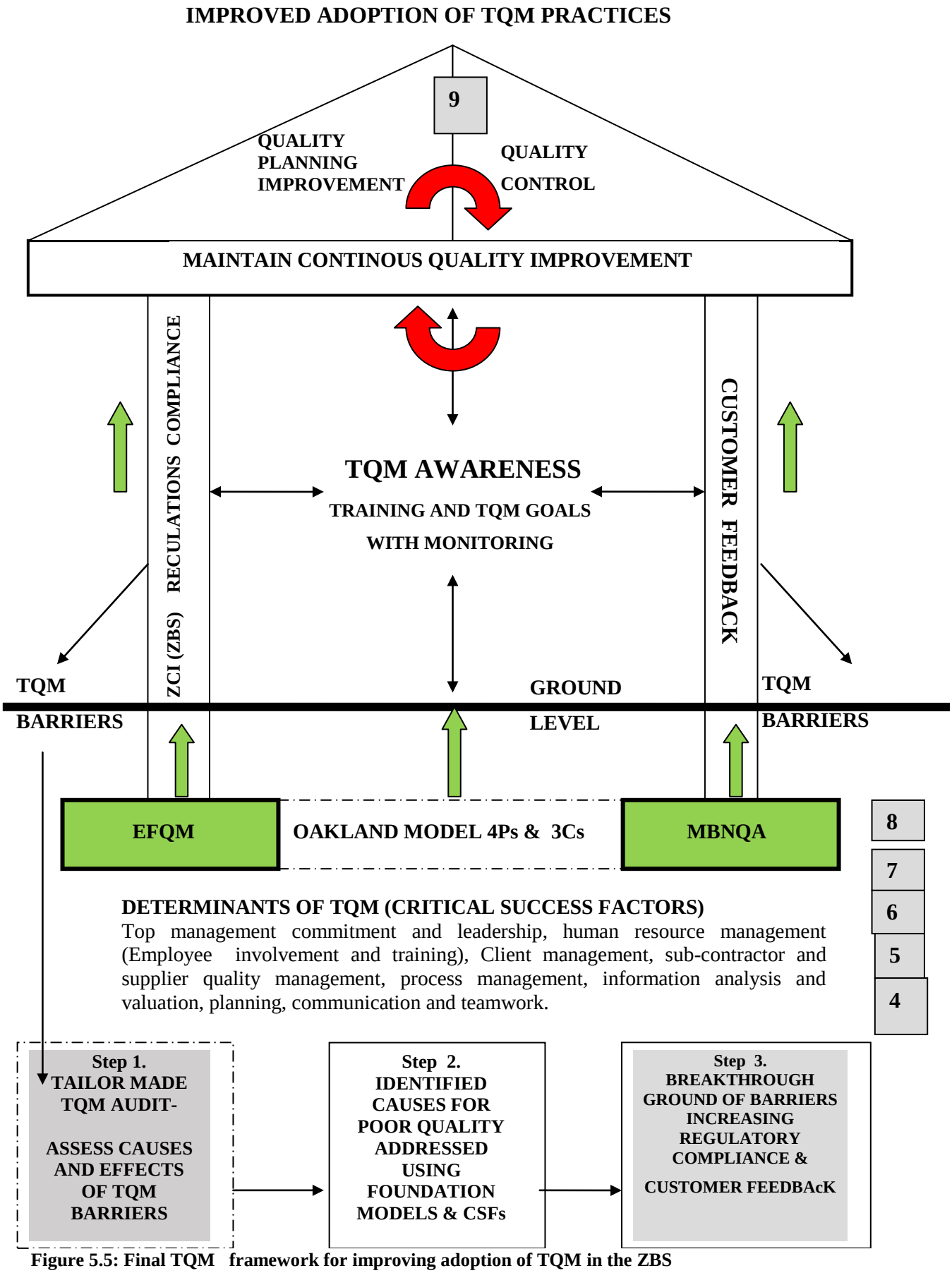


Figure 5.5: Final TQM framework for improving adoption of TQM in the ZBS

CHAPTER SIX CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

In the recent past, quality management practices in the construction industry have been increasing in order to improve on competitiveness, performance, and client satisfaction. However, not all construction stakeholders in the Zambian construction industry (ZCI),particulary the building sector, have mitigated poor quality output of buildings. This study researched on the barriers to implementation of total quality management in the ZCI.

This study had three basic objectives relatated to the construction industry. These objectives were:

1. To review the philosophy of TQM and the Critical Success Factors (CSFs) to improve the adoption of TQM.
2. To identify the barriers affecting improved adoption of TQM practices in the ZBS.
3. To develop a TQM framework to improve adoption of TQM practices and quality output from upcoming building projects in the ZBS.

The study identified some barriers to TQM implementation, benefits of TQM and proposed a TQM framework for the ZBS. This led to the conclusion and recommendation in this chapter.

The objectives of the study were met as elaborated below.

6.2. Determination of TQM implementation in ZCI

The research concluded that TQM implementation in the ZCI has not reached its fullest potential because of the inherent barriers outlined in the study. Furthermore, TQM implementation varied from one company to another. According to Giri (2014), the company should perform a cultural assessment before implementing TQM so that corporate objectives and behaviours can be aligned to the goal of the TQM program and establish proper TQM implementation methodology for the company

6.2.1 Barriers to TQM in ZCI

Based on the literature review, interviews and questionnaire survey, the barriers to implementation of TQM included the following:

1. **Procedural barriers**:
   - The lack of standardization i.e. products differ widely in terms of size, appearance, location, techniques, space, quality etc.
   - Too much documents are required (Lack of documentation ability)
   - Difficulty in measuring results on construction sites is problematic
   - The notion that TQM is costly and requires a long time of implementation
   - Low bid subcontracting is a challenge to successful TQM implementation
   - Schedule and cost treated as the main priorities
   - Emphasis on short-term objectives since most products are on/off specially designed for a specific purpose.

2. **Cultural barriers**:
   - Multiple stakeholders with conflicting interests in construction, i.e.consultants, engineers, quantity surveyors, contractors etc. in such a way one can be committed to quality while others not.
   - Conservative nature of the construction industry does not innovate rather copiesideas of pioneering firms or borrow experience from experience.
   - Creating and maintaining team spirit behaviour and attitude for TQM implementation is a challenge on construction sites.

3. **Employee barriers**:
   - Lack or inadequate education and training programs on TQM
   - Lack of top management and employee commitment
   - Lack of expertise/resources in TQM (cost involved)

4. **Authorities/Other barriers**:Government policies, corruption, collusion, etc.

In conclusion, in spite of these barriers, TQM embraces the philosophy, principles, procedures, and practices necessary for providing customer satisfaction as well as achieving productivity and business performance in the construction industry (Pheng, 2004). The journey to overcome these barriers requires commitment from the ruling government in order to save national resources that are wasted on rework on building projects. Lastly, fom review of literature and survey findings, quality progress shall be slow if no stringent measures are taken to implement TQM in the building works..

Alintah-Abel (2019), the principle behind the idea of continuous improvement is basically the idea that mistakes can be avoided and defects can be prevented. It was noted that the continuous improvement process never ends; therefore no true destination is ever reached. Management must drive the TQM program and gain the support from all employees by making their leadership visible through accomplishment of quality objectives.The first step and key ingredient for success by management was its affirmation of TQM commitment (Burati and Oswald, 1993).

Thus, there needs to be complete commitment from top management; TQM needs to be defined and integrated with the organisation's business strategy and there needs to be a link between information technology and quality systems.

6.3 Limitations to the study

It was observed that most respondents had not fully understood the concept of TQM and that some organizations had no proper documentation on implementation of quality. Additionally, most construction shareholders had not responded and were unwilling to give accurate information for fear that the information may be sensitive despite assurance of confidentiality.

The implications of findings on policies and regulations existing in the Zambian Construction Indusrty,particularly buiding sector would improve future adoption of TQM practices. Furthemore, future research could take into account:

- **Regulatory bodies/Authorities:** ICT sysytems to track compliance of building quality must be set up in NCC and councils.Organizations such as Zambia Beraeu of Standards(material compliance) could further work with inspectorates from NCC, ZIA, LPPA, LCC with assistance of qualified quality experts.
- **Consultants:** The quality culture,communication of drawings and contrcat specifications must be clear and specific.
- **Contractors:** Introduction of TQM certificates
- **Clients:** Awareness through local press and feedback to th ebuilding key are vital to quality attainment.

6.4 Recommendations

The research results revealed that it may be more difficult to implement TQM on a building site rather than within the organization because the other parties in the project team may resist this process. However, some recommendations have been proposed to overcome these barriers.

The key themes drawn from the research findings were:-

- Low levels of TQM knowledge neccessitating need for TQM awareness in construction and local press publications.
- The TQM barriers that caused poor quality outcomes were categorized as procedural, cultural, employer/employee and authorities/other driven barriers. These barriers needed to be addressed at all levels of the organization, that is, from top management to junior/operational management.
- CSFs - These were numerous but had been summarised into quality models. For this research, the Oakland Model was adopted considering the high aspect of commmitmnet at all levels which Juran had also concluded.
- TQM framework for the ZCI. Most respondents at reported that ther was no roadmap showing the causes of poor quality and a sequential approach to win the war on waste/rework. Ishikawas' cause and effect diagram as well as concepts from Juran and oaklands model were adopted to develop the ZCI TQM framework.

  It is recommended that all public and private construction works must be governed by a TQM framework, especially in local authorities and construction regulating institutions.Furthermpre, a TQM compliance certificate must be awarded only if a

building project meets the set building standards and verification of a TQM specialist presence on site during project implementatiom.

6.5 Future Research

This research sought to determine the barriers to the implementation of total quality management in the ZBS. In view of this, there is the need to suggest further research on the following areas that were not covered under this study:

- Development of standardized TQM compliance certificates for the ZCI. Certification helps produce a product in a consistent way but does not guarantee customer satisfaction.
- The role of current ICT (information and communications technology) in TQM implementation.
- A study on the relevance of a TQM degree for the ZCI and proposing a course outline for the full training programme.
- Internal resistance in TQM implementation.
- The impact of external factors such as government rules and regulations on TQM implementation.

The implications of the findings were that improved quality and productivity were needed to eliminate high levels of waste in the construction industry.It is also necessary to note that the framework could act as a tool that encourages the improved adoption of TQM practices; as well as provide a clear perspective for practitioners on how to overcome TQM barriers .

6.6 Chapter summary

In this chapter, the elements surrounding TQM implementation, its barriers and practices were summarized while linking the research findings both in literature and in the field. The researcher noted that TQM was a continuous process and technological building trends kept evolving. Thus, satisfying every clients' needs required sacrifice by the building team and cultural change in execution of all works. Construction organizations should realize that results cannot be gained overnight and that an organization needs time to adapt, change, and learn. Thus, organisations must develop a culture that would support TQM and raise awareness of the significant role of TQM practices.

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APPENDICES

Appendix A: Cover Letter for the questionnaire

THE UNIVERSITY OF ZAMBIA

School of Engineering

Department of Civil and Environmental Engineering P.O Box 32379, Lusaka.

CELL: +260 955 669150, Email: mary.nyaywa@yahoo.com

10th July, 2018

Dear Respondent,

QUESTIONNAIRE SURVEY ON A FRAMEWORK TO ADDRESS BARRIERS TO TOTAL QUALITY MANAGEMENT (TQM) ADOPTION IN THE ZAMBIAN BUILDINGS SECTOR

I am currently pursuing a Master of Engineering Degree in Construction Management at the University of Zambia undertaking a study on "**Barriers to implementation of Total Quality Management (TQM) in the Zambian Construction Industry"**.

This study endeavours to explore TQM in the Zambian Construction Industry, the methods of TQM adoption and implementation currently being utilised in Zambia and investigate the barriers to its implementation for building projects. The information obtained will be used to suggest approaches that can be employed to enhance TQM implementation in the Zambian Construction Industry, particularly Buildings Sector.

Attached is a questionnaire to be filled-out based on your knowledge and understanding of Total Quality Management and its application in the local construction industry, particularly buildings. All the information gathered will be treated as confidential and will be used only for the purpose of the research. Should there be any clarifications, please get in touch with the undersigned using the email address and mobile number provided.

Your assistance and time are highly appreciated.

Yours Faithfully,

Mary M Nyaywa - Kaluba (Master of Engineering Student at University of Zambia)

Appendix B: Questionnaire

The purpose of this study is to identify the main barriers to the adoption and implementation of TQM in Zambia's construction industry.

Please respond to the following questions either by ticking (√) appropriately or by writing your answer in the spaces provided.

Please note that all information provided will be treated in the strictest of confidence.

PART A: Background Information

What is your gender?

Male

Female

What part do you play in the Zambian construction industry, particularly in the building sector?

Contractor ☐

Consultant ☐

Client ☐

Construction regulator ☐

Other (please specify) _____

Which professional or governing body do you belong to?

Zambia Institute of Architects ☐

Engineering Institute of Zambia ☐

Quantity Surveyors Registration Board of Zambia ☐

National Association of Medium & Small Scale Contractors ☐

Association of Building & Civil Engineering Contractors of Zambia ☐

Other (please specify) _____

What position do you hold within your organization?

Owner ☐

Senior level management ☐

Middle level management ☐

Junior level management 5) Support staff

How many years of experience do you have within your aforementioned profession?

Less than 5 years ☐

Between 5 years and 10 years ☐

Between 10 years and 15 years 4) Between 15 years and 20 years ☐

5) Over 20 years ☐

PART B: General understanding of TQM and level of implementation in organisation.

What do you understand by the term Total Quality Management in Construction? (tick the most important options as applicable to your view)

Meeting expectations of customers ☐

Reduced errors, waste, rework or defects ☐

Conformance to ISO 9000 and other standards ☐

Completion on time and within budget ☐

Continuously improving performance ☐

Doing job right first time ☐

Employee satisfaction

Kindly indicate below if you have any other understanding of Total Quality Management in Construction:

……

……

……

……

……

…….

Do you have an employee specialized in TQM in your firm?

Yes ☐

No

If your answer to question 8 above is yes, what component of TQM training has been specialized?

Process control
Statistical analysis ☐
Data gathering and analysis ☐
Teamwork ☐
Communication ☐
Customer satisfaction

Please indicate to what level the following TQ practices are implemented in your organisation by ticking (√) your rating on the following scale ranging from 1 to 4 as follows:-

(1- Not implemented, 2- Poorly implemented, 3- Partially implemented, 4- Fully implemented)

S/No	Procedure	Scale			
		1	2	3	4
1	Top management commitment and support				
2	Employee empowerment and involvement				
3	Sub-contracting and vendor involvement				
4	Cost of quality				
5	Process improvement				
6	Continuous improvement				
7	Training				
8	Customer and shareholder satisfaction				
9	Vision, mission and guiding principles				
10	Quality control policies				

PART C: Barriers to adoption and implementatino of total quality management (TQM)

The following are identified barriers faced by different stakeholders in the Zambian Construction Industry construction industry in a process of adopting and implementing TQM within their organisations. Kindly indicate by ticking (√) to what extent you agree or disagree to the highlighted barriers.

S/No	Barriers to TQM implementation in construction industry	Scale			
	Procedural Barriers	Strongly Agree	Agree	Disagree	Strongly Disagree
1.	The lack of standardization i.e. products differ widely in terms of size, appearance, location, techniques, space, quality etc.				
2.	Too much documents are required (Lack of documentation ability)				
3.	Difficulty in measuring results on construction sites is problematic				
4.	The notion that TQM is costly and requires a long time of implementation				
5.	Low bid subcontracting is a challenge to successful TQM implementation				
6.	Schedule and cost treated as the main priorities				
	Emphasis on short-term objectives since most products are on/off specially designed for a specific purpose.				
	Cultural Barriers	Strongly Agree	Agree	Disagree	Strongly Disagree
7.	Multiple stakeholders with conflicting interests in construction, i.e. consultants (engineers), quantity surveyors, contractors				
	etc. in such a way one can be committed to quality while others not.				
8.	Conservative nature of the construction industry does not innovate rather copies ideas of pioneering firms or borrow experience from experience.				
9.	Creating and maintaining team spirit behaviour and attitude for TQM implementation is a challenge on construction sites				
	Employee Barriers	Strongly Agree	Agree	Disagree	Strongly Disagree
10.	Lack or inadequate education and training programs on TQM				
11.	Lack of top management and employee commitment				
12.	Lack of expertise/resources in TQM (cost involved)				

Kindly indicate any other barriers to TQM implementation which you feel should be included:

……

……

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……

……

Part D: Approaches to improve implementation of TQM in the Zambian Construction Industry

How best do you think TQM can be implemented?

(Kindly tick (√) as many applicable answers as possible)

Standardize and document all procedures and techniques among parties involved in construction	☐
Employ qualified professionals on TQM and competent field managers.	☐
Emphasis on education and training to drive the improvement process	☐
Top-management and employee commitment towards TQM	☐
To prioritize in all construction aspects instead of Schedule and cost only.	☐

Kindly indicate any other approaches to improve implementation of TQM in the Zambian Construction Industry which you feel should be included:

……

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……

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……

THANK YOU FOR SPENDING YOUR TREASURED TIME TO COMPLETE THIS QUESTIONNAIRE

Note: All information provided in a questionnaire will be confidentially treated and will be used for academic purposes only.