IMPLEMENTATION OF TOTAL QUALITY MANAGEMENT IN ROAD CONSTRUCTION PROJECTS IN UGANDA – A CLIENT'S PERSPECTIVE

OBIM BENARD HAROLD

REG.NO: **19/U/GMET/18785/PD**

A DISSERTATION SUBMITTED TO DIRECTORATE OF RESEARCH AND GRADUATE TRAINING IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN CONSTRUCTION TECHNOLOGY AND MANAGEMENT OF KYAMBOGO UNIVERSITY

OCTOBER, 2025

DECLARATION

I, **Obim Benard Harold,** declare that this submission is my own work and to the best of my knowledge and belief, it neither contain any material previously published or written by any other person nor material which has been accepted for the ward of any other degree of the university or other institute of higher learning, except where due acknowledgement has been made in the text and reference list.

Sign…….. Date……

APPROVAL

We the undersigned approve that we have read and hereby recommend for submission to the Directorate of Research and Graduate Training of Kyambogo University, a dissertation titled "Implementation of Total Quality Management in Road Construction Projects in Uganda – a client's perspective" in fulfilment of the requirements for the award of Master of Science in Construction Technology and Management Degree of Kyambogo University.

DR. RUTH SENGONZI

Signature……Date……

ASSOCIATE PROFESSOR LAWRENCE MUHWEZI

Signature……Date…….

DEDICATION

It is my sincere desire to dedicate this work to my lovely wife Jennifer Obin, for close support and encouragement.

Not forgetting my beloved children; Apwoyorwot Keziah, Laloyo Favour, Nimaro Joy, Parwot Joel Obin, and Genirwot Joseph Obin. Who missed my parental care in this long period of my studies, be assured that I was with all of you in spirit.

Above all, to my beloved parents Ceasar Arweny and Regina Arweny, whose support and care cannot go unrecognised. I appreciate your contribution to my success.

ACKNOWLEDGEMENT

First and foremost, I want to thank the Almighty God for his guidance, provision and protection. The production of this research dissertation was as a result of the efforts of good hearted and co-operative people whom I owe them of gratitude.

Thanks to the project coordinator, Dr. Charles Onyutha for his continued support and guidance offered during the period of development of this dissertation.

Many thanks to my supervisors, Dr. Ruth Sengonzi and Assoc. Prof. Lawrence Muhwezi for always sacrificing their time despite their busy schedule to listen, discuss and provide valuable support. Your guidance and critics made this work a success.

My prayer is that the Almighty God reward you all abundantly.

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LIST OF ABBREVIATIONS

DLG	District Local Government
DMAIC	Define, Measure, Analyze, Improve, and Control
DPA	Departmental Purpose Analysis
FMEA	Failure Mode and Effects Analysis
IMS	Integrated Management Systems
IR	Interview respondent
ISO	International Organization for Standardization
JIT	Just-in-Time Inventory Management
NGT	Nominal Group Technology
OH&S	Occupational Health and Safety
PDCA	Plan Do Check Act
QA	Quality Assurance
QC	Quality Control
QI	Quality Improvement
QM	Quality Management
QMS	Quality Management Systems
SPC	Statistical Process Control
SPSS	Statistical Package for Social Sciences
TQM	Total Quality Management
UNRA	Uganda National Roads Authority

ABSTRACT

There are many challenges faced by the construction industry today. Project managers and decision makers are faced with challenges comprising time overruns, cost overruns, and poor workmanship, among others. This has prompted important project implementers to think about total quality management (TQM) as an important tool for project management in order to attain high-quality results. This study sought to evaluate the implementation of Total Quality Management (TQM) in Ugandan construction projects, with a particular focus on the road sector from the standpoint of the client. This required a review of the literature on perception, current practices, and TQM implementation tools and techniques. A mixed method approach and a case study strategy was used and data were triangulated through various methods such as literature review, interviews, and questionnaire survey. Data were collected from two entities that are common clients in the road construction industry in Uganda (i.e., Uganda National Roads Authority-Moroto station and the District Local Government-Moroto). Descriptive statistical analysis coupled with content analysis methods were used as a means of data analysis. The study findings revealed that 92% perceived TQM as: involving everyone in the organization, teamwork, and participation for achievement of continuous improvement culture and customer satisfaction. 53.4% of the study further revealed that not all the steps for TQM implementation were being practiced. The findings of the study also indicated that there was moderate use of TQM tools and techniques at 58.4% and 51.5% respectively. Finally, the outcome of this research led to establishment of a tool that can be adopted to improve TQM implementation in the road construction industry in Uganda. There is need to adhere to aspects like continuous improvement, process approach, and measuring performance to better TQM implementation. The key elements of the tool developed were organizational commitment, employee involvement, training and development, and work environment and organizational culture. These findings are significant in the implementation of TQM and motivate other researchers to investigate more in this area of study.

Key words: Quality, Management, Construction industry, Customer satisfaction.

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

In general, the construction industry faces a lot of challenges. The major challenges are time overruns, cost overruns, and poor workmanship (Harrington et al., 2012). The road construction sector has been one sector affected by the above challenges. One of the drivers for economic growth in any country is a road infrastructure and the living condition of people can greatly be improved by sustaining access to roads (Benamghar and Iimi, 2011). The security, welfare, and productivity of the people both in the urban and rural setting is influenced by the level of development of the road infrastructure (Arrowsmith, 2010). To achieve the above, the quality of the road infrastructure constructed and the quality initiative used is important.

According to Gherbal et al., (2012), implementors of projects have found it important to achieve high quality outcomes by prioritizing quality management in their projects. The underlying task for construction firms is to ensure constant creation of additional value and provision of great quality products that meets the customer's or client's demand.

According to Achterkamp and Vos, (2008), extensive studies on quality have been carried out in the construction industry considering parties in the project's lifecycle like clients, donors, managers, and contractors. In brief, quality can be referred to as those conditions of the project that will meet the aesthetic, functional and legal aspects (Asim et al., 2013). There should be an effective quality management initiative such as Total Quality Management (TQM) for quality to be achieved.

Initially, TQM was first implemented in Japan then the United States followed, as well as countries in Europe and Asia. Generally, for developing countries, adopting TQM practices has been gradual (Sadeghian, 2010). While the literature review indicates that developed countries have implemented TQM, it also highlights the scarcity of research on TQM implementation. Gosen et al. (2005) noted that a significant gap in TQM implementation within developing countries is the unclear perception of quality management.

In Africa, the implementation of Total Quality Management (TQM) began in South Africa approximately twenty years ago, gradually extending to Burkina Faso in the 1990s. The shifts in management paradigms highlighted TQM as an innovative approach to manufacturing. This contemporary management philosophy places significant importance on employee empowerment, customer service, and charismatic leadership (Aletaiby, 2018).

In Uganda, implementing TQM on road construction projects has been a great challenge. The Ministry of Finance Audit Report, (2021) on the evaluation of the road construction revealed that the quality of roads constructed is not commensurate with the budget allocated for the road sector.

Mukherjee (2006), defined TQM as an organized scientific approach that is geared towards continuous improvement of quality that involves all employees of an organization intended to cover all functions aiming for customer satisfaction in totality. TQM's general goal is to maintain continuous improvement across the organization's workforce, systems, procedures, and surroundings in order to improve customer service and boost profits by creating an effective and efficient business (Bahri, 2012).

While some business organizations have adopted TQM with a completely lax approach by adopting only parts of the principles, others have operated TQM like a program expected to function and perform on its own (Oluwatoyin et al., 2008). This has been a major factor in most organizations' inability to implement TQM ideology and meet expected targets.

The road sector in Uganda has seen improvements in funding and reforms, but the sector's service indicators have not improved enough (ACODE, 2012). The government continues to lose billions of shillings due to shoddy works and services, according to the performance report for the road sector (Inspectorate of Government, 2012). Many road projects have experienced implementation delays due to complaints about poor quality of work and cost overruns (Apolot et al., 2013). There have also been reported instances of unfinished construction or roads collapsing shortly after they were put into service. For service delivery to improve, Uganda's road infrastructure quality is a critical issue.

In Uganda, the official government organizations in charge of overseeing road projects are the Uganda National Roads Authority (UNRA), the District Local Governments (DLGs), and the Kampala Capital City Authority (KCCA). All of these organizations receive funding from the Uganda Road Fund (URF), a corporate entity established by an Act of Parliament in 2008. The URF's overarching goal is to guarantee that all public roads are consistently maintained by offering sufficient and reliable funding for both regular and sporadic road maintenance. Local governments (districts and municipalities) are required by the Local Governments Act, 1997 to construct, rehabilitate, and maintain roads within their jurisdictions.

The construction industry in Ugandan, according to Fateh et al., (2016), illustrated the limitations of organizations when profit is prioritized over quality. The increased competition in the industry brought about by the recent flood of foreign investors into various economic sectors has forced organizations to evaluate their internal operating procedures and make strategic changes in response to challenges. Due to the challenges of poor services, and substandard end-products to the clients in the Ugandan construction industry, different stakeholders have been observed to accuse each other of inefficiency in service delivery. This research therefore aims to assess TQM implementation in the road construction projects in Uganda.

1.2 Statement of the problem

The construction industry in Uganda has recorded commendable growth over the years. The government of Uganda has invested in infrastructure development like construction of hospitals, schools, roads, and industrial parks to mention but a few. Road infrastructure is one of the main investments the government of Uganda has prioritized to boost economic activities in the country. Given that most of this infrastructure is developed using donor money, there has been strict requirement to attain the quality standards expected by the donor and government of Uganda.

To close the gaps caused by poor performance and poor quality, the Ugandan construction industry must consider implementing a better quality management system, like TQM.

Although there has been some effort to apply TQM, there are still problems with poor project performance and quality in Ugandan construction projects. When

combined, the aforementioned issues create a significant barrier to the construction industry's efficacy. The lack of adherence to TQM principles has prevented contractors from achieving quality on their projects.

The concept of TQM appears to be a promising remedy for the persistent issues. Organizations are therefore urged to adopt this concept, which can increase competitiveness through empowered employees and subsequently improved performance, to maintain competitiveness and guarantee improved performance. This research was envisaged to ascertain the current level of uptake of TQM in the Ugandan road construction industry since the studies referenced above are over five years old. Identifying the current level of TQM implementation will enhance improvement in performance and customer satisfaction.

1.3 Objectives of the study

1.3.1 Main Objective

The main objective of this research was to assess the level of TQM implementation by clients in the road projects in Uganda.

1.3.2 Specific Objectives

The specific objectives below were explored to achieve the main objective of this study:

i) Examine the perception of clients on TQM principles in the road construction projects.

ii) Establish the current TQM practice in the road construction projects.

iii) Generate solutions necessary for developing a tool that can be used for improving uptake of TQM in the road construction projects.

1.4 Research questions

i) What is the perception of the clients on TQM in the road construction projects?

ii) What are the current TQM practices in the road construction projects?

iii) What tool can be used for improving uptake of TQM in the road construction projects?

1.5 Significance of the study

This study on assessing the implementation of TQM in the road construction projects in Uganda will contribute information that will help in quality management issues in the Ugandan road construction projects.

The paramount importance of the study was to enrich the body of knowledge and and to further research on TQM in this area. The study also established a tool that can promote uptake of TQM in the road construction projects and lastly, the researcher was able to complete the course since this research was a requirement.

1.6 Justification of the study

This study dwells more on application of TQM in the road construction projects in Uganda. There are critical roles played by the road infrastructure in the economic development of Uganda. Agriculture being the backbone and main source of income of Uganda's economy contributes to 24.1% of gross domestic products (GDP) and 33% of export earnings (www.trade.gov, 2022). The products from agricultural activities can only reach the market when there is good road network. The ministry of works and transport has several mandates which it endeavors to achieve. Among these mandates is planning, developing, and maintaining an economic, efficient and effective transport infrastructure.

However, the main challenge that hinders the achievement of this target is the quality of the road infrastructure constructed. Therefore, it's imperative that implementers use management strategies that take into account enhancing the organization's integrated management performance as well as the needs of its employees, the market, and its clients. TQM has been adopted by numerous industries and this has improved the quality of goods and services (Al-Khalifa and Aspinwall, 2000). As a result, implementing effective management strategies like TQM can boost and improve performance in the building sector. With a focus on studies for the road sector, the study aimed to assess the degree of TQM implementation in the construction industry in Uganda. The study advised on ways of promoting TQM application by the client's team who are major players in the industry; and thereby promote the achievement of better quality in construction projects.

1.7 Scope of the study

1.7.1 Geographical scope

The study was conducted in Northeastern region of Uganda. The choice of the region was because of an article on one of the national newspaper (Daily Monitor) of March/ 13th/2019 by politicians from Moroto and Nakapiripirit Districts raising concern about the quality of a recently upgraded 98 kilometer road that connects the two Districts. The construction of Moroto-Nakapiripirit road started in 2015 but barely five years in to the lifespan of the road, there were already major cracks that developed on the road on very many spots along the road stretch. The target of Moroto-Lokitanyala Road project where UNRA is the client is because it is a similar project within the same region and also Nawanatau-

Acerer road maintenance project within Moroto District where Moroto District Local Government is a client. The choice of the District was because of the on-going projects by both UNRA and Moroto District Local Government as described above.

1.7.2 Content scope

Despite significant research carried out in the construction industry concerning quality management, the focus has always been on the contractor and there is little or even no attempt made to investigate the perspective of the client. Any quality issue that arises road projects are normally associated with the contractor. This research focused on clients in the construction of road projects. In Uganda, the main client for a road project is majorly either central government or local government. The researcher focused on road projects for both paved and gravel types. For the paved road, the researcher considered an ongoing project of upgrading of the Moroto – Lokitanyala cross boarder Road (42 km) from gravel to paved (bituminous) standard which connects Uganda to Kenya at Lokitanyala boarder point. This is a project that was being developed by Uganda National Road Authority (UNRA). For the gravel road, the researcher considered a completed mechanized routine maintenance of Nawanatau – Acerer district road (8 km) by Moroto District Local Government in FY2021/2022.

1.7.3 Time scope

This study was conducted from March to June 2022.

1.8 Conceptual Framework

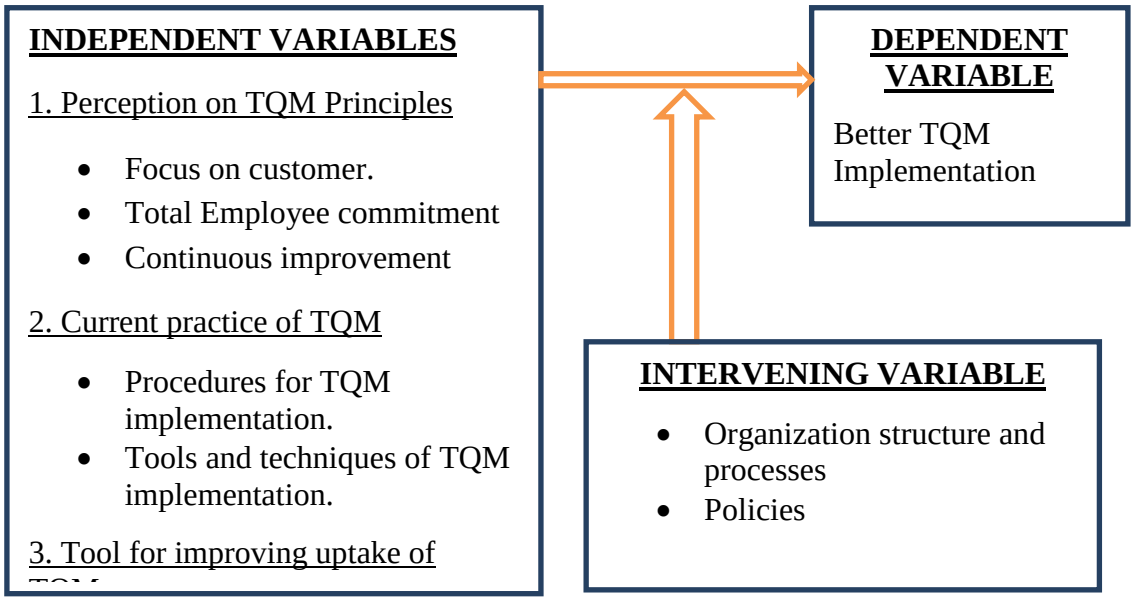

Figure 1. 1: Conceptual framework of the study

The conceptual framework of this study consists of the independent variables (IV), the dependent variable (DV), and the intervening variables.

The IV looked at three areas; 1) Perception of TQM principles (customer focus, total employee commitment, and continuous improvement), 2) current practice of TQM which incorporated the procedures and tools/techniques of TQM implementation, 3) tool that can be used for improving uptake of TQM. The intervening variables looked at organization structure/processes and their policies. The DV looked at achieving implementation of TQM.

In summary, the conceptual framework relays that in order to appreciate whether an organization is implementing TQM, there is need to understand their perception of TQM and their current practice as pertains implementation of TQM in terms of procedures and tools/techniques used given that the intervening variables like organization structure/processes and policies can also contribute to achieving the DV.

1.9 Summary of Chapter One

The chapter provided a summary of the main TQM-related concerns. The background, problem statement, study objective, research questions, significance, study justification, study scope, and conceptual framework were presented first. The review of the literature for the goals of this investigation will be presented in the upcoming chapter.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The literature for this study was reviewed in this chapter. The relevant literature on TQM and quality concepts was examined, considering the many definitions and points of view expressed by a few writers regarding TQM, as well as the quality management tools and techniques applied in construction projects. This chapter also extensively reviewed literature concerning the perception of TQM, establishing whether TQM is practiced formally, and exploring a tool that can be used for the uptake of TQM. .

2.2 Definitions of Quality

Shoshan and Celik, (2018), state that many business organizations use the word 'quality' as a slogan to describe different things in different ways, which has occasionally led to misunderstandings. The word "quality," which refers to the characteristics of goods or services in any industry, comes from the Latin word "quails," which means "of what kind?" The subjective nature of quality concepts implies that their meaning varies from person to person and from nation to nation (Simsek, 2007).

A few researchers and organizations define quality differently because there isn't a single, accepted definition, as shown in Table 2.1.

Table 2. 1: Definition of quality

S/No	Definition of quality	Author/year
1	Serving its purpose	Juran, 1989
2	Quality must satisfy the needs of the customer both now and in the future.	Deming, 1986
3	The characteristics of product or service in engineering, marketing, maintenance, and manufacturing where the product and service meets the customer's expectation	Feigenbaum, 1961
4	Adhering to requirements	Crosby, 1979
5	Level of fulfilment of requirements	ISO, 2000
6	Satisfaction of a product even after sale, quality of organization, management, and human beings	Ishikawa, 1985
7	"Quality is how the requirements of the customer is met	Oakland, 2003

According to Shoshan and Celik, (2018), quality is the ability to satisfy the demands of the designer, builder, owner, and regulatory authorities. The requirements of each implementer, as listed in Table 2.2, are clarified to provide a detailed explanation of the definition of quality above.

Table 2. 2: Defining quality in the context of the construction industry

Meeting requirements of the;	Explanation
Owner	- The project's suitability for its intended use, - Completion within estimated budget and on time, - Operation and maintenance
Designer	- Provide a clearly specified scope of work, - A budget for assembling and employing a knowledgeable, skilled, and experienced team, - Set aside money to acquire sufficient field data before designing, - Provisions for the owner and designer to make decisions promptly, - Agree to supply the necessary work within the allotted time frame and at a fair price.
Constructor	- Contract plans, specifications, and other records that are created with enough specificity to allow the builder to create a bid that is competitive or a costed proposal. - Quick decisions of processing change orders by client or consultant - Prompt conceptualization of the requirements of the contract by staff. - An agreement to complete the work within a reasonable timeframe that allows for a reasonable profit.
Regulatory agencies	- Adherence to relevant laws, rules, and guidelines. - Protecting public assets - Guarantee public health and safety, - Environmental consideration.

Source: Shoshan and Celik, (2018)

2.3 Stages of quality development

The idea of quality is believed to have originated in Babylonia about 2150 B.C. The laws of Hammurabi, the Babylonian king, were cited, stating that "when you construct a building and it collapses and kills people, you also be killed" (Abdelsalam and Elfaituri, 2012). They added, "In the past, there have been four improvement stages in quality development, which are Inspection, Quality Control (QC), Quality Assurance (QA), and Total Quality Management (TQM)." As seen in Figure 2.1, Shoshan and Celik (2018) divided the four stages into two categories: proactive (focusing on preventing problems from the start) and reactive (focusing on detecting and fixing problems).

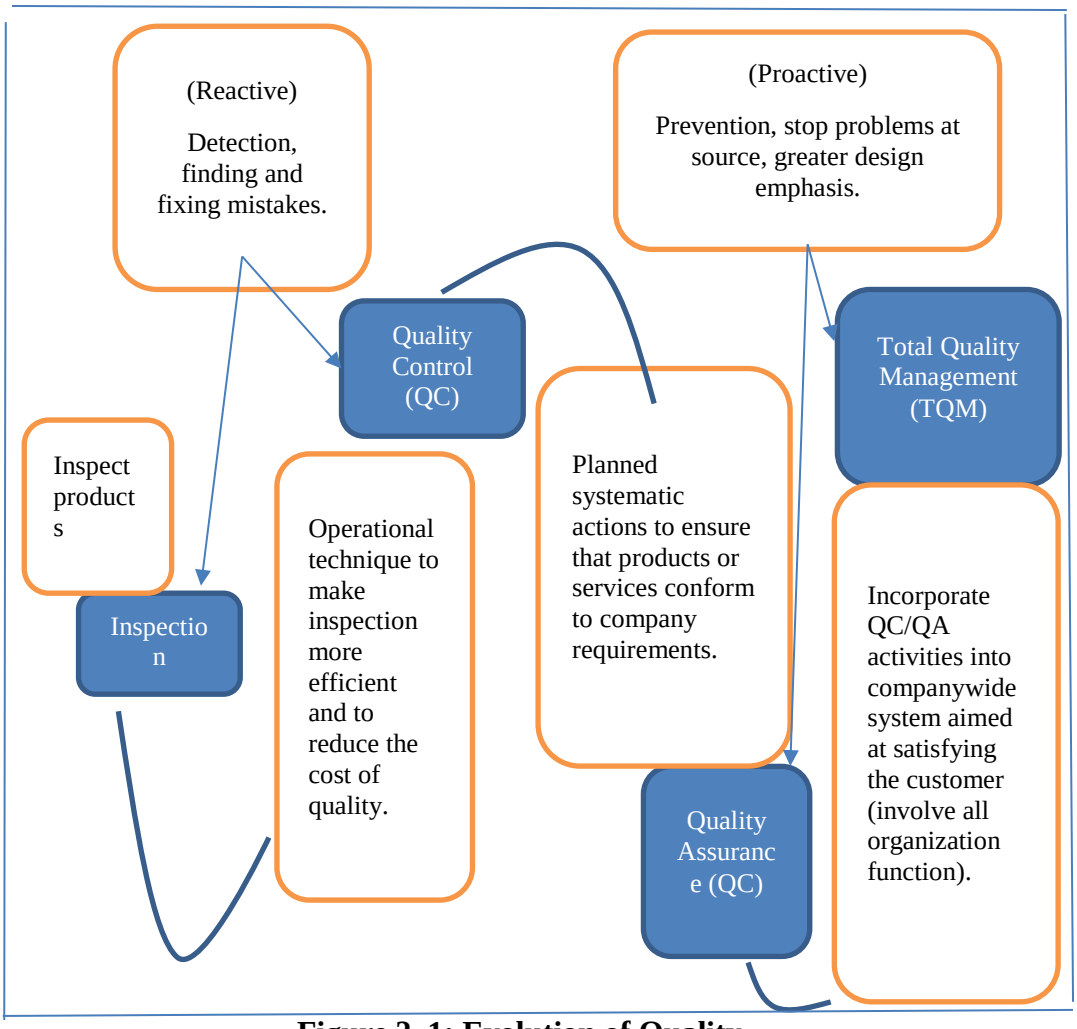

Figure 2. 1: Evolution of Quality

Source: Shoshan and Celik, (2018)

2.3.1 Inspection

Inspection involves measuring, assessing, testing, or determining one or more characteristics of an entity and comparing the outcomes to the prescribed standards in order to determine whether conformance is attained for each feature (Abdelsalam and Elfaituri, 2012). Dahlgaard et al. (2007) state that the First World War's productive efforts contributed to the advancement of quality inspection. However, at the start of the Second World War, manufacturing systems became more complex as a result of more workers reporting to fewer supervisors, suggesting the possibility of control over the work being easily lost. Companies hired full-time quality inspectors to solve this issue because they believed that inspection was the most likely means of guaranteeing high quality. Several product attributes were measured, tested, inspected, and compared with the original requirements under a streamlined inspection-based system to assess conformance (Abdelsalam and Elfaituri, 2012).

2.3.2 Quality Control (QC)

According to Bani (2012), General Douglas MacArthur was assigned by the United States of America to spearhead Japan's reconstruction efforts in 1946. Because of their contributions to the modern quality concept, General Douglas MacArthur invited Joseph Juran and Edward Deming to help with the rebuilding during this period. Demings and Juran's advocacy of the QC process and focus on top management instead of quality experts encouraged the Japanese to establish a continuous improvement culture and integrate quality control throughout their organizations. Quality control, according to ISO (2009), is the operational methods and procedures used to satisfy quality standards. According to this definition, any activity that involves the design of a product, operational

procedures, and outputs whether they be related to controlling, managing, or improving quality is deemed a quality control activity. It is more important to focus on defect prevention and operational process monitoring that ensures that the required standards of the final goosd and services are met, rather than just inspecting them (Bani, 2012).

2.3.3 Quality Assurance (QA)

Level three of the TQM evolution process is occupied by quality assurance. According to Abdelsalam and Elfaituri, (2012), quality assurance is distinct from quality control in that it occurs both prior to and during the event process. Quality assurance, according to Abdelsalam and Elfaituri, (2012), is a preventive system that increases productivity and improves the quality of goods and services by emphasizing product, service, and process design. Even when the flaws are discovered early in the process, the issue of goods or services not meeting requirements is avoided when sufficient attention has been paid to source activities and quality is integrated throughout the planning and design phases. At this point, the production system was more complicated. Zero defects, quantifying quality costs, total quality control, advanced quality planning, and improving product design, process, and service quality were the main factors deemed important in quality control. The result revealed that employee involvement and motivation programs were put into place, and quality assurance enhanced productive process control (Abdelsalam and Elfaituri, 2012).

2.3.4 Total Quality Management (TQM)

As stated by Abu (1994), In organizations and management, TQM has to be viewed as an outgrowth of the rational and human relation models. In addition,

TQM is an evolution of the human relation models since it builds and improve commitment and empowerment of employees.

Total Quality Management (TQM) according to Dale (1994a), is the pinnacle of quality management and includes the management of quality principles across all aspects of a business, including suppliers and customers. TQM is an approach that incorporates quality management principles into all facets of the business, including suppliers and customers, and integrates them with critical business processes. It also calls for continuous improvement from everyone within the organization (Oluwatoyin et al., 2008)

Dale (1994) cites BS.4778; part 2 (1991), where TQM is defined as a philosophy that includes all activities wherein the organization's objectives and the needs and expectations of its customers are satisfied in the most economical and efficient manner possible by optimizing each employee's potential in a continuous drive for improvement. According to Oluwatoyin et al., (2008), TQM is regarded as an efficient system that unifies efforts for developing quality, maintaining, and improving various system aspects to enable the most affordable level of services with total satisfaction.

Oluwatoyin et al. (2008) continues to state that TQM is a philosophy that emphasizes people and work processes, with a primary focus on improving organizational performance and customer satisfaction. They go on to say that it entails well-coordinated work processes that enable ongoing development in every business unit with the goal of fulfilling or exceeding customers' expectations. Its primary focus is on overall quality in all organizational domains,

with the goal of minimizing waste and rework to cut costs and increase production efficiency.

2.4 The contribution of experts in the field of quality

Understanding the contributions made by quality experts, whose theories, procedures, and instruments are still applicable today, is essential to comprehending the origins of TQM (Aletaiby, 2018). Even though not all quality experts used the term Total Quality Management, their contributions have had a major global influence and are considered the foundation for comprehending the development of TQM techniques. The TQM philosophies, practices, and principles that the majority of quality pioneers advocated are presented in the subsections below.

2.4.1 Williams Edward Deming

Most authors agree that William Edwards Deming is the originator of the modern drive for quality in business. Deming, taught the Japanese the concepts and practices of in 1946 (Beckford, 2010). Deming literally saw Total Quality Management (TQM) as a management strategy designed to encourage ongoing enhancements in the quality of goods and services by inspiring every worker to engage in the transformation process and realize that satisfying customer expectations is crucial to the company's long-term success.

Plan, Do, Check, and Act (PDCA) is a cyclical problem-solving technique popularized by Deming; however, some authors credit Walter Shewhart as its creator. In any event, senior managers must get deeply involved in the internal operations of the company in order to implement the quality improvement cycle of PDCA. Workers were urged to bring up any issues without fear of

repercussions, and statistical methods would be used to track quality control (Aletaiby, 2018). Demings thought that every employee had a part to play in achieving quality, which was key in establishing a position that is competitive in the market. Quality should therefore be the organization's guiding principle at all stages of production or service delivery, including planning, design, and product or service delivery. The following list of Deming's 14 TQM principles summarizes his theory of quality (Beckford, 2010):

i. Ensure that the goal of improving the product and service is consistent.
ii. Accept the new way of thinking that's needed to tackle the problems of the modern economy. Management is responsible for exercising leadership in enacting the necessary changes.
iii. Instead of depending solely on mass inspection, incorporate quality into the good or service.
iv. Don’t choose contracts based only on price but focus on working with a select few suppliers.
v. Create a continuous improvement system to maximize efficiency and reduce expenses while delivering improved quality.
vi. Start your on-the-job training.
vii. The goal of leadership should be to assist others in becoming more productive.
viii. To the organization's advantage, eradicate a culture of fear and replace it with one of teamwork.
ix. Encourage all departments to unite to help dissolve departmental barriers and rivalries.

x. Get rid of exhortations, slogans, and numerical goals; these will only serve to further polarize the workforce.

xi. Get rid of exhortations, slogans, and numerical goals; these will only serve to further polarize the workforce.

xii. Managers should set an example for employees rather than assigning quotas or numerical goals.

xiii. Ensure that people pride in their work.

xiv. Launch initiatives that promote education and self-improvement.

xv. Assign everyone in the company the responsibility of implementing the necessary changes.

2.4.2 Joseph Juran

while working with Western Electric in the 1920s and then with Deming in the 1940s, Juran developed a quality philosophy. Despite this, he created his own method that differs in some ways from Deming's but is similar in others (Zairi, 2013). According to Aloe & Gorantiwar, (2013), Juran defined quality as suitability for a given purpose or use. He made a significant contribution to quality management with a trilogy he published in 1986, outlining three steps that must be followed in order to improve quality.

i. Quality control: emphasizing the prevention of product or service defects and their correction to provide a product or service free of any defects.

ii. Quality improvement: a proactive strategy to make improvements before issues arise.

iii. Quality planning: where meeting customer expectations and needs is the driver of the planning process.

According to Aletaiby (2018), The 10 steps proposed by Juran to achieve quality improvement were:

i. Create awareness for the need for improvement.
ii. Improvement targets should be set.
iii. People should be coordinated to achieve the targets set.
iv. At all levels in the organization, training should be delivered.
v. Projects should be carried out for problems to be solved.
vi. Every progress should be reported.
vii. Recognize efforts.
viii. Communicate results.
ix. Evaluate overall progress and keep score.
x. Ensure annual reviews becomes a policy and procedural issue for sustainable quality improvement.

2.4.3 Armand V Feigenbaum

According to Shoshan and Çelik, (2018), Feigenbaum noticed that management is responsible for overseeing and directing all organizational operations, including its social and technological facets. Feigenbaum also emphasizes that managers must handle all of the aforementioned organizational responsibilities while putting a priority on supplier relations and customer satisfaction. Feigenbaum goes on to suggest that quality is more than just inspecting goods as they come off the production line; but rather, high standards should permeate the entire company, embracing high quality machinery and materials, highly

qualified workers, and offering the best services to customers at competitive costs. He determined that quality control has four essential phases (Aole & Gorantiwar, 2013):

i. Set benchmarks that defines quality.
ii. Monitor the extent of achievement of these benchmarks.
iii. To achieve set standards, take corrective actions when necessary.
iv. Devise how these standards can be improved continually.

Feigenbaum's quality method entails teamwork, involving all workers at every level, and implementing plans for ongoing performance and service delivery improvement. Feigenbaum argued that quality and cost should be viewed as allies rather than enemies, even though delivering high quality did have a financial cost (Zairi, 2013).

The 10 critical standards required for total quality competitive success as identified by Feigenbaum (1961) are:

i. Quality and cost comprehend each other.
ii. The customer is the one who defines quality.
iii. Quality is a process embraced company-wide.
iv. There is a mutual dependency between Quality and innovation.
v. Quality is a management process.
vi. For Quality to be achieved, effort has to be from both individual and teamwork.
vii. Quality in an organization is for every one and takes care of suppliers and customers.
viii. Improving continuously is what quality entails.

ix. Quality is a cost effective means of excelling and is therefore less capital intensive.

x. Quality is an ethic.

2.4.4 Philip Crosby

Crosby described quality as measurable conformance to predetermined standards. Despite the fact that this implied higher standards, he thought that offering better quality would increase profitability, which would then translate into lower costs (Aletaiby, 2018). He maintained that the goal of a "zero-defect program" was to completely eradicate defects by achieving high, quantifiable standards. These were the five prerequisites that he listed in order to reach the quality standard of zero defects.

i. To do it right first time will save cost in the future.

ii. The cost of delivering quality is assessed through performance.

iii. Quality is meeting measurable specifications and not just excellence or elegance.

iv. No problems exist in Quality.

v. Zero defects is the only standard of performance in Quality.

As a result, Crosby went beyond the statistical and analytical methods used by Deming and Juran, his predecessors. He put forth the following fourteen quality management facets:

i. Commitment to quality by top Management.

ii. Approaching quality improvement through teamwork.

iii. Quality is measured to identify areas to improve.

iv. The cost of Quality is measured using systems.

v. Corrective actions initiated.

vi. Quality awareness should be promoted in the whole company.

vii. Setting a plan for zero-defect.

viii. Employee supervisory training organized at all levels.

ix. Organization's standards for improvement are set both individually and in a group.

x. To achieve zero defects' outcomes, performance methods should be devised.

xi. To reinforce quality benchmarks, there has to be a day of observance of zero defects.

xii. Recognize individuals on achieving their quality goals.

xiii. Set up a platform for sharing best practices and experiences by employees.

xiv. 'Have it done repeatedly' to ensure improvement.

2.4.5 Kaoru Ishikawa

Ishikawa made a significant contribution to the Japanese industry in the 1960s by introducing the concept of quality. Aole & Gorantiwar, (2013), state that Ishikawa expanded the definition of quality to encompass excellence of after-sale service. Ishikawa believed that employee participation was necessary for Total Quality Management (TQM) to be achieved. He had a sound belief in the significance of quality circles and recognized that education was crucial to achieving quality. Consequently, he included worldwide education in the quality control tools:

i) Pareto chart.

ii) Scatter diagram.

iii) Control chart

iv) Cause - effect diagram (Ishikawa diagram)

v) Check sheet.

vi) Histogram.

vii) Process flow chart.

Ishikawa claimed that managers and their employees could skillfully handle any problem they came across in meeting high standards of quality with these seven tools (Zairi, 2013). According to Evans and Lindsay, (2007) , the fundamental principal for the approach of Ishikawa to quality have been summarized as;

i) For every stage of achieving quality, education is important.

ii) The initial step to quality achievement is to understand customer requirements.

iii) Rather than treating the symptoms, focus on root cause elimination.

iv) Quality control is everyone's responsibility in the organizations.

v) The means to achieving objective don't matter a lot rather the objectives themselves.

vi) The outcome of quality is sustainable profitability.

vii) The market is the final arbiter of quality.

viii) Up to 95% of problems can be solved with the right tools.

2.4.6 Genichi Taguchi

According to Aole & Gorantiwar, (2013)Taguchi's perspective of quality was the loss the company incurs from the point of dispatching the product, like, loss associated with failure of the products and services to meet the expectation of the

customer. This indicated that Taguchi paid more attention on product or service design other than inspection. He also viewed eight stages involved in improving and designing the quality of a product: problem definition, stating the achievable objectives, having a session of brainstorming, design of experiment, performing the experiment, result analysis, result interpretation, and performing confirmatory experiment (Aletaiby, 2018) . The outstanding principles of quality by Taguchi are:

i) The final quality and cost of any product that is manufactured are majorly determined using engineering design and the process of manufacture of the product.
ii) Customer loss coming as a result of the product's performance varying in direct proportion to the square of the performance characteristics' deviation from the desired value.
iii) Putting effort in reducing variations in performance of any product is necessary for the achievement of improved quality.
iv) Minimizing variations in product or process performance is achieved through utilizing non-linear effects product or process parameters on performance characteristics.
v) To minimize performance variances, statistical methods experiments can be used to identify the product or process factors causing the variation.

2.5 Principles/key factors of TQM implementation

Organizations may better grasp TQM's dynamic and proactive character by identifying its essential key factors. Central to TQM are processes that prioritizes the size, management styles, and culture of the company. The idea and guiding

principles of Total Quality Management (TQM) were examined in the literature by quality writers such as Feigenbaum (1991), Deming (1986), and Crosby (1979), who created a number of approaches in managing quality. Having a comprehensive view of their insights concerning management of quality allows identifying key factors which has prompted practitioners and professionals in the field of quality to build their perception of TQM.

The 14 steps identified by Crosby (1979) for quality improvement included the top management commitment, measuring indicators of quality, evaluating cost of quality, ensuring corrective action, training, zero defect philosophy, setting out objectives that are clear, and having a structure that recognizes staff. Feigenbaum (1991) observed leadership to be the key factor to attain quality and this is achieved by ensuring that quality is embedded in all organization's activities by the participation of all employees. By this approach being adopted, Feigenbaum believed that organizations would operate efficiently and minimize costs because of quality process implementation.

A survey was conducted by Black and Porter (1996) to identify key TQM factors. The main critical factors that were identified in the data analysis and were essential for implementing TQM were "Customer satisfaction orientation, external interface management, strategic quality management, operational quality planning, quality improvement measurement systems, partnerships between management and suppliers, information sharing about improvements, and people and consumers, and corporate quality culture". Based on the aforementioned study, every organization must take certain factors into account to successfully

implement the process of TQM. Here is a discussion of the main TQM factors/principles.

2.5.1. Customer Focus

According to Richards, (2012), the customer is the primary focus of Total Quality Management. Aletaiby, (2018) has emphasized that since quality is what the final consumer expects, the customer defines quality, not the organisation or the manufacturer of the good or service. For this reason, the customer is at the center of a quality improvement program. Businesses can determine whether customers are satisfied by gathering information from them through focus groups, service assessment forms, and listening to their complaints and responses (Evans and Lindsay, 2007). According to Ganihar and Bhat (2006), a successful organization is one that recognizes that the expectations of its customers are dynamic and flexible, rather than fixed.

2.5.2 Total Employee Commitment

To ensure an increase in productivity and processes, all employees must have total commitment, they should understand vision and goals communicated, they must be thoroughly trained and availed with proper resources to complete tasks so as reach goals on time. Earlier on, it was said that "T" of TQM refers to involving everyone in the TQM actions. According to Shoshan and Çelik, (2018), everyone's participation is achieved through involving and empowering all the organization's employees. Involving is all about taking employees to be important and involve them in the process of making decision while empowerment refers to giving employees tools and authority for decision making and displaying their leadership skills within their own spheres.

2.5.3 Continuous Improvement

Achieving perfect customer satisfaction and maximum efficiency takes time; processes should be continuously improved, and products and services should be adjusted to meet changing customer needs. As previously mentioned, the TQM principles ought to support maintaining a focus on continuous improvement. Planning, organizing, and implementing a methodical process to maintain, expand, and alter current practices across the entire organization to improve performance is what it means to continuously improve (Boer, 2003). Achieving continuous improvement of performance and superiority in business is the primary objective of putting TQM into practice (Chin and Pun, 2002). According to Bhuiyan and Baghel, (2005), achieving continuous improvement can be realised at three distinct organizational levels: management, individual, and group levels. The organization's strategies determine how continuous improvement plays out at the management level. The representation of continuous improvement in the Deming cycle are in four phases of Plan, Do, Check, and Act.

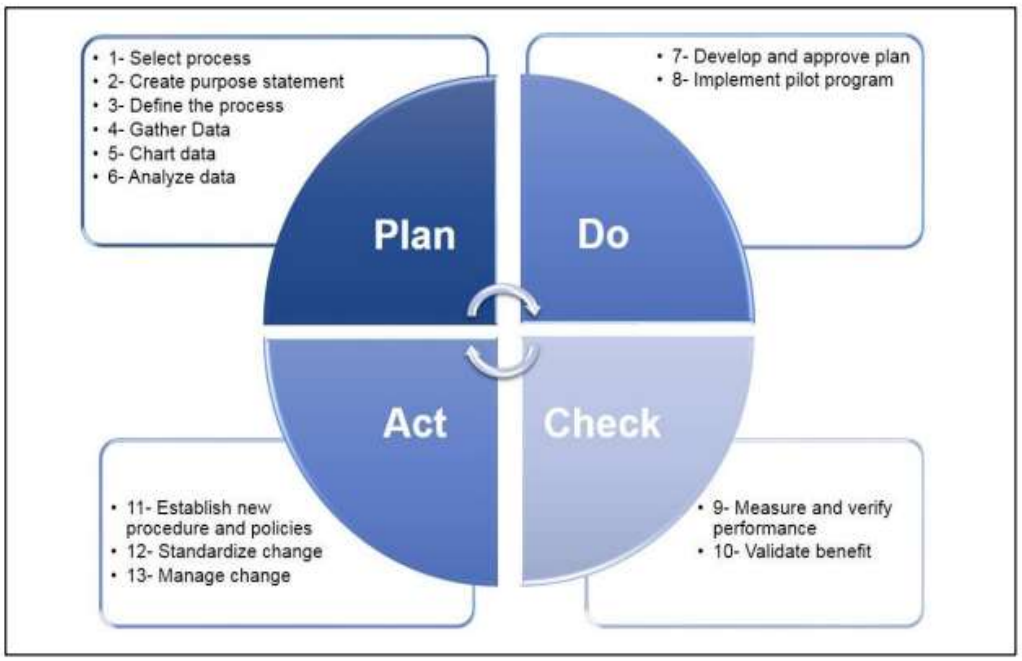

Figure 2. 2: The PDCA cycle

Source: Aletaiby, (2018)

Determining the objectives and procedures required to produce results in accordance with policies and client requests and needs is what it means to "plan." The "do" carries out these procedures. Then, these processes and products are measured and monitored in accordance with policies, objectives, and requirements; subsequently, the "check" generates reports on the outcomes. The "act" guarantees the continuous advancement of system performances and processes (Lewis et al., 2006).

2.6 Other factors that affect TQM implementation

2.6.1 Organization Structures and processes

For effective quality control, there is need for process compliance. If output is to be boosted and consistency maintained, it is through processes that you can ensure that the appropriate actions are carried out at the appropriate times. Process management, according to Tsim et al. (2002), is implementing a system

of processes inside an organization and identifying, linking, and managing these processes. It is important to view the system, with no discrete elements. Process management emphasizes developing productivity per employee, raising quality standards, and improving processes (Dahlgaard et al., 2007). Jorgensen and Nielsen, (2013) assert that because the TQM philosophy is based on processes, it is essential to have processes that are created to satisfy the quality standards of the organization. In this instance, educating staff members about their roles within the company and its procedures is crucial. Process management encompasses various behavioral and methodological approaches that prioritize actions and activities over outcomes.

2.6.2 Policies around the work environment

According to Zairi, (2013), successfully developing and formulating policies, strategic planning, and goal setting are essential components for successful implementation of TQM. Consequently, the best criterion for a company is achieved through the implementation of its vision and mission, which is accomplished when a stakeholder-focused strategy is created that considers the operational market and industry.

The customer's confidence in a TQM organization's policy and strategy is its top priority because it integrates satisfying the needs and expectations of the customer. The first step towards gaining the confidence of customers is their feedback. Customer satisfaction surveys, questionnaires, meetings, complaints, and feedback mechanisms can all be used to get this input. Employee opinions and expectations are also given top priority in policy and strategy, and these can be obtained through focus groups and in-person conversations (Madan, 2006).

2.7 Benefits of TQM implementation

The construction sector is encouraged to adapt and apply TQM concept whose benefits are seen from its successful application in the manufacturing sector. The following benefits are because of application of TQM in the construction industry: increased productivity and quality of services, increment in customer satisfaction, reduction in costs, growth in market share, profitability, and competitiveness, cultural change and increased supplier quality (Shoshan and Çelik, 2018). Advantages of TQM implementation within the construction sector is summarized in Figure 2.3.

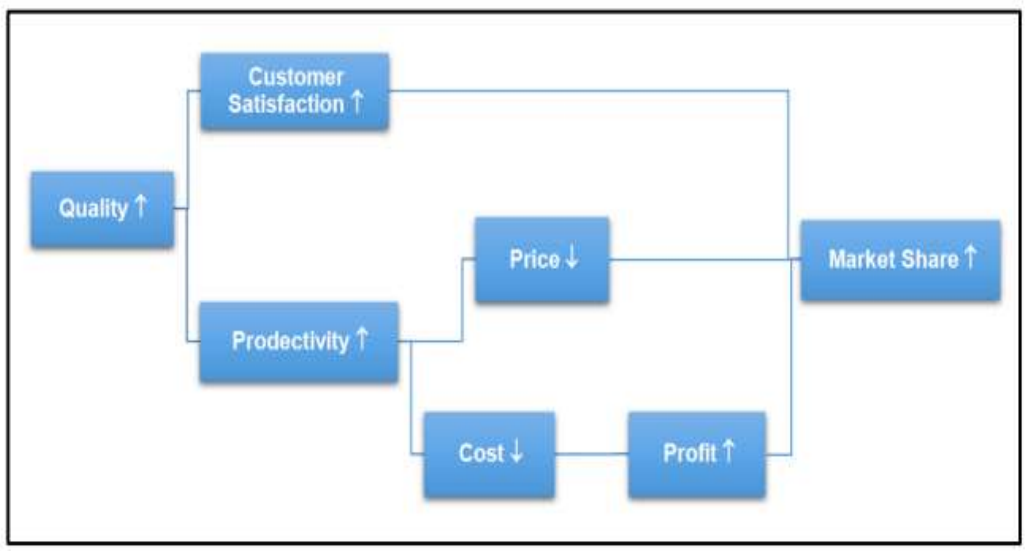

Figure 2. 3: The advantages of applying TQM

Source: Soin, (1992)

Shoshan and Celick (2018) state that it can be difficult to immediately see the benefits of TQM in the construction sector, and they may even be perceived as unnecessary expenses. The building sector needs to exercise patience and wait for these advantages to materialize.

2.8 TQM implementing barriers

Jacobsen, (2008), states that managers can create successful tactics that may increase the likelihood of better TQM implementation and ultimately excelling in business by identifying and understanding barriers that are hindrances to TQM application. According to Shoshan and Çelik, (2018), the challenges to TQM implementation in construction are alteration in conduct and mindset, lack of resources and experience in TQM, no employee commitment and understanding, insufficient education and training are impeding the process of improvement, when budget and schedule are given top priority, and putting special emphasis on short-term goals.

Kazemi and Mohajer, (2010) investigated the most important barriers which are hinderance to TQM application in the construction industry. He as well-made emphasis that the above barriers need identification, removal, or neutralization for the purpose of achieving a successful TQM application.

Lawrence et al, (2021) investigated the quality management practices of building construction firms in Uganda and found out that the top most challenge affecting quality management of construction buildings was poor designs in construction projects in Uganda.

Shoshan et al. (2018) evaluated TQM implementation in the construction sector of developing nations, and several findings were revealed: a deficiency in commitment from top management; the belief that implementation is expensive and requires significant time; inadequate education and training; poor communication between upper management and employees; and difficulties in transforming organizational culture.

Dale et al, (2013) conducted a study to identify the challenges to TQM implementation and the outcome of the study revealed; Ineffective leadership, resistance to change, inconsistent policies, unsuitable organizational structure, insufficient documentation, inadequate staff training, and poor communication.

2.9 The perception of TQM

One of the most enduring management innovations of the last decade is TQM. TQM does not have a single definition but rather is a theory that emphasizes understanding variation, the value of measurement, the role of internal and external customers and suppliers, and employee involvement at all levels of an organization in the pursuit of continuous improvement (Alwis and Abeykoon, 2016).

Alwis and Abeykoon (2016), examined the "Hard" and "Soft" components of TQM. Systematic planning, measurement, analysis, and fact-based decision-making are examples of "hard" practices. Al-Khalili and Subari, (2013) list the "soft" practices also referred to as the humanistic factors as visioning and establishing organizational values, recognizing individual and group behavior, empowering employees, teamwork, and consensual decision-making.

Wickramaratne (2013) states that the “Hard” component entails a variety of production techniques such as statistical process control, layout modifications, organizational design processes and procedures, and data interpretation using these seven fundamental TQM tools (Process Flow Charting, Tally Charts, Pareto Analysis, Scatter Diagrams, Histograms, Control Charts, and Cause and Effect Analysis). Adopting both "hard" and "soft" TQM components can help set the

stage for enhancing an organization's operations and, in turn, its quality (Fotopoulos and Psomas, 2009).

Aletaiby (2018) asserts that although imparting comprehensive skill and understanding of TQM to managers and practitioners is extremely difficult, it is crucial for numerous organizations worldwide. Raising awareness is an important topic that, when addressed, can inspire and instill in all organization personnel a sense of accountability for achieving excellence in all facets. Improved process outcomes and an overall organization-wide process of continuous improvement are the outcomes of TQM awareness. Zairi, (2013) states that organizations should, as a first step, raise quality awareness at various levels and make sure that basic strategies are developed for implementing suitable programs. They ought to initiate a quality approach to attain certain levels of maturity. It's also possible that a not being aware and having little knowledge to Total Quality Management concept will result in varying perspectives and understandings of what TQM should achieve, such as whether TQM should be measured by an increase in profit or an improvement in human resource performance. In essence, increasing TQM awareness will help the organization's personnel reap several benefits, such as ensuring that they are well versed with the quality policy and management procedures. Because there are so many definitions of TQM and it can be challenging for practitioners to identify how to apply TQM to their activities, they often struggle to understand what TQM means (Aletaiby, 2018).

Since there have been numerous books and research articles written about TQM, each definition is based on the background, viewpoints, interests, and level of knowledge and awareness of scholars, researchers, or authors. Therefore, with

reference to extensive literature reviewed, TQM has got many different definitions. According to several writers, TQM is primarily a management technique used to achieve continuous improvement. According to some authors, Total Quality Management (TQM) is an integrated approach that has the potential to produce successful, long-lasting results for the organization. Some authors also view TQM as an organizational culture for the company. Furthermore, TQM has been defined by some as a tactic for the advancement of organizational activities, while others view it as a systems approach in reference to the systematic nature of other organizations.

Furthermore, many other writers regard it as a management ideology that aims to incorporate the organization's stakeholders to achieve its predetermined objectives (Aletaiby, 2018). The following views of TQM, which were covered in-depth under the section on key components of TQM, provide credence to the variances in TQM definitions and perspectives:

i) With a customer-centric approach, Total Quality Management seeks to establish a continuous improvement culture within an organization to consistently and dependably meet and exceed customer needs and expectations.
ii) TQM stands for total work commitment. This is a culture that management created where all workers, regardless of positions or managerial levels, are made to understand that it was their collective responsibility to achieve the organization's goals.
iii) Total Quality Management is an integrated management philosophy and set of practices that prioritizes long-term thinking, employee participation,

competitive benchmarking, team-based problem-solving, process reorganization, continuous outcome measurement, and positive relationships with suppliers. The perspective of TQM is broad and can be taken differently according to the opinions of the practitioner or the researcher referring to the concept of TQM.

2.10 Establish the current practice of TQM

According to ISO (9001), TQM principles include: positive supplier connections; leadership; participation of people; process approach; system approach to management; customer focus and ongoing improvement; and a factual approach to decision making. In establishing the current practice of TQM implementation, there was need to understand the steps followed in implementing TQM and the tools and techniques used.

2.10.1 Procedures of TQM implementation.

Shoshan and Çelik (2018), listed seven stages for applying TQM in construction as shown in Table 2.3.

Table 2. 3: Stages of applying TQM in construction

Stages	Procedures Detailed
Stage 1	Get the top management's dedication
Stage 2	Educate staff, change their mindset, and awareness raising
Stage 3	Create approaches to TQM that are procedure-oriented.
Stage 4	Create plans for achieving quality for projects at every work level.
Stage 5	Institute continuous improvement
Stage 6	Use quality control circles and incentive programs to encourage staff involvement and contribution.
Stage 7	Quality plans are reviewed and performance measurement done

Source: Shoshan and Celik (2018)

Shoshan and Çelik (2018) state that the following processes can be used to attain quality in the construction industry:

(i) A clearly defined work scope.

(ii) The development of organizational leadership to meet the predetermined standards for quality.

(iii) Implementing continuous improvement at every stage through:

- Owner: Specify any updated needs.
- Designer: Make sure the specification includes the latest, highest-quality goods, machinery, and materials.
- Constructor: Build the facility with the latest machinery available.

(iv) Determining performance measures through:

- Owner: verifying that the contract documents meet requirements and that the work completed in accordance with these documents is compliant.
- Contractor: use the supplies, tools, and machinery that meet the requirements to build the project in accordance with the contract documents.

- Consultant: oversee the contractor's work in accordance with the terms of the contract and the established benchmarks.

(v) Every project team member taking part in the process of quality improvement.

(vi) Plans for education and training for laboureres, managers, engineers, supervisors, office workers, and technicians exist.

2.10.2 Exploring the TQM tools and techniques commonly used

Jafari and Setak (2010), noted that many tools and techniques have been proposed for the achievement of TQM. A technique is a series of actions carried out in a specific order to achieve the desired values, whereas tools occasionally have statistical foundations to aid in data analysis or decision-making. Numerous studies concur, according to Bunney and Dale (1997), regarding the significance of using and choosing quality management tools and techniques to support and advance the process of quality improvement. Jafari and Setak (2010), however, highlighted the challenges that organizations face when utilizing and applying quality management tools and techniques. They continue by saying that the introduction of quality management tools and procedures is somewhat influenced by the stage of the improvement process. TQM introduction can take place in three stages according to Juran and Gryna (1988). The three stages are: diagnosis and preparation, management focus and commitment, and intensive improvement. During the diagnostic and preparation phase, two fact-finding instruments that must be introduced are "cost of quality" and "Departmental Purpose Analysis (DPA)". During the management focus and commitment phase, data analysis methods (such as cause and effect analysis, flow charts, and Pareto analysis) must be utilized to identify problem areas, quantify their consequences,

and prioritize the need for remedies. During the intensive improvement phase, the use of more advanced technologies like statistical process control (SPC) and failure mode and effects analysis (FMEA) helps to facilitate company-wide improvement. (Jafari and Setak, 2010).

Numerous factors influence the choice of TQM tools, and it is important to take them into consideration before developing an implementation strategy. Jafari and Setak (2010) state that the following factors:

i) The company's ability to provide the resources needed to enable the tool's successful introduction.

ii) The goal of applying quality management techniques, such as achieving a high standard of quality or resolving a straightforward issue.

iii) The attributes of the product; and

iv) New product introduction or current product and process improvement

Techniques of TQM

Project managers use a range of tools and techniques to ensure thorough quality control. Here is a list of some of the most popular techniques.

i) Correct First Time: Workers guarantee quality in their work. They act appropriately the first time. Their goal is to have no defects.

ii) Benchmarking: The technique of applying best practices from previous projects to your own to achieve improved performance. They produce work of extraordinarily high quality.

iii) Outsourcing: This refers to contracting out operations and services to other businesses that can complete them more effectively and at a lower cost.

iv) ISO 9000: The International Organization for Standardization (ISO) developed this set of quality standards. Organizations receive ISO certification for product testing, employee training, record keeping, supplier relations, and repair policies and procedures.

v) Statistical Quality Control: This refers to a collection of statistical instruments that are employed for quality monitoring. It is based on sampling.

vi) Just-in-Time Inventory Management (JIT): This method involves receiving inventory just in time for production to use it up. They are not kept in storage.

vii) Speed: The amount of time required to complete a task is its speed. TQM quickens the pace. Speed is incorporated into the project processes as part of project culture

viii) Training: Staff members receive ongoing instruction in quality-related topics. Additionally, quality circles function as TQM training grounds.

Tools of TQM

Since TQM bases its core principles on continuous improvement, effective quality improvement requires the use of tools and techniques for data collection, interpretation, analysis, and process control. Utilizing TQM methods and tools aids businesses in meeting performance targets and generating insightful data. Additionally, this aids managers in making better-informed choices (Zairi, 2013).

The following is a list of the most frequently used tools categorized by purpose, as per Shoshan and Çelik, (2018).

i) Data Collection Instruments

Since the process of quality improvement necessitates fact-based decision making enhanced by accurate and reliable data, data collection is the most crucial

part of the quality improvement process. As mentioned below, quality management instruments like surveys, observation, check sheets, and more can be used to collect data.

a). Check Sheets

This is a list that is structured to show how frequently an item occurs. Here, information is gathered by adding tally or checkmarks to predefined item categories.

b). Survey

This is a tool for collecting data and can be in the form of questionnaires or interviews. A paper and pen tool given to a respondent is called a questionnaire. They are either open-ended, requiring participants to provide their own answers without predetermined options, or closed-ended, limiting their responses to available options. Conversely, an interview is a survey format that allows you to freely ask follow-up questions to delve deeper into the respondents' responses. Interviews can be divided into three categories namely structured, unstructured, and semi-structured.

ii) Tools for understanding data

Managers can comprehend quality data with the aid of various tools, including scatter diagrams, Pareto charts, stratification graphs, and histograms.

a). Histograms

These are bar graphs that display the distribution of the frequency of data, grouped in convenient class intervals and arranged based on the magnitude of the data. Compared to a table of numbers, a histogram summarizes data in a way that is easier to understand, making it a valuable tool.

b). Pareto Charts

A graphical tool for ranking an item or items within a set of data is the Pareto chart. It helps team members and project managers by providing a starting point when tackling issues that rank highest on the chart. Vilfredo Pareto, an Italian economist, is credited with creating the Pareto chart. Based on his research, he found that 20% of the population controls 80% of the wealth. This distribution, also known as the 80:20 rule, can be used in production processes. It states that 20% of potential sources of error account for 80% of defects. Juran in 1950 applied the Pareto principle after determining that quality losses were not evenly distributed. He referred to the 80% less significant causes as "the trivial many" and the 20% significant causes as "the vital few." However, he later modified the word "unimportant many" to "valuable many," highlighting the fact that most causes of problems are significant in quality and need the attention of management.

c). Scatter Diagrams

A graph that shows potential correlations between two variables is called a scatter diagram. It does not establish a cause-and-effect relationship; rather, it is meant to evaluate the correlation between variables (showing how one changes when another is altered). A visual method of determining the presence or absence of a correlation, as well as the strength and direction of the correlation, is by scatter diagrams.

iii) Tools used to understand processes

To understand processes in the management of quality comes next, after comprehending the data. A good way to comprehend the processes is by using flow charts, run charts, and control charts.

a). Flow Charts

This is a diagram that shows the stages in a process or the order in which things happen. It makes use of a variety of symbols joined by arrows to show the direction of the flow, including ovals for starting and ending points, diamonds for significant choices, rectangles for data input and output, and boxes for steps or events. Identifying and reducing non-value-adding activities is one way that flow charts can support process improvement.

b). Run charts

These are line graphs/trend chart that shows the evolution of an event measured within a duration. The Y-axis shows the measured item, while the X- axis shows the time. The graph also displays the average of the measurement. Run charts are an excellent tool for tracking performance over time in quality management.

c). Control Charts

Like the run chart, the control chart displays the changes in a process over time and includes control limits to the upper and lower side that are determined from historic information and are utilized to track stability of a process or if the process is experiencing unusual variation due to special causes.

d). 5W2H

This innovative tool asks seven questions and provides answers to help you understand a process. The two Hs are How many and How much, and the five Ws are Why, What, When, Where, and Who.

iv) Tools used in process analysis

Having a basic knowledge of data and processes is not enough to act. Without analysis, action is based on trial and error, precedent, and intuition. Fishbone diagrams and Why-Why diagrams are useful tools for process analysis.

a). Cause-effect diagrams

This is an effective tool in identifying, exploring, and graphically representing every possible cause of a problem. Kaoru Ishikawa first introduced it in 1943, and hence it is also known as the "Ishikawa diagram. Sometimes because of its shape, which resembles the skeleton of a fish, it is also referred to as a "Fishbone diagram."

b). Why-Why Diagrams

A "why-why diagram," is a tool for determining possible causes to problems by first probing "why the problem occurs," then getting answers, and asking "why" once more. Asking is continued five times.

v) Tools for Solving Problems

Although they are crucial components of quality improvement, gathering, comprehending, and evaluating data and processes by themselves cannot ensure quality. These actions are the first steps towards acting. Managers can take appropriate action to solve problems with the aid of various tools, including Nominal Group Technique (NGT), affinity diagrams, and brainstorming.

a). The Nominal Group Technique (NGT)

This tool is an organized process for group decision-making that ranks or prioritizes ideas submitted by group members to bring disparate ideas together

for a consensus. "Nominal group" refers to a group that exists only in name. In other words, members of a nominal group behave independently of one another.

b). Affinity Diagrams

During a brainstorming session, a lot of ideas can be generated and sorted into smaller groups based on their inherent relationships using an affinity diagram. It assists in bringing these concepts to feasibility for analysis, thereby helping to find a solution to the problems. This diagram is sometimes referred to as the "KJ method" because it was created and introduced by the Japanese anthropologist Kawakita Jiro.

c). The Nominal Group Technique (NGT)

This tool is an organized process for group decision-making that ranks or prioritizes ideas submitted by group members to bring disparate ideas together for a consensus. "Nominal group" refers to a group that exists only in name. In other words, members of a nominal group behave independently of one another.

c). Brainstorming

The goal of brainstorming is to get a lot of ideas from the group members in a setting where there is no room for criticism or evaluation of the suggestions made. It fosters creative thinking and improves teamwork and group participation. This can be done in a formal or unformal way. In an unstructured brainstorming session, participants can call out ideas as they come to them, whereas in a structured brainstorming session, participants can submit ideas in turn until the session is over.

2.11 Analytical description of the Ugandan road sector

In Uganda, roads are of great importance to both the local communities and the country at large. 95% of Uganda's freight and 99% of its passenger traffic travel on its roads, accounting for 3% of the country's GDP. The most important attributes of these roads are their ability to facilitate access to employment opportunities, healthcare, education, and markets for local communities. Additionally, they foster regional integration, promote economic growth, and reduce poverty (Benedict and Eijbergentony, 2020).

One of the three subsectors that make up the works and transport sector is "roads." The works and transportation sector is mandated to:

i) Construct, design, and manage a road, rail, water, and air transportation network that is affordable, effective, and efficient.

ii) Oversee public projects, such as Government structures; and

iii) Promoting the building sector to adopt standards.

To promote Uganda's social and economic growth, the subsector aims to provide enough, secure, and well-maintained transportation infrastructure services. This aids the industry in realizing its objective of having an improved transportation network. Ministry of Works and Transport (MoWT), Uganda National Roads Authority (UNRA), Uganda Road Fund (URF), and Local Governments (LGs) are the four entities in the Road Sub-Sector. The Ministry of Works and Transport (MoWT), Uganda National Roads Authority (UNRA), Uganda Road Fund (URF), Kampala Capital City Authority (KCCA), District Local Governments (DLGs), lower local governments (sub-counties), and urban councils are the primary implementing entities in the road subsector. Office of the Prime Minister

(OPM) and the Ministry of Local Government (MoLG) are two other organizations outside the works and transportation sectors that have projects with sub-components related to roads (Ministry of Finance, 2021).

2.12 Tool for uptake of TQM within the road construction projects

Shoshan and Çelik (2018), state that a more comprehensive methodology is required for the implementation phases, and that a systematic approach is required during the selection process of tool and technique. In order to respond to this, an extended model built on the define, measure, analyze, improve, and control (DMAIC) methodology of six sigma is presented here. To illustrate its developmental sequences toward the implementation of TQM tools and techniques, this model is referred to as the TQM implementation roadmap. The suggested roadmap is displayed in Figure 2.4.

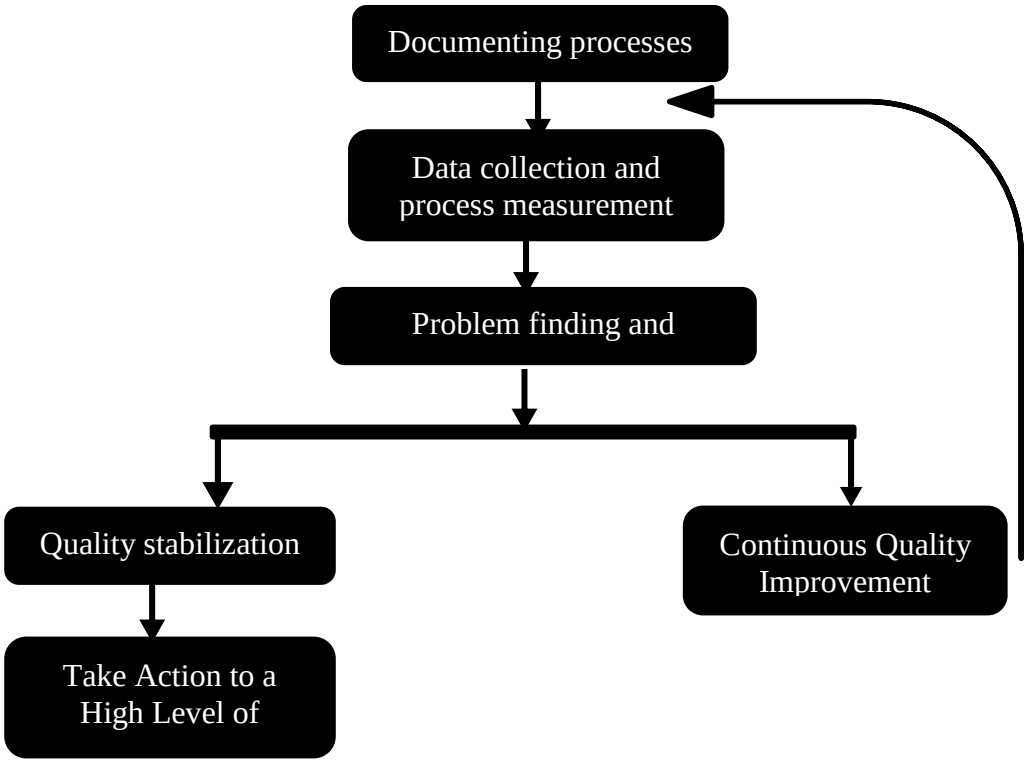

Figure 2. 4: TQM Implementation roadmap

Source: Shoshan and Celik, (2018)

Thus, it was preferable for the researcher to create a tool that facilitates better adoption of TQM which addresses concepts that aid in identifying key areas during TQM implementation. The tool for improving uptake of implementing TQM was created based on two things; firstly, the concepts and key issues identified during review of literature and secondly, the familiarity of the understanding of the concept by the researcher. This guide developed is for two reasons. First, the tool serves as a guide for comprehending Total Quality Management (TQM) and it will be improved during the study based on the information gathered from junior, middle, and senior managers within the organization. Secondly, the final tool will be taken as a starting point to enhance uptake of TQM implementation in the construction industry. The main areas contained in this tool was got from reviewed literature, the factors perceived to be required in facilitating the implementation of TQM (objective 1), the current practice of TQM implementation (objective 2). As seen in Figure 2.5, these issues were expanded in the final tool, even though the initial tool did not specify any means of carrying out the implementation steps.

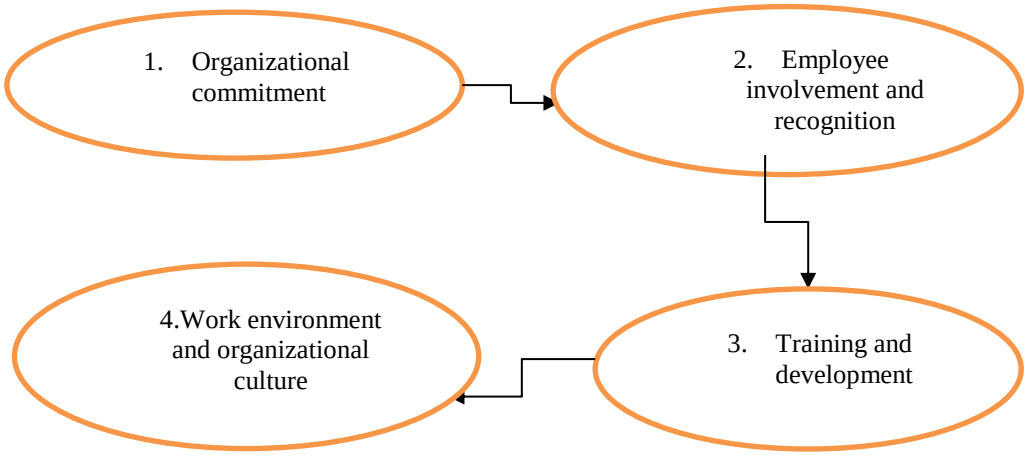

Figure 2. 5: Tool for promoting improved uptake of TQM Implementation

Source: Adopted from Abdussalam Shibani, 2012 and modified by the researcher

2.12.1 Organizational commitment

Lately, organizational commitment has drawn a lot of attention and several studies have defined and operationalized the concept, as well as studying its antecedents and outcomes. Workplace commitment is a major concern in the field of human resource management, primarily due to numerous studies that have found significant correlations between workplace attitudes and organizational commitment. Employees' sense of connection to the organization's objectives and core values, as well as their role within it, are all factors that contribute to their organizational commitment. This connection should be made with the intention of benefiting the organization, not just for its instrumental value (Mendesvera. L et al., 2014).

2.12.2 Employee involvement and recognition

A customer-focused firm can implement TQM as a management approach that incorporates all staff members in continuous improvement. TQM's pillars are empowerment, engagement, and involvement of the workforce. The practice of giving employees the authority to solve problems and make decisions that are acceptable for their position within the company is known as employee participation. A approach and set of management concepts known as "total employee involvement" pushes team members, individual contributors, and workers to get significantly more involved in activities such as planning, making decision, and solving problems. Organizational communication plays a vital role in boosting employee morale (Chiu, 1999).

2.12.3 Training and development

Organizations benefit from the training and development of their employees. For a successful implementation of TQM, employee need to be trained on job related skills that can enhance their ability to deliver as expected by the organization. Training can be done on job or special training sessions on quality management and improvement areas.

2.12.4 Work environment and organizational culture

Organizations should set up work environments where the quality management plans are aligned with the vision and goals of the organization. Following processes is critical and there is need to ensure that proper steps are always followed to ensure consistency. TQM implementation is optimized through goal-setting, strategic planning, and policy design. The client ultimately determines the level of quality, and organizations should always implement a culture of quality improvement. Determining the expectation of the customer through listening to their complaints will help organizations to measure the needs of the customer for the business to thrive.

2.13 Chapter Two Summary

This chapter examined what quality is, the development of TQM. Additionally, it has also examined and assessed several TQM ideologies that have been created by different authors. From the construction industry point of view, TQM is basically looked at as an approach that involves continuous improvement and application of quality management principles by everyone in an organization for better service delivery. This resonates with the definition given by both Williams Edward Demings and Kaoru Ishikawa of what TQM is.

Based on the available literature, factors of TQM implementation that were identified by the researcher were continuous improvement, customer focus, and total staff commitment. Included in this chapter also was a clear picture of the benefits of and the barriers to TQM, and an overview of the construction industry in Uganda. Finally, attention was paid to perception, current practice, and tools and techniques used in TQM implementation.

Table 2. 4: Summary of an overview of the challenges to the successful implementation of TQM in construction industry.

Author	Aim of the study	Findings of the study
Muhwezi et al, (2021)	Assessment of Quality Management Practices of Building Construction Firms in Uganda: A Case of Kamwenge District	Poor designs in construction projects
Shoshan et al, (2018)	Application of TQM in che construction Industry of developing countries - Case of Turkey	Lack of top-management commitment; perception that application is costly and time-consuming; lack of or insufficient education and training; lack of communication between top managers and workers; challenges in changing organizational culture.
Dale, et al (2007).	To identify the challenges to TQM implementation	Ineffective leadership, resistance to change, inconsistent policies, unsuitable organizational structure, insufficient documentation, inadequate staff training, and poor communication

CHAPTER THREE: METHODOLOGY

3.1 Introduction

The research approach used in this study is presented in this chapter. According to Oluwatoyin et al., (2008), methodology refers to all methods, investigative techniques, or the group of techniques used in a specific research study. This chapter covers and explains the various methodological concepts that guided the research methodology and method utilized in the study as elements of the research design.

The framework that described the methodology of this study included the population and sample, research design and technique, data source, data collection tools, pilot study, validity and reliability of the instrument, data analysis, triangulation, and accomplishment of particular goals.

3.2 Research design and approach

3.2.1 Research design

A research design is the overall strategy that a researcher will select in order to logically and coherently combine the various study components, ensuring that the research problem will be effectively addressed. It serves as the guide for collection, measuring, and analyzing data. Some of the research designs commonly used are; 1) Descriptive research design - the primary purpose of the descriptive research design is to describe a condition or phenomena. The goal of descriptive research is to present a precise and in-depth account of a certain group, occasion, or circumstance. It is helpful in locating correlations, patterns, and trends in the data, 2) Correlational research design - is employed to ascertain whether two or more variables are related. Finding the direction and intensity of

the association between the variables is its main goal, 3) Experimental research design - investigating the cause-and-effect correlations between variables is the goal of experimental research design. It entails adjusting one variable and calculating how that adjustment affects another. Usually, the elements are randomly grouped and then the independent variable altered to ascertain its effectd on the dependent variable. The purpose of experimental studies is to prove causation. 4) Case Study Research Design- is employed to thoroughly examine one or a small number of situations. The purpose of case study research is to offer a comprehensive insight of a specific case or circumstance, and 5) Longitudinal Research Design- is employed to examine how a specific phenomenon evolves over time. It entails gathering information at various intervals and examining any changes that transpire. The purpose of longitudinal study is to shed light on how a certain phenomenon evolves, expands, or contracts over time.

In this study, a descriptive case study design was adopted. This particular design was selected since it offers a thorough analysis of the topic and it is also cost effective since there are many ongoing construction projects in the sector which could be time consuming if the researcher is to analyse all of them (Mugenda & Mugenda, 2003).

Yin (2014) noted that case studies are well-suited for addressing questions of "how" or "why" and that they are particularly effective for exploring contemporary phenomena that have not been extensively examined in prior research. Case studies can be an excellent way to demonstrate a project's success since they capture what happened and tell the story behind the outcome (Aleper, 2015).

3.2.2 Research approach

This is a strategy and process that entails the stages of assumptions to specific methods of gathering, analyzing, and interpreting data. According to Creswell (2014), there are three types of research approaches: mixed, qualitative, and quantitative. In order to increase the validity and strength of the study's conclusions, both qualitative and quantitative approaches were employed in this investigation. The goal of the qualitative approach was to help obtain more information pertaining to assessing the degree of TQM implementation in Uganda's construction sector, particularly client perspectives and opinions. However, the researcher was able to gather quantitative data using the quantitative approach, and the results were utilized to make inferences or generalizations based on measurements.

3.3 Population and Sample

3.3.1 Population

According to Aleper (2015), a population is the whole set of elements that the researcher is interested in studying, whereas an element is just one individual that is a part of the population. The target population of this study comprised of 41 professional employees who are top level managers, middle level managers, and supervisors in UNRA on the Moroto-Lokitanyala road and in Moroto District Local Government on the Nawanatau – Acerer who are involved in project at all times and those that come in when their services are required at an appropriate time. The categories of the employees are shown in Table 3.1

Table 3. 1: Categories of employees by organization

Categories / Organization	Top Level Management	Middle level management	Supervisors	Total
UNRA-Moroto station	8	15	4	**27**
Moroto District Local Government	5	6	3	**14**
Total	**13**	**21**	**7**	**41**

3.3.2 Sample and sampling strategy

Aleper (2015) defines a sample as a portion or subset of the population, the size of which is determined by the nature, goal, budget, and time restrictions of the study.

The personnel that took part in the chosen project served as the sampling unit for this study. Supervisors, middle managers, and top managers were the intended respondents. The sample size of 37 participants for the survey was determined by applying Sloven's sample size computation formula, which states that:

$$n = \frac{N}{\{1+Na^2\}}$$ ……equation (3.1)

Where, n= the sample size

N= total population of respondents, that is 41

a= the level of significance, that is 0.05

$$n = \frac{41}{\{1+41(0.05)^2\}} = 37$$

Sample sizes in quantitative research were determined by the size of the population as a whole, while in qualitative research, a different logic known as "replication logic" was used. This implies that interviews were conducted until a certain level of "saturation" or "replication" was reached, meaning that the same stories were repeated once again and again (Saunders and Bezzina, 2015). It is

not anticipated that any new information will surface during the interviewing process at this time. A total of 10 respondents sufficed for the interviews and the balance of 27 were taken for questionnaire. The distribution of the population and sample sizes for the two locations were as shown in Table 3.2.

Table 3. 2: Population and sample size of the research

Locations	**Population**	**Sample size**	**Sampling technique used**
UNRA-Moroto Station	27	24	Simple random sampling
Moroto District Local Government	14	13	Purposive sampling
Total	**41**	**37**	

3.4 Sources of Data

In research, data can come from primary, secondary, or both sources. The researcher used information from both primary and secondary sources for this study.

3.4.1 Primary Data Source

The researcher obtained primary data using questionnaires and key informant interviews. The questionnaire used consisted of questions divided into five sections. Section one was for obtaining demographic data of the sample. Section two was meant to study the perception of TQM. Section three touched on examining whether TQM is being practiced formally. Section four gathered information about the TQM tools and techniques commonly used and lastly section five collected information regarding other factors that can affect TQM implementation.

3.4.2 Secondary Data Source

As a secondary source of data, the researcher used information from books, reports, and earlier studies.

3.5 Data Collection Tools

Information is always required to be gathered during research and the process of information gathering is what is referred to as data collection. Data collection is aided by designed tools that capture the area of interest of the researcher. These tools can be case studies, checklists, interviews, observation sometimes, and surveys or questionnaires (Saunders and Bezzina, 2015). The tools that were used collected information mainly from the primary source.

3.5.1 Primary Data Tools

Primary data is information collected by a researcher or investigator. Primary data were collected for this study through questionnaires and interviews with respondents and the various data sources were merged together using method of triangulation. The main goal for this was for improving research validity and reliability while reducing or eliminating participant and researcher bias.

3.5.2 Secondary Data Tools

Secondary data is information that was not initially gathered but was instead obtained from previously published or unpublished sources. It is a combination of research-related published and unpublished materials and is very significant because it provides the logical foundation for the study. Secondary data for this study was gathered from academic journals, textbooks, and articles about the application of TQM. Also, a few online resources were used to get information for the literature review.

3.5.3 Data collection techniques

To provide quantitative data for the case study in this study, a questionnaire was utilized (see appendix I). An inventory of topics to be covered during interviews was also used to conduct the in-person, semi-structured individual interview (refer to appendix II). The questions were posed to each respondent in accordance with the direction of the discussion. Prior to the interview, copies of the interview guide and support letter were sent to each targeted respondent. Notes were taken to document the responses. Some interviews took place on location during the interviewees' working hours, while others were conducted at their convenience in their offices. The duration of each interview was 45–60 minutes on average.

3.6 Pilot study

To reduce the likelihood that the interviewees will have difficulty responding to questions, a pilot study was conducted before the main study to evaluate the research data collection instruments (Saunders et al, 2016). Reliability and internal validity of a data collection tool are dependent on the rigor of the pilot testing, as well as the precision and the composition of questions. A pilot study verifies that a question is reasonable, unambiguous, and clear in addition to evaluating its validity and reliability (Aletaiby, 2018).

In a pilot study, five questionnaires were given out to assess possibility, duration, and unfavorable events. Two managers who oversee different departments within the company were interviewed in-person twice using a semi-structured format. After the pilot study was completed, the opinions and feedback from the participants were useful in modifying the questions. Comments from participants were considered very helpful, and this aided in making changes to the tool.

3.7 Reliability and Validity of the instrument

3.7.1 Reliability

This is the measure by which an assessment tool provides consistent and stable results. This implies that when the same research procedure is carried out and the results are reproduced within specified confidence limits, reliability is attained (Mugenda & Mugenda, 2003). If another investigator can perform the same research and reach the same conclusions, then the reliability of an investigation is satisfying. This relates to a study's capacity to repeat itself in the event of a parallel investigation. The tools were tested through a pilot study and then applied on the respondents.

The Cronbach Alpha was used to test the reliability of questions asked for this research and a result from the validity test was only accepted if it showed Cronbach Alpha which is above the required 0.7 mark as shown in table 3.3.

Table 3. 3: Cronbach's alpha internal consistency

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Source: Hair et.al (2003)

The internal consistency and reliability of the survey instrument were evaluated in this study using the Cronbach's alpha coefficient. Table 3.3 shows that the Cronbach's Alpha coefficient values for the different study dimensions varied from 0.741 to 0.953 giving an average of 0.8746. This means that the internal consistency of the tool is good according to table 3.3 and hence an assurance that the results that will be obtained using this survey tool will depict the true findings.

Table 3. 4: Outcome of reliability test (Cronbach's Alpha Coefficient)

Descriptions in the tool	Items	Cronbach's Alpha
Perception of TQM	3	0.744
Step1: Client commitment	4	0.901
Step2: Generate awareness, educate, and change the attitude of staff	4	0.741
Step3: Develop a process approach towards TQM	4	0.913
Step4: Prepare a project quality plans for all levels of work	5	0.894
Step5: Institute continuous improvement	4	0.924
Step6: Encourage the participation and contribution of staff using motivation programs and quality control circles	4	0.867
Step7: Review quality plans and measure performance	5	0.939
Techniques of TQM	8	0.87
Tools of TQM	5	0.953
Average		**0.8746**

Concerning the reliability of the survey outcomes, the pilot study resulted in the improvement of the research tool by removing vagueness or biases in the manner in which the tool was developed.

3.7.2 Validity

According to Yin (2014), validity represents 'the extent to which an instrument measures what it intended to measure. The research questions in the questionnaire were developed to reflect each variable in the study in order to guarantee the

content validity of the questionnaires and interview guide. To verify the construct validity of the data gathered from the pilot study, factor analysis was performed. This is done in order to identify any potential issues that might develop as a result of respondents having trouble interpreting the questions. In order to modify the questions to better suit the research aims, seven respondents from a pilot study were taken into consideration, along with their feedback. This was all done using the Pearson product moment correlations using SPSS software. The bivariate correlation analysis was done for all the seven respondents of the pilot study and the significant value of the Pearson product moment, rxy, was >0.05, making this instrument to be considered valid.

3.8 Data analysis

After raw data has been collected, the next step in the research framework that yields the research findings is data analysis. Data analysis procedures, according to Hollweck (2016), are the steps involved in analyzing, testing, categorizing, recombining or tabulating data to verify initial hypothesis or results of a study. For this study, qualitative and quantitative methodologies were employed as was previously mentioned. The organization's managers at various levels were given the questionnaire and conducted semi-structured interviews. According to Hollweck (2016), to ensure that the results are in line with the research questions, a plan for data analysis must first be developed. Since quantitative and qualitative data were collected, each data set was analyzed differently before using a triangulation strategy to merge the results. This process is described in the sections below.

3.8.1 Qualitative analysis

This analysis looks into texts other than numbers. According to Saunders et al. (2016), there isn't a set technique for analyzing qualitative data. The term "qualitative" is synonymous with "interview" and refers to the method by which the researcher analyses non-numerical data. Qualitative analysis is of two types; content and theme analysis.

Busch et al. (2012) lists four available categories of content analysis. First is analysis based on words. This relies on word count and is done by getting the number of times the words repeat itself in the text and the most occurring words is taken to be of interest. The second is concept content analysis that depends on existence of a recognized theme or concept in the text. Thirdly, is a referential content analysis that rely on the researcher's judgement of the fundamental meaning or understanding of the text. Fourth, the relational analysis method, that takes into account the relationships between the concepts found in the text.

Referential and concept content analysis were both used by the researcher to analyze the interview data for this study. Using a variety of content analysis techniques, it was possible to evaluate interviewees' responses in several ways to identify the information that is most crucial to this study in line with the procedures suggested by Braun and Clarke (2006). The procedures followed were:

1. Data transcription were typed and then the transcript were reviewed while making notes that served as personal record.

2. Features that are of interest were coded to ensure that the specific participant is mentioned in code form. To make sure that nothing important was missed, the coding was kept as broad as possible.

3. Themes were established and codes were arranged into themes for purposes of classifying important data under a theme.

4. Themes were reviewed and it was ensured that they worked properly and matched the coded extracts.

5. To ensure that every theme is organized to tell a full story, they were refined and named as broad categories that encompassed the data.

Data collected using semi-structured interviews were subjected to analysis using ATLAS.ti software program version 9 to facilitate the analysis.

3.8.2 Quantitative analysis

Statistical data analysis techniques are usually used to achieve quantitative data analysis. Chi-square analysis, correlation analysis, regression analysis, and factor analysis are the methods that are frequently used. Descriptive statistics are the first step in most quantitative data analyses to illustrate different trends in the data.

For this study, descriptive statistics have been used. Sekaran (2003) claims that these measurements provide a view of the data in addition to appropriate bar charts, pie charts, and line graphs. This study's descriptive analysis used percentage tables, graphical methods, and, most importantly, ways to display central tendency. Standard deviations and other measures of variability and dispersion were also acquired.

Programs like Statistical Package for Social Scientists version 23 (SPSS) and Excel have been used to produce descriptive statistics. To ascertain how the data should be analyzed, a normality test was carried out in the SPSS software on the created variables and the result obtained was as in Table 3.5

Table 3. 5: Tests of Normality

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Formal_practices	0.108	25	0.200*	0.972	25	0.688
Tools_and_Techniques	0.131	25	0.200*	0.905	25	0.024
Perception	0.163	25	0.085	0.937	25	0.125
TQMImpl	0.256	25	0.000	0.810	25	0.000
InterVar	0.190	25	0.021	0.850	25	0.002
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

Since the data set is less than 100, the researcher used Shapiro Wilk. Also, since the significance value (or the p-value) is more than 0.005, the data set generated for the variables is assumed to have a normal distribution. This implies that the acceptable method of analysis used was linear regression and Pearson correlation. The study presented responses using percentages, means, and standard deviations. The scores ranged from 1 (the lowest score) to 5 (the highest score), or 5-1=4. Since there were 5 cells, the cell length is equal to 0.8 (5/4). Table 3.6 shows that the first cell length was 1 + 0.8 = 1.8. Although the mean is the most widely used measure of central tendency, it is insufficient to fully describe the data on its own. Additionally, standard deviation was employed as the appropriate measure of dispersion to demonstrate variation in the result obtained.

Table 3. 6: How to interpret Likert Scale

Point Scale	Mean	Qualitative Interpretation	Level of agreement
1	1 < 1.8	Strongly disagree	Very low
2	1.8 < 2.6	Disagree	Low
3	2.6 < 3.4	Moderate	Moderate
4	3.4 < 4.2	Agree	High
5	4.2 <5	Strongly agree	Very high

Source: Adopted from Siti Rahaya & Salbiah (1996)

Data were also analyzed using inferential statistics. Based on the results from the sample, inferential statistics employs statistical measures to derive conclusions from the survey. This is accomplished by analyzing the numerical data for patterns, relationships, and differences, which ultimately aids in assessing the relationship within a sample and their strength. It evaluates how strongly independent variables affect results. This research used the correlation and regression inferential data analysis. Each independent variable was regressed against the dependent variable using the SPSS software and from the table of results generated by the software, the regression coefficients were extracted and the outcome of a regression analysis forecasted the relationship between the independent variable and the dependent variable.

3.9 Triangulation

According to Amaratunga et al., (2002), triangulation is the process of combining different approaches for studying the same phenomenon in order to increase the validity of measurement. In triangulation, quantitative and qualitative methods are combined in such a way that one group response to a questionnaire while

another group is interviewed (Gray, 2014). According to Yin (2014), the advantages of utilizing a variety of evidence sources and analytical techniques enable addressing a wider range of behavioral and historical issues. In practice, mixed method approach is usually good to use for the following reasons:

i. It addresses different research questions.
ii. It assists in data triangulation and balances weaknesses that could arise in the method of collecting data (Gray, 2014).

According to Yin (2014), using a variety of data collection techniques allowed for a deeper understanding of phenomena than could be obtained from using just one. As a result, this study's triangulation strategy is based on a mixed method sequential exploratory design, in which qualitative data were first collected and analyzed, then quantitative data were collected and analyzed. The qualitative and quantitative triangulation approach is described in Figure 3.1.

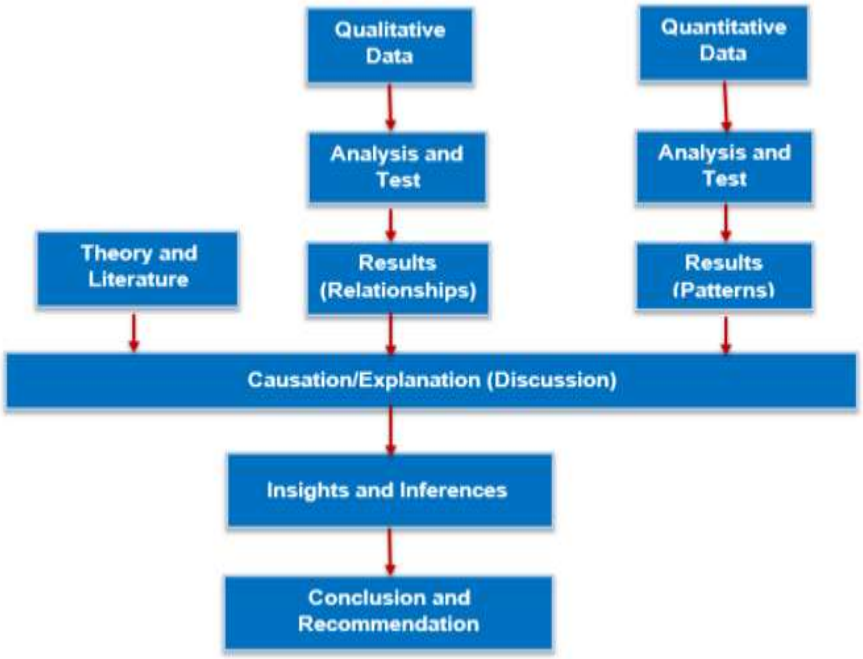

Figure 3. 1: Triangulation of qualitative and quantitative data
Source: Amaratunga et al., (2002)

3.10 Achievement of specific objectives

Data were categorized and discussed in accordance with several study-related topics. The conclusions were supported by pertinent justifications provided by the respondents. The data were analyzed using the Statistical Package for Social Sciences (SPSS). The ordinal data scale (Likert-Scale) was employed in this study, with 1 denoting strongly disagree, 2 disagree, 3 neutral, 4 agree, 5 strongly agree, and 1 representing very low practice, 2 low practice, 3 moderate practice, 4 high practice, and 5 very high practice, where necessary.

3.10.1 Achievement of specific objectives number one

Specific objective number one sought to ascertain the client's knowledge of Total Quality Management in the construction industry. The interview was conducted with questions related to ascertaining the views of the respondents on what they perceive as TQM in the construction industry. The questionnaire established the respondent's agreement to the perceptions of TQM that were obtained from literature reviewed and their responses from the interviews were then analyzed using the SPSS software. The mean values obtained from the SPSS software were compared against the five-point Likert scale to ascertain the level of agreement as described below.

If 1<mean<1.8, level of agreement is very low; If 1.8<mean<2.6, level of agreement is low; If 2.6<mean<3.4, level of agreement is moderate; If 3,4<mean<4.2, level of agreement is high; and If 4.2<mean<5.0, level of agreement is very high.

3.10.2 Achievement of specific objectives number two

The second specific objective aimed to determine the level of practice of TQM within the construction industry. The steps involved in the formal practice of Total Quality Management (TQM) as well as some frequently used tools and techniques were covered in the questionnaire. The procedures that were followed focused on the TQM principles according to Shoshan and Çelik (2018), as listed below:

i) Obtaining the commitment of the client to quality,

ii) Generating awareness, educate, and change the attitudes of staff,

iii) Developing a process approach toward TQM

iv) Preparing project quality plans for all levels of work

v) Instituting continuous improvement

vi) Promoting staff participation and contribution using quality control circles and motivation programs

vii) Review quality plans and measure performance.

Data were analyzed using SPSS tool by inputting the responses which suggested the level of practice of the above principles. The mean values obtained from the SPSS software (version 23) were compared against the five-point Likert scale to ascertain the level of practice as described below.

If 1<mean<1.8, level of practice is very low; If 1.8<mean<2.6, level of practice is low; If 2.6<mean<3.4, level of practice is moderate; If 3,4<mean<4.2, level of practice is high; and If 4.2<mean<5.0, level of practice is very high.

A regression analysis was also carried out to validate how the independent variable affected the dependent variable.

3.10.3 Achievement of specific objectives number three

This specific objective was seeking to establish a tool that will be used as a guide to promote the uptake of TQM in the construction industry. The information from literature reviewed and data from the research findings of the other specific objectives of this study were used to formulate a tool that will be a guide for uptake of TQM implementation.

3.11 Ethical consideration

Ethical approval was obtained from graduate school of Kyambogo University and then a letter of introduction was obtained to seek permission to conduct the study. Authorization to conduct the study was sought from the authorities of UNRA at its head office in Kampala and the Chief Administrative Officer of Moroto District Local Government where the study was conducted. Informed consent was sought from each respondent safeguarding privacy and confidentiality throughout the study.

Carrying out this research was authenticated by obtaining a research permit from the relevant authorities and the respondents were informed that it was conducted solely for academic purposes. I made sure that the information provided by the respondents was kept highly confidential. For example, codes rather than names were written on the questionnaire, and the data collected was only utilized for the study. The respondents were assured of their freedom to choose whether or not to participate in the research and they were also informed that their participation in the study was voluntary and that they could withdraw at any time if they wish.

3.12 Summary of the Chapter Three

The research methodology was presented in detail in this chapter. The major issues discussed comprise research design and approach, population and sample, data sources, tools for collecting data, reliability and validity of the instrument, analysis of data, triangulation, and achievement of specific objectives. Analysis, discussion and presentation of findings and how it will contribute to this study will be discussed in the next chapter.

CHAPTER FOUR: ANALYSIS, DISCUSSION AND PRESENTATION OF RESULTS

4.1 Introduction

This chapter presents the analysis of primary data collected, discussion, and presentation of results. The questionnaire from 25 participants, ranged from low level, middle level, and top-level managers. The semi-structured interview was administered to 10 participants. The descriptive statistical analysis and qualitative analysis comprises five sections. The first section described the respondents' demographic data, the second section focused on TQM perception, the third section was on other factors that affect TQM implementation, the fourth section examined whether TQM is being practiced formally, and lastly, Section five gathered information about the TQM tools and techniques commonly used.

4.2 Demographic data of respondents

4.2.1 Characteristics of the Interviewees

Tables and graphs are used in this section to display the primary attributes of the respondents.

4.2.2 Response rates

The eligible sample for this study were 37. Ten respondents were interviewed face-to-face and 27 were given questionnaires. For those that were given the questionnaires, 25 completed questionnaires were deemed suitable for use in the final analysis, yielding a response rate of 94.6%. Due to their failure to be returned to the researcher, two questionnaires were not included in the analysis. The response rate and total number of respondents to the questionnaire are shown

in Table 4.1. It is noteworthy to mention that the researcher's direct approach and the subject's level of interest were credited with the high response rate.

Table 4. 1: Details of the questionnaire issued out

Description	Respondents	Response Rate
Interviewed face-to-face	10	27.0%
Questionnaires distributed	27	
Total valid questionnaire received	25	67.6%
Total		**94.6%**

4.2.3 Age of the Respondents

The results in figure 4.1 below shows that 8 % (n=2) are in 18-30 years, 48% (n=12) between 31-40 years, 36%(n=9) between 41-50 years, and 8%(n=2) between 51-60 years. The findings show that most category of the respondent interviewed are in age bracket 31-40. This result can be attributed to the fact that within this age bracket and above, the employee has gained experience and has been trusted with management position.

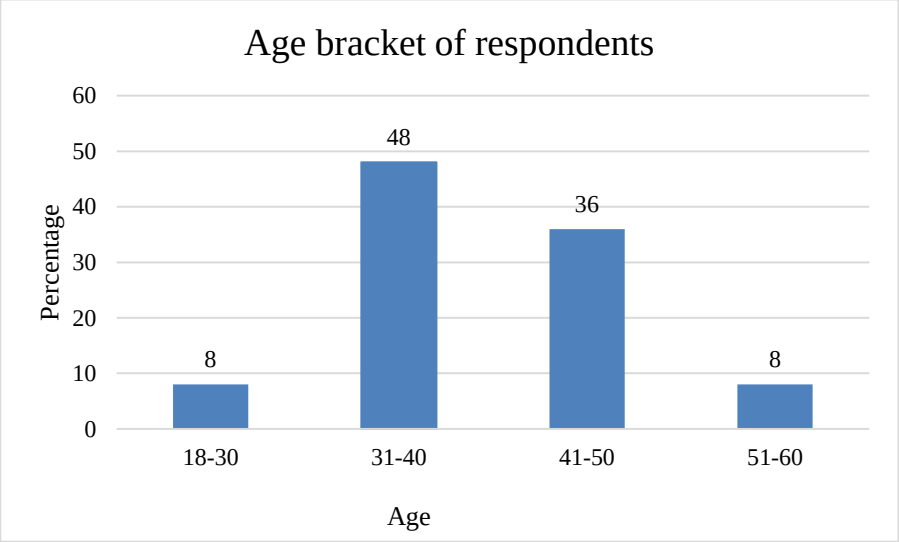

Figure 4. 1: Age bracket of respondents

4.2.4 Professional background of the Respondents

The highest proportion of the respondents (64.0%, n=16) were civil engineers, 20.0% (n=5) had other professional backgrounds for example, in the District

Local Government, departments involved in road works are audit, natural resource, human resource, and administration while in UNRA, departments like environmental safeguard and human resource. 12.0% (n=3) of the respondents are project managers and 4.0% (n=1) are Architects. The findings indicate that most of the respondents were civil engineers. This should be true since the projects under study are road construction and most of the employees are typically civil engineers. It is worth noting that TQM implementation requires that all employees be trained in information analysis and also problem solving in case it arises in the workplace. As a result, a professional's background plays a major role in determining whether TQM can be successfully implemented in the construction industry. This may also be interpreted as a sign of how receptive the public is to TQM awareness. Consequently, it can be said that these results are reliable given the professional background of the respondents who were selected from top level management, middle level management, and supervisors.

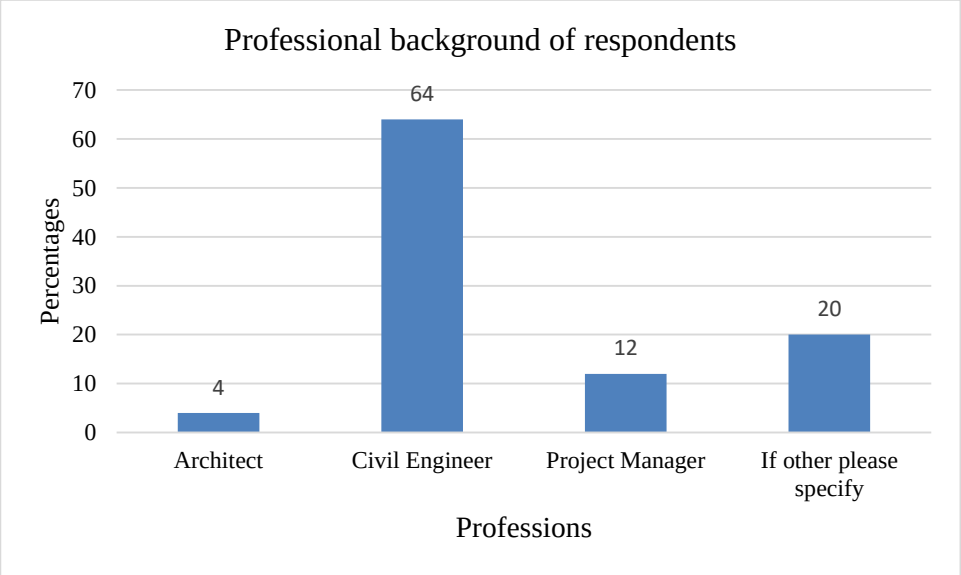

Figure 4. 2: Professional background of respondents

4.2.5 Work experience of the Respondents

In relation to the staff's years of experience, the results, as depicted in Figure 4.3 indicate that 36.0% have less than ten years of experience, 60.0% (n=15) have between eleven and twenty-five-years' experience, and 4.0% (n=1) have more than twenty-five years' experience. The majority of respondents, according to the findings, have between 11 and 25 years of experience, which is quite impressive in terms of the quality of responses given by the respondents.

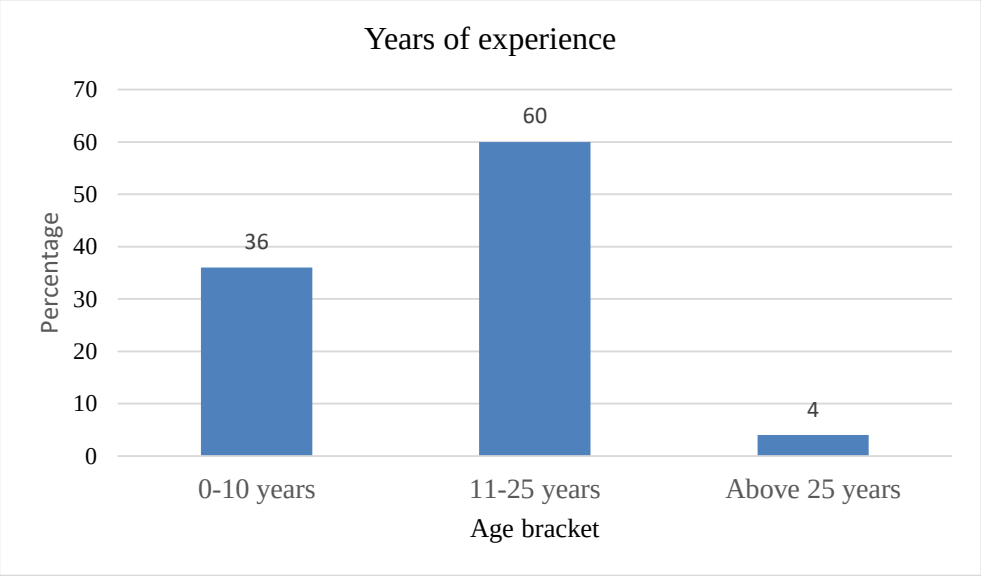

Figure 4. 3: Years of experience

4.2.6 Years of employment of respondents with the organization

With respect to the years of employment of the respondents with the organization, 36.0% (n=9) of the respondents were employees between 6-11 years, 32.0% (n=8) between 1-5 years, 16.0%(n=4) between 12-17 years, 12.0%(n=3) between 18-23 years, and 4.0%(n=1) had been with the organization for 24 years and above as shown in figure 4.4.

This suggests that the majority of staff members have been with the company for six to eleven years. The findings show that the majority of respondents have worked for a longer time, which suggests that they have a broader understanding

of the real circumstances within their company. Employee work experience has a significant impact on improving performance in many organizations because it can help to facilitate the organizations efforts related to adopting and implementing quality initiatives like TQM.

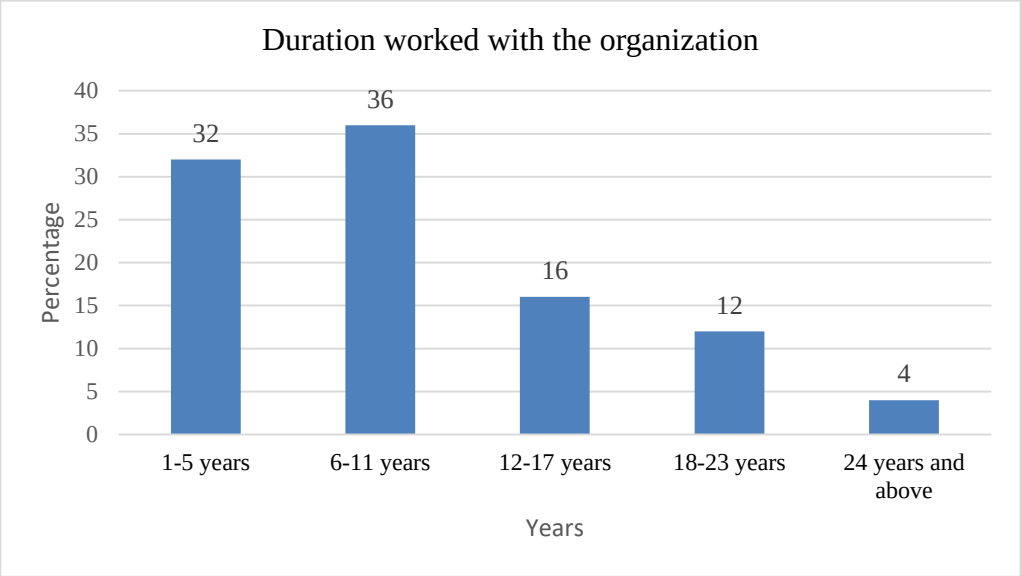

Figure 4. 4: Duration worked with the organization

4.2.7 Existence of quality improvement program in the organization

Table 4.2 illustrates the responses from respondents on whether quality improvement program is in the organization. Ninety-two percent (n=23) agree to while 8.0% (n=2) disagree to the organization having a quality improvement program. The findings show a high percentage of respondents who were agreeing to the organization having a QI program in place. The results so far give a clear indicator towards the process of TQM implementation since they were already using other system.

Table 4. 2: Existence of quality improvement program in the organization

Existence of quality improvement program in the organization	Frequency	Percentage (%)
Yes	23	92.0
No	2	8.0
Total	25	100.0

4.2.8 Type of quality improvement program adopted in the organization

As shown in figure 4.5, 73.9% (n=17) acknowledged QC/QA, 17.4% (n=4) TQM, and 8.7% (n=2) ISO 9001. The data indicates that Quality Control and Quality Assurance were the most commonly used type of QI program followed by TQM and then ISO 9000 series. This a very impressive indication that the implementation of TQM is picking up given that QA/QC is preceding TQM is the hierarchical order of QI.

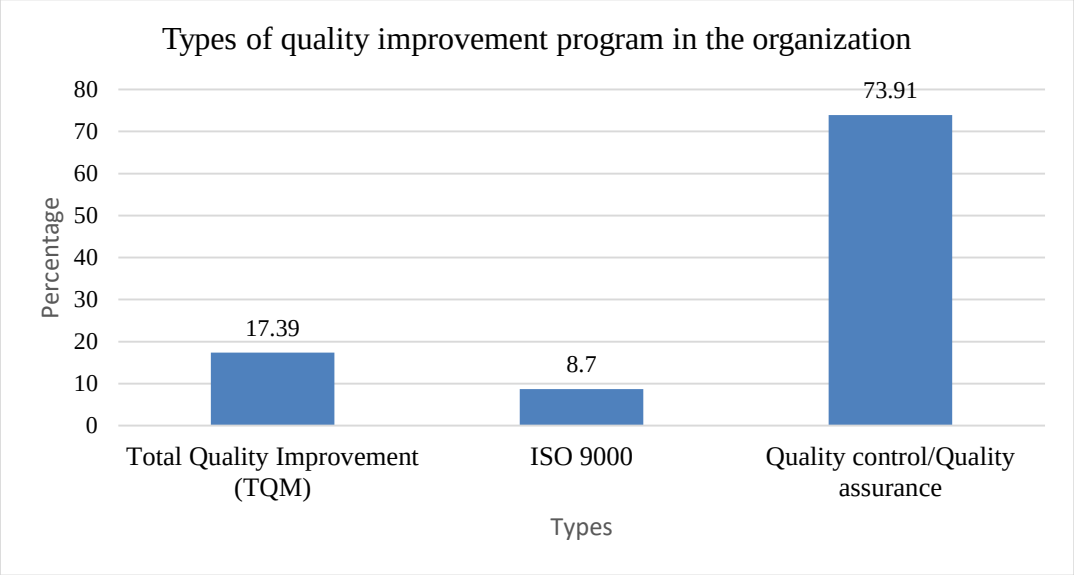

Figure 4. 5: Types of QI program in the organization

4.2.9 Implementing a formal quality management system

Regarding implementing a formal quality management system as shown in table 4.3, 84.0% (n=21) of the respondents agree to it while 16.0% (n=4) disagree to the organization's implementation of a formal system for quality management. The data in table 4.3 show high agreement to a formal implementation of quality

management system (QMS). This is quite impressive result as a step towards implementation of total quality management.

Table 4. 3: Implementing a formal quality management system

Implementing a formal quality management system	Frequency	Percentage (%)
Yes	21	84.0
No	4	16.0
Total	25	100.0

4.2.10 Years of implementation of a quality management system

Of the respondents who agreed to implementing a formal quality management system, 42.9% (n=9) have done it for between 6-10 years, 28.6 % (n=6) have done it between 0-5 years, and 28.6 %(n=6) have done it above 10 years. Figure 4.9 below shows high percentage of respondents who have implemented QMS for between 6-10 years. This is an indication that quality management system started thriving seriously within the last decade. Before that, there were few people involved in quality management systems implementation.

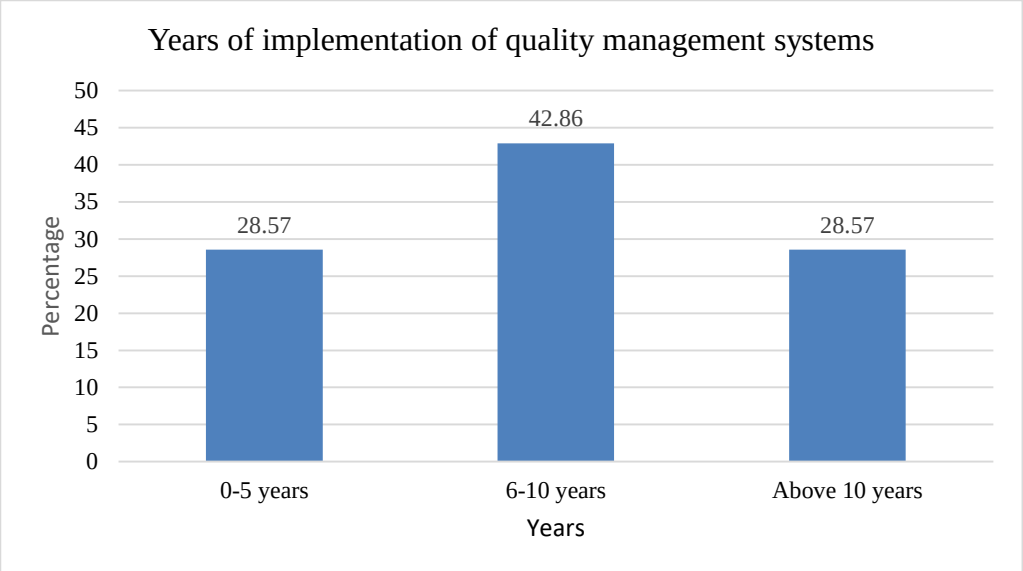

Figure 4. 6: Years of implementation of quality management system

4.2.11 Reasons for non-implementation of quality management system

Table 4.4 shows the respondents that previously disagreed to the organization having a formal implementation of a quality management system, 75% attribute the reason to being the organization thriving without such a system in place, and 25% attribute it to implementing a formal quality management system being expensive. The descriptive statistics in table 4.4 shows that there are some few employees who have not implemented the QMS in their organization and the reasons given are twofold. The most pronounced reason is that organization has been operating without a QMS in place. This could be because the organization has not fully invested in QMS.

Table 4. 4: Reasons for non-implementation of quality management system

Why quality management system is not implemented	Frequency	Percentage (%)
Lack of knowledge on its implementation	0	0.0
Its expensive to implement a formal quality management system	1	25.0
The company has been operating without any system in place	3	75.0
If other, please specify	0	0.0
Total	4	100.0

4.3 Perception of the client on TQM

4.3.1 Qualitative analysis of perception of the clients on TQM

TQM perceptions among the respondents were dealt with in this section. Here, the researcher wanted to ascertain the interviewees understanding of the meaning of TQM. The question asked was: “As per your work activity, what is ‘Total Quality Management’?”

Four points were covered by the responses from the interviewees, these were: customer satisfaction, involving every one, ensuring/maintaining quality, and controlling project constraint. Therefore, the above four points sum up what the

interviewees understood when they used the term "total quality management." Three respondents specifically stated that TQM entailed meeting the needs of clients, customers, and stakeholders. Interviewee IR10 specifically pointed out that "*TQM is having a product that meets the stakeholder's satisfaction. Like for me who is an highway engineer, I specify quality of materials like for a walkway C30 to the lab to adopt*". In the same context, another respondent IR5 indicated that, "*To me TQM means trying to have a product from a service you are providing that is satisfying client. In this case, the road should be satisfying when worked on both in the dry and rainy season*".

Similarly, interviewee IR6 stated that, "*I look at TQM in three perspectives;1) Client/customer satisfaction, 2) Everybody's business in the organization. E.g if a person is chased away from the gate, a good customer could have been chased a way, and 3) Processes, meaning you do abit and leave others to continue. Every body do their responsibilities right the first time.*

At my work place, TQM is bringing all sectors of the organization to do what the organization wants to achieve her goal. For e.g when procurement is not done well i.e. selection of a bidder was not right, then the contract may not be done well". While, four of the respondents mentioned that TQM was involving everyone in organization's business. For instance, one respondent IR4 stated that,

"*To me, TQM means involving everybody or making every one participate in the activity within the organization". In a similar view, looking at what IR6 quoted above, the respondent revealed that, "I look at TQM in three perspectives;1) Client/customer satisfaction, 2) Everybody's business in the organization. E.g if a person is chased away from the gate, a good customer could have been chased*

a way, and 3) Processes, meaning you do abit and leave others to continue. Every body do their responsibilities right the first time.

At my work place, TQM is bringing all sectors of the organization to do what the organization wants to achieve her goal. For e.g when procurement is not done well i.e. selection of a bidder was not right, then the contract may not be done well".

Likewise, respondent IR8 stated that

"*TQM is a system of management based on principles that every member of the team must be committed to maintaining high standard of work in every aspect of the operation*". Lastly, interviwee IR9 highlighted that:

"*To me, TQM, I perceive that it encompasses everybody so that whatever processes we do collectively brings quality*".

Two respondents viewed TQM as maintaining or ensuring quality. As for example, IR2 stated that,

"*In my field as maintenance technician, TQM means; testing thicknesses, CBR, ensuring good quality, using the required sieve. It also means checking quality to ensure value for money. It also ,means doing something that will serve its purpose and the intended duration*".

Nevertheless, one interviewee, IR3, understood TQM as controlling cost, quality, and time. The respondent reported that, "*My understanding of TQM is how to control cost, quality, and time*".

In summary, from the results above regarding the perception of the client to TQM, it can be concluded that TQM was perceived as satisfying client/customers,

involving everyone, ensuring/maintaining quality, and controlling project constraint.

4.3.2 Quantitative analysis of the perception of client on TQM

The survey in this section was purposely to gauge the participants' awareness and understanding of TQM regarding importance and concepts of quality management initiatives. Three perceptions of TQM were got from literature reviewed and these statements were validated using the questionnaire to identify the extent of agreement of participants to this perception of TQM. Table 4.5 shows the results from the responses.

Table 4. 5: Perception of TQM in percentage (%)

Code	Perception of TQM	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
P1	Focus on the customer	0.0	0.0	4.0	24.0	72.0
P2	Total employee commitment	0.0	0.0	4.0	48.0	48.0
P3	Continuous improvement	0.0	0.0	8.0	48.0	440.0
	Average percentage	**0.00%**		**5.3%**	**94.7%**	

Among the respondents, customer focus, total employee commitment, and continuous improvement received combined scores of 94.7% (as agree and strongly agree). Additionally, the findings demonstrated that, at 8.0%, continuous improvement had the highest percentage of neutrality, while customer focus and total employee commitment had the lowest percentages, at 4.0%.

Overall, the participants' responses show that the "strongly agree" category is the most prevalent, followed by the "agree" category. The categories of "strongly disagree" and "disagree" were not filled by any respondents. Thus, with an average percentage of 94.7%, it can be assumed from the above results that the

respondents have extensive agreement regarding the suggested perception of TQM.

4.3.3 Conclusion on the perception of clients on TQM

The semi-structured interview results showed that different people had different interpretations of what TQM meant. Customer satisfaction was viewed by the majority of interviewees as the key concept that best-defined TQM. This is also reflected in the descriptive statistics in Table 4.5 which shows that TQM aims to make customer satisfaction as the focus of a business. Researchers like Aleitaby (2018) have also demonstrated this finding, claiming that what makes a quality improvement program is customer focus.

Second, some respondents suggested that TQM is involving all members of the organization. This is supported by the descriptive results in Table 4.5, which demonstrate that the perception of TQM was teamwork and participation for the development of a continuous improvement culture. This result is consistent with numerous researchers' findings reported in the literature. Ishikawa (1985) added that employee participation was a prerequisite for achieving TQM.

The above conclusion drawn was validated by a regression analysis that was carried out on perception of TQM as indicator variable and the implementation of TQM a dependent variable and result is presented in Table 4.6.

Table 4. 6: Regression analysis of Perception on TQM Implementation

Test	Regression weight	Beta coeff	R^2	F	p-value	Test supported
Perception	Perception On TQM implementation	0.455	0.184	5.190	0.000	Yes

The DV, TQM implementation was regressed on predicting variable, perception, to see if perception carries a significant impact on TQM implementation. Perception significantly predicted TQM implementation, F (3, 21) =5.19, $p<0.001$ which indicates that perception can play a significant role in TQM implementation ($b=0.455$, $p<0.001$). These results clearly direct the positive effects of the perception. Moreover, the $R^2=0.184$ depicts that 18.4% variance in TQM implementation is contributed by perception.

4.4 Current practices of TQM Implementation

4.4.1 Qualitative analysis of the steps of TQM implementation.

This section was purposed to determine steps of implementation of TQM. The question was "What are the steps of implementation of TQM and what is entailed in those steps?"

Most of the respondents talked about the procedures of attaining a product of the required standards and not the process of attaining TQM. The respondents gave procedures of getting the desired products although some of their procedures are only part of the processes of implementation of TQM. Interviewee IR1 stated that the steps are: "*Trainings, appraisals, Reporting (monthly reports, accountability reports)*". Two interviewees declared that the steps involve strategically planning and communicating the plans to the implementing unit of the organization. IR7 states: "*Strategic plan as an organization on quality, the plan should be communicated from directorate to stations, stations to implement the plans, and evaluate the progress of the implementation-to create room for improvement*".

Other two interviewees also looked at the steps in terms of top management commitment, process approach, and teamwork. IR4 highlights that:

"*Engage with the community to ascertain what they require, how it will impact them, responsiveness of the design e.g. pedestrian, disabled people, car users, and all these can be accommodated in the design. Ensuring a top-down leadership where meetings are organized to create an open avenue for addressing issues. Having a quality assurance plan in place to create awareness of what each person is supposed to do to achieve the required quality. Ensure a process approach. Look at activities in how it has been done and not only the work*".

IR8 indicates the statistical process control for implementing TQM. The respondent states that:

"*Identify problem, collect enough data about the problem, analyze data, generate solutions, prioritize options, plan implementation, monitor and measure performance*".

In summary, the interviewees demonstrated the steps that are required in following the international standards to get a product that matches the approved standards. These steps are not very far from the processes of attaining TQM since they are similar.

4.4.2 Quantitative analysis of steps of TQM implementation

A descriptive analysis was used by the researcher to improve the results and ranked each step of TQM practices according to the highest mean value and highest percentage values.

i) Obtain the client's commitment to quality.

Based on the average degree of agreement among respondents, results in Table 4.7 regarding "obtain the client's commitment to quality" can be explained as follows:

Statement 1: "*Top management ensures that every employee knows the company's mission and business objectives.*"

This statement has a mean value of 4.24 of agreement and a standard deviation of 0.97. 84% of respondents gave this statement a "Very high" and "High" rating. The mean value, interpreted using the Likert scale, falls between 4.2 and less than 5.0, indicating a very high degree of agreement with this statement.

Table 4. 7: Descriptive statistics for client commitment

Statements	Code	Very Low	Low	Moderate	High	Very High	Mean	Rank of mean	SD
Top management makes sure that all staff members are aware of the mission and goals of the organization.	S1.1	4	0	12	36	48	4.24	1	0.97
There are established lines of communication between upper management and staff.	S1.4	0	0	16	60	24	4.08	2	0.64
Employee participation in quality management and improvement initiatives is highly encouraged by top management.	S1.2	4	12	24	28	32	3.72	3	1.173
Employees are empowered by managers and supervisors.	S1.3	4	8	36	36	16	3.52	4	1.005
Percentage		**8%**		**22%**	**70%**				
Mean of Means (MoM)							**3.89**		

Statement 2: "*Communication links are established between employees and top management*".

The mean is 4.08 and the standard deviation is 0.64. Percentage for "very high" and "high" is 84%. Based on the interpretation of the Likert scale, the mean value falls between 3.4 and less than 4.2, which indicates a high degree of agreement for this statement.

Statement 3: "*Top management strongly promotes staff involvement in quality management and improvement activities*".

This statement has a mean value of 3.72, and its standard deviation is 1.173. Percentage of respondents who rated both "high" and "very high" is 60%. With the mean ranging from 3.4 to 4.2, this indicated high degree of agreement.

Statement 4: "*Managers and supervisors empower employees*".

This statement has a mean value of 3.52 and a standard deviation of 1.005. 52% of participants gave this statement a "very high" and "high" rating. The mean value falls between 3.4 and 4.2, which indicates a high degree of agreement for this statement.

Overall, conclusion can be made that there is a high level of agreement, at averagely 70% and mean of 3.89 for the statement "obtaining the client's commitment to quality." Thus, it can be stated that a key component of implementing TQM in an organization is the commitment of top management.

ii) Generate awareness, educate, and change the attitude of staff.

The highest percentages were recorded for the statements below (between 40.0% and 52%), with an average of 49%, for both the "high" and "very high" choices. The choices for "very low" and "Low" ranged between 4.0% to 28%. On the other

hand, the "Moderate" option had an average percentage of 39.0%. Furthermore, results in Table 4.8 can be interpreted as follows.

Table 4. 8: Descriptive statistics for staff training and development

Statements	Code	Very Low	Low	Moderate	High	Very High	Mean	Rank of mean	SD
Workers receive training in job-related skills.	S2.2	0	4	44	32	20	3.68	1	0.85
Education and training are means of facilitating ongoing learning.	S2.4	4	4	40	32	20	3.6	2	1
Top management keeps up with the latest developments.	S2.1	4	4	40	44	8	3.48	3	0.87
Workers receive training on overall quality ideas.	S2.3	8	20	32	36	4	3.08	4	1.04
Average percentage		**12%**		**39%**	**51.5%**				
Mean of Means							**3.46**		

Statement 1: "*Employees are trained for job related skills*".

Here, the standard deviation is 0.852 and the mean value is 3.68. 52% of participants gave this statement a "high" and "very high" rating. The mean ranges from 3.4 to 4.2, which indicates the statement having high agreement based on the interpretation of the Likert scale.

Statement 2: "*Continuous learning is provided through education and training*".

3.6 is the mean value, and the standard deviation is 1.0. The percentage rating of 52.0% was classified as "high" and "very high." The mean value for this statement ranges between 3.4 and 4.2, which indicates high agreement for this statement as per the interpretation of the Likert scale.

Statement 3: "*Top management always updates their knowledge*".

3.48 is the mean value, and 0.872 is the standard deviation. Participants who gave this statement a "high" and "very high" rating was 52%. The mean value, interpreted using the Likert scale, falls in the range of 3.4 to 4.2, which is considered high.

Statement 4: "*Employees are trained on total quality concepts*".

The mean is 3.08 and 1.038 is the standard deviation. 42% of participants gave this statement a "high" and "very high" rating. There is moderate agreement for this statement.

In general, it can be said that there is a high level of agreement, on average 51.5% and a mean of 3.46 with the statement that "awareness generation, education and changing staff attitude."

All organization personnel should receive the necessary training and development to ensure that they fully comprehend the concepts of quality management. Without employee training and development, the company will struggle to solve issues and employees' attitudes and behaviors won't be focused toward creating a culture of quality. Employees should undertake courses that are specifically designed according to the resources and the context of the organization based on its requirements. The results of the study validated the importance of training and development for all employees, as it is the second phase of implementing Total Quality Management (TQM).

iii) Develop a process approach towards TQM

For the statements below, the data for the choices of "very high" and "high" varied from 40.0% to 56.0%, with an average of 46.0%. Conversely, the choices for

"low" and "very low" were between 12.0% and 28.0%. The percentage for the "moderate" choice varied from 28.0% to 48.0%. Furthermore, Table 4.9 below provides an explanation of the results.

Table 4. 9: Descriptive statistics for develop a process approach.

Statements	Code	Very Low	Low	Moderate	High	Very High	Mean	Rank of mean	SD
There is implementation of systems and procedures for quality control.	S3.1	4	12	28	32	24	3.6	1	1.118
Internal data collection system is established.	S3.2	0	28	28	32	12	3.28	2	1.021
Market information and feedback system is established.	S3.3	8	16	32	32	12	3.24	3	1.128
The staff members engaged in various procedures are qualified to assess them.	S3.4	8	6	48	28	10	3.22	4	1.032
Percentage		**20.50%**		**34%**	**45.50%**				
Mean of Means							**3.34**		

Statement 1: "*Systems and procedures for quality assurances are implemented".*

The percentage of respondents who "strongly agree" is 56.0%, with a mean of 3.6 and 1.118 as the standard deviation. The mean lies between 3.4 and 4.2, which indicates a high degree of agreement based on the interpretation of the Likert scale.

Statement 2: "*Internal data collection system is established*".

The standard deviation is 1.021 and a mean is 3.28, 44.0% of all respondents rated their level of satisfaction as "very high" and "high." The mean indicates a moderate level of agreement, as per the Likert scale.

Statement 3: "*Market information and feedback system is established*".

The percentage of "very high" and "high" is 44.0% with a mean of 3.24 and 1.128 as standard deviation. The mean falls between 2.6 and 3.4, indicating a moderate level of agreement based on the interpretation of the Likert scale.

Statement 4: "*The employees involved in different processes know how to evaluate them*". 3.32 is the mean value, and 1.032 is the standard deviation. 40% of the participants gave this statement a "very high" and "high" rating. The mean value indicates a moderate level of agreement.

In general, it can be said that the statement "develop a process approach towards TQM" has a moderate level of agreement, averagely 45.5% with a mean of 3.34. Processes are an essential component of TQM implementation and the results presented in literature reviewed (section 2.5.3) support these opinions. High-performing organizations, according to Zairi (2013), have evolved typically to a process driven by customers from function-based approach. Because the TQM philosophy is process-based, processes must be created to satisfy the quality standards of the organization. An organization's ability to focus on tasks and activities rather than on abstracts determines its level of success. The results of the study indicated a moderate level of implementation of this step. Based on the data presented above, the researcher believes that the following gaps have been identified: a poorly established internal data collection system; a poorly established market information and feedback system; and employees who are involved in various processes lack sufficient evaluation expertise. This gap can be addressed by making sure that the process approach towards TQM implementation is developed at strategic level of the organization. This may be

one of the causes of the incomplete adoption of TQM in road construction projects.

iv) Prepare project quality plans for all levels of work

The data related to project quality plans shows that, on average, 62.4% of all survey respondents selected "very high" and "high" for each of the statements below, which ranged between 56.0% and 72.0%. Conversely, the choices for "low" and "very low" were between 12.0% and 16.0%. On the other hand, the percentage of survey participants who selected the "moderate" option varied from 16.0% to 28.0%. Furthermore, results from Table 4.10 regarding the statement "prepare project quality plans" are described as follows.

Table 4. 10: Prepare project quality plans for all levels of work

Statements	Code	Very Low	Low	Moderate	High	Very High	Mean	Rank of mean	SD
Top management should define the team's quality responsibilities.	S4.2	4	8	16	48	24	3.8	1	1.04
Company determines the project's quality standards.	S4.1	0	16	20	32	32	3.8	1	1.08
Company defines the acceptance criteria for every deliverable.	S4.3	4	12	24	32	28	3.68	3	1.15
Ensure that you document your project quality plan.	S4.4	8	8	24	36	24	3.6	4	1.19
Top management should obtain approval for their quality plan.	S4.5	12	4	28	40	16	3.44	5	1.19
Average Percentage		**15.20%**		**22.40%**	**50.40%**				
Mean of Means							**3.66**		

Statement 1: "*Company determines the project's quality standards".*

Mean score of practice is 3.8 for this statement with 1.08 as the standard deviation and a percentage of 72.0% of those who "strongly agree". The mean value falls between 3.4 and 4.2, which indicates a high level of practice, based on the interpretation of the Likert scale.

Statement 2: "*Top management should define the team's quality responsibilities*".

The standard deviation is 1.041, the mean is 3.8. 64.0% of the respondents scored "very high" and "high." The mean indicates that the practice is high.

Statement 3: "*Company defines the acceptance criteria for every deliverable*".

The Mean value is 3.68, and 1.145 is the standard deviation. 60% of participants gave this statement a "very high" and "high" rating. The mean value indicates a high level of practice.

Statement 4: "*Ensure that you document your project quality plan*".

With this statement, the mean value of practice is 3.6, and the standard deviation is 1.19. 60.0% gave a rating of "very high" and "high." The mean indicates that the practice is high.

Statement 5: "*Top management should obtain approval for their quality plan*".

Standard deviation is 1.193 and the mean is 3.44. A total of 56.0% of participants gave this statement a "very high" and "high" rating. The mean value indicates that the practice is high.

In general, it can be said that the statement “prepare project quality plans for all levels of work" has a high level of agreement, averagely 50.4% with a mean of 3.66. A project quality plan (PQP) is a project-specific quality plan that outlines the procedures, standards, instruments, and activities required to achieve quality in the project delivery. It is also sometimes referred to as a quality management plan, quality assurance plan, or project quality management plan. Organizations must create project quality plans for all work levels to successfully apply TQM. The aforementioned result is a definite step in the direction of TQM implementation.

v) Institute Continuous Improvement.

The figures demonstrate that the range of choices for "very high" and "high" for the statements in this section was 32.0% to 56.0%. The percentages for the "moderate" choice were comparatively higher compared to “low and very low”, with an average percentage of 33.0%, while the percentages for the "low" and "very low" choices ranged from 20.0% to 24.0%. Referring to Table 4.8, the phrase "institute continuous improvement" can be understood considering the average degree of practice among the respondents as explained below:

Statement 1: “*The Company practices continuous improvement of all its products, services, and processes*”.

The mean is 3.44, and 1.121 is the standard deviation. 48% of the survey respondents overall gave this statement a "very high" and "high" rating. The mean value for this statement falls between 3.4 and 4.2, indicating a high level of practice, according to the interpretation of the Likert scale.

Statement 2: "*There is a quality improvement coordinating body (e.g., quality steering committee*)".

Practice of this statement has a mean value of 3.28 and a standard deviation of 1.173. Conversely, 56.0% represents the "very high" and "high" percentages. The mean falls between 2.6 and 3.4, which indicated a moderate level of practice.

Table 4. 11: Institute continuous improvement

Statements	Code	Very Low	Low	Moderate	High	Very High	Mean	Rank of mean	SD
All of the company's services, goods, and procedures are continuously improved.	S5.4	4	16	32	28	20	3.44	1	1.12
A coordinating body for quality improvement exists (e.g., quality steering committee).	S5.1	12	12	20	48	8	3.28	2	1.17
Tools and methods for improving quality are frequently applied.	S5.3	8	16	32	32	12	3.24	3	1.13
Every department has a functioning improvement team.	S5.2	4	16	48	28	4	3.12	4	0.88
Average percentage		22%		33%	45%				
Mean of Means							3.27		

Statement 3: "*Quality improvement tools and techniques are widely used*".

The mean value 3.24, and the standard deviation is 1.128. This statement was rated "very high" and "high" by 44% of the respondents. Mean value falls between 2.6 and 3.4, which indicates a moderate level of practice based on the interpretation from the Likert scale.

Statement 4: "*Improvement teams are active in all departments*".

The mean value is at 3.12, and 0.881 is the standard deviation. 32% of participants gave this statement a "very high" and "high" rating. The mean value for this statement falls between 2.6 and less than 3.4, which indicates a moderate level of practice according to the interpretation from the Likert scale.

In general, it can be said that, at an average of 45%, the statement "Institute Continuous Improvement." Has a moderate level of agreement. Building on the discussions previously, it seems to appear that continuous improvement which is the core of TQM implementation was considered as a moderately significant step and this is not a good indication of TQM implementation. The gaps identified here is that the organization seems not to practice continuous improvement culture, there is no quality steering committee, they lack the quality improvement tools to use, and the improvement teams are not active in all the department. Organizations are recommended to put more efforts in maintaining and improving quality and performance if continuous improvement will be used as a constant process by creating a continuous improvement culture within their organizations.

vi) Promote staff participation and contribution using quality circles and motivation programs.

The statements below had both "very high" and "high" choices, with a range of 36.0% to 64.0% overall for survey respondents. The average response rate was 52.0%. Conversely, "moderate" choice, with an average rate of 35.0%, were comparatively high in comparison to the low statements, while the "low" and "very low" choices ranged from 4.0% to 28.0%. Furthermore, the results from

Table 4.9 can be interpreted as follows considering the respondents' average level of practice:

Statement 1: "*Teamwork and involvement are normal practices in the company*".

The mean is 3.76 and a standard deviation of 0.926. 64% of participants gave this statement a "very high" and "high" rating. The mean value indicates high level of practice.

Statement 2: "*Positive values such as trust, honesty, hardworking, are fostered by management*".

The mean value is 3.64, and 0.952 is the standard deviation. 60% of participants gave this statement a "very high" and "high" rating. The mean value indicates a high level of practice.

Table 4. 12: Promote staff participation

Statements	Code	Very Low	Low	Moderate	High	Very High	Mean	Rank of mean	SD
Involvement and teamwork are standard procedures in the organization.	S6.3	4	0	32	44	20	3.76	1	0.93
Management cultivates virtues like honesty, hard work, and trust.	S6.2	4	4	32	44	16	3.64	2	0.95
Every workspace has a comfortable atmosphere.	S6.1	4	8	40	40	8	3.4	3	0.91
The business implements "Employee satisfaction" programs (profit sharing, suggestion schemes, etc.).	S6.4	4	24	36	24	12	3.16	4	1.07
Average percentage		**13%**		**35%**	**52%**				
Mean of Means							**3.49**		

Statement 3: "*A pleasant environment exists in all working areas*".

The percentage of "very high" and "high" is 48.0%, and the mean is 3.40 with 0.913 as the standard deviation. The mean value indicates a high level of practice.

Statement 4: "*The Company adopts 'Employee satisfaction' initiatives (such as suggestion schemes, profit sharing, etc.)".*

The percentage of "very high" and "high" is 36.0% and mean of 3.16 with 1.068 as the standard deviation. The mean value indicates a moderate level of practice.

In general, it can be concluded that, at an average of 52% and a mean of 3.49, the above statement has a high degree of agreement.

Total quality management (TQM) is defined by Mukherjee (2006), as an organized scientific approach aimed at continuous quality improvement that involves all employees of an organization intended to cover all functions aiming at customer satisfaction in its entirety. For successful implementation of TQM, there must be promotion of participation of staff and their contribution through quality circles and motivational programs. It is evident that encouraging employee involvement and contribution was regarded as a significant step required in implementing TQM in the organization.

vii) Review quality plans and measure performance

For the statements below, the data for both choices of "very high" and "high" was between 32.0% and 60.0%, with average of 46.4%. Also, both the "low" and "very low" choices, ranged from 12.0% to 44.0%. The proportion of survey participants who selected the "moderate" option varied from 16.0% to 40.0%. Furthermore, results from Table 4.13 regarding the statement "review quality

plans and measure performance" can be explained as follows using the average level of agreement among respondents.

Table 4. 13: Review quality plans and measure performance

Statements	Code	Very Low	Low	Moderate	High	Very High	Mean	Rank of mean	SD
Employee performances are measured and recognized.	S7.5	0	12	28	32	28	3.76	1	1.01
The opinions of employees are heard, and action is taken.	S7.4	0	16	40	24	20	3.48	2	1.01
Data regarding the financial and operational performances are gathered and examined.	S7.3	8	8	36	32	16	3.4	3	1.12
Levels of customer satisfaction are tracked and measured.	S7.1	8	28	16	32	16	3.2	4	1.26
Data regarding customers and quality is gathered and examined.	S7.2	12	32	24	12	20	2.96	5	1.34
Average percentage		**24.8%**		**28.8%**	**46.4%**				
Mean of Means							**3.36**		

Statement 1: "*Employee performance are measured and recognized*".

With this statement, the mean value of practice is 3.76, and the standard deviation is 1.012. 60% of participants gave this statement a "very high" and "high" rating. The mean value indicates that the practice is high.

Statement 2: "*Employees' views are listened to and acted upon*".

The percentage of "very high" and "high" is 44.0% and mean of 3.48 with a standard deviation of 1.005. Mean value indicates that the level of practice is high.

Statement 3: "*Information on operational and financial performances are collected and analyzed*".

With this statement, the mean value of practice is 3.4, and the standard deviation is 1.118. 48.0% of participants gave this statement ratings of "very high" and "high." The mean indicates a high level of practice.

Statement 4: "*Customer satisfaction level are measured and monitored".*

With this statement, the mean value of practice is 3.2, and the standard deviation is 1.258. Of the participants, 48.0% gave this statement a "strongly agree" rating. Mean falls between 2.6 and 3.4, which indicates a moderate level of practice based on Likert scale's interpretation.

Statement 5: "*Information on quality and customers are collected and analyzed*".

The mean value is 2.96, and the standard deviation is 1.338. This statement was rated 44.0% as "very low" or "low." This is a higher percentage than the 32.0% who rated it as "very high" and "high." Mean falls between 2.6 and 3.4 indicating a moderate level of practice based on interpretation of the Likert scale.

Based on average responses of 46.4% and a mean of 3.36, it can be concluded that for this statement, "Review quality plans and measure performance.", the level of agreement is moderate. The gaps found here are due to the inconsistent collection, analysis, and monitoring of data on quality and customers, which makes it difficult to track and measure customer satisfaction levels. This might be resolved by making sure that channels for customers to communicate their level of satisfaction are made available through customer satisfaction surveys.

The significance of this statement is substantiated in a literature review by Aletaiby (2018), who states that in order to develop policies and strategies, a thorough analysis of the requirements of the key stakeholders, the performance of competitors, and the market, industry, and sector conditions is necessary. These factors serve as the basis for top-level goals, activity planning, target setting, and objective setting. As previously discussed, reviewing quality plans and measuring performance was a moderate step required for TQM implementation in the organization.

4.4.3 Qualitative analysis of tools used in Implementing TQM

The purpose of this theme was to determine tools commonly used in implementing TQM and the interview question was "What TQM tools do you use in implementing TQM and at what stages do you use them?"

Most of the interviewees used the following tools: check sheets, data collection, flow charts, graphs, survey tools, and fish borne diagram. Interviewee, IR4 stated that several tools ranging from test forms, check list, and excel sheets for data collection. The respondent states: "*Tests forms and check list for data collection, flow charts, root cause analysis, work program, excel sheets*". Interviewee IR5 states that the tools commonly used are: "*Survey tools, check sheet, graphs, flow charts, fish bone diagram*".

To summarize the responses, the interviewees demonstrated that they understood the statistical process control tools in implementing TQM in the organization. These tools are check lists, flow charts, root cause analysis, work program, and survey tools.

4.4.4 Quantitative analysis of TQM tools commonly used.

For each of the statements in Table 4.14, the data gathered shows that, 48.0% to 72.0% of all survey respondents selected "agree" and "strongly agree", with an average of 58.4%. Conversely, the choices for "strongly disagree" and "disagree" varied from slightly above 12% to 28%. On the other hand, "neutral" choice also was between 12.0% and 28.0%. Furthermore, results in Table 4.14 regarding the statement "TQM tools commonly used" is explained as follows.

Table 4. 14: TQM Tools commonly used

Statements	Code	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Rank of mean	SD
Top management uses either brainstorming, affinity diagrams, or nominal group technique as tools for problem solving.	Tool.5	20	52	16	8	4	3.76	1	1.01
We use either flow charts, run charts, or control charts as tools for understanding processes	Tool.3	32	28	24	4	12	3.64	2	1.32
Employees uses either check sheets or surveys as tools for data collection	Tool.1	24	40	12	12	12	3.52	3	1.33
We use either cause and effect diagram or why-why diagrams as tools for analyzing processes	Tool.4	16	32	28	12	12	3.28	4	1.24
We use either histograms, pareto charts, scatter diagrams, or stratification graphs as a tool for understanding our data	Tool.2	16	32	24	16	12	3.24	5	1.27
Average percentage		**62.4%**		**18.8%**	**18.8%**				
Mean of Means							**3.49**		

Statement 1: "*Top management uses either brainstorming, affinity diagrams, or nominal group technique as tools for problem solving*".

The mean value is 3.76, and the standard deviation is 1.012. This statement received the highest percentage of "strongly agree" and "agree" ratings at 72%. The mean indicates a high degree of agreement.

Statement 2: "*We use either flow charts, run charts, or control charts as tools for understanding processes*".

The standard deviation is 1.319 and the mean value is 3.64. 60% of participants gave this statement a "strongly agree" and "agree" rating. There a high level of agreement.

Statement 3: "*Employees uses either check sheets or surveys as tools for data collection*".

With a standard deviation of 1.327, the mean is 3.52. 64.0% of participants gave this statement a "strongly agree" rating. The mean falls between 3.4 and 4.2, which indicates a high degree of agreement.

Statement 4: "*We use either cause and effect diagram or why-why diagrams as tools for analyzing processes*".

The mean is 3.28 and standard deviation is 1.242. Of the participants, 48% gave this statement a "strongly agree" or "agree" rating. The mean falls between 2.6 and 3.4, which indicates a moderate level of agreement as per the Likert scale.

Statement 5: "*We use either histograms, pareto charts, scatter diagrams, or stratification graphs as a tool for understanding our data*".

The mean is 3.24 and the standard deviation is 1.268. 48% gave a "strongly agree" and "agree" rating. The mean value for this statement is between 2.6 and 3.4, which indicates a moderate level of agreement as per the Likert scale.

Figure 4.7 shows graphically the usage of the tools in TQM implementation.

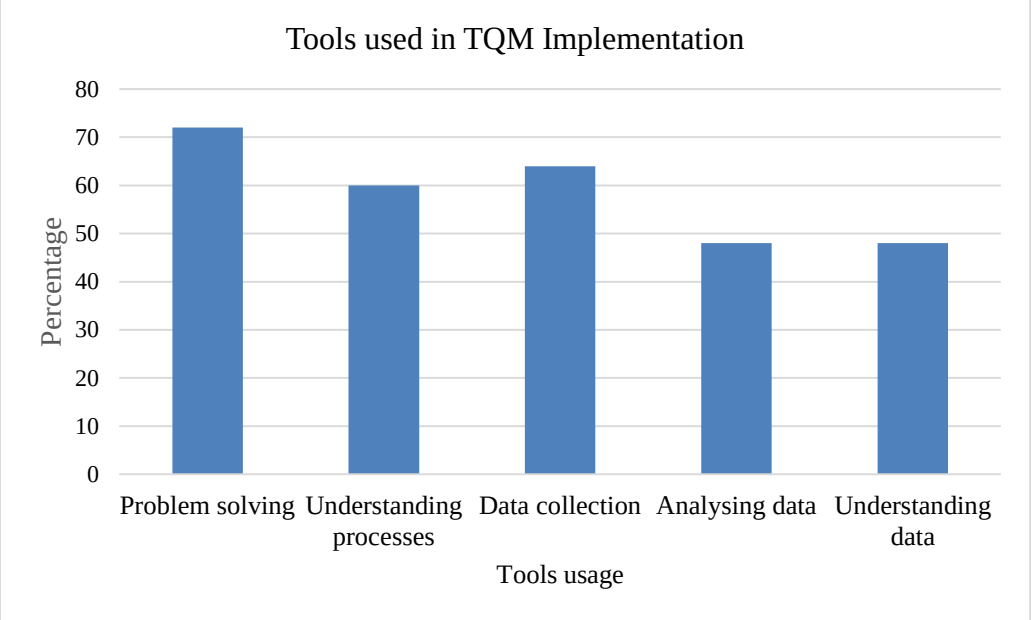

Figure 4. 7: Tools use in TQM implementation

4.4.5 Qualitative analysis of the techniques used in implementing TQM

In this section, the techniques used in implementing TQM in the organization is explored. The purpose of the theme was to determine techniques used in TQM implementation. The interviewees were asked that "What TQM techniques do you use in implementing TQM in your company?"

The interviewees gave four responses ranging from ISO 9001, Statistical Process Control (SPC), Integrated Management Systems (IMS), and trainings/benchmarking. According to IR1, the respondent says that the technique used is appraisal, employee transfer and trainings/benchmarking. This respondent stated that: "*Appraisals, Employee transfers, Trainings/benchmarking*". IR4 states that the techniques commonly used is: "*ISO 17025-environmental*

processes, ISO 9001-Quality management systems, and SPC". Another respondent IR8 looked at other techniques and sumarised them as follows: "*On spot checks, check list, monthly performance assessment, toolkit talk, inspection*".

To summarize these responses, the interviewees demonstrated that the most commonly used technique in implementing TQM in the organization is ISO9001 and SPC. This was a result of the organization following ISO certification and using the relevant tools for problem solving.

4.4.6 Quantitative analysis of TQM techniques commonly used.

According to the data, the percentage of survey participants who selected "strongly agree" and "agree" for each of the statements below ranged from 36.0% to 72% with an average of 51.5%. Also, the percentages for the "disagree" and "strongly disagree" options varied between 12% and 40%. However, the proportion of survey participants who selected the "neutral" option varied from 12.0% to 32.0%. Furthermore, results from Table 4.15 regarding the statement "TQM techniques" is explained as follows.

Table 4. 15: TQM Techniques commonly used

Statement	Code	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Rank of mean	SD
Staff adhere to quality during work and should aim at zero defect by doing the right things first time.	Tech.1	24	36	28	4	8	3.64	1	1.15
Top management outsources services and operations from service providers who do them better and cheaply.	Tech.3	16	56	12	4	12	3.6	2	1.19
Employees encouraged to benchmark so that they can perform better	Tech.2	12	56	20	0	12	3.56	3	1.121
Workers receive ongoing instruction in quality-related topics.	Tech.8	20	28	28	16	8	3.36	4	1.221
Based on sampling, quality is tracked using a specific set of statistical quality control techniques.	Tech.5	16	32	24	20	8	3.28	5	1.208
Organizations are certified by ISO for product testing, personnel training, record keeping, supplier relations, and repair policies and processes,	Tech.4	20	24	16	16	24	3	6	1.5
TQM lengthens the time required to complete tasks, and this additional time gets ingrained in the project's culture.	Tech.7	12	24	32	12	20	2.96	7	1.306
Inventories to be used up by production are received just-in-time and they are not stored.	Tech.6	4	32	28	24	12	2.92	8	1.115
Average percentage		51.3%		23.5%	25.2%				
Mean of Means							3.29		

Statement 1: "*Employees ensure quality while they work by doing the right things first time aiming for zero defect*".

The mean is 3.64 with a standard deviation of 1.15. This statement was rated at 60% as "strongly agree". The mean falls between 3.4 and 4.2, which indicates a high level of agreement based on the Likert scale.

Statement 2: "*Top management outsources services and operations from outside firms who can do them cheaper and better*".

The mean is 3.6 with standard deviation of 1.19. This statement received ratings of "strongly agree" and "agree" from 72% of participants. According to the Likert scale, there is a significant degree of agreement because the mean is between 3.4 and 4.2.

Statement 3: "*Employees learn from best practices of other projects that produce superior performance so as to do exceptionally high-quality things*".

68% of participants indicated they "strongly agree" and "agree" with this statement, which has a mean agreement score of 3.56 and a standard deviation of 1.121. Based on how the Likert scale is interpreted, the mean value for this statement falls between 3.4 and less than 4.2, indicating a high level of agreement.

Statement 4: "*Employees are provided continuous training in quality matters*".

This statement has a mean agreement score of 3.36 and a standard deviation of 1.221. 48% of participants said they "strongly agree" and "agree" with this statement. The mean value for this statement falls between 2.6 and 3.4, which indicates a moderate level of agreement based on the Likert scale.

Statement 5: "*A set of specific statistical quality control tools are used to monitor quality based on sampling*".

The mean is 3.28 and 1.208 is the standard deviation. 48% said they "strongly agree" and "agree" to this statement. The mean value for this statement falls between 2.6 and 3.4, which indicates a moderate level of.

Statement 6: "*Organizations obtain certification from ISO for product testing, employee training, record keeping, supplier relations and repair policies and procedures*".

This statement has a mean value of 3.0 and a standard deviation of 1.50. 44% of participants gave a "strongly agree" and "agree" rating. The mean falls between 2.6 and 3.4, which indicates a moderate level of agreement.

Statement 7: "*TQM increases the time needed to get the activities accomplished and this time needed becomes a part of project culture*".

The mean is 2.96 and a standard deviation of 1.306. 36% gave a "strongly agree" and "agree" to this statement. The mean value for this statement falls between 2.6 and 3.4, which indicates a moderate level of agreement.

Statement 8: "*Inventories are received just-in-time to be used up by production and they are not stored*".

This statement has a mean value of 2.92 and a standard deviation of 1.115. 36% of participants gave this statement a "strongly agree" and "agree" rating. The mean value indicates a moderate level of agreement.

Figure 4.8 shows the graphically representation of the techniques of TQM implementation used.

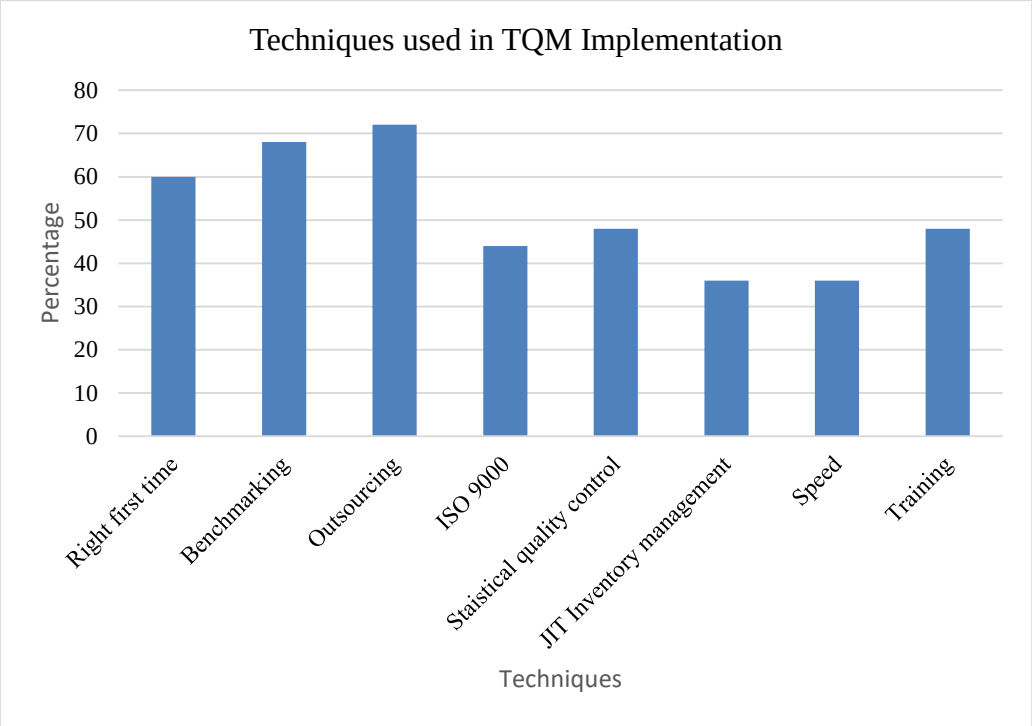

Figure 4. 8: Techniques for TQM implementation

4.4.7 Conclusion on the current practice of TQM

Generally, results from this survey data have shown that,

i) For steps of TQM implementation, following the steps for formal practice of TQM implementation is at averagely 53.4% which is at a moderate level. Results from qualitative analysis has shown that the interviewees demonstrated the steps that are required in following the international standards to get a product that matches the approved standards. These steps are not very far from the processes of attaining TQM since they are almost similar, but this is not a very good indicator towards TQM implementation. This can be confirmed by a regression analysis that was carried out on formal practice of TQM as indicator variable and the implementation of TQM a dependent variable and result is explained below.

Table 4. 16: Regression analysis of formal practice on TQM Implementation

Test	Regression weight	Beta coeff	R^2	F	p-value	Test supported
Formal practice	Formal practice On TQM implementation	0.081	0.016	0.377	0.000	Yes

The DV, TQM implementation was regressed on predicting variable formal practice to see if formal practice carries a significant impact on TQM implementation. Formal practice significantly predicted TQM implementation, $F(1, 24)=0.377$, $p<0.001$ which indicates that formal practice can play a significant role in TQM implementation ($b=0.081$, $p<0.001$). These results clearly direct the positive effects of the formal practice. Moreover, the $R^2=0.016$ depicts that the model explains 1.6% of the variance in TQM implementation is contributed by formal practice which is relatively small impact on TQM implementation.

ii) Continuous improvement is a basic TQM principle that ensures effective quality improvements in terms of tools and techniques. Techniques and tools are needed for gathering, comprehending, analyzing, and managing the processes' data. Organizations can achieve better performance, produce information that are of value, and assist management in better decision making by utilizing TQM tools and techniques.

Results from the survey revealed 58.4% of respondents agreed with every statement pertaining to frequently used TQM tools. Furthermore, these statements had a mean value ranging from 2.6 to 3.24. Therefore, there was a moderate level of agreement among participants as per the Likert scale's interpretation. It is evident that the TQM tools specified in the survey were

utilized and regarded as a moderately significant requirement for the implementation of TQM in the organization.

The results of the questionnaire survey analysis revealed that, on average, 51.5% of the respondents indicated that they agreed with each statement pertaining to widely applied TQM techniques. Additionally, 3.29 is the mean which lies between 2.6 to 3.24. Therefore, the extent of agreement among participants was moderate, as per the interpretation of the Likert scale. It is evident that the adoption of commonly used TQM techniques was regarded as a moderately important prerequisite for TQM implementation within the company.

This can be confirmed by a regression analysis that was carried out on tools and techniques of TQM as indicator variable and the implementation of TQM a dependent variable and result is explained below.

Table 4. 17: Regression analysis of tools and techniques on TQM implementation

Test	Regression weight	Beta coeff	R^2	F	p-value	Test supported
Tools and techniques	Tools and techniques On TQM implementation	0.092	0.031	0.724	0.000	Yes

The DV, TQM implementation was regressed on predicting variable tools and techniques to see if tools and techniques indicate a significant impact on TQM implementation. Tools and techniques significantly predicted TQM implementation, $F(1, 24)=0.724$, $p<0.001$ which indicates that tools and techniques can play a significant role in TQM implementation ($b=0.092$, $p<0.001$). These results clearly direct the positive effects of the tools and techniques. The $R^2=0.031$ depicts that the model explains 3.1% variance in TQM

implementation which is contributed by tools and techniques and this is relatively small impact on TQM implementation. The low value of R-squared could be due to the dependent variable being influenced by unobserved factors or random error.

4.5 Other factors that affect TQM Implementation

Table 4. 18: Other factors that can affect implementation of TQM

Code	Other factors	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
OF1	Organization structure and processes	0.0	0.0	8.0	36.0	56.0
OF2	Policies	0.0	0.0	20.0	44.0	36.0
	Average percentage	**0.00%**		**14.00%**	**86.00%**	

The respondents' combined percentage of “agree” and “strong agree” for organization structure and processes was 92%, while their combined percentage for policies was 80%. Additionally, the results indicated that organization structure and processes had the lowest percentage of neutrality at 8.0%, while policies had the highest percentage at 20.0%.

Overall, the most common response from the participants is in the "strongly agree" category, which is followed by the "agree" category. With an average percentage of 86%, it can be inferred from the above results that respondents generally agree on other recommended factors that influence TQM implementation.

A regression analysis was carried out on intervening variables of TQM as indicator variable and the implementation of TQM a dependent variable and result is explained below.

Table 4. 19: Regression analysis of Intervening variable on TQM Implementation

Test	Regression weight	Beta coeff	R^2	F	p-value	Test supported
Other factors	Other factors On TQM implementation	0.557	0.345	12.096	0.000	Yes

The DV, TQM implementation was regressed on other factors as the predicting variable to see if the other factors carry a significant impact on TQM implementation. Other factors significantly predicted TQM implementation, $F(1, 24)=12.096$, $p<0.001$ which indicates that the other factors can play a significant role in TQM implementation ($b=0.557$, $p<0.001$). These results clearly direct the positive effects of other factors. Moreover, the $R^2=0.345$ depicts that the model explains 34.5% of the variance in TQM implementation implying that 34.5 % variation in TQM implementation is contributed by the policies and organization structures and processes and this is a big impact on TQM implementation.

4.6 Tool for uptake of TQM Implementation

In this section, the tool for uptake of TQM implementation is explored. The tool was developed from the literature reviewed and outcome of the data analysis. This tool examined four areas of concern and represents objective number three of this research.

i) Organizational commitment.

For any decision to be taken in an organization, top management needs to be convinced of the importance of the decision to the organization. The findings of this research revealed that for TQM to be implemented successfully, at the planning stage, top management who represent the organization should be

committed to supporting the drive. This can be done through creating vision and formulating objectives that incorporate TQM in the strategic planning process.

ii) Employee involvement and recognition.

Implementation of TQM can only be achieved when all employees of the organization understand their roles and responsibilities in the process. The sector responsible for quality issues in the organization should ensure that all employees are involve at all stages of implementation i.e., planning, execution, monitoring, and improvement. This research has revealed that involving all employees can be done by having face to face meeting with all employees to explain the need for TQM, communicating vison /objectives of the organization, and getting their feedback on the same.

iii) Training and development.

Training is one of the ways of enhancing the capacities of the employees to be able to deliver effectively. This research has revealed that employees need to be trained on quality management and improvement activities, trained on interaction skills, and reviewing of motivational systems that can empower them. This can be done in the execution phase when the strengths and weaknesses of the employees are identified.

iv) Work environment and organization cultures.

Organizations should set up work environments where the quality management plans are aligned with the vision and goals of the organization. Processes is critical and there is need to ensure policy formulation, goal setting, and strategic planning to optimizes TQM implementation. This can be done at the all the stages

of planning, executing, monitoring, and improvement. It can be achieved through designing processes that meet the company's quality requirements, providing avenues for customers to express their level of satisfaction, and creating continuous improvement culture. This is illustrated in figure 4.9.

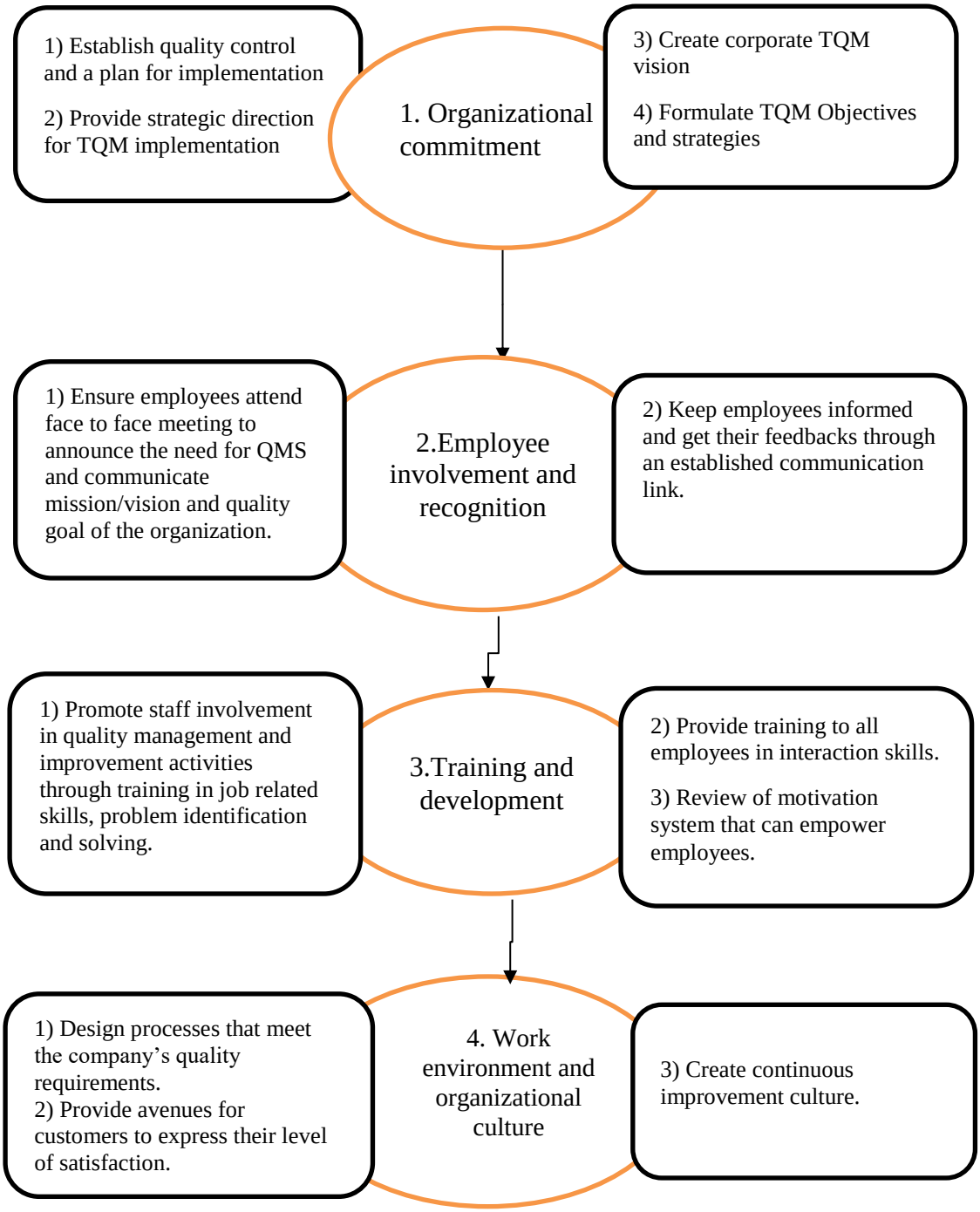

Figure 4. 9: Tool for promoting uptake of TQM Implementation

Source: Adopted from Abdussalam, (2012) and modified by the researcher

4.6.1 Alignment of specific objectives to tool developed

Steps I and 2 in the framework looked at organizational commitment and employee involvement respectively and these aligns with specific objective one (perception on TQM principles) of the research.

Steps 3 and 4 of the frameworks looked at training and development to staff and creating work environment that fosters TQM implementation. This relates with specific objective two (TQM practice within the organization).

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In chapter four of the research findings, a discussion based on the data analysis results and the existing literature review was provided. Based on the outcomes of the quantitative and qualitative data analyses, the key conclusions were compiled and presented. The review of previous research has further validated the findings. The format of this chapter is as follows.

i) Conclusions of the research drawn from each objective.

ii) Contribution of the research to the body of knowledge.

iii) Recommendations.

5.2. Conclusions of the research drawn from each objective of the study

Three research objectives were used to examine the purpose of this study. The first objective was to examine the perception of the clients about TQM principles in relation to road construction projects. The second objective was to determine how TQM is currently applied in road construction projects. The third objective was to develop a tool that can be used for uptake of TQM in road construction projects. All these specific objectives were achieved through a questionnaire survey and semi-structured interviews supported by a comprehensive review of literature. The main conclusions pertaining to each objective were outlined and presented in the subsequent sections.

5.2.1. Objective One; To examine the perception of clients on TQM principles in the road construction projects

Based on the perception of TQM derived from the discussion, the research study concluded that TQM was perceived as customer satisfaction, involving everyone

in the organization, teamwork, and participation for achievement of continuous improvement culture. The above conclusion drawn was also substantiated by a regression analysis that was carried out on perception of TQM as indicator variable and the implementation of TQM a dependent variable and result. The results clearly directed the positive effects of the perception and depicted that 18.4% variance in TQM implementation is contributed by perception.

5.2.2. Objective Two; To establish the current practice of TQM in road construction projects

Regarding following the steps for formal practice of TQM implementation, this is at averagely 53.4% which is at a moderate level. Results from qualitative analysis have shown that the interviewees demonstrated the steps that are required in following the international standards to get a product that matches the approved standards. Results from quantitative analysis investigated literature review findings of the seven key stages of TQM implementation as listed below.

Stage 1: Get top management's dedication.

Stage 2: Educate staff, change their mindset, and awareness raising

Stage 3: Create approaches to TQM that are procedure-oriented.

Stage 4: Create plans for achieving quality for projects at every work level.

Stage 5: Institute continuous improvement

Stage 6: Use quality control circles and incentive programs to encourage staff involvement and contribution.

Stage 7: Quality plans are reviewed and performance measurement done.

The study revealed high level of practice of other steps with only steps three and five having moderate level of practice. The study concluded that TQM is being

practiced moderately in the construction industry in Uganda. This was substantiated in the regression analysis that 1.6% of the variance in TQM implementation is contributed by formal practice.

Regarding tools and techniques of TQM implementation, results revealed 58.4% used TQM tools and averagely 51.5% agreed to using TQM techniques. It's clear that TQM tools and techniques commonly used were regarded as a moderately significant requirement for implementing TQM in the organization. This can be confirmed by a regression analysis that was carried out on tools and techniques of TQM as indicator variable and the implementation of TQM a dependent variable and result is explained model explains 3.1% variance in TQM implementation which is contributed by tools and techniques.

5.2.3. Objective Three; To develop a tool that can be used for uptake of TQM in road construction projects

From the results of the finding and through literature reviewed, the researcher improved a tool that can be used for uptake of TQM implementation in the construction industry. The four areas of concern in the tool are organizational commitment, employee involvement and recognition, training and development, and work environment and organizational culture. The tool further simplified tasks to be carried out to achieve the area of concern.

5.3. Contribution of the research to the body of knowledge.

Through the following scholarly and practical contributions, this study provides the major outcomes that add to the body of knowledge on Total Quality Management (TQM)..

5.3.1. Academic Contribution

i) This research is the first to assess implementation of TQM in the road construction projects in Uganda with a bias on the client's perspective. Thus, this research basically provided substantial information that represents TQM issues in the Ugandan road construction projects.

ii) The importance of these research findings and recommendation is to add on the body of knowledge and motivating further follow-up studies on Total Quality Management. Indeed, it is anticipated that this study will create opportunities for other scholars and researchers to conduct additional research to examine and pinpoint other factors influencing the adoption of Total Quality Management.

iii) Finally, the researcher's own professional and personal development has been achieved from this study. This has made it possible for the researcher to finish the studies as a master's student because doing so is necessary to receive the degree.

5.3.2. Practical Contribution

i) The research's findings can be employed as a tool to promote TQM implementation in a variety of industries, not just road construction projects.

ii) This study offers data that helps increase awareness of the state of TQM implementation, which may aid in the performance improvement of other industries as well as road construction projects.

5.3.3 Limitations of this study

i) The findings are limited in their applicability to other parties involved in road construction projects because the research strategy adopted here was a single case study within the parties involved during road construction. However, for

the study's conclusions to be applied to other construction projects in Uganda besides roads alone, the researcher gave detailed explanations of the concept studied, how it was analysed and who the participants were.

ii) The limited timeframe could not allow the testing of the tool that was developed by the researcher for improving uptake of TQM on a real-life project.

iii) Finally, there is difficulty of generalization of the research findings which are sector specific to other sectors other than the ones in road construction projects in Ugandan.

5.4. Recommendations

The recommendations listed below are meant to serve as starting points for issues that need more research.

Given that the findings have already demonstrated that TQM was perceived as customer satisfaction, involving everyone in the organization, teamwork, and participation for achievement of continuous improvement culture, it is important that organizations invest in building the perception of TQM so that it is taken holistically. This can be done by ensuring that management put policies in place that encourage knowledge management in TQM implementation.

Since the results revealed that TQM is being practiced moderately in the road construction projects in Uganda by the clients, the gap in the steps to follow while implementing TQM (i.e. instituting continuous improvement, developing process approach towards TQM, and reviewing quality plans and measuring performance) needs to be addressed. This can be done by laying down the

implementation steps to the employees of the organization so that they can be able to follow in their day-to-day work activities.

Since the study has established a tool that can be used for uptake of TQM in the construction industry, the tool can therefore be subjected to use to ascertain its effectiveness. This can be done through disseminating and sensitizing the employee on the usage of the tool.

Whereas the findings of this research are sector specific (i.e road), it is believed that they could be generalized to other sectors of the construction industry in Uganda. Therefore, more research is needed to determine whether these findings can be applied outside of the construction sector.

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