EVALUATION OF TOTAL QUALITY MANAGEMENT (TQM) PRACTICES OF SELECTED CONSTRUCTION FIRMS IN AKWA IBOM METROPOLIS

BY

DURU, EMMANUEL CHIGOZIE

REG NO: (20085657909)

A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL

FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF BUSINESS ADMINISTRATION DEGREE (MBA) IN PROJECT MANAGEMENT TECHNOLOGY.

JULY, 2023

DECLARATION

I declare that this project work is my original work and has not been previously submitted for any degree in any university or similar institution.

_____ _____

DURU, EMMANUEL CHIGOZIE **DATE**

CERTIFICATION

This is to certify that this project work titled Evaluation of Total Quality Management (TQM) Practices of Selected Construction Firms in Akwa Ibom Metropolis with Reg. No. 20085657909 in partial fulfillment for the Award of Master of Business Administration (MBA) Degree in Project Management Technology of the Federal University of Technology, Owerri.

PROF. E. C. UBANI **(PROJECT SUPERVISOR)**	23-01-2024 **DATE**
DR. I. I. ECHEME **(HEAD OF DEPARTMENT, PMT)**	30/1/2024 **DATE**
PROF. K. U. NNADI **(DEAN, SMAT)**	31/1/24 **DATE**
PROF. B. O. ESONU **(DEAN, PGS)**	**DATE**
EXTERNAL EXAMINER	**DATE**

DEDICATION

This project work is dedicated to Almighty God who has been showing me favors in different dimensions, my Wife Mrs. Ezinne Emmanuel and Children: Chidera Emmanuel, Chioma Emmanuel, Chimuanya Emmanuel and Chiemela Emmanuel.

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ABSTRACT

The construction industry grapples with significant challenges arising from both domestic and international market competitions. These challenges stem from the limited capacity of construction companies to adopt innovative managerial methodologies capable of addressing the prevailing complexities within the business environment. Consequently, the sustainability and competitive positioning of these companies in the dynamically evolving global economic landscape become precarious. Failure to effectively mitigate these challenges and devise strategic solutions may result in the displacement of domestic employment opportunities in Nigeria by multinational construction firms, thereby exerting adverse repercussions on the nation's economy. To preemptively address this impending threat, a rigorous scientific inquiry into the total quality management (TQM) practices of selected construction companies in Nigeria becomes imperative. Consequently, this research project aimed to evaluate the TQM practices of chosen construction companies situated in the Akwa Ibom Metropolis. Utilizing structured questionnaires, secondary data were gathered from 45 selected construction companies, with 40 returned and validated responses. Reliability testing was conducted using Cronbach's alpha statistic. Dimension reduction analysis, employing the principal component regression method, was employed for factors influencing TQM practices, encompassing twenty questions, as well as fifteen questions pertaining to TQM practices adhered to by the companies. The findings, based on factor loadings of singular components extracted in each instance, revealed that Project quality, estimation, scheduling, risk assessment, and quality of workmanship emerged as the top five factors influencing Quality Management. Concurrently, proper planning, adequacy of employee training, budgetary allocation, staff training, and personnel management were identified as the foremost TQM practices adhered to by construction companies in the Akwa Ibom Metropolis. This research contributes to the understanding of TQM dynamics within the construction sector, offering valuable insights for enhancing competitiveness and sustainable growth in the face of evolving market challenges.

Keywords: Evaluation, Total Quality Management (TQM), Construction firms, Akwa Ibom Metropolis, Project quality, Estimation, Risk Assessment.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Construction firms in Nigeria, like those in other developing nations, face significant obstacles from domestic and global market rivalry. These are brought on by their poor ability to adapt new managerial techniques to address the issues facing the company environment today. Thus, it will be hard to see companies remain afloat and compete favorably in the dynamically changing global economics. If all those threats are not properly managed and solutions proffered, the available domestic jobs in the country will be taken over by the multi-national construction firms which will have adverse effects to the economy of the country. Due to the intense competitive bids and robust process in construction executions, there should be emphasis on quick work and short time cycles in construction processes and long-term viability in quality. Billions of Naira of public funds are spent each year in the Construction Industries in Nigeria. Globalization, tending single market economy and liberalization lead to more demand by clients for durable projects. The Construction firms are becoming more innovative and competitive to survive in this context. However, the firm must give its workers the necessary tools and skills, especially those people involved in the continual improvement, in order to enable enterprises to enhance operational systems continually by offering high-standard goods and services. Customer happiness is what motivates quality improvement, although other people contend that internal productivity or cost-cutting initiatives may also accomplish quality management. Due to the significance of the Nigerian economy's construction industry and the intense competition in the sector, business owners must embrace the Total Quality Management (TQM) strategy in order to compete locally and internationally by reinforcing their quality standard in order to enable and grow their market shares and customer

loyalty. The construction industry must thus be expanded in a number of areas, beginning with the adoption of a formal quality strategy, having a firm grasp of the TQM method and essential business processes, staff training and supervision, and quality measures. Adopting TQM practices in the Nigerian market should improve the quality of projects and tasks, boost productivity and profitability, improve worker and client satisfaction, and strengthen brand recognition by enabling businesses to compete on a global scale while maintaining high standards of quality.

Nigeria, one of the developing nations and the second-largest economy in Africa, is anticipated to exit recession in 2017 with a development rate of 1.2 percent before picking up speed to 2.4 percent in 2018. This prediction was made in the World Bank's 2017 Global Economic Prospects report. The World Bank reported that there have been fewer militant attacks on oil pipelines in Nigeria. Nigeria's economic downturn is ending, which has had an impact on the country's construction firms' adoption of TQM.

Moreover, Nigeria has had a recent surge in growth in the construction\ industry; thus, many foreign organizations have allegedly adopted TQM methods and tools, but regrettably the lack of studies and research in the TQM area in Nigeria and the nonexistent quality control system have led these companies to operate locally, devoid of any quality measurements by government. Hence, due to increased client complaints, it has been noticed that the quality scale in the Nigeria construction sector has dropped suddenly to the lowest level, as a result of giving to meet the increased demand in the industry, contractors are putting more emphasis on output than quality and to stay afloat in cash crunched economy. The stakeholders in construction sector (clients, contractors, suppliers, employees and final users) are of the opinion that firms should ensure that quality tops priority in every construction job.

1.2 Statement of Problem

Nigeria, the most populous nation in Africa, requires a well-structured environment to house its citizens. Despite the fact that Nigeria is considered to be a developing nation, it is impossible to ignore the fact that there are several shortcomings in the area of social facilities such as public buildings and roads. In recent years, it has been seen that many public structures, including roadways, are no longer able to withstand the test of time. The poor performance of building projects in Nigeria has raised serious concerns, which is partially attributable to the choice of the incorrect contractor to complete the work (Akinsiku, 2020). The inability of Nigeria's construction industries to consistently produce long-lasting structures raises many questions about whether these businesses are being forced to compromise on cost and quality as a result of the economy or whether the necessary resources are no longer easily accessible in the nation. Building projects are getting bigger and more complex, and clients are now demanding higher quality at a minimized cost and budget, so construction companies need to decide on how to utilize a strategy for higher quality at a minimal cost without losing out on their profit margin and the clients' desire. (Femi, 2015). Despite the infrastructure issues, it's paramoumt to keep in mind that any company establishment's first goal is to make profit and the construction industry is no exception. There is an increase in the dumping of less expensive building supplies, particularly from Asian nations, and many construction companies still view overall quality management as a luxury rather than a need (Gharakhani, Rahmati, Farrokhi and Farahmandia, 2013). Even when many of them make an effort to develop, they only concentrate on catching up to rivals rather than on the actions that would add new advantages to their objective. In the cooperate world, quality management is used to oversee all the engagements and task used to maintain a certain level of excellence in quality. Therefore, it is crucial to examine the TQM procedures used by building companies in the Uyo

metropolis as it would provide a reliable understanding of the issues that have resulted in subpar infrastructure. Investigating this background has led to this project work considering the Evaluation of Total Quality Management (TQM) Practices of Selected Construction Firms in Uyo Metropolis.

1.3 Aim and Objectives

The main aim of this study is to evaluate the total quality management (TQM) practices of selected construction firms in Uyo Metropolis. The specific objectives of this research study are:

i. To examine the factors affecting Quality Management practices in construction firm located in Akwa Ibom metropolis.
ii. To assess the Quality management practices that conforms to construction companies in Akwa Ibom Metropolis.

1.4 Research Hypothesis

It is usual practice to set hypothesis wherein research of this nature is embarked upon to act as a guide to the study. Hence, the following hypothesis were tested by the researcher in this research work.

i) Worker's perception on the factors affecting TQM in some construction companies in Akwa Ibom is the same.
ii) Factor's affecting TQM practices in some construction companies is unknown.
iii) Akwa Ibom construction companies do not observe any TQM practices.

1.5 Justification of Study

The significance of this research studies when successfully completed include:

i. The study will give the management of the several Akwa Ibom - based construction companies the ability to know the top five factors affecting TQM practices in their companies.

ii. The study will reveal the top five TQM practices that are predominant in Akwa Ibom based construction companies which will help the management team device a method of also looking into the remaining TQM for the betterment of the company.

iii. This study will contribute to the development of improvement plans that will assist businesses in this industry operate more profitably.

iv. It will give new industry investors useful information on how to make to plan for sustenance in the business.

1.6 Scope of Study

It will primarily take into account the observations made by local Uyo building construction companies. As the present capital of Akwa Ibom state, Uyo is the most well-known city there and a prime location for infrastructure development initiatives. Additionally, the state has recently hired many indigenous construction workers as a result of its push for infrastructure development. Twenty Construction Firms in total participated in this study in terms of institutional coverage, and the study is carried out in Uyo, Akwa Ibom State, in terms of geographic coverage. The companies are listed in the Table below:

Table 1.1: Construction Firms for the Study

S/N	Name of the company	Status	Quality management culture
1	Julius Berger	Foreign	Yes
2	Nigerpet Structures	Foreign	Yes
3	Cecc	Foreign	YES
4	Wee Engineering	Foreign	Yes
5	Seatraco	Foreign	YES
6	Arab Contractor	Foreign	Yes
7	Zeerock	Foreign/Indigenous	YES
8	Seyang	Indigenous	NO
9	Neatbuild	Indigenous	NO
10	Edcon Nigeria	Indigenous	No
11	Sametric Structured	Indigenous	No
12	Emilia Construction	Indigenous	No
14	Clintbil	Indigenous	NO
15	Nyak Nig Ltd	Indigenous	No
16	Drogo Multi-Concept Ltd	Indigenous	No
17	Zebul Engineering Ltd	Indigenous	No
18	Seyang	Indigenous	YES
19	Nsik Construction	Indigenous	Yes
20	Hensek Engineering	Indigenous	Yes

1.8 Limitation of the Study

The scope, data collection method, and methodological assumptions are the study's main shortcomings. Only respondents from the Uyo metropolitan are included in the study's scope, which may not be sufficiently representative to provide insight into the nation or state as a whole. Additionally, the choice of Akwa Ibom State as the study's location was made based on convenience and a sizable ongoing construction project. The non-cooperative attitude of some

respondents, who didn’t comprehend the research's main motive, is one of the study's limitations. There are numerous processes that are subsections of TQM, few of which might have not been adequately covered in the study. A representative sample of all the construction firms should have been sufficient because one of the study's goals was to help them improve their tactics so they could compete successfully in the Nigerian market. Despite these obstacles and consumers' cynicism that their opinions would matter, the researcher made a concerted attempt to get meaningful information from respondents. This procedure lessened bias and skepticism regarding the efficacy of anticipated results and the study method.

CHAPTER TWO

LITERATURE REVIEW

2.1 Conceptual Review

Total Quality Management (TQM) has grown to be a crucial managerial concept as a result of quality getting increasingly salient to firms due to high levels of competitiveness in the global marketplace (Martínez-Lorente, Dewhurst and Dale, 1998). The concept of TQM was first utilized in the middle of the 1980s and only officially entered the quality-related lexicon in the late 1980s (Martínez-Lorente *et al.*, 1998). TQM was not just a bloom topic in every company development, it had a lot of pioneers like Deming, Crosby, Juran, Feigenbaum, Ishikawa, and others who worked extremely hard to define and update the topic by enhancing some outdated systems. According to Behnam (2017), there were four major phases of TQM evolution are Quality Inspection, Quality Control, Quality Assurance, and TQM.

Quality Inspection

Dale and Bunney (1999) defined quality inspection as a series of procedures that involve measuring, examining, testing, gauging one or more product or service qualities, and comparing all findings to predetermined standards in order to access each feature by establishing conformance. On the other hand, "Inspection" is a useful and efficient method for identifying product and service flaws at the necessary level. As a result, it's important to study, test, and assess inside businesses and sectors. In order to guarantee the finished product is of the appropriate quality, inspection is employed to grade it. According to Juran (2008), quality inspection helps skilled workers increase the quality. Due to the implementation of skilled staff, measurement and examination may be conducted more effectively. The management of the quality improvement concept in the production process is assisted by skilled people. The degree of activities and

approaches for quality improvement are provided to the work process through quality inspection. Furthermore, it is claimed to be an effective activity of quality enhancement in satisfying the needs of its clients. Testing allows quality inspectors to spot chances for offering high-quality goods and services, which in turn helps the process of continuous quality improvement. Therefore, whether inspection roles were established by competent individuals or not, manufacturing activity focused on inspection.

Quality Control

Quality control, according to Lawrence (1998), encompasses operational strategies and routines used for inspecting and evaluating products and processes in order to maintain and conserve quality. Product design, operational procedures, and outputs are all subject to quality control to make sure that all tasks are primarily completed in accordance with the necessary standard. Additionally, quality control is a regulatory procedure necessary for a business to attain the standards of quality (Mitra, 2008). Quality control places emphasis on operational procedures to assess real quality performance and determine if items can adhere to specifications. It has to do with the inspection procedure, which serves as a prerequisite for getting past a consumer. Quality control, on the other hand, doesn't set the bar for creating standards because its primary goals are reducing fault occurrence and stabilizing process control. The goal of quality control is to maintain a high standard for the output related to the product or service through the method of selection, measurement, and fault avoidance. Three quality management procedures, including quality planning, quality improvement, and quality control, exist, according to Juran & Joseph (1998). Additionally, quality, according to Dale (2009), is the culmination of marketing, engineering, production, and service that makes it possible to meet consumer needs. Additionally, the term "quality" can refer to a methodical strategy that entails the involvement of all activities, such as

quality control, quality maintenance, and quality enhancement. Quality control is a commercial strategy as opposed to a technical activity, claims Jerry (1989), because the latter requires the utilization of materials, machinery, processes, and operational procedures. He emphasizes further that human relationships are a fundamental component of quality control work that results in progressive commitment to TQM, including top management, employee engagement, supply management, open communication, and cost-benefit analysis of quality.

Quality Assurance

By putting an emphasis on the quality of the product and the services provided, quality assurance is a planned and systematic preventative action that boosts productivity (Oakland, 1995). According to Dale *et al.* (1994), quality assurance places a strong emphasis on defect prevention and concentrates on preventing the manufacturing of non-conforming items in order to provide organizations confidence in their outputs and guarantee that customers will be satisfied. Additionally, it aims to regulate quality at all manufacturing steps that are intended to guarantee that the finished good and service match consumer expectations. Because all the tasks are completed prior to manufacturing or the planning stage of a product or service, respectively, quality assurance demonstrated that quality is established in the design stage but not in the control stage. Defects in a product or service are therefore avoided or reduced through the creation of innovative operational procedures. In order to guarantee that final goods or services created as a result of the business process of production being designed fulfill customer expectations, quality assurance, according to Frank & Ronald (2013), needs systematic preventative efforts. In order to ensure quality at every level of production, quality assurance is thus carried out through a series of procedures prior to the manufacture of goods and the provision of services. To keep a strong relationship with clients, it is essential to inspire trust in an organization's outputs. Therefore,

through creating new items with superior design and development, customers' wants and expectations are determined. Quality assurance for goods and services involves the prevention and mitigation of the root causes of problems during the planning stage. Additionally, any actions and programs that have a strong focus on product development may be used to ensure quality improvement. According to Joachim (1993), quality assurance focuses on continuous improvement across the whole production process, from the level of planning and preventative measures through the actual job being done. The fulfillment of client expectations and satisfaction, which are based on design, distribution, and development within a structured work plan process, will be facilitated by a focus on quality assurance. The fundamental tenet of quality assurance is the notion that faults may be avoided.

Quality Management

Setting up the right circumstances for the construction work process, developing the mindset and atmosphere necessary for prevention, and formulating strategies are all part of quality management (Crosby, 1989). Quality management is concerned with the operation process, organizational planning, and creation of strategies, according to Dale & Lascelles (1997). Additionally, quality management deals with the process of planning, coordinating, and managing the variables in order to provide high-quality work at a reasonable cost, guaranteeing customer happiness and boosting the organization's reputation. In order to fulfill customers' requests and expectations while enhancing overall company efficiency, strategy creation for quality management for a specific process by an organization primarily focuses on customer satisfaction. According to Besterfield (2008), staff training is crucial for firms in order to enhance worker productivity and capabilities while also speeding the kind of quality and customer satisfaction-producing organizational performance. Therefore, it should be a need for quality management at all levels to have enough

education and training that can support the process of continuous quality improvement and product development. According to Ramezani & Gharleghi (2013), in order to produce value for the business and high-quality outputs, employees and management must collaborate with all departments and be integrated in order to accomplish the essential quality management outcomes. Defects may be decreased by integration processes across all divisions, which will lower the organization's total operational expenses.

Recently, the concept of TQM has evolved into one of the most utilized industry management concepts across the globe. The development of specific ideas in the area of corporate quality improvement by TQM experts during the past few decades has led to a significant paradigm shift in the enhancement of the quality of goods and services (Fonseca, 2015). In both public and commercial enterprises, TQM has been identified as a significant driver of organizational performance. To comprehend how organizational culture, TQM, and sustainability all affect performance inside organizations, extensive research has been done (Wassan, Memon, Mari, Kalwar (2021). When starting a TQM program in a company, everyone involved must first comprehend the fundamental TQM concepts before identifying the core issue, which might range from high-level strategic issues to regular operational concerns (Orumwense, 2014). Given that management philosophy is relatively new in Nigeria, it is observed that the current state of TQM adoption in local businesses is encouraging (Orumwense, 2014). Due to the global manufacturing sector's continued growth and expansion, TQM has emerged as a fundamental pillar for progress and growth. TQM practices are thought to be crucial for successful TQM implementation, albeit they may vary in manufacturing organizations (Wassan *et al.*, 2021). However, it was discovered that if TQM techniques are properly handled in manufacturing organizations, organizational performance can be attained (Wassan *et al.*, 2021). According to (Ellitan, 2021), the most recent

development in management is called TQM, where all actions are directed toward maximizing customer satisfaction through ongoing process development. TQM is a set of organizational management practices created to ensure that the business consistently satisfies or beyond customers' expectations. A well-planned management process produces lower production costs, higher output production efficiency and effectiveness, which improves overall business performance. The findings of Wassan *et al.* (2021) indicated that full quality management and sustainability are the most important strategies for the manufacturing industry's performance success. The findings demonstrated a beneficial relationship between TQM and sustainability and organizational performance. In the light of these results, a framework was developed to examine the connections between important TQM practices, sustainability, and organizational performance (Wassan *et al.,* 2021). The general consensus is that complete quality management can result in long-term competitive advantages for organizational success (Wassan *et al.,* 2021).

2.2 Theoretical Review

Producing high-quality products and services that satisfy consumer demands and expectations is the alternative. In literature reviews of modern management, the notion and methods of TQM have received substantial study, particularly in relation to corporate performance (Ellitan, 2021). Over the past 10 years, many companies have focused on total quality management (TQM) as a strategy to boost profits, market share, and competitiveness (Virender, 2016). According to Akinsiku (2020), the top six challenges identified by project stakeholders, including clients and consultants, included a lack of technical expertise, a project's inability to generate profit, a delay in paying contractors for their work, poor delicate planning and forecasting, a shortage of trained labor, poor supervisory capabilities, ineffective project planning, and poor management of the construction process. Due to poor quality's significant financial consequences and negative repercussions on

every part of an organization, businesses have become increasingly aware of its high cost. Poor quality expenses result in unhappy consumers, a smaller market share, and ultimately a loss of business. Although there are other tools that must be taken into account, such as profits, production and servicing costs, and maintenance and quality costs, they are not considered a reliable measurement tool to guide management performance and reliability. There has been a significant shift in the notion of what quality expenses are. Prior to the 1990s, corporations felt that improvements were inevitably associated with increased costs, which included scrap costs, warranty costs, and operating costs for the quality assurance department. In 1951, Juran divided the costs associated with quality into conformance and non-conformance costs, where conformance costs are associated with higher quality and non-conformance costs are associated with lower quality. Building on Juran's quality costs, Feigenbaum split the non-conformance cost into internal and external failure costs in 1961. He also divided the conformance cost into preventative and assessment costs. According to Seokjin and Behnam, this is when this model of quality prices became the most popular (2008). Due to the present economic downturn and intense competition, it has recently come to be widely understood that there are additional expenses associated with manufacturing, operation, maintenance, and design. As a result, companies now need to closely monitor and limit their spending. A variety of operations, such as internal ones like planning, R&D, production, marketing, sales, purchasing, storage, control, delivery, and installation, result in quality expenses. On the other hand, some outside variables, such as suppliers, distributors, agents, subcontractors, and, in particular, consumers, might have a direct impact on the cost of quality. However, there are several additional expenditures associated with quality that fall into two categories. The first category is referred to as "quality control expenses," and it is further broken down into two types: preventative costs and assessment costs. The second

category is referred to as quality failure cost, which includes both internal and external failure costs associated with low quality. In order to meet customer expectations and reduce production and service expenses, prevention expenditures are incurred. These costs include strategic quality planning, frequent training, and regular internal audits. To guarantee that output complies with requirements, input, process, and output inspection expenses are all included in appraisal costs. According to Gryna *et al.* (2007), a company's quality effectiveness of its quality expenditure may be stated as a percentage by assessing total quality cost as a proportion of sales turnover, labor hours, material expenses, and overall manufacturing costs. While some businesses link internal failure costs to typical percentages of production expenses or utilize quality improvement costs as a proportion of quality costs, others use warranty costs as an average percentage of sales volume.

The main way that TQM principles are applied in relation to structural failure rate is by making sure that the materials chosen meet the necessary specifications, using an institution's quality-improving construction process, making sure that quality is supervised by the construction performance management, and monitoring and controlling quality throughout the construction to make sure that quality standards are strictly adhered to (Egwunatum, Anumudu, Eze and Awodele, 2022). The primary observed that the main barriers to the implementation of TQM on construction projects include insufficient equipment, facilities, a collapse in information and communication in both supervisory and management teams on site, poor attitudes and techniques toward maintaining equipment, tools, and machines, as well as a lack of swift reimbursement and economic benefit programs (Egwunatum *et al.*, 2022). It was noted that process innovation, innovative thinking, and searching for methods to enhance not only the end product but every stage of the manufacturing operation is crucial to the future of quality management. (Kumar, Singh, Kumar, and Antil 2016).

Total Quality costs:

Due to poor quality's significant financial consequences and negative repercussions on every part of an organization, businesses have become increasingly aware of its high cost. Poor quality expenses result in unhappy consumers, a smaller market share, and ultimately a loss of business.

There are other tools that must be taken into account, such as profits, production and servicing costs, maintenance and quality costs, but producing high-quality goods and services that meet customer needs and expectations is not thought to be a reliable and valid tool to guide management performance and reliability.

There has been a significant shift in the notion of what quality expenses are. Prior to the 1990s, corporations felt that improvements were inevitably associated with increased costs, which included scrap costs, warranty costs, and operating costs for the quality assurance department. In 1951, Juran divided the costs associated with quality into conformance and non-conformance costs, where conformance costs are associated with higher quality and non-conformance costs are associated with lower quality. Building on Juran's quality costs, Feigenbaum separated the non-conformance cost into internal and external failure costs and the conformance cost into preventative and assessment costs in 1961. According to Seokjin and Behnam, this is when this model of quality prices became the most popular (2008). Their spending carefully and periodically evaluates it. Due to the present economic downturn and intense competition, it has recently come to be widely understood that there are additional expenses associated with manufacturing, operation, maintenance, and design. As a result, companies now need to closely monitor and limit their spending.

Quality costs emerge from range of activities; for instance; planning, research and development, production, marketing, sales, purchasing, storage, control, delivery, service making, and

installation as internal activities. On the other hand, there are some external factors that can directly influence the cost of quality, such as, suppliers, distributors, agents, subcontractors, and especially customers. However, there are several additional expenditures associated with quality that fall into two categories. The first is referred to as quality control cost and is broken down into two categories: preventative costs and assessment costs. It consists of essential expenses for obtaining high quality. The second is referred to as quality failure cost and includes both internal and external failure costs. It is comprised of expense due to poor quality.

Prevention costs are incurred to minimize appraisal and failure (internal and external) costs by having strategic quality planning, regular training and regular internal auditing, to fulfil customer expectations and minimize production and services costs.

Appraisal costs include all the costs incurred by input, process and output inspections to ensure that output conforms to specifications. However, while the internal failure costs occur as a result of defective products and services before being received by customers, external costs are associated with product and service quality problems after being received by customers such as warranties, returns, and reputation or business loss due to customer dissatisfaction.

Gryna *et al.* (2007) report that quality cost can be expressed as a percentage, by measuring a firm's quality effectiveness of its quality expenditure, such as measuring total quality cost as percentage of sales turnover, hours of labour, material costs, and total manufacturing costs. Some firms use warranty costs as an average percentage of sales volume, while others compare internal failure costs to average percentage of production costs or use quality improvement costs as a percentage of quality costs.

However, Giakatis *et al.* (2001) mention that quality costs represent a considerable amount of the overall manufacturing or servicing cost. Nowadays, total quality management receives enormous

international attention and a majority of organisations have started to apply total quality management due to the spread in the belief that it reduces costs and improves productivity. On the other hand, some organisations believe that the higher the quality, the higher the costs; thus, they neglect this approach, according to Lau and Tang (2009). However, different studies of quality implementation by Ford, Jaguar, and some construction firms found, that there is a direct relation between quality implementation and cost reduction, as mentioned by Chauvel and Andre (1985). Deming (1986) states that "improving quality always reduces costs", as seen in his quality chain, as follows:

Quality implementation Vs Cost reduction **Deming (1986)**

Cost reduction is an important approach within an organization towards improving quality and controlling company expenses. Therefore, all organizations are keen to implement the total quality management approach since it focuses on doing the job right first time, employee training and empowerment, continuous improvement, and supplier relations, all of which leads to cost reduction. Thus, an organization can achieve cost savings by implementing a strategic and methodical cost reduction approach which, at the same time, can make a contribution to the business by helping an organization to adopt and monitor the effects of the required changes towards cost reduction by conducting a thorough check of the overall costs involved. However, the cost reduction concepts require fundamental changes and improvement to company strategies and culture to make improvements in product and service design, delivery, employee skills and knowledge, and especially employee attitude towards error prevention by adopting an error prevention culture. Thus, it is important to discuss Six Sigma as a statistical approach leading towards improving quality and cost reduction.

Quality Management Leaders Comparison and Similarities

The early Americans were significant in putting Japan at the center of quality leadership. In the 1950s, they adopted, developed, adapted and applied distinctive approaches which matched their culture. Much of the increased awareness of the Importance of the quality in the West has resulted from the work of the newer western gurus, and they have contributed to the development of the modern TQM concept.

MacDonald (1993) draws attention to an 'intriguing' aspect of the quality movement in the 1990's in the relative demise of the quality guru. McDonald states that Crosby, Deming and Juan dominated the subject of quality throughout the 1980s. They each provided wisdom and powerful drivers for thought, but none have provided a complete and final answer in the form of a TQM framework, where their work was rather considered as advice for management to follow. While each guru has his own distinctive approach, however, there is considerable commonality between them.

Similar to Deming, Ishikawa, and Juran, Crosby emphasized the importance of management in the attempt to improve quality as well as the use of statistical control methods for quality monitoring and measurement. Deming gave management a high priority and held it accountable for 94% of quality issues, both at the individual and corporate levels. His fourteen-point strategy is an all-inclusive management philosophy that may be used by small and large businesses in the public, private, or services sectors. Juran stressed the need of continual quality improvement through a series of minor improvement initiatives carried out throughout the business, even though he thought that quality is connected to consumer happiness and discontent with the product. Feigenbaum emphasizes quality development based on the efforts of various groups within an organization, while Ishikawa emphasizes the human side of quality.

Instead of striving to control all the numerous changes during actual manufacture, according to Taguchi, it is preferable to develop a product that is resilient to or immune to change in the manufacturing process. However, Deming is against the Zero Defects philosophy, while Crosby believes in it, and all but Crosby rely on statistics.

Moreover, all emphasize that having a good management philosophy and strategy are important steps for organizations towards quality improvement and aims achievement; customer satisfaction should be an organization's main objective; the people within the organization should have full attention as they are considered the main aspect toward quality achievement. They emphasize team work instead of individuality, good relations with suppliers and constant training and improvement.

However, none of the aforementioned excellent contributors actually created any implementation frameworks. They came up with certain stages for improvement and management guidance that was more like a prescription for businesses to follow. By taking up the quality contributors' improvement steps and advice on TQM implementation, countries have developed frameworks for their organizations to implement TQM, based on the previously discussed guru contributions. Therefore, their knowledge and contribution to the quality improvement fields helped countries worldwide to establish their own frameworks for quality improvement in different industries, such as the manufacturing and services industry where the major focus was. Companies such as Toyota and Ford established their quality improvement frameworks and measurement tools based on the contribution of TQM gurus.

Jordan and the UK, TQM gurus helped to spread quality throughout all industry and to establish different quality improvement models to help organizations improve their quality performance such as the European Quality Award, Pride in Job Quality Award and King Abdullah II Award for

Excellence (KAAE) (Jordan), which are still fundamental for quality improvement for all types of companies and industries. Their ideas have been taken forward by many countries but, despite the availability of these models, many companies in the UK and Jordan still fail to achieve quality improvement due to some internal and external factors.

Critique of Total Quality Management:

The other aspect of the situation still involves some failure or difficulty in fully implementing Total Quality Management and, in some cases, it could be impossible to achieve due to several barriers towards full Total Quality Management, despite the existence of numerous experiences of successful implementation of TQM in various companies across the globe. For instance, Wilkinson and Witcher (1991) discuss the fundamental obstacles to the application of total quality management in the UK, citing a survey of 250 UK businesses that revealed that few businesses recognize that TQM is a comprehensive effort that necessitates a change in management behavior and culture. Despite the fact that TQM projects are quite popular, they add that short-termism, hesitant management, organizational segmentation, and industrial relations are some of the obstacles to TQM adoption in the UK.

According to Lam and Reshef (1999), TQM is a long-term organizational change that necessitates developing new capabilities while eradicating current ones. As a result, it entails substantial risks and demands a significant level of commitment. It also makes the gains temporary since, after the TQM long-term program has been established, management must be updated to prevent unexpected changes in the markets that might endanger the life of the firm. Additionally, implementing TQM requires all staff members and management to participate in numerous activities (such as training, assessments, presentations, and team meetings) that have little to do with the primary goals of the company. This adds to the workload for staff members and

management as they work to implement the TQM program. Furthermore, having on-site continuous improvement training courses and education programmes are very costly and not feasible in small businesses.

Nwabueze (2001) explains some of the obstacles to implementing TQM, such as the organizational culture, lack of management commitment, lack of teamwork, poorly thought out plans, emphasis on short-term profits, poor measurement techniques, lack of education and training programs, high employee turnover, and worker concern about losing their jobs, especially after undergoing training programs that cause them more stress, could be difficult, and in some severe cases, to change. Thus, a company must understand some critical points before implementing a Total Quality Management programme to ensure success implementation. Organisations have to understand that TQM programme adoption is not a phase but permanent and involves continuous improvement. A TQM programme implementation is a long-term plan and it may take up to 5 years or even more to fully become a TQM company. It requires full commitment and cooperation from all employees, line managers, managers and owners, and it also requires culture change; thus management has to deal with resistance and has to vanish the ‘old ways’ of management because, if the implementation fails, it can have long lasting damage on the company and employee morale.

2.3 Empirical Review

The term "Quality Management System" (QMS) is used in the construction industry to refer to quality planning, quality assurance, and quality control (Mane and Patil, 2015). The fundamental goal of the construction sector is to ensure that projects are successfully completed while upholding the standards of best quality, predetermined timeline, and minimum cost (Mane and Patil, 2015). The factors that had the biggest an impact on the performance improvement of indigenous contractors were found to be the application of project management techniques in

construction activities, quality control of materials, increasing production capabilities, hiring and training top professionals, starting on a continuous training program to raise the skill level of the staff, employment of competent personnel, and easy access to plant and equipment. The construction sector has expanded sustainably and strategically, increasing the competitiveness of the enterprises. TQM has had a major and positive impact on industrial performance (David & Gunaydin, 1997, Anderson *et al.,* 1994). Value creation is the main emphasis of TQM as a management philosophy since it has become a source of long-term competitiveness. The building industries continue to face significant challenges in adopting such high quality for customer demands, which has turned into the primary focus in modern business success. From the perspective of customer satisfaction, Peter *et al.* (2010) found a strong association between TQM and market orientation since market orientation is concerned with adopting the highest standards of quality for customers. Furthermore, market orientation, according to Narver & Slater (1990), aimed to give customers a range of activities and greater value. In the meanwhile, TQM has improved product quality in an effort to promote customer pleasure through value creation. Consumer demand for high-quality goods that may be deemed to have a lasting value in the market has increased as a result of the development of the global market (Anderson et al., 1995). Businesses have adopted TQM while taking into account current and future issues in order to positively impact industrial performance. In the Saudi construction industry, for instance, TQM has been applied to achieve long-term profitability, sustainability, and competitiveness (Albert, 2012). TQM in the construction sector therefore offers a wide variety of benefits to improve business quality, increase customer satisfaction, and save construction costs. Construction companies should create a flexible and supportive organizational structure that encourages the evolution of quality management systems in all areas of their business, according to research based

on quality management systems (Mane and Patil, 2015). TQM, which prioritizes everyone's engagement, may improve company outcomes, greater customer orientation and happiness, worker involvement and fulfillment, teamwork, and better management of people inside organizations (Theo, 2018). Because of its adaptability, it may be applied to construction field operations with personnel at levels commonly classified as below middle management, but in a modified form. However, the TQM concept has taken some time to catch on in the building industry (Theo, 2018). Construction firms have continually struggled to execute it. Historically, the construction industry has been reluctant to change (Theo, 2018). As a result, it has yet to catch up to where it should be in terms of TQM implementation. The global building sector depends on nations' long-term growth. The industry may be used to support economic and environmental growth by implementing significant building projects (Olufemi 2016). It may also be utilized to provide jobs and soft facilities for the community. Globally, construction contributes between 2 and 10% of GDP, with industrialized countries contributing more than rising countries (Olufemi, 2016). The following are the three building industries: Projects firms specializing in speciality trades, heavy and civil engineering construction, and building contractors, also known as general contractors (Olufemi 2016). The Total Quality Management concept has been embraced and applied in the majority of Nigerian construction enterprises, for example, quality is viewed as a concept rather than a legal norm by Nigerian construction firms. Quality is an increasingly required expectation, and previous building collapses and other infrastructural flaws have resulted in legislative revisions pertaining to the country's infrastructure management. TQM is designed to achieve profitability through efficient organization within a company, with the emphasis being upon the people aspect, providing the right training and job conditions, in addition to motivating employees to a level of performance that characterizes a company's reputation for service quality.

Furthermore, the changing customer requirements for quality and durable infrastructure in the country are forcing both the construction giants and local contractors to adopt TQM. The inability of indigenous construction companies in Nigeria to handle complex and highly technical processes, as opposed to focusing on small jobs and some outsourced infrastructure development, shows that they are not as operationally advanced as those in the west when it comes to using the best business practices in relation to TQM. Due to local contents legislations in the Country many indigenous construction firms are now well equipped to handle highly technical processes, having developed logistics capabilities to ensure a smooth exchange between the parties in the construction chain.

Application of Total Quality Management in Nigeria

The Total Quality Management concept has been adopted and implemented in most Nigerian Construction firms for instance, quality is seen as a concept rather than a legal standard by construction companies in Nigeria. Quality is an increasingly demanded expectation, building collapses and other infrastructural defects recently have led legislative changes relating to the handling of infrastructures in the country.

Moreover, the changing customer requirements for quality and durable infrastructure in the country is forcing both the construction giants and local contractors to adopt TQM as it is designed to achieve profitability through efficient organization within a company, the emphasis being upon the people aspect, providing the right training and job conditions, in addition to motivating employees to a level of performance that characterize a company's reputation for service quality. Previously Indigenous Construction companies in Nigeria are operationally not advanced, compared to those in the western world in utilizing the best business practices in relation to TQM which is demonstrated in their inability to handle cumbersome and highly technical processes,

rather than dealing with small Jobs and some outsourced infrastructural development. Due to local contents legislations in the Country many indigenous construction firms are now well equipped to handle highly technical processes, having developed logistics capabilities to ensure a smooth exchange between the parties' in the construction chain.

The commitment of senior management has been a major element to ensure the success of TQM within their different establishments Tesco saw a chance for more improvement in its quality management system by developing a strong supply chain relation to ensure product availability at the right time and, furthermore, it has invested in its IT system to be able to collect more data on customers through the use of the loyalty card and, thus, getting more of its customers exactly what they want, where and when they want it and at lower prices. Furthermore, Tesco's quality management strategy has emphasized workers as a potent instrument for increasing profitability by giving them the necessary training and enhancing the remuneration system to increase their loyalty for improved job performance and greater service quality.

In a survey by Heller (2006), five of the UK's famous retail brand quality management and marketing strategies, Tesco, Marks and Spencer (M&S), Sainsbury's, WH Smith and Boots, were compared. The study gave M&S an enormous lead over the competition because customers and employees knew exactly what to expect from the business and found those expectations were largely delivered, not as a result of massive advertising spend and 'starry' promotion, but by the integrity of the quality system and giving customer satisfaction the priority attention by investing in employee training and quality services. Thus, it was a forerunner of the virtual company by delivering the customer greatest desire: Value for Money (VFM).

Within the Construction sector, the manufacturing industry has expanded beyond geographical and cultural boundaries by depending on location and spread. The Construction industry, with its

complex organizational structure, is required to line up the end-to-end logistics supply chain management, human resources, and customer relations. The adoption of technology within the industry has developed rapidly, not just in the construction process, but also in quality management. Toyota production and quality systems were one of the best production systems in the world until they encountered quality problems with their brake pedal system in their hyper model in 2009. The Toyota quality philosophy is based on the following principles:

i. Create a culture of stopping to repair mistakes and getting things right the first time.
ii. Standardized tasks lay the groundwork for ongoing improvement and employee empowerment.
iii. Only use dependable, properly proven technology that benefits both people and processes.
iv. Develop leaders who have a deep understanding of the task. Practice the idea and pass it on to others.
v. Create great individuals and teams who adhere to and teach the corporate ideology.
vi. Show gratitude to your expanded network of partners and suppliers by pushing them and assisting them in improving.
vii. Become a learning organization via constant reflection and development.

Toyota's quality and production systems were founded on "lean production," which implies eliminating everything that does not progress the process or provide value. As a result, Emiliani *et al.* were able to significantly cut lead time and expenses (2007). Despite quality problems in Toyota's manufacturing systems (such as back gas struts and ball joints) in 2005 and 2006, Toyota was still the largest automobile manufacturer in 2007. However, as a result of new production problems related to safety, Toyota experienced two million car recalls as a consequence of original

defects and quality control failure. Recalls are a significant performance indicator since they are a key predictor of consumer trust. Customer trust, in turn, has an important role in quality perception.

Lean production waste, as well as actions and procedures that use resources without adding anything to the finished product, were to be eliminated. In order to deliver something correctly the first time, lean focuses on creating and executing the proper process and having the appropriate resources, metrics, and systems. Jones and Womack (2003). According to Koskela *et al.* (2002), Lean construction is therefore described as a "means to design production systems to reduce waste of resources, time, and effort in order to achieve the maximum amount of value." Koskela adds that early on in the project, all project participants the end user, the facility manager, the constructor, and the owner must fully collaborate in order to develop a production system that will meet the stated goals.

Furthermore, according to Abdelhamid (2008), the main goal of lean construction is to gradually get closer to meeting customer expectations and needs while also comprehending the manufacturing process, recognizing its waste, and gradually removing it. Mistakes, waiting for late or lost supplies, project delays, working out of order, needless storage, and failing to meet customer expectations are all examples of waste. Lean Building, according to Abdelhamid (2007), is a philosophy that applies lean manufacturing processes and ideas to the whole design and construction process. Its goal is to enhance the construction process so that it may more effectively and profitably meet client demands.

Lean manufacturing was initially pioneered and developed by the Japanese car manufacturers and has been widely implemented by European and American manufacturers outside and within the automotive industry with considerable success.

It is based on the following principles, as declared by Womack and Jones (2003):

i. Eliminate waste.
ii. Precisely specify value from the ultimate customer perspective.
iii. Identify the process that delivers high value and eliminate all non-value adding steps.
iv. Manage the interface between different steps to avoid any interruption for the adding value steps.
v. Do not make anything until it is needed, then make it quickly.
vi. Develop strong relations with suppliers, and
vii. Pursue perfection by continuous improvement.

However, unlike manufacturing, construction is a project based on sequence and relevant production processes and, thus, the lean construction is concerned with the holistic pursuit of continuous improvements in all dimensions of the project and natural environment: design, construction, maintenance and recycling, Womack and Jones (2003). In addition, Lichtig (2005) adds that, within the construction industry, lean construction can only be applied fully and effectively by focusing on improving the whole process which means that all participants have to be involved, work and committed to overcome any obstacles that may arise during the constructing process.

Even though lean manufacturing has had a significant effect in other sectors such as aerospace and automotive, until now lean construction has not taken-off in the Nigerian construction sector, according to Mossman (2009), for many reasons such as the following:

i. Fragmentation: the construction industry characteristics with fragmentation and sub-contracting means that there is a little incentive and it is highly unlikely for a project team to learn from each other and work together again.

ii. Long-term: long term development is unattractive to many managers.

iii. Squeezing Middle Management: going lean in construction clearly reflects management benefits as greater production; also this is quite clear to the workforce by enabling them to make money faster. For middle management, the benefits are not so clear and they have not received the required training to culture and thinking changes.

iv. It is just too big: going lean in construction is likely to take longer than manufacturing where it often takes three to five years just to embed a continual improvement culture.

v. Low level literacy and computer literacy: even though the case is changing nowadays, for years, careers advisors and teachers have seen the majority of operatives in the construction industry suffering from low levels of literacy and computer literacy and especially after the influx of workers from different countries with language problems.

vi. No time to think: the recession has affected the entire economy and, thus, companies have no time to think about new changes; so if there is no time to think, then there will be no time to learn new skills and adopt change.

2.4 Analytic Tool Review

A questionnaire was used to gather primary data for Akinsiku, (2020), which examined the difficulties faced by Nigeria's indigenous construction sectors. After data collection, the Kruskal-Wallis test, mean scores, and descriptive statistics were used to analyze the data (Akinsiku, 2020). The investigation was able to determine that the top three issues were a lack of technical experience, a lack of project profit, and a delay in paying contractors for completed work Akinsiku, 2020). In Egwunatum *et al.* (2022), the study collected data from construction industry experts in Imo state, Nigeria, using a well-designed questionnaire and an easy sampling technique. Frequency, percentage, mean analytics, and Pareto analysis were used to analyze the data

(Egwunatum *et al.*, 2022). Factor analysis and confirmatory factor analysis (CFA) were the methods of analysis used for the investigation in (Wassan *et al.*, 2021).

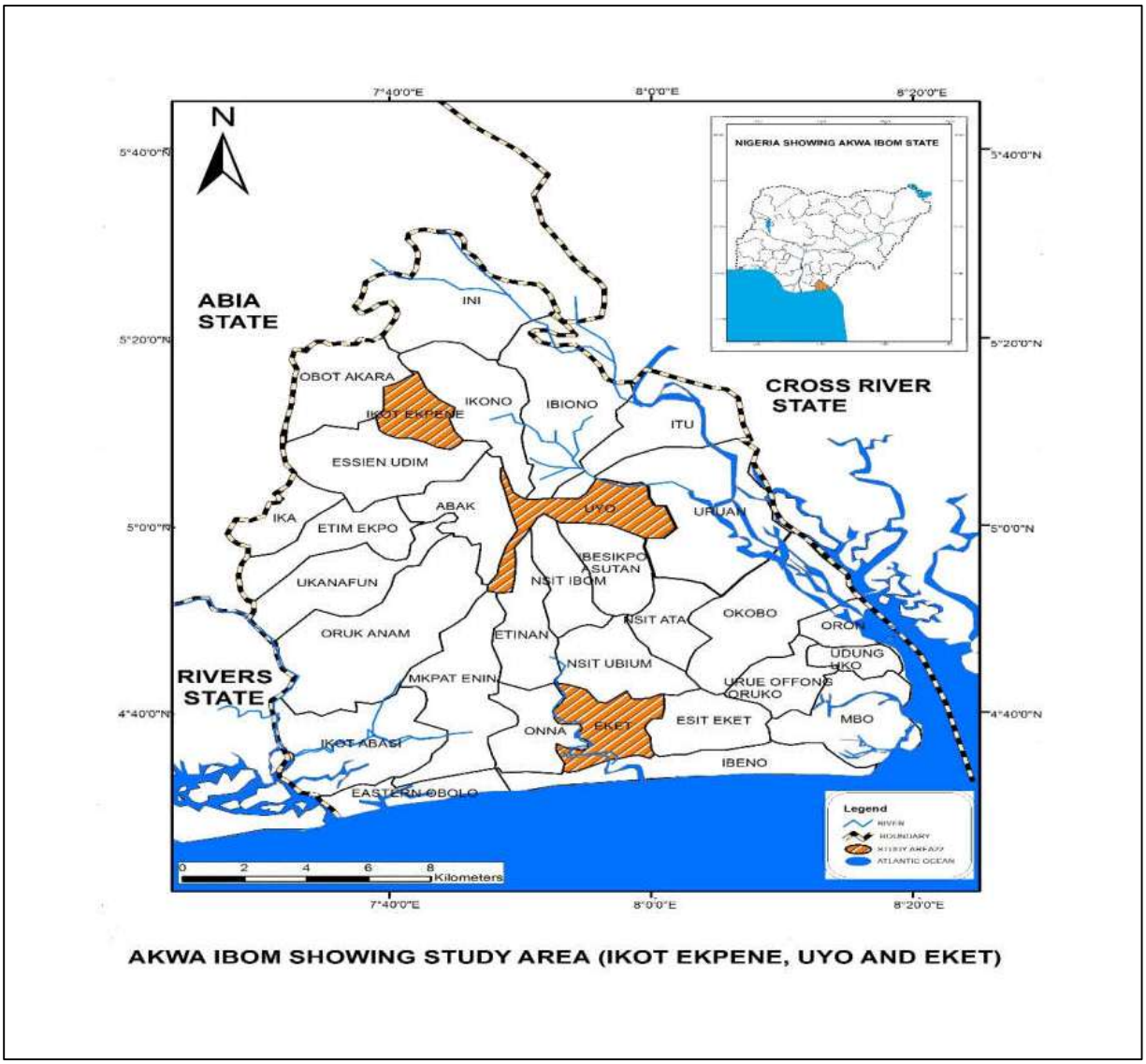
CHAPTER THREE

RESEARCH METHODOLOGY

In this chapter the research design is described, the population frame defined and the sample size as well as the sampling technique adopted for the study is established. The procedures for the administration of the research instrument, methods for data processing and the tools used for data analysis also form part of this chapter. The chapter also shows the conceptualization of the research variables used in the study.

3.1 Study Area

The study area is located in Nigeria and primarily in Akwa Ibom State in the South-South geo-political zone of Nigeria. Nigeria officially referred to as the Federal Republic of Nigeria is located in West Africa on the Gulf of Guinea between the Republic of Benin and Cameroun. The country has an area of 923,768 square kilometers, including about 13,000 square kilometer of water. Nigeria shares borders with Cameroun (1690 kilometers) in the east, Chad Republic (87 kilometers) in the northeast, Niger (1,497 kilometers) in the north, and Benin (773 kilometers) in the west (Library of Congress, 2008). For ease of administration Nigeria is divided administratively into the Federal Capital Territory (Abuja) and 36 states, which are organized into six zones. South West, South-South, South East, North West, North Central and North East zones. (Library Congress, 2008). Akwa Ibom State is situated in the South-South part of Nigeria lying between latitudes 4° 32' and 5° 33' North, and longitudes 7° 25' and 8° 25' East. It is bounded by neighboring states of Abia to the north, Cross River to the east and Rivers state to the west and the Atlantic Ocean to the south. Akwa Ibom state has a population of about 4million (National population Commission (NPC), 2010) and has a land mass of about 304.769 m^2. Figure 3.1 shows the location of the study area in the Map of Akwa Ibom State.



AKWA IBOM SHOWING STUDY AREA (IKOT EKPENE, UYO AND EKET)

Figure 3.1: Location of study Area in the Map of Akwa Ibom State

Source: GIS- Geography Department, UNIUYO (2016).

3.2 Research Design

This research adopted the survey research design approach involving a mixed or triangulated technique which allows the use of both qualitative and quantitative approaches for individual part(s) of a study (Fellows and Liu, 2008). This approach was chosen to aid in the evaluation of quality management practices and determines their level of influence on project performance. The study also employed descriptive and explanatory approaches in proffering answers to the research

questions in line with the objectives of the study. The descriptive aspect provides information about conditions, situations and events that occur in the present; while the explanatory was used to establish relationships.

The statistical analysis used in this study was a Dimension Reduction model known as Factor Analysis using the Principal Component Regression method. Due to the nature of the data that was collected and the various variables that were taken into account, this strategy is effective. In order to take time and financial constraints into account, a sampling survey method was utilized, which comprised choosing a few construction industries at various levels and drawing conclusions about our community from the data gathered. A lot of focus was placed on the scientific production of the sample by using a sample survey to ensure that the participants are representative of the population of interest.

3.3 Sample Plan

Because Akwa Ibom State is an accurate illustration of a State where Indigenous and Foreign Contractors worked on various projects during the research, it was chosen as the sample state (2007-2015). The state's different villages are dotted with obvious building sites. Furthermore, because these businesses' rural development projects in communities have an impact on the host communities' long- and short-term quality of life. For an eight-year study on the effects of TQM on the firm, various companies' projects in various Akwa Ibom State locations were chosen.

3.4 Population of Study

The study's population consists of the personnel of construction firms that TQM as well as the clients and users of the infrastructure those firms have produced. The population was chosen because it was believed that the employees, clients, and users fairly represented the consumer base.

Additionally, it is important to be aware that these firms have a limited number of employees, making it difficult and time-consuming to determine the precise number of employees employed by each of these firms. The population of the study consists of building construction firms in Jos metropolis. There are 45 registered construction firms in Akwa Ibom metropolis (JMDB, 2010). Therefore, the sample frame of the study was 45 construction firms.

3.5 Sample Size and Sampling Technique

A sample size of 40 (2 participant each from one construction company) was obtained from a population of 45 using Krejcie and Morgan Table 1970. The sampling technique adopted for this research work is random Sampling. The random sampling method selects the sample size without giving priority (unbiased).

3.6 Procedure for Data Collection

Questionnaires served as the primary sources of data. Questionnaires were administered to building construction firms within Akwa Ibom metropolis. The secondary sources of materials used in the research work include: textbooks, journals and published research. The questionnaire structure consists of close ended questions, hence, respondents needed not to explain the answers, rather they were required to tick any of the answer options provided. On the other hand, the secondary data collection was based on published journals by the companies, published works, textbooks and reports on related research studies, etc. Selected construction works or projects embarked upon by the companies in selected host communities in Akwa Ibom state within a period of Eight years (2007 to 2015) were covered. These development projects range from road, health centers, electrification, agriculture and education etc. which believed to direct positive impacts on the lives of people in the host communities.

3.7 Method of Data Analysis for Hypothesis

This research was carried out using quantitative analysis to obtain data in other to assess quality management practices in building construction firms in Akwa Ibom metropolis. Descriptive and inferential statistics were used for simplicity and clarity. Tables, means, and percentage were used to present the results. The main statistical method used in this research was the factor analysis because we want to by means of dimension reduction, extract a component via the principal component analysis method that will give us the ranking based on the factor loadings of the various factors affecting quality management and quality management practices in Akwa Ibom metropolis. To use the factor analysis, we need to verify that the responses obtained via the returned questionnaires are valid and reliable for the factor analysis by subjecting the data to a reliability test.

3.8 Reliability Statistics

Given that the data collection method to be used for this project is administration of structured questionnaire to health care providers, then the first statistical analysis to be conducted will be the reliability test. The reliability test will be conducted using the Cronbach's alpha statistic.

A gauge of dependability of a group of variables is measured by Cronbach's alpha. High alpha values do not always mean that the dependability is one-dimensional. In addition to testing the internal consistency of these group of variables, additional analysis to show that the dependability scale is uni-dimensional can be carried out. This additional analysis for determining dimensionality is exploratory factor analysis. Cronbach's alpha is a coefficient of reliability and a very important test for survey researches. The average inter-correlation between the variables and the total number of variables can be used to calculate Cronbach's alpha. For conceptual purposes, we have included the Cronbach's alpha formula below:

$$\alpha = \frac{N * \overline{C}}{\overline{V} + (N-1) * \overline{C}} \quad (3.1)$$

Where

N is variable count

$\overline{C}$ is the mean inter-item covariance among the variables

$\overline{V}$ equals the mean variance among the variables.

Table 3.1: Cronbach Alpha Score Decision Rules

Cronbach Alpha Score	**Level of reliability**
0.0 – 0.20	Less reliable
>0.20 – 0.40	Rather reliable
>0.40 – 0.60	Quite reliable
>0.60 – 0.80	Reliable
>0.8 – 1.00	Very reliable

The participants will be asked to choose an option out of a five point likert scale (strongly disagree, disagree, somewhat agree, agree, and strongly agree) for each question corresponding to the proposed factors affecting quality management and quality management practices. The responses will be coded in a scale of 1-5 where 1 = strongly disagree, 2 = disagree, 3 = somewhat agree, 4 = agree and 5 = strongly agree. The coded responses will be subjected to factor analysis via the principal component analysis method. The factor(s) with the maximum loadings (0.5 and above) for the extracted component(s) will be selected as the most significant factor(s) that affect(s) quality management and quality management practices.

3.9 Factor Analysis

Factor Analysis (FA) is a technique for determining independence when there is no dependent variable. Spearman invented factor analysis in 1904, making it one of the earliest structural models. FA is motivated by the fact that many variables are commonly included in a study design, and it is usually beneficial to limit the many variables to smaller collection of components, with the goal of primarily understanding the underlying structure of the data matrix. The so-called factor loading describes the relationship between each variable and the underlying factor. The independent variables are commonly assumed to be normal and continuous in the parametric approach, with at least three to five variables loading onto a factor. With at least five observations per variable, the sample size should be substantial (i.e., the number of observations should be more than 50). The statistical model for factor analysis, according to Child (2006), is presented in equation 3.2, which explains a collection of p observations in each n persons with a common set of k common factors that satisfy the requirement.

$$x_{i,m} - \mu_i = l_{i,1} f_{1,m} + l_{i,2} f_{2,m} + ... + l_{i,k} f_{k,m} + \varepsilon_{i,m} \tag{3.2}$$

where

$\varepsilon_{i,m}$ is the unobserved random error with zero mean and known variance

μ_i is the average for i^{th} observation

$f_{k,m}$ is the m^{th} observation for the k^{th} common factor

$l_{i,k}$ are the factor loadings for the i^{th} subject of k^{th} common factor

3.9.1 Assumptions of Factor Analysis

(a) KMO Test

Prior to performing the factor analysis, the sampling adequacy will be examined using the Kaiser-Meyer-Olkin (KMO) method. The partial correlation strength between the variables will be revealed by the KMO test, which measures how well the components account for one another. KMO values are regarded as acceptable when they are closer to 1.0 than 0.5.

(b) Bartlett's Test of Sphericity

The Bartlett's test of sphericity is a test to determine that the number of factors extracted from the actual values of the variables is enough. A significant Bartlett's test of sphericity indicates that the number of factors extracted is adequate to account for the total variance in the entire variables.

(c) The Scree Plot

Normally, only factors whose eigenvalues are greater than one are extracted during factor analysis. The scree plot graphically displays the eigenvalues and the number of factors to be extracted, a sharp fall below one on the vertical axis shows that only the number of factors with eigenvalue above one should be extracted.

3.10 The Principal Component Analysis (PCA) Method

After the assumptions testing, the factor analysis can proceed especially when the sample data have satisfactorily met the assumptions. The total or common factor approaches are both used in the factor analysis method. The principal component analysis method extracts components using the total variance of the factors, whereas the common factor approach uses a common variance of the factors. Principal component analysis finds the latent underlying components, whereas common factor analysis finds the fewest number of variables that explain the most variance. Most

of the variance is often explained by the first factor. The factor loadings describe the correlations between the variables and the factor. A factor can be associated with a particular variable if the factor loading is at least 0.4. Using fitting techniques, the factor loadings and unique variances of the model are estimated. Because we are solely interested in our sample and do not plan to generalize the results beyond that, we will employ the principal component analysis method. According to Onoghojobi *et al.* (2016), the PC regression decomposes the standardized data matrix using the singular value decomposition approach $X\,(k \times m)$ as follows:

$$X = U \xi V' \tag{3.3}$$

where U is a $k \times m$ matrix which contains the first m orthornormalized eigenvectors of XX' and $U'U = 1$. These vectors are also called the left singular vectors of *X*.

ξ is a diagonal $m \times m$ matrix with non-increasing elements. The values of ξ are known as singular values of X . They are the positive square roots of the eigenvectors of $X'X$

V is $m \times m$ matrix which contains the orthornomalized eigenvectors of $X'X$. These vectors are also called the right singular vectors of *X*.

The spectral decomposition of $X'X$ gives

$$X'X = \left(U\xi V'\right)' \left(U\xi V'\right) \tag{3.4}$$

and

$$X'X = V\psi V' \tag{3.5}$$

Where

ψ is a diagonal $m \times m$ matrix of the non-negative eigenvalues of $X'X$

that is

$$\psi = \text{diag}(\lambda_1, ..., \lambda_m) \tag{3.6}$$

Where

$\lambda_1, ..., \lambda_m$ are the eigenvalues of $X'X$. Then multiplying matrix X by matrix V gives the principal components as:

$$XV_m = [XV_1, XV_2, ..., XV_m] \tag{3.7}$$

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

Table 4.1: Distribution of Questionnaires/Number Returned

Types of response	Frequency (No.)	Percentage (%)
Number distributed	45	100
Number properly	40	89
Completed and returned		
Number not returned	5	11

Source: *Field Survey (2023)*

Table 4.2: Years of Experience

Years of Experience	*Frequency (No.)*	*Percentage (%)*
1-5 years	9	22.5
6-10 years	13	32.5
11-15 years	8	20
16-20 years	6	15
20 years and above	4	10

Source: *Field Survey (2023).*

Table 4.1 shows the number of questionnaires administered to Building Construction Firms. 45 questionnaires were administered 40 were properly completed and returned representing 89% response. This percentage can be regarded appropriate and an adequate representation of the population of this study and therefore valid for consideration and use for the study.

Table 4.2 shows that 32.5% of respondents have 6-10 years working experience and 20 years and above have the least working experience percentage as 10%. Also 20%, 22.5% and 15% of the

respondents have working experiences of 11-15 years, 0-5 years and 16-20 years respectively. Therefore, the respondents have adequate knowledge and experience.

Respondent's Profile

This section focuses on the respondents' working experience, educational background and category of films.

Table 4.3: Respondents' Educational Background

Types of response	Frequency (No.)	Percentage (%)
Ph.D	0	0
M.sc	5	12.5
B.sc	17	42.5
PGD	4	10
HND	8	20
ND	6	15
Total	40	100

The academic qualification of the respondents is summarized in Table 4.3 of which 12.5% is Master Science (M.Sc.) holders. The other categories of academic qualification are given as follows; First degree 42.5%, Postgraduate Diploma (PGD) 10%, Higher National Diploma (HND) 20% and National Diploma (ND) 15%. None of the respondents possesses a Doctorate degree. The respondents' academic background is significant and supports the idea that they are aware and qualified to offer the crucial professional judgment necessary for the validity of the data gathered for the study.

Table 4.4: Satisfaction with Quality Practices

Types of response	Frequency (No.)	Percentage (%)
Highly satisfied	12	30
Satisfied	18	45
Neutral	5	12.5
Dissatisfied	3	7.5
Highly dissatisfied	2	5
Total	40	100

Source: *Field Survey (2023).*

Table 4.4 Shows 45% of firms are satisfied with quality management being practiced in their firms; also 30% are highly satisfied. While12.5 %, 7.5% and 5% are neutral, dissatisfied and highly dissatisfied with the quality standards adhered to in their firms respectively.

Table 4.5: Firms Awareness of the need for Quality Management Practices

Types of response	Frequency (No.)	Percentage (%)
Yes	40	100
No	0	0
Total	40	100

Source: *Field Survey (2023).*

Table 4.5 summarizes the category of awareness of Quality Management, it shows 100% the respondents are aware of the need for quality management in construction firms. This shows all of the respondents are fully informed on the need for quality management in construction firms.

Table 4.6: Firms perception of Quality Management as Feasible

Types of response	Frequency (No.)	Percentage (%)
Yes	38	95
No	2	5
Total	40	100

Source: *Field Survey (2023).*

Table 4.6 presents the firms' perception of the viability and feasibility of involvement in quality management. As seen in the Table 4.6 95% of firms see quality management as feasible and viable practice, while 5% see otherwise.

Table 4.7: Interest of Firms to Implement Quality Management Practices

Types of response	Frequency (No.)	Percentage (%)
Yes	40	100
No	0	0
Total	40	100

Source: *Field Survey (2023).*

From Table 4.7, from the results above, it shows clearly that 100% of the firms visited are aware of the importance of quality management in construction and are interested in adopting quality management measures in order to achieve effective service delivery.

Table 4.8: Empowerment of Employees to make Quality Changes

Types of response	Frequency (No.)	Percentage (%)
Fully empowered	12	30
Only key officials	23	57.5
No empowerment	5	12.5
Total	40	100

Source: Field Survey (2023).

From Table 4.8 it is seen that only 30% of employees are fully empowered to carry out quality changes, while 57.5% of firms have key officials empowered. It is also seen that 12.5% have no empowerment respectively.

Table 4.9: Types of Quality Improvement Systems Firms are involved with

Types of response	Frequency (No.)	Percentage (%)
TQM	5	12.5
Quality assurance	12	30
ISO 9001	9	22.5
Others	8	20
None	6	15
Total	40	100

Source: Field Survey (2023).

Table 4.9 show that 12.5% of firms utilize TQM which is the least also 30% of firms use Quality Assurance which has the highest percentage. 23.5% and 22.5% make use ISO 9000 and others take 20% while 15% are not involved in any form of quality management practice.

Table 4.10: Firms' perception of Factors Affecting Quality Management Frequency response

Management factors	1	2	3	4	5	No.	Total Score	Mean
		RII	Rank					
Adequacy of site personnel	-	-	3	20	17	40	174	4.35
Adequacy of project control	-	1	4	18	17	40	171	4.26
Certification of material	-	2	2	23	13	40	165	4.13
Knowledge of project	-	3	3	18	16	40	165	4.13
Material quality	-	2	5	21	12	40	163	4.10
Quality of workmanship	-	4	7	14	15	40	160	4.00
Project quality	1	2	8	15	14	40	158	3.95
Adequacy of delivery	1	3	5	20	11	40	157	3.91
Adequacy of design	2	1	7	18	12	40	157	3.91
Progress review meeting	-	3	8	20	9	40	156	3.90
Scheduling	-	3	8	18	10	40	152	3.80
Estimation	2	6	7	13	12	40	147	3.68
Time completion	3	4	5	20	8	40	146	3.65
Risk assessment	3	4	8	16	9	40	144	3.60
Site safety	1	4	13	16	6	40	142	3.55
Interaction of professionals	2	6	9	17	6	40	133	3.33
Site cleanliness	3	7	11	14	5	40	130	3.28
Testing procedure	2	9	15	11	3	40	124	3.10
Adequacy of storage	3	10	14	9	4	40	121	3.03
Adequacy of security	4	10	14	9	3	40	92	2.30

Source: *Field Survey (2023)*

Key: 1- Strongly Disagree, 2- Disagree, 3-Somewhat Agree, 4- Agree, 5- Strongly Agree

Table 4.10 shows the summary of the factors affecting quality management with regards to the responses of the respondents.

Table 4.11: Firms' Ranking of Quality Management Practices they conform with Frequency response

Managementfactors	1	2	3	4	5	Total No.	Score	Mean	RII	Rank
On site supervision			-	1	3	19	17	40	172	4.30	0.86	1
Education on need for quality			1	2	3	19	15	40	165	4.13	0.83	2
Compliance to quality standard			-	2	2	23	13	40	165	4.13	0.83	2
Customer Satisfaction			-	4	3	18	15	40	164	4.10	0,82	4
Motivation of employee			1	2	5	20	12	40	164	4.10	0.82	4
Adequacy of employee training			1	3	7	13	16	40	160	4.00	0.80	6
Budgetary Allocation			1	2	8	15	14	40	158	3.95	0.79	7
Staff training			1	3	4	20	12	40	157	3.91	0.78	8
Proper Planning			3	3	6	16	12	40	151	3.90	0.77	9
Personnel management			2	3	7	20	8	40	149	3.73	0.75	10
Qualification of Employee			1	5	8	18	8	40	147	3.68	0.74	11
Attention to client needs			2	8	7	13	10	40	141	3.53	0.71	12
Team work among workers			3	7	5	17	8	40	140	3.50	0.70	13
Administration of change order			5	5	8	15	7	40	134	3.35	0.67	14

Source: *Field Survey (2023)*

Table 4.11 presents the quality management practices that building construction firms conform with.

Reliability Analysis of the Responses for factors affecting quality management

Table 4.12: Reliability Statistics for the responses on factors affecting quality management practices

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.992	.994	20

Given that the Cronbach's Alpha statistic value of 0.992 in Table 4.12 is closer to one and above 0.5000, we conclude that the responses provided by the respondents are reliable for analysis. We then use the Friedman's ANOVA test to check the null hypothesis that the responses are the same or similar in Table 4.13.

Hypotheses:

H_o: The workers have the same perception about the factors affecting TQM practices

H_1: The workers does not have the same perception about the factors affecting TQM practices

Table 4.13: ANOVA with Friedman's Test

		Sum of Squares	df	Mean Square	Friedman's Chi-Square	P-value
Between People		661.039	39	16.950		
Within People	Between Items	144.614[a]	19	7.611	457.658	.000
	Residual	95.536	741	.129		
	Total	240.150	760	.316		
Total		901.189	799	1.128		

Since the p-value = 0.000 in Table 4.13 is less than the alpha level = 0.05, we reject the null hypothesis (H_o) and conclude that the mean of their response are not equal across the questions. Therefore there is enough variability in the data that could provide interesting results. The assumption of factor analysis is tested and displayed in Table 4.14

Table 4.14: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.910
Bartlett's Test of Sphericity	Approx. Chi-Square	1662.714
	df	190
	P-value	.000

In Table 4.14, we want the Kaiser-Meyer-Oikin (KMO) value to be above 0.500 and the p-value of the Bartlett's test of sphericity to be less than the alpha level of 0.05. The KMO value is 0.910 and the p-value = 0.000 is less than 0.05; we therefore conclude that the data meets the assumption for factor analysis. The principal component regression method of the factor analysis was now applied to the data and the total variance explained by the individual components is displayed in Table 4.15.

Table 4.15: Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	17.841	89.207	89.207	17.841	89.207	89.207
2	.510	2.552	91.759			
3	.338	1.692	93.451			
4	.315	1.575	95.026			
5	.223	1.115	96.141			
6	.146	.732	96.872			
7	.119	.594	97.466			
8	.109	.543	98.009			
9	.089	.445	98.454			
10	.071	.354	98.808			
11	.048	.238	99.046			
12	.045	.227	99.273			
13	.036	.179	99.452			
14	.028	.141	99.593			
15	.027	.133	99.725			
16	.016	.082	99.808			
17	.016	.078	99.885			
18	.013	.063	99.948			
19	.007	.033	99.981			
20	.004	.019	100.000			

Extraction Method: Principal Component Analysis.

Table 4.15 shows all twenty components supposed to be extracted and their corresponding percentage of variance they explain. Notice that only the first component contains (explains) about 89% of the total variance contained in the responses provided by the respondents on the twenty

questions on the factors affecting quality management. This is an indication that the first component (only one component) should be extracted from the entire responses. The spree plot in Figure 4.1 is used to further verify the number of components to be extracted.

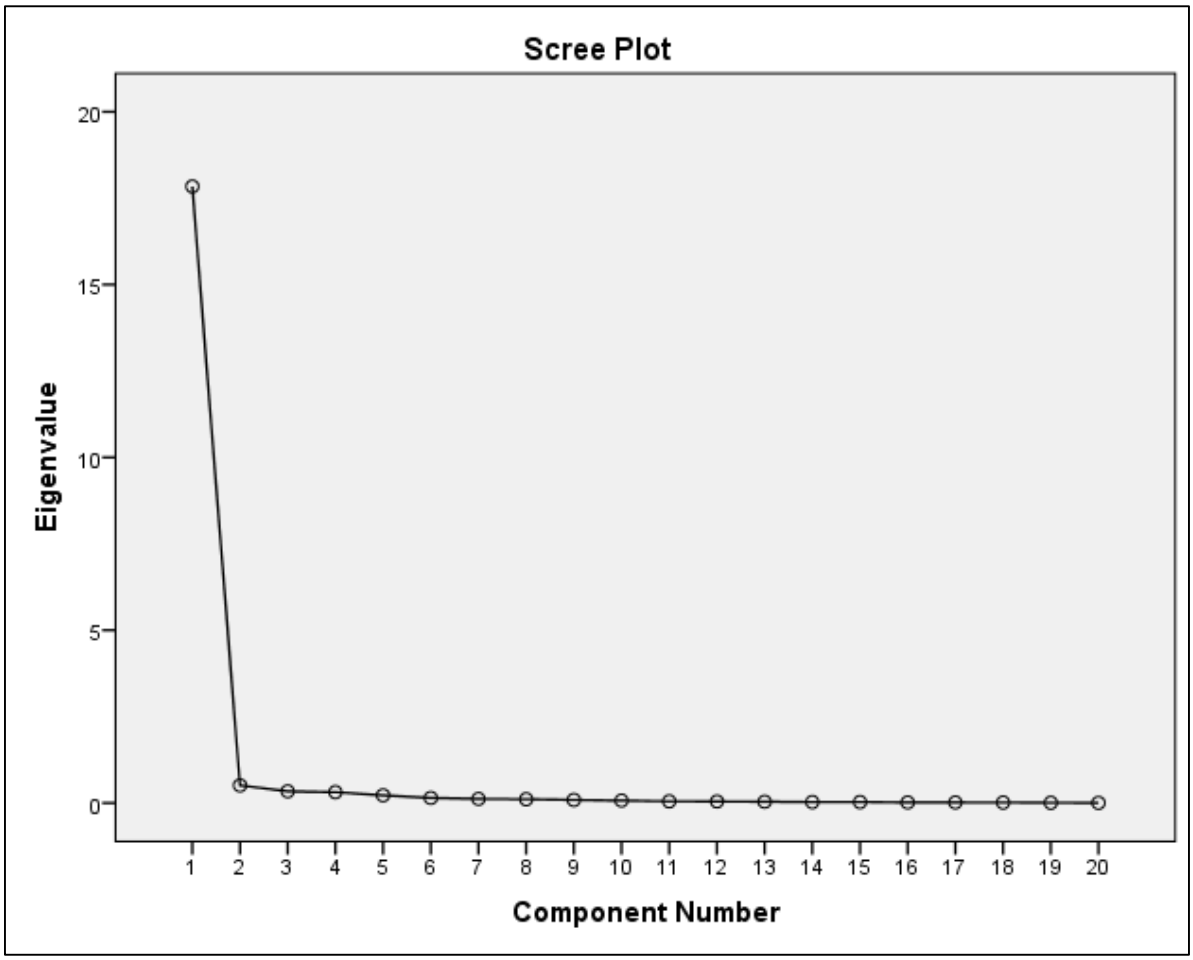


Figure 4.1: Spree plot for the number of components to be extracted

Figure 4.1 has shown the spree plot to have only the first component to have eigenvalue clearly above one. This supports that we should extracted only the first component. Only one component was extracted and the factor loadings corresponding the factors from which they were initially extracted from were used to rank the importance in Table 4.16.

Table 4.16: Component Matrix

	Component 1
Project quality	.967
Estimation	.967
Scheduling	.964
Risk assessment	.964
Quality of workmanship	.962
Adequacy of storage	.959
Adequacy of security	.955
Site cleanliness	.955
Adequacy of delivery	.952
Time completion	.951
Adequacy of design	.950
Progress review meeting	.948
Interaction of professionals	.947
Testing procedure	.942
Material quality	.939
Site safety	.935
Knowledge of project	.933
Certification of material	.917
Adequacy of site personnel	.897
Adequacy of project control	.884

Extraction Method: Principal Component Analysis. 1 components extracted

From Table 4.16, Project quality, estimation, scheduling, risk assessment and quality of workmanship are the top five factors affecting Quality Management because they had the top five factor loading in the component extracted. It is important to note that based on the responses and the respective factor loadings as contained in Table 4.16, all the factors are important since their factor loadings are all above 0.500 but the closer the loading is to 1.000 the more important the corresponding variable.

Reliability Analysis of the Responses for quality management practices

Table 4.17: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.990	.991	15

Given that the Cronbach's Alpha statistic value 0.990 is closer to one and above 0.5000, we conclude that the responses provided by the respondents are reliable for analysis. We then use the Friedman's ANOVA test to check the null hypothesis that the responses are the same or similar in Table 4.18.

Hypotheses:

H_o: The mean of their responses are equal across the questions

H_1: The mean of their responses are not equal across the questions

Table 4.18: ANOVA with Friedman's Test

		Sum of Squares	df	Mean Square	Friedman's Chi-Square	Sig
Between People		560.318	39	14.367		
Within People	Between Items	60.210[a]	14	4.301	240.382	.000
	Residual	80.057	546	.147		
	Total	140.267	560	.250		
Total		700.585	599	1.170		

Since the p-value = 0.000 in Table 4.18 is less than the alpha level = 0.05, we reject the null hypothesis (H_o) and conclude that the mean of their response are not equal across the questions. Therefore there is enough variability in the data that could provide interesting results. The assumption of factor analysis is tested and displayed in Table 4.19.

Table 4.19: Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.350	88.998	88.998	13.350	88.998	88.998
2	.637	4.245	93.243			
3	.266	1.770	95.013			
4	.162	1.080	96.093			
5	.148	.989	97.083			
6	.111	.743	97.826			
7	.083	.552	98.377			
8	.072	.481	98.859			
9	.049	.329	99.188			
10	.045	.302	99.490			
11	.039	.262	99.752			
12	.023	.152	99.904			
13	.011	.075	99.979			
14	.003	.021	100.000			
15	5.204E-17	3.469E-16	100.000			

Extraction Method: Principal Component Analysis.

Table 4.19 shows all twenty components supposed to be extracted and their corresponding percentage of variance they explain. Notice also that only the first component contains (explains) about 88.998% of the total variance contained in the responses provided by the respondents on the

fifteen questions on the quality management practices their company conform with. This is an indication that the first component (only one component) should be extracted from the entire responses. The spree plot in Figure 4.2 is used to further verify the number of components to be extracted.

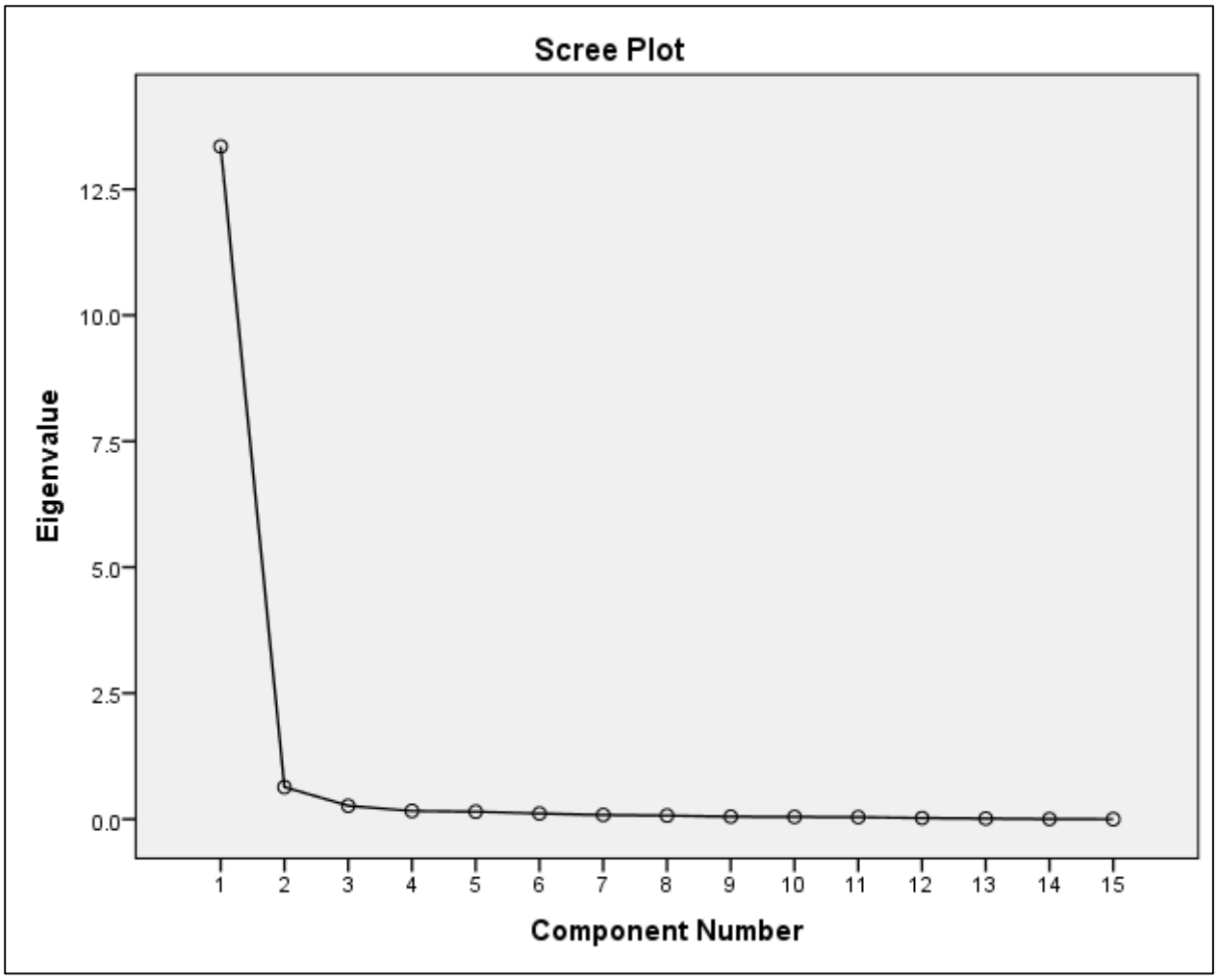


Figure 4.2: Spree plot for the factor analysis of responses on quality management practices

Figure 4.2 has shown the spree plot to have only the first component to have eigenvalue clearly above one. This supports that we should extracted only the first component. Only one component was extracted and the factor loadings corresponding the factors from which they were initially extracted from was used to rank the importance in Table 4.20.

Table 4.20: Component Matrix

	Component 1
Proper Planning	.978
Adequacy of employee training	.973
Budgetary Allocation	.968
Staff training	.961
Personnel management	.959
Motivation of employee	.957
Attention to client needs	.956
Team work among workers	.956
Employee	.950
Education on need for quality	.944
Qualification of	.944
Customer Satisfaction	.939
Administration of change order	.937
On site supervision	.882
Compliance to quality standard	.838

Extraction Method: Principal Component Analysis. 1 components extracted

From Table 4.20 proper planning, adequacy of employee training, Budgetary Allocation, Staff training and Personnel Management are the top five Quality Management Practices that the companies conform with in Akwa Ibom metropolis because they had the top five factor loading in the component extracted. It is important to note that based on the responses and the respective factor loadings as contained in Table 4.20, all the factors are important since their factor loadings are all above 0.500 but the closer the loading is to 1.000 the more important the corresponding variable.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

In this project, evaluation of total quality management practices of construction companies in Akwa Ibom Metropolis was treated. The study area is located in Nigeria and primarily in Akwa Ibom state in the south-south geo- political zone of Nigeria. Akwa Ibom state is situated in the South-South part of Nigeria lying between latitudes 4° 32' and 5° 33' North, and longitudes 7° 25' and 8° 25' East. It is bounded by neighboring states of Abia to the north, Cross River to the east and Rivers state to the west and the Atlantic Ocean to the south. For an eight-year study on the effects of TQM on the firm, various companies' projects in various Akwa Ibom State locations were chosen. The study's population consists of the personnel of construction firms that TQM as well as the clients and users of the infrastructure those firms have produced. The population was chosen because it was believed that the employees, clients, and users fairly represented the consumer base. A sample size of 40 was obtained from a population of 45 (Total questionnaire distributed) using Krejcie and Morgan Table 1970. The sampling technique adopted for this research work is random Sampling. The random sampling method selects the sample size without giving priority (unbiased).

Questionnaires served as the primary sources of data. Questionnaires were administered to building construction firms within Akwa Ibom metropolis. The secondary sources of materials used in the research work include: textbooks, journals and published research. The questionnaire structure consists of close ended questions, hence, respondents needed not to explain the answers; rather they were required to tick any of the answer options provided. On the other hand, the secondary data collection was based on published journals by the companies, published works,

textbooks and reports on related research studies, etc. Selected construction works or projects embarked upon by the companies in selected host communities in Akwa Ibom state within a period of Eight years (2007 to 2015) were covered.

This research adopted the survey research design approach involving a mixed or triangulated technique which allows the use of both qualitative and quantitative approaches for individual part(s) of a study (Fellows and Liu, 2008). This approach was chosen to aid in the evaluation of quality management practices and determines their level of influence on project performance. The study also employed descriptive and explanatory approaches in proffering answers to the research questions in line with the objectives of the study. The descriptive aspect provides information about conditions, situations and events that occur in the present; while the explanatory was used to establish relationships.

The statistical analysis used in this study was a Dimension Reduction model known as Factor Analysis using the Principal Component Regression method. Due to the nature of the data that was collected and the various variables that were taken into account, this strategy is effective.

The responses from the respondents were subjected to reliability statistics (see Table 4.15 and Table 4.17) using the Cronbach's Alpha statistic. The responses were reliable and were used for factor analysis. The assumptions of factor analysis were tested using the KMO and Bartlett's test of sphericity (see Table 4.14). One component each was extracted from the twenty questions that assessed factors affecting total quality management practices in Akwa Ibom Metropolis and the various fifteen questions on total quality management practices that conform to the companies. Based on the factor loadings of the components extracted, Project quality, estimation, scheduling, risk assessment and quality of workmanship are the top five factors affecting Quality Management (See Table 4.16) while proper planning, adequacy of employee training, Budgetary Allocation,

Staff training and Personnel Management are the top five Quality Management Practices that the companies conform with in Akwa Ibom metropolis (See Table 4.20). The findings on the top factors affecting total quality management practices are in agreement with the findings of Akinsiku (2020) and Egwunatum *et al* (2022).

5.2 Conclusion

This study has further buttressed the findings of Akinsiku (2020) and Egwunatum et al (2022) that the most important factors affecting total quality management practices include Project quality, estimation, scheduling, risk assessment and quality of workmanship. Meanwhile, proper planning, adequacy of employee training, Budgetary Allocation, Staff training and Personnel Management are the top five Quality Management Practices that the companies conform to in Akwa Ibom metropolis.

The hypotheses stated in Chapter One are answered thus:

i. Worker's perception on the factors affecting TQM in some construction companies in Akwa Ibom is the same.

   Answer: The perception on the factors affecting TQM in some construction companies in Akwa Ibom is not the same (Table 4.13 ANOVA with Friedman's Test)

ii. Factor's affecting TQM practices in some construction companies is unknown.

   Answer: The top five factors affecting TQM practices in some construction companies in Akwa Ibom Metropolis include: Project quality, estimation, scheduling, risk assessment and quality of workmanship

iii. Akwa Ibom construction companies do not observe any TQM practices.

Answer: The top five TQM practices that conforms with construction companies in Akwa Ibom Metropolis include: proper planning, adequacy of employee training, Budgetary Allocation, Staff training and Personnel Management

5.3 Recommendations

Based on the findings of this study, we recommend the following:

i. That construction companies in Akwa Ibom Metropolis should pay more attention on the quality of their project, estimation of the project cost, project scheduling, project risk assessment modules and finally quality of workmanship. These are key areas that must be addressed with top priorities in order to maintain total quality management practices for all their projects.

ii. That construction companies in Akwa Ibom Metropolis should also imbibe other total quality management practices other than proper planning, adequacy of employee training, Budgetary Allocation, Staff training and Personnel Management in order to further improve the quality of their projects.

5.4 Contribution to Knowledge

This study is different from other literatures reviewed to the best of my knowledge. Especially, it differs from the rest by method of data analysis e.g Adam, Kunya and Abdulmin (2020) studied quality management practices of building construction firms in Jos Metropolis using descriptive statistics and Relative importance index to rank the factors affecting quality management and also practices that conform to quality management in the various building construction firms in Jos which ensures effective service delivery. This study used Descriptive statistics and Factor Analysis

via Principal Component Analysis method to rank the factors affecting quality management and also practices that conform to quality management in the various building construction firms in Akwa Ibom Metropolis which ensures effective service delivery.

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APPENDIX I

Questionnaire

Section A – Sociodemographic characteristics

1) How many years have you been working in construction company in Uyo

   (a) 1 – 5yrs (b) 6 – 10yrs (c) 11 – 15yrs (d) 16 – 20yrs (e) above 20 yrs

2) What is your highest educational qualification?

   (a) Ordinary National Diploma (OND) (b) Higher National Diploma (HND) (c) Postgraduate Diploma (PGD) (d) Bachelor of Science (BSc.) (e) Master of Science (MSc.) (f) Doctor of Philosophy (Ph.D)

Section B – Quality Practices

3) Are you satisfied with the quality practice in the construction company you work currently?

   (a) Highly dissatisfied (b) Dissatisfied (c) Neutral (d) Satisfied (e) Highly satisfied

4) Is your construction company aware of the need for quality management practices?

   (a) Yes (b) No (c) No idea

5) The construction company where you work currently believes that Quality Management practice is Feasible?

   (a) Yes (b) No (c) No idea

6) The construction company where you work currently is interested in implementing Quality Management Practices?

   (a) Yes (b) No (c) No idea

7) The construction company where you work currently their employees to make Quality Changes?

   (a) Fully empowered (b) only key officials (c) no empowerment

8) Select the type(s) of quality improvement systems your construction company is involved with

(a) TQM (b) Quality assurance (c) ISO 9001 (d) Others (e) None

Section C Firms' perception of Factors Affecting Quality Management Frequency response

Choose only one option in the following five-point Likert scale questions as it applies to the construction company you work currently.

Key: SD- Strongly Disagree, D- Disagree, SWA - Somewhat Agree, A- Agree, SA- Strongly Agree

S/N	Item	SD	D	SA	A	SA
9	Adequacy of site personnel					
10	Adequacy of project control					
11	Certification of material					
12	Knowledge of project					
13	Material quality					
14	Quality of workmanship					
15	Project quality					
16	Adequacy of delivery					
17	Adequacy of design					
18	Progress review meeting					
19	Scheduling					
20	Estimation					
21	Timely completion					
22	Risk assessment					
23	Site safety					
24	Interaction of professionals					
25	Site cleanliness					
26	Testing procedure					
27	Adequacy of storage					
28	Adequacy of security					

Section D - Firms' Ranking of Quality Management Practices they conform with Frequency response

Choose only one option in the following five-point Likert scale questions as it applies to the construction company you work currently.

Key: SD- Strongly Disagree, D- Disagree, SWA - Somewhat Agree, A- Agree, SA- Strongly Agree

S/N	Item	SD	D	SA	A	SA
29	On site supervision					
30	Education on need for quality					
31	Compliance to quality standard					
32	Customer Satisfaction					
33	Motivation of employee					
34	Adequacy of employee training					
35	Budgetary Allocation					
36	Staff training					
37	Proper Planning					
38	Personnel management					
39	Qualification of employee					
40	Attention to client needs					
41	Team work among workers					