

EVALUATION OF TOTAL QUALITY MANAGEMENT PRACTICES OF CONTRACTORS IN BUILDING INDUSTRY IN ABUJA, NIGERIA

ABSTRACT

Many of the management practices used to support construction organisations are being challenged. The industry's clients are moving forward and demanding improved quality service, faster project delivery and innovations in technology. Total Quality Management (TQM) has increasingly been adopted by construction companies as an initiative to solve quality problems and to meet the needs of the final customer. This research therefore aims at evaluating the Total Quality Management Practices of contractors in building industry in Abuja, Nigeria. The study identified TQM practices used by contractors in housing delivery in Abuja, the level of commitment of contractors to TQM, the challenges encountered by contractors while implementing TQM and measures for effective quality assurance practice through the use of TQM. Quantitative research approach was used, field survey was carried out, structured questionnaires were administered to contractors and response were subjected to statistical analysis. The findings showed that most respondents were familiar with total quality management practices; its application was relatively low; further to this, it came to light that the potential barriers to the attainment of total quality management among construction firm are: lack of effective Supervision (3.91) ranked 1st followed by effective Communication (3.50) and Management's Commitment to Quality Assurance (3.50) ranked 2nd, Proper Equipment available for use (3.36) ranked 3rd, Quality Assurance Team to lead the process (3.33) ranked 4th. More importantly, in curbing the above-mentioned potential barriers the study revealed the following as measures for effective quality management practices, namely: Management Commitment, Communication between Managers and Employees, Employee Involvement, Detailed and Logical Work Program, Regular Inspection and Audit of Quality Report, Training and Education of Team Members and Review/Analysis. The research therefore recommended that construction companies should create a flexible and conducive organizational atmosphere which encourages the development of total quality management practices in all aspect of their work. Furthermore, construction firms should be encouraged to apply total quality management techniques during the execution of project and engage/include personnel in charge of Quality as part of an integrated team in the Project Management and Delivery process.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The building industry provides a professional service that uses specialized, project management techniques to oversee the planning, design, and construction of a project, from its beginning to its end (Olatunji *et al* (2012). The purpose of management is to control a project's time / delivery, cost and quality sometimes referred to as a project's "triple constraint" (Battikha, 2002). Management is compatible with all project delivery systems, including design-bid-build, design-build, Risk and Public Private Partnerships.

The concept of quality management is to ensure efforts to achieve the required level of quality for a product which is well planned and organized. From the perspective of the building industry, quality management in construction projects should mean maintaining the quality of construction works at the required standard so as to obtain customers' satisfaction that would bring long term competitiveness and business survival for the construction companies (Tan & Abdul-Rahman, 2005).

Quality of a product can be measured in terms of performance, reliability and durability. Quality is a crucial parameter which differentiates an organization from its competitors. Quality management tools ensure changes in the systems and processes which eventually result in superior quality products and services. Quality management methods such as Total Quality management have a common goal to deliver a high-quality product. Quality management is essential to create superior quality products which not only meet but also exceed customer satisfaction. Total Quality management is defined as a continuous effort by the management as

well as employees of a particular organization to ensure long term customer loyalty and customer satisfaction.

Further to this, Olatunji et al (2012) also reiterated that the term quality management as used in the construction industry is all encompassing and embedded in the phenomenon itself and are concepts such as quality control, quality assurance, quality improvement, quality standards etc. The authors revealed that the earliest form of formal quality management practices in construction can be traced back to ancient Greece and Rome. In addition to the aforementioned, Harris and McCaffer, (2001) opined that quality management practices include all the means employed by managers in an effort to implement their quality policies. These activities include quality planning, quality control, quality assurance and quality improvement.

Many of the management practices used to support building industry are being challenged. The industry's clients are moving forward. Client's demand improved service quality, faster buildings and innovations in technology. It is no accident that the construction industry has turned to the manufacturing sector as a point of reference and source of innovation. Successful concepts derived from manufacturing, such as Total Quality Management (TQM), Reengineering and Lean (or Just-in-Time) Production, are being adopted and integrated into the construction industry. Implicitly, the successful implementation of these concepts is heavily dependent on a culture of teamwork and cooperation at both intra- and inter-organizational levels in construction.

Naoum (2007) cited in Olatunji *et al* (2012) indicated that performance on a global level represents results of activities undertaken. He proceeded further to explain that performance of a project is measured as its ability to deliver the building or structure at the right time, cost and quality as well as achieving a high level of client satisfaction. It therefore stands to reason that quality performance in construction is results oriented and seeks evidence of quality awareness

within the operations and output of a building/construction team. Quality performance is also defined over the long term for the effect to be permanent (Yasamis *et al*, 2002). In other words, quality performance improvements are expected to increase the productivity and profitability of contractors as well as increasing client satisfaction. Quality Management has increasingly been adopted by organizations in the building industry as an initiative to solve quality problems and to meet the needs of the final customer, if ever an industry needed to take up the concept of QMS (Quality Management System) it's the construction industry. However, implementing QMS principles in construction industry is particularly difficult because of the many parties involved. There is therefore a need to evaluate TQM practice of contractors in Nigeria.

1.2 Statement of Research Problem

A building project in its life span goes through different phases. The main phases of a project can be described as: conceptual planning, feasibility study, design, procurement, construction, acceptance, operation and maintenance. Quality of building projects is linked with proper quality management in all the phases of project life cycle (Howell, 2013). Design and construction are the two important phases of project life cycle which affect the quality outcome of construction projects significantly (Hutchins, 2014). In a NEDO (National Economic Development Office), London survey aimed at improving methods of quality control for building works it was found that "design" and "poor workmanship in the construction process" combined to form more than 90% of the total failure events (NEDO, 2011).

During the last decades construction industry has been heavily criticized for its performance and productivity in relation to other industries. With the turn of the new millennium, it appears that the construction industry is going through an intense period of introspection, which is exacerbated by increased technological and social change (Kannan and Tan, 2015). These changes are altering the tempo of the environment within which construction operates.

Moreover, such changes extensively affect the way business is carried. No organization operating in the building industry, whether large or small, private or public, can afford to ignore its changing environments if it is to survive (Kim and Park, 2013).

Poor quality of building has brought the need for more maintenance, rehabilitation, and renovation work in an effort to ensure the serviceability and safety of such buildings. Consequently, housing in Abuja are prone to these stated housing challenges and deficits. The main cause of these problems is the fact that the government agencies responsible for housing delivery are not proactive in their responsibilities. However, the challenges facing the building industry do not appear to be of serious concern to the government (Kim and Park, 2013), and have consequently, not been addressed, such that there still remains a need for Total Quality Management (TQM). To date there has been no study of this subject, aimed at evaluating Total Quality Management practices of contractors in building industry in Abuja. It is against this background that this study seeks to ensure the use of total quality management in the execution phase of construction projects.

1.3 Research Questions

To enable the researcher, undertake this study, the research questions below were formulated;

- i. What are the Total Quality Management practices used by contractors in housing delivery in Abuja?
- ii. What is the level of commitment of Building Contractors to Total Quality management Plans in the execution of projects to deliver structurally sound buildings?
- iii. What are the challenges faced by building challenges in their effort to adhere to Total Quality Management during execution of projects?

- iv. What are the measures for effective quality assurance practices through the use of TQM in the building industry?

1.4 Aim and Objectives

The aim of this study is to evaluate the Total Quality Management Practices of Contractors in building industry in Abuja with a view to improved performance of practices in building industry. The following objectives are set in order to achieve the aim of the study to:

- i. Identify the Total Quality Management practices used by contractors in housing delivery in Abuja
- ii. To determine the level of commitment of contractors to Total Quality Management Practices in the delivery of housing projects in Abuja.
- iii. To examine the challenges encountered by contractors while implementing Total Quality Management during the execution of housing projects.
- iv. To propose measures for effective quality assurance practice through the use of TQM in the building industry.

1.5 Justification for the Study

The existing studies in the area of interest (Kannan and Tan, 2005; Kim and Park, 2012; Abdel-Razek *et al*, 2017 and Abdullah *et al*, 2016), did not address the issue of TQM practices in Nigeria context. Clearly, some research on TQM in building industry in Nigeria has been undertaken, very few articles focus on TQM practice to building industry in Abuja, and hence, the available literature is extremely limited in its focus and range. However, with recent developments and research in TQM practice, there is a great opportunity to investigate how TQM practice can assist in public housing development in Nigeria.

The significance of this study lies in its attempt to identify the TQM practice for achieving a successful housing development in Nigeria. Effectively, it explores the gap that exists between

the theory and the practice. In doing this, the study develops a quality procedure based on the implementation of TQM practice to improve housing development. The proposed practice will bring benefits for both the industry and the local economy in general, being used as a guideline by housing developer to successfully prepare, develop, and apply more effective project management as a means to become more efficient and effective. The TQM procedures will consider the communication among maintenance parties and decision-makers involved in the business process, and assist in demarcating stronger lines of responsibility. The study will enrich the extant literature concerning TQM, implementation, and practices.

1.6 Scope of Study

This study was carried out in FCT, Abuja. It focuses on investigating the adoption and implementation of Total Quality Management (TQM) in the construction industry and developing a “measurement methodology” of construction processes for customer satisfaction and continuous improvement. The main concept of this thesis is to identify “what” processes can be measured and “how” to measure them. To identify the above objectives, literature search, questionnaires and interviews were used. The tools used in the measurement is one of several of the “Tools of Total Quality” such as control and run charts, cause and effect diagrams, flowcharts, check sheets, Pareto diagrams, and histograms. For the local construction industry, this project has the potential of demonstrating benefits of using TQM in their organizations. This was carried out by showing that quality improvement efforts can be quantified, measured, and analyzed - thereby showing the construction company to continuously improve in products and services to meet and even exceed customer needs.

1.7 Study Area

Abuja in the center of Nigeria and within the Federal Capital Territory (FCT) Abuja was built mainly in the 1980s. It officially became the Nigerian capital on 12th December 1991, replacing

Lagos which is till the country’s most populous city. It has Kaduna State by the north, Nasarawa State to the east, Kogi State to the south-west and Niger State to the west. It lies between 7°20’and 9°15’ North of the Equator and longitudes 6°45’ and 7°39’East Greenwich Meridian, Abuja is geographically located in the center of the country (Figure 1.1).

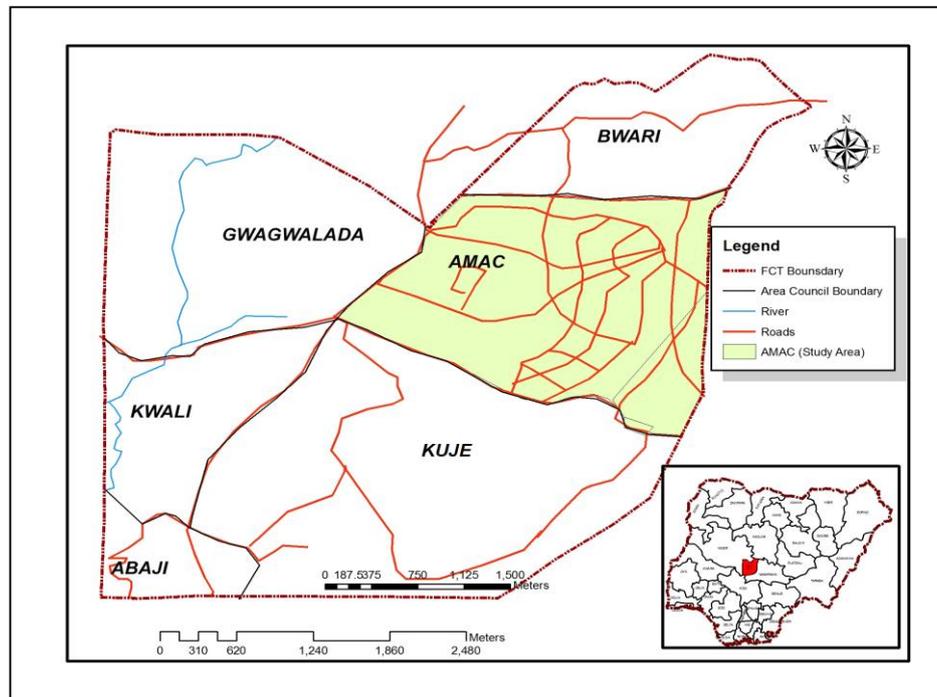


Figure 1.1: Location of Abuja
Source: FCDA, Abuja (2019)

Abuja is one of the fastest growing cities in West Africa. The territory has experienced rapid changes, urban spatial expansion and transportation infrastructure expansion over the last 30 years. Over time, urban growth significantly changed in Abuja which necessitate complex urban dynamics such as conversion of agricultural land to settlement, road and infrastructure (FCDA, 2011). The rate of population growth is high with an estimated annual growth rate of 9.4% (UNFPA, 2015), and its status in the country as the FCT, it has undergone and is still undergoing a vast amount of development in terms of commercial, residential, industrial, social and political growth, with the Federal Capital Development Authority (FCDA) charged with the responsibility of its spatial planning and development. The level of development in the city and

the number of offices and head quarters offices located in the FCT makes it a city where urbanization is at a high pace.

1.7.1 Housing in Abuja

Abuja, being the Federal Capital Territory of Nigeria houses most of the headquarters and head offices of Government parastatals, quite a number of private firms, foreign organizations and investors, offices and companies. It is an area undergoing a vast amount of development, with majority of these offices, headquarters and firms are located in an area which is referred to as the federal capital city. Due to its level of development, it is undergoing a vast amount of urbanization by people not only migrating in from rural areas, but also by individuals moving in from other parts / states of the country in search of a better wage or salary.

As the economy of the city continued to improve over time, people got and are still getting wealthier. Coupled with the continuous influx of people from different parts of the country, housing and land was seen by the wealthier individuals as a commodity and therefore bought and built in most areas in and around the central city. As identified by Logan and Molotch (1976), land entrepreneurs, which include: Landlords, Businessmen Developers, Transportation and Utility Companies, Banks and Corporations, etc, see homes as not just places that are lived in, but also as commodities in the real estate market, that can be bought and exchanged, hereby providing use and exchange values for producers (entrepreneurs) and customers (users), and therefore attempt, through collective actions and in most cases in alliance with other businessmen, to create conditions that will intensify future land use in an area.

Today, the housing developments in Abuja have completely diverted from the recommendations of the master plan for a housing program that offered a strategy to improve the housing conditions in urban areas in Nigeria. The ranges of housing options in the city do not support all income groups. Even though there are different house designs, they have been developed by

private individuals and investors who have obtained parcels of land at very high rates from the government and therefore cost of rent for these buildings are on the high side, coupled with the cost of construction and finishing of the residents.

There was suppose to be an increased reliance on local construction materials and the use of self help and self contracted services / modes of construction. Today, in the central area of Abuja, construction of so many buildings and houses are done by multi – national and foreign construction companies, an example of which is Julius Berger, and with the use of foreign building materials, which in turn makes housing more expensive and unaffordable by the low middle and low income earners. Because of this, and the high influx of people from other parts of the country in search of a better source of income, the government have undertaken several mass housing projects to cater for the growing population of the Federal Capital Territory.



Figure 1.2: An Apartment building at ministers hill, Abuja



Figure 1.3: A residential building at Wuse, Abuja



Figure 1.3: A residential building at Utako, Abuja

CHAPTER TWO

LITERATURE REVIEW

2.1 Evaluation of Total Quality Management (TQM) in Construction Industry

2.1.1 The Concept of Total Quality Management in construction practice

Quality may mean different things to different people. Sun (2000) stated that some take it to represent the products and customers satisfaction, and others interpret it as compliance with requirements. Moreover, quality was defined as the totality of features and characteristics of a product or service that bear on its ability to stated and implied needs. For construction the needs must be defined by the client. The inclusion of services is pertinent to construction, where both designers and constructors supply services as well as the product (i.e. the completed work). Juran (2011) stated that although the need for quality has existed since the beginning of time, the ways and means of meeting the need for managing quality have changed dramatically. Wong and Fung (1999) stated the construction industry is being viewed as one with poor quality emphasis compared to other sectors like the manufacturing and service sectors.

Sun, (2000) stated that total quality management is increasingly being adopted by construction companies as an initiative to solve quality problems in the construction industry. In fact, a building is good quality if it will as be intended for its design life. As a true quality of the building may not be revealed until many years after completion, the notion of quality can only be interpreted in terms of the design attributes. (Battikha and Russell, 1998), Deming (1986), and worldwide, there are several Quality Awards such as the Deming Prize (1996) in Japan, the European Quality Award (1994) in Europe, and the Malcolm Baldrige National Quality Award (1999) in the United States of America. Each award model is based on a perceived model of TQM and provides a good understanding of the TQM philosophy, principles, and practices.

2.1.2 Defining Quality on construction projects

Hawell (2013) expressions have been adopted to define quality in the construction industry. Crosby (1979) defined quality as "conformance to requirements". Juran's definition pointed to quality as "fitness for use" in terms of design; conformance, availability, safety, and field use. According to Hart (2003) quality has a three-fold meaning in construction , it means getting the job done on time; it means ensuring that the basic characteristics of the final project fall within the required specifications; it means getting the job done within budget. Kanji and Wong (1998) stated that the construction industry has numerous problems because of its complicated nature of operation. Moreover, industry is comprised of a multitude of occupations, professions and organisations. A quality construction project has to comprise all these dimensions. Actually, quality in construction is directly connected with conformity to specifications and fitness for use. According to Wong and Fung (1999), higher customer satisfaction, better project quality and higher market share often come with the adoption of TQM by such companies. These definitions are interdependent and the choice of one depends on the domain and the purpose of its use. In construction quality is defined as "conformance to established requirements". (Hawell, 2013).

Hawell, (2013) stated that quality management (QM) is "the quality of management" which contains leadership, communication, team work and ability to change and improve and pleasing the customer. It includes the ongoing search for opportunities to improve total quality management (TQM) is an overall concept that should be committed to by top management. According to Juran and Gryna (1993), quality management is the "process of establishing long-range quality goals and defining the approach to meeting those goals". However, construction companies are adopting TQM to improve their performance. In addition, there is much dissimilarity between manufacturing and construction, so TQM techniques must be adapted for the construction industry. Understanding the customer's requirements is essential in ensuring

customer satisfaction, and the demand for the construction product must be viewed in relation to the intended use of the facility.

Quality is one of the aims of standardization. The quality of a product or a complete building or other constructions is the totality of its attributes that enable it to perform a stated task or to fulfill a given need satisfactorily for an acceptable period of time. For a building and civil engineering work, a satisfactory product, although essential in itself, is not on its own sufficient. It must be incorporated in the design and construction in a correct manner. In buildings, more defects and failures arise from inadequacies in the treatment of products in design and construction than from shortcomings in the products themselves (Atkinson, 2005). In their work, Abdulrazak et al (2017) stated that Quality Management has seen a transition from reacting to the outcome of site production activities to becoming a strategic business function accounting for the *raison d'être* of construction companies. Unless a construction company can guarantee its clients a quality product, it cannot compete effectively in the modern construction market.

The management philosophy based on TQM has generated significant interest in various economies across the World, a phenomenon that Kanji (1990) called the second industrial revolution. The increased awareness by senior management, that quality is an important strategic issue, has made it an important focus for attention at all levels of an organisation, something that Crosby (1979), Juran (2011) and Deming (1986) all point to as evidence that the organisation has adopted a TQM philosophy. However, different researchers have adopted different definitions of TQM. Smith et.al.(2013) *et.al.* (2011) said one of the common reasons for the failure of TQM is the cultural position of the company. The implementation of a TQM required a culture change and change in management behaviour. The literature will identify the important TQM culture elements that contribute to successful implementation of TQM. These elements

should be adopting by the construction industry in implementing TQM in Libya, Further, companies are prepared to only implement those aspects of total quality management (TQM) programs that will provide them with competitive advantage and improve their overall performance and the organisations must use a systems approach to manage their interrelated processes. Wilkinson (1994) cited that TQM is a philosophy of management derived from the work of the quality gurus. It is based on three fundamental principles:

- Customer orientation to satisfy customer requirements and expectations.
- Process orientation, the activities to be performed as process (inputprocess- output).
- Continuous improvement.

The justification of adoption of the Total Quality Management is based normally on its benefits and their effects on the organisation's future. According to Abdullahi et al., 2016 (1993), the justification for a firm to adopt total quality management (TQM) is normally based on the premise that it will acquire benefits. And that increase of the awareness of quality in general is a benefit obtained by the organisations with the total quality management (TQM) programme (Sun, 2000). According to Yasamis *et al.*, (2002) stated that total quality management (TQM) is seen as a continuously evolved management system consisting of values, methodologies and tools, the aim of which is to increase external and internal customer satisfaction with a reduced amount of resources. Moreover, (Yasamis *et al.*, (2002) said different values are included in the concept of TQM by different authors, as well as in different quality awards,

2.1.3 Quality Management in Construction Industry

The concept of quality has existed for many years, but its meaning has changed and evolved over time. Before the early twentieth century, quality management meant inspecting products to ensure that they met specifications (Yasamis *et al.*, (2002). This is evident in the Egyptian wall painting circa of 1450BC which showed evidence of measurement. Stones used in the pyramids

which were cut so well that a knife could not go between them (Yasamis *et al.*, (2002)). According to (Yasamis *et al.*, (2002)) around 1940s, during World War II, quality became more statistical in nature. Statistical sampling techniques were used to evaluate quality, and quality control charts were used to monitor the production process. In the 1960s, with the help of so-called “quality gurus,” the concept took on a broader meaning. Quality began to be viewed as something that encompassed the entire organization, not only the production process. All functions were responsible for product quality and shared the costs of poor quality. However, in the 1970s and 1980s many U.S. industries had to make changes to their quality policies when they lost market share to foreign competition particularly in the auto industry. Many hired consultants and instituted quality training programs for their employees (Yasamis *et al.*, (2002)).

Yasamis *et al.*, (2002) established in his study that many of the management practices used to support construction organizations are being challenged. The industry’s clients are moving forward. Clients demand improved service quality, faster buildings and innovations in technology. In Kaufmann and Wiltschko, (2006), Quality Management Concept is said to be structured in general according to the “International Organization for Standardization” ISO 9000-series and the “Plan, Do, Check, Act” PDCA-cycle. It further illustrated the two main structures stated above as follows;

ISO 9000-series: According to EN ISO 9000 quality management is defined as “coordinated activities to direct and control an organization with regard to quality”. Direction and control with regard to quality generally includes establishment of the quality policy and quality objectives, quality planning, quality control, quality assurance and quality improvement:

- **Quality planning** is focused on setting quality objectives and specifying necessary operational processes and related resources to fulfill the quality objectives

- **Quality control** is focused on fulfilling quality requirements
- **Quality assurance** is focused on providing confidence that quality requirements will be fulfilled
- **Quality improvement** is focused on increasing the ability to fulfil the quality requirements

PDCA-cycle

An important mindset of quality management is the PDCA-cycle. This cycle including the four components as Plan, Do, Check and Act (PDCA), was originally conceived by Walter Shewhart in the 1930`s, and later adopted by W. Edward Deming. The model provides in general a framework for the improvement of a process or system and is an iterative four-step quality strategy cf. Deming, (1982) as cite in Kaufmann and Wiltshko, (2006).

- **Plan:** Establish objectives and processes necessary to deliver results in accordance to specification
- **Do:** implementation of processes
- Check:** Monitor and evaluate processes and results against objectives and specifications
- **Act:** Take actions to the outcome for necessary improvement (e.g. improve, standardize)

2.1.4 Evaluating TQM approaches

It important to get feedback on success, and should be given recognition as a result of contribution to the improvement process in the encompassed many of the essential features of TQM that are demanded for improving the Total Quality Management of Organisations, and clearly these are relevant to initial idea are used in this research. Kanji and Asher (1993) suggested that the process of implementing TQM can be carried out in four stages as followings:

Identification and preparation: At this stage the organisation identifies and collects information about the prime areas where improvement will have most impact on performance, and it prepares the detailed basic work for the improvement of all the organisations activities. The information collected at this stage should include the costs of quality such as the total cost of waste, error correction, failure, appraisal and prevention to identify the potential areas for improvement and to direct the improvement efforts towards the areas they are most needed. It also should include the opinions of customers, suppliers; managers and employees to get different views about the problems and the necessary actions that are required for tackling these problems. In general, the aim of collecting information is to ensure that management has correct and accurate information to make its decisions.

Management understanding and commitment: The aim at this stage is to make sure that management understands the objective and methodology of TQM and is prepared to adopt them all the time. To achieve this, it is necessary to educate management in the TQM approach so that it can take appropriate actions and demonstrate its total commitment and take the leading role in the quality improvement process.

Scheme for improvement: At this stage it is necessary to develop a scheme for improvement, which should include appropriate training programmes for employees. The scheme should be developed after the realisation of some of the organisational critical aspects, such as customer supplier relationships, meeting customer needs, main causes of the problems, best solutions to these problems, prevention of recurring problems, priorities for improving efficiency, etc.

Critical analysis: At this stage it is necessary to obtain information about successes. This will help to review the achievements and to understand the future requirements for continuous quality

improvement, it is also important that everyone gets feedback on success and given recognition as a result of his/her contribution to the improvement process. However, Kanji (1996) suggested Darning's Plan-Do-Check-Act for *modeling* the four stages of implementation. To achieve this, it is necessary to educate management in the TOM approach so that it can take appropriate actions and demonstrate its total commitment and take the leading role in the quality improvement process. It is necessary to obtain information about successes. This will help to review the achievements and to understand the future requirements for continuous quality improvement. Also, Yasamis *et al.*, (2002)) who said lack of understanding the PDCA process was a barrier affecting successful implementation of the new standard in the north west of UK organisations.

Sun, (2000) stated that clearly, such a role distinction among leaders demands that each levels of management possess differing skills because the responsibility with which each is charged differs. Deming considered that quality responsibility is of the top management. Atkinson (1990) points out that 80 percent of TQM failures are mainly attributed to a lack of requisite commitment of top management.

2.2 Total Quality Management Practices used in Housing Delivery

If properly implemented, formal quality management systems provide a vehicle for achieving quality (i.e. conformance to established requirements). As defined by ANSI, a quality system is “the organizational structure, responsibilities, procedures, processes, and resources for implementing quality management” (Sun, 2000). In other words, Quality management systems refers to the set of quality activities involved in producing a product, process, or service, and encompasses prevention and appraisal (Yasamis *et al.*, (2002)). It is “a management discipline concerned with preventing problems from occurring by creating the attitudes and controls that

make prevention possible” (Crosby, 1979 cited in Battikha, 2002). Quality activities include the determination of the quality policy, objectives, and responsibilities and implementing them through quality planning, quality control, quality assurance, and quality improvement, within the quality system (ASQC, 1997 cited in Battikha, 2002).

Other views expressed by Battikha (2002) is that, a quality management system is a management technique used to communicate to employees what is required to produce the desired quality of products and services and to influence employee actions to complete tasks according to the quality specifications. In like manner also explained quality management system as a set of coordinated activities to direct and control an organisation in order to continually improve the effectiveness and efficiency of its performance. These activities interact and are affected by being in the system, so the isolation and study of each one in detail will not necessarily lead to an understanding of the system as a whole. The main thrust of a QMS is in defining the processes, which will result in the production of quality products and services, rather than in detecting defective products or services after they have been produced. The paper continued to say that a fully documented QMS will ensure that two important requirements are met:

- The customers’ requirements – confidence in the ability of the organisation to deliver the desired product and service consistently meeting their needs and expectations.
- The organisation’s requirements – both internally and externally, and at an optimum cost with efficient use of the available resources – materials, human, technology and information.

2.2.1 Understanding TQM and the requirements in construction industry

TQM concept and approach are well-understood and widely practiced in Europe, North America and Japan and growing economies of East Asia. However, some firms have experienced difficulties in implementing TQM successfully (Sun, 2000). These difficulties may not be due to the TQM concept itself; rather, there might have been problems stemming from the cultural

factors. However, this often resulted in missing the whole picture of TQM. According to Wong and Fung (1999) who indicated that the quality programs implementation in developing countries failed due to the lack of understanding of quality management (QM). Yasamis *et al.*, (2002) stated the failure of understanding of top management of TQM programmes requirements and the implementation process. However, it is clear that top management need to have a good understanding of the purpose of the TQM, how its requirements are implemented, ways to measure its business impact and areas in which benefits may lie. According to Al-Zamany et al (2002) the lack of understanding processes the people need to know and understand the internal and external processes that may be affected when improvement in any process is required. Also Lewis (1992) found no difference between the American and Spanish quality managers and he attributed this to their common lack of knowledge about TQM. Also according to Schmoker and Wilson (1993) one of the most critical challenges to the companies is to provide all staff with a comprehensive understanding of TQM.

2.2.2 Awareness of TQM in construction industry

Total Quality Management (TQM) is a way of thinking and a set of continuous and improvement processes for individuals, groups and whole organisations by understanding awareness of TQM as discovering better process, (Juran1986). Crosby (1996), states that the purpose of awareness is to let every one feel that they belong to a quality organisation. In addition, awareness means that the staff in an organisation understands the management's quality policy. If the levels of awareness of QMS issues in an organisation are very low there may also be a poor understanding about the importance of quality in international trade and globalisation of world markets. It is a result of lack of information, education and training programs available on quality issues (Al-Zamany *et.al* 2002). According to Yeh (2003), the majority of the studies were based on the

assessment of managers' awareness of a specific principle or practice of TOM like teamwork or training.

2.2.3 TQM and customer satisfaction in construction industry

Total customer satisfaction requires the organisation to know itself, its product, its competition, and its customers (Fox, 1995) said the following ways as:

- *Know your customers:* get to know your customers. It is not always obvious who your customers are. Customers are all those people touched by the product or service, internal and external to the organisation. To continue to satisfy the customers, all customers must be identified, and then the target customers are must be determined. Once the target customers are identified, customer needs and expectations must be determined. Customer expectations are dynamic; they continuously increase and change. So a continuous review is necessary to ensure customer satisfaction.

Understanding customer needs and expectations: The identification of customer needs and expectations requires systematic, thorough, and continuous market research. The most important aspect of this process is to listen to the customer.

2.2.4 Purpose of Quality Management in the Construction Industry

The U.S. Army Corps of Engineers, (2004) states that Construction Quality Management “CQM” is the performance of tasks, which ensure that construction is performed according to plans and specifications, on time, within a defined budget, and a safe work environment. For purposes of this study, quality is defined as conformance to properly developed requirements. For a construction project, quality begins with requirements carefully developed, reviewed for adherence to existing guidance and ultimately reflected in criteria and design documents which accurately address these needs. Therefore, the designer establishes the quality standards and the contractor in building to the quality standards in the plans and specifications, controls the quality

of the work. The purpose of CQM is the Government's efforts, separate from, but in coordination and cooperation with the contractor, assure that the quality set by the plans and specifications is achieved. CQM is the combined effort of the contractor and the Government. The contractor has primary responsibility for producing construction through compliance with plans, specifications, and accepted standards of the industry.

2.3 Commitment of Contractors to TQM in Housing Project Delivery

Investopedia explains 'Quality Control' as a process through which a business seeks to ensure that product quality is maintained or improved and manufacturing errors are reduced or eliminated. Quality control requires the business to create an environment in which both management and employees strive for perfection. This is done by training personnel, creating benchmarks for product quality, and testing products to check for statistically significant variations. A major aspect of quality control is the establishment of well-defined controls. These controls help standardize both production and reactions to quality issues. Limiting room for error by specifying which production activities are to be completed by which personnel, reduces the chance that employees will be involved in tasks for which they do not have adequate training. Quality Management Systems, (2013) stated that, quality control is the process of evaluating whether construction projects adhere to specific standards. The main objective of quality control is safety. Additionally, quality control is also meant to ensure that buildings are reliable and sustainable.

The ISO definition also states that quality control is the operational techniques and activities that are used to fulfill requirements for quality. This definition could imply that any activity whether serving the improvement, control, management or assurance of quality could be a quality control activity. What the definition fails to tell us is that controls regulate performance. They prevent

change and when applied to quality, it regulates quality performance and prevent undesirable changes in the quality standards. It continued that quality control is a process for maintaining standards and not for creating them. Standards are maintained through a process of selection, measurement and correction of work, so that only those products or services which emerge from the process meet the standards. In simple terms quality control prevents undesirable changes being present in the quality of the product or service being supplied. The simplest form of quality control is illustrated in the Figure below. Quality control can be applied to particular products, to processes which produce the products or to the output of the whole organisation by measuring the overall quality performance of the organisation.

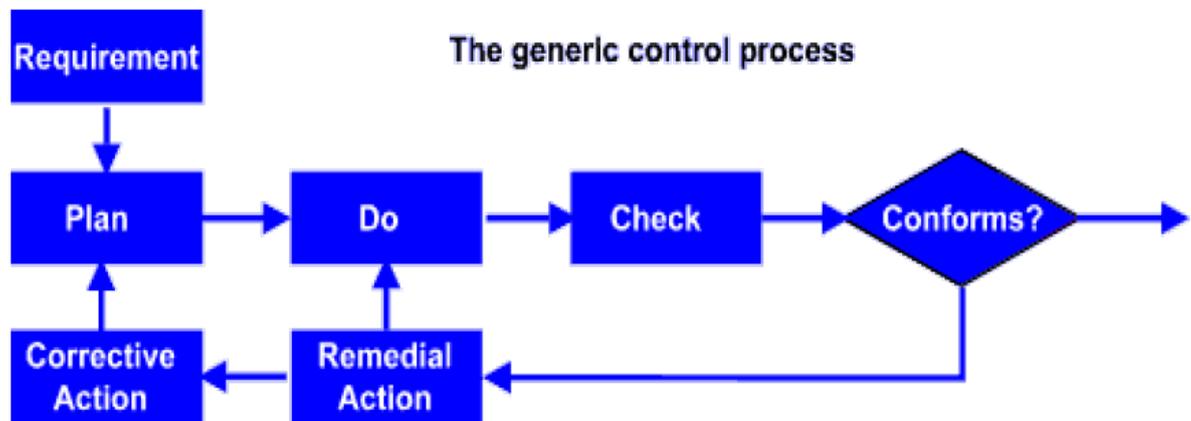


Figure 2.1 Quality Management System
Source: (QMS, 2013)

It is often deemed that quality assurance serves prevention and quality control detection but a control installed to detect failure before it occurs serves prevention such as reducing the tolerance band to well within the specification limits. So quality control can prevent failure. Assurance is the result of an examination whereas control produces the result. Quality Assurance does not change the product, Quality Control does. Harris and McCaffer, (2001) defined quality control as a set of activities or techniques whose purpose is to ensure that all quality requirements are being met. In order to achieve this purpose, processes are monitored and performance problem are solved. Scatterfield, (2005) in other words said quality control is critically important

to a successful construction project and should be adhered to throughout a project from conception and design to construction and installation. Inspection during construction will prevent costly repairs after the project is completed. The inspector, engineer, contractor, funding agency, permit agency, and system personnel must work together to inspect, document, and correct deficiencies.

2.3.1 Importance of Quality Control in Construction

Quality Control (QC) in construction is the process of verifying that the project is built to plan, that the tolerances allowable by industry standard and engineering practices have been met or bettered, and that the finished project (and all phases to get there) meet with the quality standards of the architect, engineer, owner, and general contractor. On construction projects there are dozens of subcontractors, all of which have specific responsibilities. Superintendents and project managers try to maintain high quality standards but they can't be everywhere at once. Required inspections by cities and counties (as well as other jurisdictions, depending on the project) help to ensure safety and code issues. In addition, a good general contractor or developer will have on staff a QC person, someone who is responsible for going through the building or project, ensuring compliance, and maintaining an ongoing list of corrective items that must be accomplished before the contractor who installed it is paid or leaves the job. QC technicians generally keep a very detailed binder, separated by areas/rooms/phases of the project with notes of items that must be either verified or corrected, with sign-off as each is accomplished. This binder becomes part of the project record and is an important element to completing the project on time and with expected quality maintained.

2.3.2 Quality Improvement

The Heath Foundation, (2009), said there is no single definition of quality improvement and no one approach appears to be more successful than another. However, there are a number of definitions that describe quality improvement as a systematic approach that uses specific techniques to improve quality. The most important ingredient in successful and sustained improvement is the way in which the change is introduced and implemented. According to ISO 9000:2000 Quality improvement is "Part of quality management focused on increasing the ability to fulfill quality requirements."

Empirical studies on quality management in construction have shown that various quality improvement practices are common among non-residential builders and developers. Most of these practices have been collectively grouped under a successful management philosophy termed, "Total Quality Management" or TQM. (Shofoluwe et al 2013)

2.3.3 TQM and the construction industry

Yasamis *et al.*, (2002) stated that TQM concepts in construction have pulled the industry out of a crisis mode that existed for quite some time and the management philosophy of TQM directs all strategic and operational policies in which the company engages. The ability of management and employees to control their work processes, to recognise problems, trace their root causes and to implement effective remedies is the cornerstone of a continuous quality improvement program. Kanji and Wong (1998) stated that a cultural and behavioural shift in the mind-set of all participants in the construction process especially top or senior management is necessary if, the construction industry is to improve its performance. A wide range of quality tools and techniques are available to companies, which provide a common language, a consistency of approach to continuous quality improvement. These tools range from simple techniques such as brainstorming to a more sophisticated option including statistical process control techniques.

While the tools may appear to be little more than applied common-sense, they have been proven in many industries and together they form a powerful methodology by which individuals or teams are able to continuously improve their work process. While data collection is the foundation on which a TQM program is built, it is important that each company selects those tools that work for it and avoids collecting data as an end in itself (Sun, 2000). Within the construction industry, architects, quantity surveyors, engineers, contractors and other specialists all have, in addition to their special technical skills, their own trade or professional customs and practices. These may have an effect on the building process either individually or collectively. Yasamis *et al.*, (2002) gave some of the benefits to total quality management may also be inferred from its potential disadvantages and benefits in construction the application of these techniques has led to the development of TQM for improving the broader overall performance within the company. As seen in the figure 2.2 below the benefits of TQM.

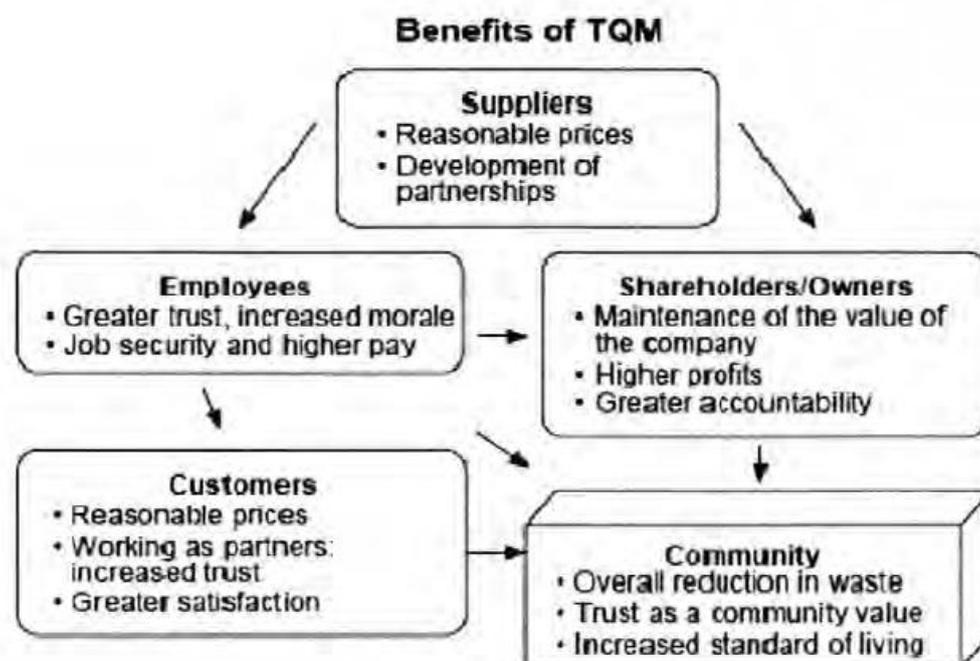


Figure 2.1: The benefit of TQM
Source: Drensek and Gurubb, 1995)

2.5 Measures for effective Total Quality Management by Contractors

Performance measurement is a fundamental building block of quality management and a total quality organisation. Historically, organisations have always measured performance in some way through the financial performance, be this success by profit or failure through liquidation. However, traditional performance measures, based on cost accounting information, provide little to support organisations on their quality journey because they do not map process performance and improvements seen by the customer. In a successful total quality organisation, performance will be measured by the improvements seen by the customer as well as by the results delivered to the shareholders (businessballs.com/dtiresources). According to Takim, et al. (2003), performance measurement in the manufacturing and construction industries is used as a systematic way of judging project performance by evaluating the inputs, outputs and the final project outcomes. However, very few companies systematically measure their performance in a holistic way. Moreover, the existing systems tend to focus more on product and less on process and design. This can lead to the suboptimal quality of the performance measurement system, the misjudging of relative performance, complacency and the denying of appropriate rewards to the deserving. Previous studies have revealed that performance can be measured in terms of financial and non-financial measures, or the combination of both. When measurements are being implemented, contractors, consultants and the management team's performances are blamed as the major reasons for the failure of a particular project. The other project stakeholders such as client, suppliers, trade contractors and the community at large are neglected.

2.5.1 Quality Planning

Harris and McCaffer, (2001) defined quality planning as a set of activities whose purpose is to define quality system policies, objectives, and requirements, and to explain how these policies will be applied, how these objectives will be achieved, and how these requirements will be met. Subsequent to this definition, Construx, (2003) stressed that quality plan is different from a test

plan. The study continued that quality plan defines the quality goals, is realistic about where defects come from, selects appropriate detection and prevention methods, and has means not to “go dark”. The Project Management Book of Knowledge “PMBOK” 4 also addressed quality planning from a different position to enhance the thoughts earlier expressed. It said that quality planning has a process input generated by predecessor processes referred to as the Project Scope Statement and Project Management Plan. These processes are introduced by external units like Enterprise Environmental Factors and Organizational Process Assets. PMBOK4 further defined quality planning as the process for "identifying which quality standards are relevant to a project and determining how to satisfy them": In other words, it means planning how to fulfill process and product (deliverable) quality requirements: "Quality is the degree to which a set of inherent characteristics fulfill requirements". By planning the quality one has to respect some principles, and these are:

Customer satisfaction comes first: Quality is defined by the requirements of the customer.

Prevention over inspection: It is better to avoid mistakes than to inspect the result and repair the defects. **Management responsibility:** Costs of quality must be approved by the management. **Continuous improvement:** Becoming better is an iteratively structured process.

2.5.2 Quality Management

In recent years, increasing concern has been expressed at the standards of performance and quality achieved in building works. The need for structured and formal systems of construction management to address the aspect of performance, workmanship and quality has arisen as a direct result of deficiencies and problems in design, construction, materials and components. Many of the problems experienced in building appear as a range of inadequacies from minor technical and aesthetic aspects to major building defects. Irrespective of their degree of severity, such problems are known to cost the industry so much annually, yet, many difficulties might be alleviated through greater care and attention to standards of performance and quality at the

briefing, design and construction stages of the building process (Griffith, 1990). If buildings are to be trouble-free, more attention needs to be given to applying quality assurance principles to design and site-work, including project selection and specification, and to supervision of the handling and protection on site (Atkinson, 2005).

Harris and McCaffer, (2001) defined quality assurance as a set of activities whose purpose is to demonstrate that an entity meets all quality requirements. Quality Assurance activities are carried out in order to inspire the confidence of both customers and managers, confidence that all quality requirements are being met. According to EuroRoadS, (2006), the main objective of quality assurance measures in information processes is to fulfill a required quality level. By using described probabilistic model, cause and effect diagram, one is able to analyse existing processes and to detect existing quality gaps within these processes. Sun, (2000) also stated that quality requirements should be clear and verifiable so that all parties in the project can understand them for conformance. Harris and McCaffer, (2001) continued that Quality assurance (QA) emphasizes defect prevention, unlike quality control that focuses on defect detection once the item is produced or constructed. It was further established that quality assurance concentrates on the production or construction management methods and procedural approaches to ensure that quality is built into the production system.

2.5.3 Quality Management in Construction

The importance of Quality Assurance is based on the principles of getting things right first time. By implementing, maintaining, reviewing and continually improving a Quality Assurance System, a construction company can achieve and reap the benefits of having such a system in place. Quality Assurance exists because of the degree of dissatisfaction experienced by the industry's clients over a long period, combined with a growing impatience by some of their

advisers to achieve value for money. An increasing number of building companies are also frustrated by the inadequacy of a system which however valiantly they try, leaves their efforts lacking in some regards. A revolution has occurred in the assembly of buildings from what was a craft process to one where the critical work of connecting interdependent units is done in the main by semi-skilled labour from a multiplicity of separate employers. This makes great demands upon supervision and management systems. (StudyMode.com, 2008)

A Quality System is designed to provide an assurance to Clients, which can be supported through documented records, that all contracts will be completed in accordance with the agreed time, cost and specification. It should also further ensure that the company personnel, sub-contractors and key suppliers are aware of customer requirements and that they are fully met. Conformance with requirements of the detailed procedures developed in accordance with the Quality Manual has to be mandatory for all staff employed in the company. It is essential to the system that encouragement is given to each employee to develop and maintain an attitude of continuing quality improvement and customer satisfaction. Quality Assurance is concerned with developing and planning the necessary technical and managerial competence to achieve desired results. It is also about attitudes, both of management and of all those for whom they are responsible. (StudyMode.com, 2008)

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

This research adopted a quantitative approach. Quantitative research employs numeric data such as scores and metrics (Bhattacharjee, 2012). According to Cresway (1994) qualitative methods have been considered capable of studying complex situations, involving human beings and yielding rich findings. It has resulted in the increase of their popularity especially in the built environment.

Quantitative research is characterized by the assumption that human behavior can be explained by what may be termed as social facts which can be investigated by methodologies that use deductive logic of natural science. Quantitative research is primarily aimed at quantifying the variation in a phenomenon, situation, problem or issue through information gathered Using predominantly quantitative variable and the analysis is carried out to ascertain the magnitude of the variation. Method of data collection described in orderly manner in the aspects of how the data were collected and where the data were sourced. Quantitative data was collected from building contractors that were involved in housing development in Abuja.

3.2 Research Population

Population is group of individuals that have common characteristics which are of interest to the researcher. The targeted population for this research are building contractors registered with Federal Housing Authority in Abuja.

3.3 Sampling Frame

This is a section of the target population from where sample can be drawn. The sampling frame for this study constitute registered building contractors with Federal Housing Authority in Abuja.

A total of 173 building contractors were registered with Federal Housing Authority Abuja and this form serve as the sample frame for this study.

3.4 Sample Size

A sample size is the number of data sources that are actually selected from the total population (Morgan, 2008). The sample size for this study is calculated using a simplified formula proportionas.

It stated that:

$$n = \frac{N}{1+N(e)^2} \dots\dots\dots (3.1)$$

Where n is the required sample size, N is the finite population size, e is the level of significance 5% (0.05) and 1 is the unity.

$$\frac{173}{1+173(0.05)^2} = 120 \dots\dots\dots (3.2)$$

Therefore, for the purpose of this study, from the 173 registered building contractors in the study area, sample size of 120 was used for the questionnaire survey.

3.5 Method of Data Collection

The data for the study were obtained from both primary and secondary sources. These data were used to achieve the objectives of the study.

3.5.1 Primary Data:

Primary data were obtained from the final questionnaire that was used for the analysis of the study. The data that were collected from questionnaire survey was distributed to contractors that are involved in building construction project. The structured questionnaire were framed based on three types of answering techniques, namely rating-based, selective based and open-ended

format. Based on rating format, respondents were instructed to rate their opinion for a specific fact by choosing from a 5-point scale ranging from Strongly Disagree to Strongly Agree. Secondly, selective-based questions only required respondents to tick in the appropriate box or boxes.

The structured questionnaires for this study covered two sections,

- (i) Section A: The background of the respondents such as number of years of experience, qualification, position in the company. The company profile where he/she is currently employed, such as business activity and nature of the company.
- (ii) Section B: The second part comprises the question that indicates the possible factors that affect the implementation of Total Quality Management in building construction work.

The respondents chosen for the study are those that are involved in building construction projects running and in particular had encounter experience during construction phase. In addition to that, the organizations that were selected range from medium to large scale organization only.

3.5.2 Secondary Data:

The secondary data for the study were obtained from the official records of the construction sites. The data were used to achieve the objectives of the study.

3.6 Data Collection Procedures

This study employed the use of personal distribution of questionnaire survey and obtained data for observation. These data were used to achieve the objectives of the study.

3.6.1 Questionnaires

Questionnaires is one of the most widely used social research techniques. The idea of formulating precise written questions, to find answer to the issues. Questionnaire is a research instrument consisting of set of question (items) intended to capture responses from respondents

in a standardized manner. For the purpose of this research a total of 120 structured questionnaire were administered to building contractors operating in Abuja.

3.7 Method of Data Presentation and Analysis

The data extracted from the questionnaire were processed and analyzed using the descriptive statistical method which includes percentages, tables and ranking method. The analysis of the data from the receivable feedback from the questionnaire quantities stimulation for instance in average index calculator. The analysis were rank based on the frequency and the average index.

This index was calculated as follows:

Average index formula:

$$\text{Average} = \frac{\sum \mu X n}{N} \quad (3.3)$$

μ = Weighting given to each factor by respondents (1to5):

n = Frequency of the response;

N = total number of response.

Whereby the application of average index in questionnaire for instance would be:

$\mu_1 = 1$, frequency of “strongly Disagree” response

$\mu_2 = 2$, frequency of “Disagree” response

$\mu_3 = 3$, frequency, of Neutral” response

$\mu_4 = 4$, frequency of “Agree” response

$\mu_5 = 5$, frequency of “Strongly Agree” response

Besides, they can be represented by:

= Very high degree of consideration.

= High degree of consideration

= Neutral consideration

= Low degree consideration

Very low degree of consideration

With the rating scale as below:

1 = Strongly Disagree ($1.00 \leq \text{Average index} < 2.5$)

2 = Disagree ($1.50 \leq \text{Average index} < 2.5$)

3 = Neutral ($2.50 \leq \text{Average index} < 3.5$)

4 = Agree ($3.5 \leq \text{Average index} < 4.50$)

5 = Strongly Agree ($4.5 \leq \text{Average index} < 5.00$).

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION OF RESULTS

4.1 Profile of the Respondents

The surveyed respondents and the firm's profile are presented in this section of the study. The major variables discussed in an attempt to describe the profile of the respondents included the respondents' position in the firm, the highest level of qualification, and the experience of the respondents in the construction industry. The major variables also presented in an attempt to describe the profile of the firm were the type of organisation, the firm's years of operation, and the major works undertaken by the firms for the past 5 years, the firm's major clients, and the category of firm. The results of the section are presented in Tables 4.1 and 4.2.

Table 4.1: Respondents Profile

Respondents profile	Frequency	Percent (%)
Position in the firm		
Project manager	34	46.2
Site manager	16	7.7
Site engineer	26	30.8
Architect	22	15.4
Highest level of qualification		
HND	34	30.8
B.Tech	36	46.2
M.Tech	28	23.1
Experience in the construction industry		
0-1 year	13	7.7
2-5 years	13	7.7
6-10 years	26	30.8

More than 10 years	46	53.8
Area based in the organization		
Site	60	76.9
Office	38	23.1
Management course participated		
Project management professional	23	23.1
MSc. Procurement management	42	53.8
Integrated quality management	33	23.1

Source: Field Survey, 2019

From Table 4.1, out of the total respondents (n=98), the majority (46.2%) were project managers in the surveyed construction firms. However, significant percentages (30.8%) of the respondents were also site engineers in the construction firms surveyed. The highest level of qualification of the majority (46.2%) of the surveyed respondents was Bachelor of Technology (B.Tech). Moreover, the majority (53.8%) have also participated in management course like M.Tech. Procurement Management. The experience of the majority (53.8%) of the surveyed respondents in the construction industry was more than 10 years. Within the construction firms surveyed, the majority (76.9%) of the respondents are predominantly based on site.

4.1.2 Profile of Organization

Analysis in Table 4.2 show the organisation profile, the majority (92.3%) of the surveyed firms were typically building construction firms. However, one of the firms was also engaged in civil works. The majority (53.9%) of the surveyed construction firms have predominantly been in business or operation for more than 10 years. The major business undertaken by the majority (76.9%) of the firms for the past five years was building works. The construction firms' major clients have predominantly been the public sector.

Table 4.2: Profile of Organization

Profile of organization	Frequency (n=13)	Percent (%)
Type of organization		
Building contractor	83	92.3
Road contractor	0	0.0
Civil works	10	7.7
Firm's years of operation		
< 5 years	22	15.4
5-10 years	24	30.8
> 10 years	47	53.9
Major works undertaken by firm the past 5 years		
Building works	74	76.9
Road works	8	7.7
Maintenance work	8	7.7
Water systems	8	7.7
The firms major clients		
Public	62	53.9
Private	12	15.4
Cooperate	19	23.1
Others	6	7.7

Source: Field Survey, 2019

4.2 Total Quality Management practices used by contractors

This section of the study presented the surveyed firm's management philosophy. The section presented the various departments that exist in the firms, some of the areas adhered to by the firms, and the Item that best describes top management philosophy of firms competitiveness or

quality achievement effort. The section also presented the percentage of turnover of the surveyed construction firm in several activities, the years of existence of the departments in the firms, and the priority given to some factors in the firms. The results are presented in Tables 4.3

Table 4.3: Total Quality Management practices used

TQM practiced used	Frequency (n=13)	Percent (%)
Department that exist in the firm		
Human resource	48	61.5
Contract planning unit	0	0.0
Estimating department	24	23.1
Quality assurance unit	13	7.7
Marketing department	0	0.0
Health & safety department	13	7.7
Some areas of adherence by firm		
Strategic marketing policy	14	9.1
Information management plan	14	9.1
Quality management plan	46	54.5
Organisational sales guidelines	0	0.0
Maintenance management plan	24	27.3
Product evaluation report	0	0.0
Item that best describes Total Quality Management		
Faster project delivery	0	0.0
Safety performance	11	8.5
Quality during/after	47	58.3
Meeting construction budget	20	16.7
Making adequate profit	20	16.7

Source: Field Survey, 2019

From Table 4.3, it is evident that the predominant department that existed in majority (61.5%) of the surveyed construction firms was human resource department. However, a significant percentage (27.3%) of the construction firms also had estimating departments. A major area of adherence by the majority (54.5%) of the surveyed construction firms was quality management plans. Also, 27.3% of the surveyed construction firms adhered to maintenance management plans of the companies. The item that best describes top management’s philosophy guiding the firm’s competitiveness or quality achievement effort was quality during and after the execution of projects. By implementing, maintaining, reviewing and continually improving a Quality Management, a construction company can achieve and reap the benefits of having such a system in place.

4.3 Level of Commitment of Contractors to Total Quality Management

Table 4.4 shows the extent to which contractors applied total quality management practices in housing delivery, the identified TQM practices were used, it shows that Competent Project Team and Planning / safety performance 234 was ranked 1st which mean is being used to a great extent, Project mission, project evaluation and faster project delivery were weighted 247 and ranked 2nd , Meeting quality standard and making adequate profit were either to a fair extent used or Not used at all.

Table 4.4: Level of commitment of TQM

Project Management Best Practice Used	Extent of Use					Weighted Average	Ranking of Factors
	1	2	3	4	5		
Competent Project Team	2	3	5	34	15	234	1 st
Authority of the Project Manager	5	5	5	29	14	211	5 th
Project Understanding	4	3	11	26	15	222	4 th
Meeting Quality Standard	7	4	9	30	9	207	6 th

Client Involvement	4	0	4	43	8	228	3 rd
Project Mission	0	0	7	37	15	226	2 nd
Adequate Resources	0	0	14	32	13	228	3 rd
Organization guidelines	0	0	8	33	18	222	4 th
Maintenance Management	0	0	9	40	10	222	4 th
Product evaluation	2	4	9	31	13	226	2 nd
Faster project delivery	2	4	9	31	13	226	2 nd
Safety performance	2	3	5	34	15	234	1 st
Quality during / after	5	5	5	29	14	211	5 th
Meeting construction budget	4	3	11	26	15	222	4 th
Making adequate profit	7	4	9	30	9	207	6 th

NB: 5 = To a great extent; 4= To a considerable extent; 3= To a moderate extent; 2 = To a fair extent; 1= Not at all

Source: Field Survey, 2019

4.3.1 Indicator for Total Quality Management in the Organisation

The best measures or indicators for total quality management in the construction firms surveyed have been presented in this section of the study. To do this, the respondents were presented with nine measure or indicators of quality to rank from least (1) to highest (5). The result of the surveyed respondents is presented in Table 4.5.

Table 4.5: Measures or Indicators for Quality in the Firm

Measures/Indicators	Mean Rank	Rank
Getting more jobs as a result of previous good work done	4.83***	1
Management commitment to quality	4.50***	2
Overall Client/Customer satisfaction	4.42***	3

Adherence to certified quality programs such as the ISO 9000 and 14000 series	4.42***	3
Meeting general construction standards	4.00***	5
Having a skilled work force	3.92***	6
Training and education for team members on quality	3.42***	7
The length of warranty (in years) the company can give on their work (Probably beyond the defect liability period)	3.08**	8
Winning Quality Awards	2.73	9

Rank: [Least (1), Quite (2), High (3), Highest (4), Highest (5)]

Source: Field Survey, 2019

***, ** & * representing significance at 1%, 5% & 10% respectively

From Table 4.5, getting more jobs as a result of previous good works done is deemed the best measure or indicator of quality in the surveyed construction firms. This quality indicator variable was subsequently followed by management commitment to quality, overall client or customer satisfaction, adherence to certified quality programs such as the ISO 9000 and 14000 series, and meeting general construction standards ranked 2nd, 3rd, 3rd and 5th respectively. However, the least three ranked measure or indicators of total quality management in the construction firms surveyed were having a skilled work force, training and education for team members on quality and the length of warranty the company can give on their work ranked 6th, 7th, and 8th respectively. Winning awards as a quality measure was however found to be statistically insignificant.

4.3.2 Influence Total Quality Management Projects of the Firm

This section of the study assesses the factors that influence the quality of project of the construction firms surveyed. From Table 4.6, the respondents were presented with five variables to rank from ‘great influence’ (1) to ‘no influence’ (3) on the bases of their influence

on the quality of projects in the construction firms surveyed. The result of the responses is presented in Table 4.6.

Table 4.6: Factors Influencing Quality of Projects

Factors	Mean Rank	Rank
Contract Documents	1.08***	1
Design Drawings	1.25***	2
Improved schedule performance	1.33***	3
Craftsmen Training	1.67**	4
Improved relationships with subcontractors	1.92	5

Rank: [Of Great Influence (1), Some Influence (2), No Influence (3)]

Source: Field Survey, 2019

***, ** & * representing significance at 1%, 5% & 10% respectively

From Table 4.6, contract documents, design drawings and improved schedule performance ranked 1st, 2nd, and 3rd respectively are deemed the three most important factors in the determinant of the quality of projects undertaken by the construction firms surveyed. Moreover, all these three ranked variables were also statistically significant at 1%. However, the least influential factor in terms of the quality of projects undertaken by the surveyed construction firms was craftsmen training and improved relationship with subordinates ranked 4th and statistically significant at 5%. However, the last ranked factor improved relationship with subordinates was found to be statistically insignificant.

4.3.3 Firms Practices and Essence of Bidding Strategies

This section of the study presents the surveyed construction firms practices and essence of bidding strategies in the construction industry. The result of the responses of the surveyed persons is presented in Table 4.7.

Table 4.7: Firms Practices and the Essence of Bidding Strategies

	Frequency	Percent (%)
Company's practice is driven by		
Technology	34	33.3
Innovation	9	8.3
Profit	9	8.3
Client satisfaction	46	50.0
Research	0	0.0
Bidding strategies that enables firm achieve best result		
concentrate on communicating our fast Project Deadline	79	69.2
focus on the particular client's needs requirement to the project	57	53.8
promote the competence of our technical team	68	61.5
promote our safety records	59	69.2
promote value for money and cost	59	69.2

Source: Field Survey, 2019

From Table 4.7, out of the total respondents, the practices of the majority (50.0%) of the construction firms surveyed are driven by client satisfaction. A significant percentage (33.3%) of the respondents also believed the construction firms practices are driven by technology. The majority (69.2%) of the respondent surveyed believed that the bidding strategies enabled the surveyed construction firms to achieve best result in communicating fast project deadline. The majority of the surveyed respondents also believed that the bidding strategies of the construction companies enabled the firms to achieve best result in the focus on particular clients' needs requirement to the project, promote the competence of the firms technical team, promote safety records and value for money and cost.

4.3.4 Techniques Practiced by Firm in an Attempt to Achieving TQM

The techniques practiced by the surveyed firms in an attempt to achieving project objectives have been presents in this section of the study. The section presents the usage of the techniques, and later presents the level of importance of the practiced factors in achieving project goals. The result of the section is presented in Table 4.8.

Table 4.8 Practiced Techniques and Their Importance to the Firm

Techniques Practiced by firm	Usage		Level of Importance				
	Yes	No	1	2	3	4	5
Project Design	9 (69.2)	4 (30.8)			1 (11.1)	4 (44.4)	4 (44.4)
Quality Manual	9 (69.2)	4 (30.8)			1 (11.1)		8 (88.9)
News Letters	3 (23.1)	10 (76.9)		1 (33.3)	1 (33.2)		1 (33.3)
Seminars on Quality Management	8 (61.5)	5 (38.5)		1 (12.5)	4 (50.0)		3 (37.5)
Short Course	2(15.4)	11(84.6)	1(50.0)		1(50.0)		
Training Programmes	8(61.5)	5(38.5)	1(12.5)		2(25.0)	1(12.5)	4(50.0)

Rank: [(1) Not Important, (2) Least Important, (3) Important, (4) Very important, (5) Most Important]

Source: Field Survey, 2019

From Table 4.8, the majority (69.2%) of the surveyed respondents believed that the construction companies are engaged in project design evaluation. Out of this majority, a greater percentage also believed that the project design evaluation of the surveyed firms are very important or most important. The construction firms surveyed also practice quality manual techniques. The practiced manual technique of the surveyed construction firms was also deemed most important by the majority (88.9%) of the respondents. Finally, the majority (61.5%) of the surveyed construction firms are also engaged in the organisation of training programmes for employees. The surveyed respondents also deemed the training programmes of the construction firms as

most important. This finding is supported by Investopedia which explains that to achieve the goal of quality of projects, there is the need to training personnel and organized further skill enhancement courses.

4.4 Challenges Encountered During Total Quality Management Implementation

The challenges encountered during quality assurance implementation policies of the construction firms have been presents in this section of the study. The various activities that are difficult to conduct before and during the execution of projects by the surveyed firms have also been presents. The result of this section is presented by Figure 4.1 and Table 4.9.

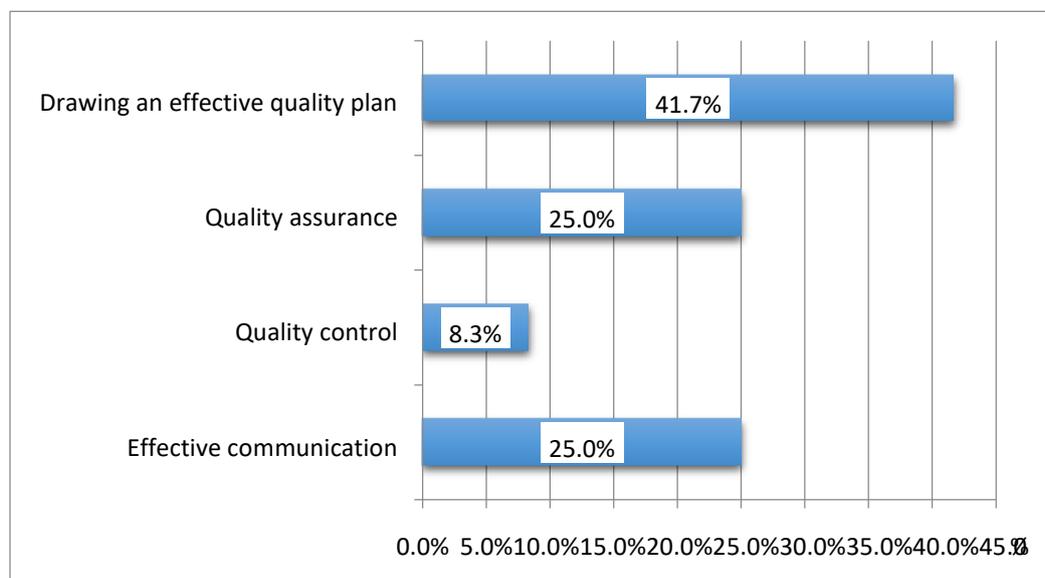


Figure 4.1: Activity Difficult to conduct before and During Execution of Project

Source: Field Survey, 2019

From Figure 4.1, out of the total surveyed respondents, the majority (41.7%) believed that the activity of the construction firms difficult to conduct before and during the execution of projects was drawing an effective quality plan. However, a significant percentage of the surveyed respondents also believed that the effective communication and quality assurance were also difficult to conduct before and during execution of projects.

4.4.1 Potential Barriers to the Attainment of Total Quality Management in the Firm

To assess the potential barriers to the attainment of project quality in the surveyed construction firms, the respondents were presented with 15 barrier items to rank from least (1) to highest (5).

The result of the section is presented in Table 4.9.

Table 4.9: Barriers to TQM in the Firm

Potential Barriers	Mean Rank	Rank
Lack of effective supervision	3.91***	1
Lack of effective communication	3.50***	2
Lack of management's commitment to Quality Assurance	3.50**	2
Lack of proper equipment available for use	3.36**	4
Lack of a Quality Assurance team to lead the process	3.33***	5
Personnel unable to thoroughly read and understand contract documents (especially specification for works)	3.09**	6
Setting unrealistic deadlines	3.00**	7
Field Employees regarding Quality Assurance as irrelevant	2.82*	8
Excessive "paper work" (Bureaucracy)	2.75	9
Working with new people/employees most often	2.73	10
High Labour turnover the company	2.70	11
Complex designs (Unable to interpret complex designs)	2.67	12
Worker attitude or "bad seed" effect	2.50	13
Lack of skilled workers available	2.36	14
Transient nature of workforce	2.25	15

Rank: [least (1), quite (2), high (3), higher (4), highest (5)]

Source: Field Survey, 2019

***, **&* representing significance at 1%, 5% & 10% respectively

From Table 4.9, the five major barriers in the order of their rank were lack of effective supervision, lack of effective communication, lack of management's commitment to quality assurance, lack of proper equipment available for use and lack of a quality assurance team to

lead the process ranked 1st , 2nd , 3rd , 4th and 5th respectively. However, the least ranked three challenge or barrier to project quality in the construction firms surveyed were Personnel inability to thoroughly read and understand contract documents (especially specification for works), setting unrealistic deadlines, and field employees regarding quality assurance as irrelevant ranked 6th, 7th, and 8th respectively. However, the remaining considered factors or barriers were found to be statistically insignificant and so were excluded.

4.5 Measures For Effective Total Quality Management Practices

This section of the study presents the desirable measures for effective quality assurance practices in the surveyed construction firms. To do this, the respondents were presented with 12 items to rank from least challenged (1) to highest challenged (5). The result of the rank t-test is presented in Table 4.10.

Table 4.10: Measures for Effective Quality Assurance

Factors	Mean Rank	Rank
Management commitment	4.91***	1
Communication between managers and employees	4.27***	2
Employee Involvement	4.18***	3
Detailed and logical work program	4.18***	3
Regular inspection and audit of quality report	3.91***	5
Training and education of team members	3.73***	6
Review/analysis used to improve performance	3.64***	7
Well-defined roles and responsibilities of project participants	3.56***	8
Clearly defined goals and objectives	3.56**	9
Incentives for good performance	3.55***	10
Subcontractors involvement in the quality process	3.45***	11
Regular meetings of project participants	3.10**	12

Rank: [Least (1), Quite (2), High (3), Higher (4), Highest (5)]

Source: Field Survey, 2019

***, **&* representing significance at 1%, 5% & 10% respectively

From Table 4.10, the highest ranked seven factors or measures for effective total quality management as given by the surveyed respondents were management commitment, communication between managers and employees, employee involvement, detailed and logical work program, regular inspection and audit of quality report, training and education of team members and review/analysis used to improve performance in their order of rank. However, the least ranked five factors or measures for effective quality assurance in the surveyed construction firms were well-defined roles and responsibilities of project participants, clearly defined goals and objectives, incentives for good performance, subcontractor's involvement in the quality process, and regular meetings of project participants in the descending order of rank.

4.6 Summary of Findings

The summary of findings this research revealed by the survey are presented below:

- i. In determining the priority given to the factors which determine what total quality management means, the research revealed that meeting of project deadline or time and meeting of quality were the two main factors project participant consider to be the most in term of project performance measurement.
- ii. On measures or indicators for total quality management in the firm the research revealed that getting more jobs as a result of previous good works done, management commitment to quality, overall client or customer satisfaction and adherence to certified quality programs such as the ISO 9000 and 14000 series were deemed to be the best measure or indicator of quality in the survey as confirm by the construction firms contacted.
- iii. In seeking the factor which influence total quality management of projects of firms, the research revealed that contract documentations, such as design drawing, bills of quantities, bond for tender's and others remain influential part of quality practices of a firm. More importantly, improved schedule performance meaning time was also not left

out by respondents due to the extent that effective quality practices system among construction firms is hinged on time. To this extent, it remains a foundation for quality management practices by contractors.

- iv. For the effectiveness of practicing total quality management among construction firms, the study revealed that construction firm's practice of total quality is driven by technology and client satisfaction. However, in terms of bidding strategies the survey revealed that construction firms achieved best result in communicating fast project deadline, promoting value for money and cost promote our safety records.
- v. It is important to note that for every system to be effective and efficient practice in the construction industry there should be techniques to adopt. Here, the study revealed that project design evaluation and Quality Manual Training Programmes are the effective techniques practiced by firms in an attempt to achieved project objectives, which quality remain an integral part of.
- vi. The study opined that challenges encountered during quality management implementation include drawing an effective quality plan and effective communication and quality. Again, it indicates that these challenges come during and after the execution of the project. Consequently, the research revealed the following as the potential barriers to the attainment of project quality among construction firm, namely lack of effective supervision, lack of effective communication, lack of management's commitment to quality assurance, lack of proper equipment available for use and lack of a quality assurance team to lead.
- vii. Lastly in solving the above mentioned potential barriers the study revealed the following as measures for effective quality management practices, namely: management commitment, communication between managers and employees, employee involvement,

detailed and logical work program, regular inspection and audit of quality report, training and education of team members and review/analysis.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The study evaluated the Total Quality Management Practices of Contractors in Building Industry in Abuja, Nigeria with emphases on building contractors registered with the Federal Housing Authority and the objectives set for this purpose were to determine whether contractors are committed to Total Quality Management Practices in the delivery of construction projects, determine the challenges encountered by contractors while implementing Total Quality Management during the execution of projects and proposing measures for effective total quality management practice leading to a higher levels of satisfaction in the Construction Industry.

It can be concluded that meeting project deadline and quality were the most of research factors considered in project performance measurement. In addition, the most significant indicators for Quality or getting more jobs as a result of previous good works done, management commitment to quality and the overall client or customer satisfaction. Furthermore, the most severe challenges encountered during the implementation of Total Quality management are; lack of effective supervision, lack of effective communication, lack of management's commitment to quality assurance, lack of proper equipment available for use and lack of a quality assurance team to lead.

Total Quality Management practices therefore remain optimum for achieving effective project performance in all types of infrastructural development. To this end, the recommendations submitted in this research would assist contractors in practicing effective total quality management during the execution of their projects.

5.2 Recommendations

In view of the findings of this research, the following recommendations are therefore prescribed as measures and strategies for the development of total quality management practices in the construction industry in Nigeria.

- i. Construction companies should create the flexible and conducive organizational atmosphere which encourages the development of total quality management practices in all aspect of the construction industry.
- ii. Managers of the various construction firms should be encouraged to used total quality management techniques in the execution of projects.
- iii. Project stakeholders should encourage the integration of total quality management practices in the early stage of the project and ensuring quality system are well instituted.
- iv. Construction companies should employ quality officers as part of their integrated teams in the management of their projects.
- v. Construction firm should institute training procedures or refresher courses in quality management as part of their annual plan for their employees.

5.3 Area of Further Studies

There are numerous research avenues in future as a result of this study. The following are therefore recommended for further research:

- Research into the impact of quality management practices in Nigeria construction industry.
- Future research into the framework for predicting the failure and success of quality management innovation in Nigeria construction industry.

5.4 Contribution to Knowledge

The study reports clearly demonstrates the value of Quality on the performance of a building/structure. It also adds to existing literatures Total Quality Management in building industry in Nigeria.

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APPENDIX I
Research Questionnaire



FEDERAL UNIVERSITY OF TECHNOLOGY
DEPARTMENT OF QUANTITY SURVEYING

QUESTIONNAIRE:

**EVALUATION OF TOTAL QUALITY MANAGEMENT PRACTICES OF
CONTRACTORS IN BUILDING INDUSTRY IN ABUJA, NIGERIA**

Dear Sir/Madam,

I am a post-graduate student of the above Institution and Department. As part of the requirements for the award of Master Degree in Quantity Surveying, I am undertaking a research on the captioned subject. This questionnaire is aimed at gathering relevant information from your organisation.

The study seeks to draw on your experience from your involvement in housing delivery, to evaluate total quality management practices if any used in housing project in Abuja. The expected outcome of the research is to help provide a more result-oriented model for improved performance of construction projects in Nigeria. The information gathered will be used as data for all the objectives listed in this research work. The information obtained from the respondents will be treated as confidential and will be used only for the purpose of the study.

Muhammed A. M.

M.Tech/SET/7172

PARTS OF THE QUESTIONNAIRE

The questionnaire consists of two main sections. The first part is **Section A**, and this requests for the background and experience of the respondent in Housing Projects delivery. **Sections B**, on the other hand cover the main objectives of the study. That is to respond to the level of total quality management practices used in Housing Project.

SECTION A: BACKGROUND INFORMATION

Experience:

1. As the Project Manager, please indicate your educational qualification?.....

2. Please indicate your profession

- Project Manager Architect Quantity Surveyor Civil Engineer Services Engineer
Main Contractor Sub-Contractor Others specify:

3. Please state your highest educational qualification

PhD MSc Bsc HND OND Others, please indicate

4. What is the typical project management system adopted by your project team on the housing scheme you managed?

- Traditional Method Construction Management Contract Management
Project

5. Management System Others specify:.....

6. How long have you been involved/participated in Housing Development?

- Up to 5years 6-10 years 11-15 years 16 years and above

7. How long has your organization been involved in Housing projects?

- Up to 5yrs 6-10years 11-15years 16- 20 years 21years and above

8. What is the maximum number of housing units you have managed per single housing scheme at one location?

- Up to 25 units 26-50 units 51-75 units 75- 100 units 101 and above

SECTION B: MEASURING EXTENT TO WHICH TOTAL QUALITY MANAGEMENT PRACTICES WERE USED IN THE PROJECT

Please indicate the significance or otherwise of the following TQM practices used on Housing projects by ticking the appropriate box. The response scale is as follows:

- 1. Very insignificant Extent 2. Insignificant Extent 3. Averagely Significant Extent 4. Significant Extent 5. Very Extent t*

Extent to which TQM practices used in mass housing project	1	2	3	4	5
Competent Project Team					
Authority of the Project Manager					
Project Understanding					
Meeting Quality Standard					
Client Involvement					
Project Mission					
Adequate Resources					
Organization guidelines					

Maintenance Management					
Product evaluation					
Faster project delivery					
Safety performance					
Quality during / after					
Meeting construction budget					
Making adequate profit					
Challenges					
Getting more jobs as a result of previous good work done					
Management commitment to quality					
Overall Client/Customer satisfaction					
Adherence to certified quality programs such as the ISO 9000 and 14000 series					
Meeting general construction standards					
Having a skilled work force					
Training and education for team members on quality					
The length of warranty (in years) the company can give on their work (Probably beyond the defect liability period)					

Winning Quality Awards					
Labour management techniques adopted for standardized repetitive construction works on schemes					
Cost saving management techniques adopted for standardized repetitive construction works on housing units under scheme					
Project delivery times adopted for various housing units under the scheme					
Repetitive Task delivery scheduling concept adopted on various housing units					
Contractual relationship adopted among project team					
Reporting styles adopted for Project Team (PT) communication					
Dissemination protocols adopted for Project Team (PT) communication					
Information documentation style adopted among team on housing units under scheme(s)					
Challenges					
Lack of effective supervision					
Lack of effective communication					
Lack of management commitment					
Lack of proper equipment					

Lack of Quality Assurance team					
Personnel unable to thorough read					
Setting unrealistic deadlines					
Field employees regarding quality assurance					
Exceive paper work					
Working with new people / employees					
High labour turnover					
Complex design					
Worker attitude					
Lack of skilled workers					
Transient nature of workforce					
Measures for effective TQM practices					
Management commitment					
Communication between managers					
Emplyee involvement					
Detailed and logical work program					

Regular inspection					
Training of team members					
Review analysis					
Well defined roles					
Clearly defined goals and objectives					
Incentives for good performance					
Subcontractors involvement in the quality process					
Regular meetings of project participants					