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Total Quality Management Implementation in the Ghanaian Construction Industry

By

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CERTIFICATION

I hereby declare that this submission is my own work towards the MSc Construction Management and that to the best of my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

Clients and other project stakeholders today place much emphasis on attaining quality on their projects, within stipulated time and budget. Total Quality Management (TQM) is counted as an advanced system in the field of quality, making it needful for construction companies to implement this system in order to attain quality on their projects. It is against this background that specific objectives were set to investigate the implementation of TQM by identifying quality management practices that improve stakeholder's satisfaction, its implementation benefits from stakeholders' perspectives in the Ghanaian construction industry. Questionnaires employed to fulfil the study objectives were developed based on the information gathered from literature review. In the questionnaire, five point Likert scale was used to gather information on the quality management practices that improve stakeholder satisfaction and its benefits. The data obtained were analyzed using the Relative Importance Index (RII). Analysis of the data revealed that the implementation of Total Quality Management had not taken full effect in Ghana, nonetheless the quality management practices identified that improve stakeholders' satisfaction comprise employing specialists to carry out key aspects of the project, ensuring the use of quality standards, offering a beneficial and safe working environment, ensuring the construction activities meet the required standards and employing on site testing procedures for materials. However, the implementation will require top management commitment, employee involvement and the organizations ability to adapt the TQM change. The benefits gained from implementing TQM comprise reduction in rework and waste, reduction in construction cycle time, reduction in client's complaints and savings on cost incurred. The study has made a substantial contribution to the knowledge of TQM in the Ghanaian Construction Industry by throwing more light on the practices that can be adopted towards achieving quality on construction projects.

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DEDICATION

This work is dedicated to God, my parents and Emmanuel Asante who have been the driving force, motivation and support for further study and this journey.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Workmanship flaws, time as well as cost overrun have been the difficulties faced by the construction industry (Harrington et al., 2012). Key project stakeholders therefore find it essential to attain high quality outcomes on their construction projects making quality management an important component in managing construction projects (Tang & Andrew 2009) as cited by (Gherbal et al., 2012). Construction companies are tasked to constantly create additional value and provide great quality products to appeal to their clients or customers.

The aspect of meeting the aesthetic, functional and legal conditions of projects can be termed as quality. While in construction; quality is meeting the specifications of the project team and regulatory agencies (Asim et al., 2013). Correspondingly, Arditi and Gunaydin (1997) as cited by Asim et al. (2013), are of the opinion that quality in construction is achieved by meeting the client's needs, design specifications, aesthetic requirements and functional requirements in conformance with appropriate laws, regulations, codes and policies etc.

Studies on quality in the construction industry has been extensively carried out taking into consideration the main parties involved in the project lifecycle such as clients, project donors, projects and construction managers and contractors of building and infrastructure projects (Achterkamp & Vos, 2008; Arditi & Gunaydin, 1997). For quality to be achieved, there is the need to have efficient quality management hence the need for Total Quality Management.

Quality management involves the process of planning, organizing and control with the objective of attaining quality work at reasonable cost whilst ensuring customer approval and enhancing the company's reputation. The key focus of an organization applying quality

management is to formulate customer satisfaction strategies which meet their needs and outlooks while improving the effectiveness of the business (Mazher et al., 2015). Gherbal et al. (2012) identified Total Quality Management as an approach to ensuring the execution of projects are to stakeholder requirements.

Total quality management is defined by Dean and Bowen (1994); Grant et al. (1994) and Shiba et al. (1993) as cited by Colurcio and Mele (2006) as a complete approach based on organization processes and continuous improvement focus by all to satisfy the client and stakeholders requirement. Total Quality Management is a development process for firms encompassing the relationship with suppliers, customers and other interested parties. The role of Total Quality Management to a firm's effectiveness certainly makes it essential for them to identify and reinforce their strength and to eliminate any weaknesses (Dean & Bowen, 1994; Hackman & Wageman, 1995) as cited by (Colurcio & Mele, 2006). The construction industry has achieved developments in value, productivity and competitiveness by ensuring the achievement of set standards through Total Quality Management (Bakar et al., 2011).

1.2 Problem Statement

The Ghanaian Construction Industry has seen a major growth since the country attained middle-income status in 2010 in addition to its discovery and production of oil in commercial quantities (Wikipedia, 2010). This growth has resulted in increasing global competition and the higher demand for building and civil engineering products. This makes it crucial for the construction industry in Ghana to implement effective quality management practices to address the persistent shortfalls of poor performance, poor quality of works, and lack of innovation and professionalism (Ahadzie, 2009).

Ofori (2012) emphasized that Ghanaian contractors had not been successful in achieving quality on their projects since Total Quality Management principles were not employed.

Construction companies are faced with many management related issues such as planning, effective communication, customer satisfaction, availability of materials and equipment, health and safety awareness, low level of skilled personnel, lack of teamwork, poor organization and scheduling and controlling techniques (Fugar & Agyarkwa-Baah, 2010; Amoah et al., 2011; Ofori, 2012). In agreement to this Imbeah (2012) pointed out that Total Quality Management has not been successfully implemented in Ghana since no such mechanism is in existence for practical implementation of these standards. Asim et al. (2013) mentioned that projects have not been accomplished within budget and on time due to the presence or non- existence of quality management practices.

The issues raised points to the need of Total Quality Management implementation in the Ghanaian construction industry to increase performance, reduce waste and rework and increase customer satisfaction. (Harrington et al., 2012).

1.3 Aim

The aim of this study was to explore Total Quality Management implementation in the Ghanaian construction industry.

1.4 Objectives

The study objectives were to:

- Identify the general quality management practices that improve stakeholder's satisfaction;
- Identify the quality management practices adopted by Ghanaian construction firms;
and
- Identify the benefits of quality management practices in achieving stakeholders' satisfaction.

1.5 Significance of the Study

The research on the employment of Total Quality Management in the construction trade in Ghana was to provide substantial information that represents the management of quality issues in the Ghanaian construction industry.

The research findings and recommendation would be important in enriching literature and stimulating further research on Total Quality Management in this area. The study will inform construction companies and project stakeholders on some available benchmarks in the implementation of Total Quality Management in Construction.

1.6 Methodology

The study employed a descriptive research methodology. The survey questionnaire was administered to selected construction professionals comprising project managers, architects, structural engineers, services engineers and quantity surveyors who worked with contractors in Accra and were responsible for quality management within a two month period from May 2016 to June 2016.

A designed questionnaire survey instrument was used to explore the use of Total Quality Management by identifying quality management practices that improve stakeholder's satisfaction and its benefits. In this designed questionnaire, both open-ended and closed-ended questions were employed. Respondents were asked to answer the asked questions in their own words whenever clarification of certain issues were to be addressed. Majority of the questions were close-ended questions and was to seek information from the respondents by giving a list of responses which do not overlap in meaning. The approach to this research was deductive.

1.7 Guide to the Report

This study comprised of five chapters with Chapter One stipulating the introductory feature of the study. The background of study, the aim, objectives and methodology were clearly identified in this chapter. Chapter Two provided a thorough assessment of literature on Total Quality Management within the Construction Industry. Chapter Three presented research approach in identifying the population, sample frame and size and method of analyzing the data collected. Chapter Four analyzed the data collected. Chapter Five presented the conclusions and recommendations. It presented the conclusions of the study and recommendations that offers knowledge into Total Quality Management implementation within Ghanaian Construction firms and dealt with conclusion and recommendation on the analysis of data collected.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The Construction Industry employs a great number of workers. According to Ghana Statistical Service (GSS) (2014), the sector has contributed an average of 9.08% of the Gross Domestic Product since 2008, and recorded a relatively high growth of 11.2% in 2012. Therefore, the construction industry can be identified as the backbone of the economy for the country and it is vital to the national infrastructure. In order for construction companies to have competitive advantage, much emphasis must be placed on their quality management systems.

This literature reviews Quality Management with emphasizes on Total Quality Management. It aims at studying the current quality management practices adopted by most construction firms the world over. The evolution, principles, implementation in the Construction industry and benefits of Total Quality Management from existing literature are considered in this chapter.

2.2 Quality Management

Quality management encompasses the creation of approaches, establishment of aims, organization and executing the strategies; and monitoring schemes for scrutinizing response and selecting remedial actions. A firm's management of quality is of two sides:

- a) Fulfilling consumer's prospect; and
- b) Perfection of the business's effectiveness (Dale et al., 1994)

Juran (1988) reported that the main aim of quality management is the removal of defects. Defects need be disallowed in the management of quality and to supervise this there must be effective planning, scheduling and monitoring.

2.3 Overview of Total Quality Management

Realization of satisfactory stages of quality in the construction industry has long been a difficulty. The absence of quality management practices causes a great amount of waste of all resources (Arditi & Gunaydi, 1997). The delivery of high quality service has become integral for sustaining competitive advantage (Gharakhani et al., 2013). Clients are increasingly desiring high standards for project execution on all their projects. Companies will have to adopt management practices that will help them satisfy the client's needs. Total Quality Management has been practiced successfully as a management technique in the service and manufacturing industries and can be embraced in the construction industry to aid improve product quality (Pheng & Teo, 2004).

Total quality management has developed into a vital tactical instrument in the construction sector. It has become an essential tool for companies to expand their turnover and market share (Hellard, 1993). Therefore, the effect of Total Quality Management application in construction industries improves quality (Mazher et al., 2015).

Quality, flexibility and customer focus cannot be overlooked when a company seeks to competitive advantage (Nair & Boulton, 2008). To make such ingenuities successful, effective strategy employment can be considered (Saunders & Mann, 2008). It is generally recognized that satisfaction of customers is the prime area in current industry achievement. In order to be successful, companies must always put in first place the customer's needs which creates value.

In their studies, Bowen and Dean (1994) and Jimenez-Jimenez and Martinez-Costa (2009) have affirmed that Total Quality Management is an entire, company-wide effort and tries to frequently advance the quality of services, product and processes with the focus on achieving clients satisfaction. According to Chowdhury (2014) Total Quality Management is a concept applies quality standards to all areas of the organization. As part of its management style, Total Quality Management focuses on the initial participation of all stakeholder involved in construction project at the preliminary phase of the construction project (Mele, 2007).

2.4 History of Total Quality Management

Although Total Quality Management became popular in the Europe and America during the 1980s, it was applied in Japan in the 1950s. Quality Management concentrates on value creation for many markets (Asim et al., 2013). Coffey et al. (2011) in their research on the history of Total Quality Management cited works by Deming (1986) and Juran (1988) which established that since the commencement of work in the 1950s in Japan, the notion of quality has become significant in the works of business management.

Total Quality Management is defined by the International Organization for Standardization (ISO), (2009) as a *“management approach for an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society”*.

Total Quality Management models in the manufacturing industries have been expanded beyond what was initially applied in Japan and adopted currently by the United States. This has improved productivity, enhanced product reliability and reduced product cost. These ideas are relevant to the construction industry. The construction companies in Japan profiting from the experiences of their manufacturers, initiated Total Quality Management during the 1970's. Despite the fact that construction is an inventive, one-off process, the construction

industry in Japan adopted the Total Quality Management ideas that some claimed could only relate to mass production (Arditi & Gunaydi, 1997).

2.4.1 Evolution of Total Quality Management

The rapid growth of the industry made room for the creation of full time inspection jobs. This position came with its challenges such as lack of trained personnel and acceptance of defective goods to save costs bringing about the creation of a separate inspection department with a chief inspector. This did not fully resolve the challenges proving that the obligation of the chief inspector was more than approving products. The quality control department was then set up to prevent defects in products (Ismail, 2012).

Statistical theory became practical to quality control in the 1920's and in 1924, Shewhart designed a modern model which was later developed by Deming. Until the late 1940's, there was insignificant application of these methods in manufacturing companies. Japan's industrial system was destroyed and was noted for cheap products and unskilled workforce. On recognizing these problems, the Japanese engaged some notable quality experts like Juran, Deming and Feigenbaum to solve these problems. Quality management practices advanced rapidly in Japanese plants in the 1950's and became a key theme in Japanese management philosophy. Compared to Western counterparts, Japan's products improved significantly, due to its low-cost, quality products in the 1960's and 1970's (Ismail, 2012).

Feigenbaum asserts that "total quality" was introduced at the very first global conference in 1969 at Tokyo. However, the quality revolution in the West commence in the early 1980's when firms presented their individual quality programs to counter the success of the Japanese. The International Organization for Standardization (ISO) 9000 became the internationally acclaimed norm for quality management structures. It encompasses some

norms that stipulate the prerequisites for the application, maintenance and documentation of systems of quality (Ismail, 2012).

Total Quality Management evolution has been defined by some researchers in different levels. Total Quality Management evolution was classified by Crosby, Weeb, Bryant and others into four stages as the following:

2.4.2 Quality Inspection

Dale and Bunney (1999) define quality inspection as the “action that compared final product with detailed requirements to achieve conformity for each characteristic”. Feigbaum (1991) as cited by Ismail (2012) mentions that this process was employed because it was difficult to maintain the required quality levels since a lot of workers had been employed. Costin (1994) emphasized that inspection formed the basis for ensuring that quality.

2.4.3 Quality Control

In 1946, Joseph Duran and Edward Deming energized the quality control procedure to Japanese business which strengthened the Japanese to build up the consistent change culture and fuse control of quality in their associations (Simpson et al., 2002).

The International Organization for Standardization (ISO) (2009) characterized the control of quality as "Operative systems and exercises which are utilized to satisfy prerequisite for quality". This explanation infers that a change of value or any aspect relating to quality is considered a way of controlling quality. This included item plan, procedure and yields. Besides, quality control is that portion of value administration identified with accomplishing quality prerequisites utilizing measurable strategies. It is identified with the review procedure of the completed items and administrations however it is more centered around keeping any deformity and observing operation procedures to observe if they are to the considered prerequisite (Genasan et al., 2009). Ellis et al. (2005) reports the measures that regulates

quality prompting lesser imperfection frequency and more noteworthy procedure restrain. They conclude that quality control is not a procedure aimed at making benchmarks, but rather to maintain them through a technique for choice, estimation and deformity aversion.

2.4.4 Quality Assurance

Quality assurance was characterized by a Standard Board in America in 1994 as composed and planned precautionary exercises geared toward giving affirmation of association yields (items/administrations) to meet consumer loyalty (Ismail, 2012).

Furthermore, the certification of quality comprises activities and projects intended to warrant that the item or administration will satisfy client hope and fulfillment, for example, plan, circulation, advancement, generation and overhauling. Quality confirmation was described by Besterfield (2003) as an arrangement of events executed prior to the designing or arranging procedure of items and managements to ensure quality and value to the clients. Furthermore, the aforementioned highlights prevention of defects by refining generation and supplementary procedures to bypass or decline risks that may bring about deformities from the onset, though quality control is an arrangement of activities done all through the assembling of items to clients yet testing and hindering the release of flawed yields; accordingly, it stresses imperfection recognition.

2.4.5 Total Quality Management (TQM):

Crosby (1979) states that Total Quality Management uses the possibility of value affirmation to the entire item and management range by focusing perfecting first time, consistently and on time. Additionally, client perspectives and thoughts are gotten and entered into the organization framework to ensure accomplishing consumer loyalty constantly. Gunasekaran and McGaughey (2003) characterized Total Quality Management as an "administration

rationality that guides cost reduction, the development of top notch products and administrations, user loyalty, worker authorization, and results estimation". Antony (2009) buttressed this by expressing that Total Quality Management strives after fulfilling client needs and desires ceaselessly by delivering and adjusting what they require at the most reduced expense and in time through involving everyone. Total Quality Management was defined by Li et al. (n.d) as an approach that requires that every personnel in the organization utilizes every one of the standards of value administration at each level.

2.5 Principles of Total Quality Management

The key principles of Total Quality Management identified by Hashmi (2009) are Management Commitment, Employee Empowerment, Continuous Improvement and Customer Focus. Voon et al. (2014) identified the components of Total Quality Management for quality progression principles as highlighted below.

2.5.1 Top Management Leadership and Commitment

Total Quality Management includes dynamic alteration in the organizations culture and this must be made conceivable with the profound inclusion/duty of administration to the company's procedure of constant change, open correspondence and collaboration all through the company. Kaynak (2003) mentioned that Total Quality Management execution redesigns the organization's accomplishment by impacting additional Total Quality Management measurements. Oakland (1993) indicated that 'for an organization to be productive in advancing business proficiency and viability, Total Quality Management needs to begin with the CEO'. Leadership was distinguished by Cooper and Ellram (1993), as basic in affecting hierarchical transformation most particularly in ranges of building successful association with most suppliers and personnel required during the time spent on quality delivery. Andrie (1994), noticed that 'the utilization of Total Quality Management involves a reasonable long

haul management duty'. To Andrlé, long haul association with fulfilled clients is an advantage for the association, along these lines, administration must be focused on it.

2.5.2 Cultural Change

Oakland (1989) mentioned that 'Total Quality Management provides the entire management process for ensuring complete customer satisfaction at every phase. Change of culture to Dale et al. (1994) denotes a method to altering the cooperative values of an organization to be client focused. The culture of total quality involves appointment of duty to the least unit. By doing this, it takes advantage of the scholarly capacity of each person in the association during the time spent persistent quality change.

2.5.3 Customer Focus

Total Quality Management is a philosophy that is scheduled to the fulfillment of client's need. Along these lines, most associations spotlight on meeting or surpassing client's desire in their day by day movement furthermore their long haul arrangement (Andrlé, 1994). All out Quality Management obliges associations to build up a client centered operational procedures and in the meantime submitting the assets that position clients and meeting their desire as a resource for the monetary prosperity of the organization.

2.5.4 Total Involvement

Conventionally, worker contribution was considered to as a 'sentiment mental proprietorship among hierarchical individuals' (Harvey & Brown, 1996). Dissimilar to what gets in the Total Quality Management conviction, the customary worker association is biased; it is employment focused as opposed to handle focused. The Total Quality Management approach includes 'accomplishing wide representative interest, cooperation and commitment during the time spent quality administration'.

2.5.5 Continuous Improvement

This signifies 'the vow headed for steady investigation of a specialized and regulatory system looking for enhanced techniques' (Fuentes-Fuentes et al., 2004). It is characterized by Turney and Anderson (1989) as a non-stop change as the determined pursuit of flawlessness in the conveyance of quality to clients. Dean and Bowen (1994) debated that consumer loyalty can be accomplished just through the determined change of procedures that make item or administration. Complete quality administration includes the outline to the procedure of creation, an arrangement of persistent change. This spreads predictable arrangement of arranging, implementation and assessment (Muffato & Panizzolo, 1995). As per Oakland (1993), 'the emphasis on consistent change will prompt the arrangement of considerable group whose participation is dictated by their work on the nitty gritty learning of the procedure, and their capacity to make change move'. Total Quality Management is included in the ceaseless change in all procedure of design, starting with the levels of organizing and basic leadership to the finishing of work by the bleeding edge staff. The tenet of the possibility of persistent change is essentially errors can be stayed away from and imperfections can be avoided.

2.5.6 Training

Training aids in getting employees ready towards handling the Total Quality Management system in the production process. Training furnishes individuals with fundamental aptitudes and methods of value change (Stahl, 1995). By preparing, workers can discover change open doors as it is coordinated at giving important aptitudes and learning to all representatives to have the capacity to add to continuous quality change procedure of creation. Stahl (1995) contended that preparation and improvement project ought not to be seen as a onetime occasion but rather a long lasting procedure.

2.5.7 Team Work

To support the efficient production of services and products through the incorporation of actions involved in the production process, a well-structured team is needed. Dale et al. (1994) noticed that cooperation is a major element of inclusion. To them, cooperation helps the dedication of the workforce to the organization's objectives and goals. The analysts trust that it is key to have a group comprising of individuals with true manner of attitude functioning in groups to understand the increases of value administration. Teamwork is a method for empowering positive work state of mind, which incorporates steadfastness to the organization and an emphasis on its objectives.

2.5.8 Communication

Good communication is key in achieving rewarding Total Quality Management performance levels. Good communication will result in disposing of tension that makes workers hesitant to voice their assessments or inquiry strategies, methods, and choices. As it were, this keeps representatives from being included. Deming exhorts, "Drive out apprehension." This requires an adjustment in administration conduct.

Total Quality Management is a cognizant procedure of change, and in this manner great correspondence and a decent criticism framework are key to recommend thoughts to administration and to coordinate the important adjustments. One dynamic methodology is open lines of correspondence that permit any worker to have direct access, at any level, to contact higher administration concerning a thought for development or a particular concern (Harrington et al., 2012).

2.5.9 Process Planning and Strategic Quality Management

The existing flow in construction is positioned to propel value in every aspect of the activities. Temporary workers are compelled to be efficient in their activities and this

inclining has advanced as an aftereffect of expanding rivalry between contractual workers to induce their customers, build piece of the pie, better name and as a consequence of enhancing quality (Green et al., 2005). The premise of aggressive plans for contractual workers looking to acquire and extend their customer range can also be termed as quality.

2.5.10 Employee Empowerment

To effectively practice Total Quality Management, employee empowerment is a fundamental condition and it is a huge component since it stimulates workers to give enhanced occupation quality and contribute towards the new industry process. Handfield et al. (1998) specified in their study the way that employee empowerment results in expanded efficiency, consumer loyalty and expanded worker fulfillment.

2.5.11 Supply Chain Management

This is a system of connections where organizations are arranged, the store network is measured as the center for creation of value for customers to propel gainfulness and enhance the whole business. Operation supply chain should be strengthened by a system that outspreads past the prompt linkages of trade to have the capacity to set up the quality in every connection (Pryke, 2009).

2.5.12 Performance Measurement Systems for Benchmarking

Benchmarking and performance evaluation are essential components of recent management practices in Total Quality Management. They are about matching the organization's performance and approaches against prime organizations or other similar organizations and apply lessons acquired to present innovative enhancement. Furthermore, this provides an emphasis on the other competitors, assists evolving strategies and performance development by valuing the strategies and procedures essential to accomplish advanced levels of performance (Chen, 2002).

2.6 Total Quality Management and the Construction Industry

The development of this idea initially occurred in the manufacturing industry. This gives the deceptive impression that the Total Quality Management idea cannot be reasonable to any industry other than manufacturing subsequent to most writing reports that.

Ali et al. (2014) in their study highlighted that various studies carried out by Kuprenas & Kenny (1998) and Kuprenas et al. (1996) revealed that the implementation of Total Quality Management procedures by small sized construction projects was quite a challenge and adoption of various tools such as Project Management, Partnership, Quality Assurance Plan, Quality Function Deployment and Jobsite Quality Planning to construction industry established varied outcomes.

Although the implementation of Total Quality Management might differ from one industry to another, its main principle is the attainment of customer satisfaction which is a significant aim for any business. The construction industry has tended to mistake Total Quality Management with Quality Assurance and Control, considering that acquiescence with Quality Assurance standards such as ISO 9001 and 9002 is the application of Total Quality Management on construction projects (Jaafari, 2001). Quality Control and Quality Assurance might be measured as independent and related sub-components of Total Quality Management. Nonetheless, Quality Assurance and Control do not characterize the only fundamentals of Total Quality Management, as it is a much more thorough and extensive concept. They are practical amid project execution while Total Quality Management is a premeditated philosophy assumed by an organization and executed on a constant premise, regardless of the fact that the association is holding up to play out another undertaking (Harrington et al., 2012).

Implementation of the Total Quality Management principles helps an industry to develop its performance, productivity and employee satisfaction by reducing poor quality. To achieve this objective, it is imperative to reduce costs related to rework. This is likely if quality costs are measured and analyzed (Mossman, 2009). According to Harrington et al. (2012) the role of Total Quality culture is to accomplish basic goals: to be specific, evacuate waste, decrease costs, increase market share and improve reputation.

2.6.1 Methods of Total Quality Management Implementation in Construction

It is resolved by several writings that it is essential for the construction trade to adopt the practices, principles and techniques used for Total Quality Management in manufacturing (Formoso & Revelo, 1999; Lahndt, 1999; McCabe, 1996; Soares & Anderson, 1997) cited by (Hoonakker et al., 2010). Lahndt (1999) as cited by (Hoonakker et al., 2010) agrees: 'Total Quality Management systems is used widely in the capacities of industrial and manufacturing engineering to control and avoid imperfections in advance, at last sparing a colossal amount of money.

Formoso and Revelo's study in 1999 on Total Quality Management implementation elaborated three Brazilian building companies, which operated supportively through several stages of Total Quality Management application. The recommended technique depended on basic surely understood quality frameworks for problem recognition, exploration and solving, such as Pareto diagram, checklist, brainstorming and flowchart. The outcomes revealed challenges in implementing such methods in small-scaled building companies. Tam et al. in their study in 2000 in the Hong Kong Building industry, came to the same conclusion.

In 1992, an authority responsible for housing in Hong Kong made the employment of the ISO 9000 quality system indispensable for contractors who desired to tender in housing development. They further established and presented an impartial quality tool: the

Performance Assessment Scoring Scheme (PASS). Seven years later, findings of the research by Tam et al. (2000) indicated that the degree of quality generally had not enhanced and the anticipated continuous improvement in quality in construction had not been accomplished. The writers concluded, based on extra analysis of data, that the principal blockade to quality implementation is the principles of the various construction firms.

Bubshait (1999); Gamsby et al. (1996) presented mixed results in their study when they tried fitting together one Total Quality Management way to deal with other prevailing management framework, such as partnership, Jobsite Quality Planning (JQP), project management, Quality Function Deployment (QFD), Quality Assurance Plan (QAP), and/or the ISO 14000 and 9000 standards.

The building and development industry has experienced much struggle in the implementation of Total Quality Management. One of the causes is 'the fleeting nature' of construction and development, the absence of institutionalization and the numerous gatherings (occupations, callings and associations) included. The customary way of the Construction Industry is another reason (Hoonakker et al., 2010).

2.6.2 Total Quality Management Practices in the Construction Industry

Much investigation has been carried out on Total Quality Management and the success of its carrying out in the construction industry. It is argued that advantages of higher customer loyalty, excellent quality products and increased market share are regularly acquired by construction companies when they implement Total Quality Management (Elghamrawy & Shibayama, 2008). Total Quality Management has been accepted by various major construction firms in the world as per their requirements and priorities for cost reduction, improved productivity and better health & safety environment for construction projects (Ali

et al., 2014). According to Sadikoglu and Oclay (2013) the quality management practices employed by the construction industry include;

Leadership: Leaders in a Total Quality Management system see the firm as a system; support employee development; institute a multipoint communication among the employees, managers, and customers; and utilize information efficiently and effectively. In addition, leaders encourage employee participation in decision-making and empower the employees. Top management dedication and involvement in Total Quality Management practices are the most significant factors for the realization of Total Quality Management practices. Managers should establish more leadership than traditional management behaviors to enhance employees' awareness of quality activities in Total Quality Management implementation and practices (Criado & Calvo Mora, 2009) and (Goetsch & Davis, 2009). Leadership expands operational performance, inventory management performance, employee performance, innovation performance, social responsibility and customer results, financial performance and overall firm performance.

Knowledge and Process Management: Successful knowledge management guarantees that employees obtain timely, consistent, stable, accurate, and necessary data and information as they need to do their job effectively and efficiently in the firm. Only in this way, the expected benefits from Total Quality Management practices can be achieved. Process management accentuates activities, as contrasting to results, through a set of practical and developmental activities. It includes precautionary and practical approaches to quality management to reduce variations in the process and improve the quality of the product (Sadikoglu & Zehir, 2010). Knowledge and successful process management practices scrutinize data on quality to manage processes meritoriously. In this way, income rate of purchased products and records can be improved. Faults or inaccuracies in the processes can also be figured out and corrected

on time. Furthermore, as the processes become prevention oriented, costs are reduced and profit of the firm increases.

Training: Total Quality Management firms should train all their employees to improve their competences in their tasks. Effective training in management and improvement in quality bring success for the firms. Employees' effective knowledge and learning capability will provide sustainability of quality management in the firm. Furthermore, learning organizations adjust quickly to the variations and establish unique behavior, which distinguishes them from other firms and permits them to achieve improved results. Quality is the responsibility of the entire industry (Criado & Calvo Mora, 2009) and (Goetsch & Davis, 2009).

Supplier Quality Management: Contributions from suppliers establish the first phase of producing the products and/or services in a firm. High quality inputs provide high quality products and/or services. Therefore, the suppliers should adopt Total Quality Management and be involved in this process. Effective supply management practices assist the suppliers to implement quality management and deliver consistent and high quality products and/or services timely (Sadikoglu & Oclay, 2013).

Customer Focus: Total Quality Management firms emphasize on serving the external customers. They first should know the customers' outlooks and wants and then should offer the products/services, accordingly. With the help of successful customer focus efforts, production can be arranged with respect to the customers' needs, expectations, and complaints. This reassures firms to produce high quality and reliable products/ services on time with improved efficiency and productivity. When customer expectations are met, their satisfaction will be increased, and the firm's sales and the market share will increase (Sadikoglu & Oclay, 2013).

Strategic Quality Planning: Strategic quality planning includes vision, mission, and values of the firms. They are formed by considering the quality concept. With effective strategic quality planning efforts employees are taken as an input in developing the vision, mission, strategies, and objectives. This eases acceptance and support of strategic quality plans by the employees. Successful strategic quality planning efforts also allow for the possible side effects of the plan to the environment prior to the production. This will manifest and improve social responsibility of the firm (Sadikoglu & Oclay, 2013).

2.6.3 Benefits of Total Quality Management Implementation in the Construction Industry

Surveys on the effects of Total Quality Management application by McIntyre and Kirschenman (2000) established that significant monetary advantages may be accomplished through the employment of Total Quality Management. Chase (1998) deduced in his study that, application of Total Quality Management enabled organizations to rapidly advance projects while intensifying productivity.

Torbica and Stroh (1999) presumed that: 'interestingly an observational study has affirmed that execution of Total Quality Management is certainly related to customer satisfaction'. Liu (2003) perception on quality application in Hong Kong public housing projects indicated enhanced customer loyalty after the implementation of ISO 9000. Moreover, the normal number of housing projects imperfections put up by organizations with ISO 9000 affirmation was impressively not exactly the quantity of deformities in lodging ventures worked by organizations without ISO 9000 accreditation. The outcomes on quality management implementation demonstrate that all stakeholders can profit by it (Hoonakker et al., 2010).

Based on case study research in some Australian companies, Bardoel and Sohal (1999) described the advantages attained from implementing Total Quality as an improved process

control ensuing in uniformity from configuration through to conveyance; diminished development process duration, lessening in the amount of products destroyed in transportation and construction, decreased delivery to the site, increased performance, diminished aftermath of chemicals and change in client view of the organization. Ismail (2012) in his study on Total Quality Management cited Anderson et al.'s (1994) findings which identified its benefits as a means which enhances process administration towards constant change, and thus enhances customer satisfaction.

Ismail (2012) also cited the works of various researchers in the area of total quality management such as Arora (1996), Gunasekaran (1999), Huarng (1998), Salegna and Fazel (2000) and Sun (2000) who described the benefits of adopting Total Quality Management philosophy as a way to help reduce time, waste, costs, revise and enhance quality, performance and competitiveness, improve profitability and proficiency of quality systems and reduce customer complaints.

Pheng and Teo (2004) proposed some benefits as reduction in quality costs, better worker work fulfillment since they don't have to take care of imperfections and customer objections, acknowledgment by customers, work completed effectively right from the beginning, subcontractors with appropriate quality administration frameworks, and nearer association with subcontractors and suppliers. Conversely, most of the key benefits of a Total Quality Management package have not been attained in construction, such as the improved consciousness and focus of all representatives on pleasing interior and outside clients. Administration targets, for example, consumer loyalty, meeting particulars, higher turnover, higher efficiency, zero deformities, percent expansion in deal, and percent diminish in expenses can be proficient by exemplifying Total Quality Management principles every facet of the organization, and those goals turn into a characteristic result (Harrington et al., 2012).

2.7 Construction Stakeholders

An interest or share in an activity is described as a stake while an individual with a stake is described as a stakeholder (Weiss, 2006) as cited by (Chinyio & Olomolaiye, 2010). Freeman's (1984) definition is that "a stakeholder in an organization is any group or individual who can influence or is influenced by the accomplishment of the organization's objectives". Stakeholders in construction project comprises of the project owner, clients, project manager, project team such as consultants and contractors, subcontractors and suppliers, public groups, regulatory authorities, donors, the media, end users, and other groups with singular interests (Chinyio & Olomolaiye, 2010).

2.7.1 Total Quality Management Practices That Improve Stakeholder Satisfaction

Adenikinju (2003) identified the quality management practices which cover the quality management foci of process, motivational and technical aspects of construction projects and influence stakeholder satisfaction. The technical attributes of Quality Management identified are:

Quality training: Warranting that all stakeholders are trained on quality (Akao, 2004);

Benchmarking: Employing beneficial systems from construction front-runners (Love et al., 2004);

Continuous improvements: Concentration on improving construction processes and maintaining continuous improvement (Akao, 2004);

Long range thinking: Utilizing planning and scheduling to plan future construction processes (Ahmed, 1995);

Quality control: Warranting that quality is maintained throughout the project duration (Akao, 2004);

Health and Safety: Ensuring a safe working environment by adhering to the necessary health and safety requirements and policies on site (BSI, 2008);

Technical expertise: Awarding specialist works in projects to the appropriate contractor (Leung et al., 2008);

Quality standard implementation: Guaranteeing the employment of quality standards for example ISO 9001, ISO 14000 to the construction project design and execution (BSI, 2008);
and

Auditing: Warranting close monitoring and control of projects throughout the project duration (BSI, 2008).

The practical characteristics of quality management necessitate the enhancement of expertise in implementation of quality management. These expertise are not limited to safeguard compliance to required international principles and requirements on the project (Obunwo, 2013). Stakeholder satisfaction from a process viewpoint in quality management included:

Process Improvements: Planned assessment of current construction processes to meet objectives and attain goals (Hoonaker et al., 2010);

Open culture: Smooth approach to information flow among the various stakeholders (Leung et al., 2008);

Meeting customers' requirements: Very much characterized and succinct comprehension of the clients' prerequisites and standards for fulfillment from such necessities (Hai et al., 2012);

Reducing Rework: Timely recognition and avoidance of mistakes with little dependence on ultimate inspection, and boosting step by step inspection (Ballard, 2008);

Process design: Confirming steadiness of construction activity over viable product outline. This decreases the experiences emerging from varieties inside the faculty in the reason for the construction project (Barrett, 2000);

Result measurement: Indicators to determine project progress and results of quality levels (Phillips et al., 2008);

Quality assurance: Activities including an assessment of the construction process, to make certain that the quality of construction is of the same kind as the designed quality (Phillips et al., 2008);

Post project review: Employing profitable management practices form earlier projects undertaken (BSI, 2008); and

Post implementation evaluation: Practical and professional appraisal of construction projects to establish if the project provided the client with value for money (BSI, 2008).

The satisfaction of stakeholders from construction projects can be persuaded extremely by the quality of the process of construction. The methodology defined in the planning phase should be sustained and even improved throughout the project duration. Advice and appraisals are significant characteristics of the characteristics of quality management as they add to the information and better performance in construction projects subsequently. The motivational features of quality management that affect stakeholder satisfaction emphasize on evolving all expertise attitude and determination while executing projects (Leung et al., 2008). They include:

Employee empowerment: Decreased influence on employees externally, permitting them to show proficiency while conforming to project necessities (Leung et al., 2008);

Executive commitment: Management fully committed to the attainment of quality (Hoonaker et al., 2010);

Employee involvement: Establishing an empowering setting to allow employees contribute in planning and making decisions reestablishing their duty for quality of project (Zwick, 2004) and (Phillips et al., 2008);

Team work: Joint effort from all groups or teams to attain project specifications (Leung et al., 2008);

Team based problem solving: Exploiting experience from all involved resolve problems when they occur on site (Phillips et al., 2008) and (Hoonaker et al., 2010);

Increased supplier relationships: Establishing good supplier relationship and an acceptable criteria for quality goods (Bemelmans, 2012); and

Motivation: Using recompenses and gratuities when operatives meet quality targets (Phillips et al., 2008).

2.7.2 Construction Project Quality and Stakeholder Satisfaction

Satisfaction which is a psychological phenomenon that is the fulfillment of a need is very difficult to measure (Yang & Zhu, 2006). All stakeholders through training, brainstorming, scheduling, monitoring and controlling project activities contribute to a successful project. Their role which includes ensuring adherence to design requirement, ensuring work is being executed within budget, time and to quality standards provides overall satisfaction of the various stakeholders as well.

The role, requirement and objective of various stakeholders on a project all form part of its successful completion. Achterkamp and Vos (2008) stated that involving the stakeholder

notion on the project presents meaning to a project's success or that the varying concerns contributes much to the project success. Yang (2010) also mentioned that the prospects and effects of stakeholders must be incorporated in the organization of the project. Much caution has been carried across that the project professionals will have to amend cost, scope and time to meet stakeholder desires and anticipations on issues regarding quality if they are not convinced with the quality of project

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Methodology is defined by Jankowicz (2002) as “the reason for employing a certain procedure in a given study”. This chapter describes and explains the research design, sampling, collection of data and its analysis. This study is a descriptive research based on quantitative analysis of data collected. Convenience sampling of construction stakeholders in Accra was used as the sampling method. Questionnaires were developed and administered to aid in collecting the necessary information.

3.2 Research Design

Oppenheim (1992) described research design as the “researchers approach to the sampling, data collection and analysis geared towards the attainment of the purpose of the study”. This research was intended to determine the effectiveness of adopting Total Quality Management in the Ghanaian Construction Industry by researching into the quality management practices employed, and its benefits in order to achieve the earlier stated aim and objectives.

The study employed a deductive approach with the research method used being quantitative. An extensive literature review was used in the preparation of questionnaires for the collection and analysis of data.

3.3 Data Collection Method

Saunders *et al.* (2003) explain the methods for data gathering for any study as primary and secondary data. In this study, primary data was collected through questionnaires focused on researching into Total Quality Management implementation within the Ghanaian Construction Industry. It included quality management practices that improved stakeholder

satisfaction of all participants involved in the construction and its benefits. Secondary information were collected from books, articles, journals and periodicals.

3.3.1 Questionnaire Design

In this study, a questionnaire based on the literature review and targeted at fulfilling the research objectives was used. To facilitate the data collection and analysis closed questions were asked. To enable other respondents answer in their own words some open questions in the form of ‘Others’ were asked. The five-point Likert scale was utilized to delve into the respondent’s views regarding quality management practices that improve stakeholder’s satisfaction and its benefits. This scale provides a range of responses to a given question or statement and was set out as 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree and 1 = not important; 2 = least important; 3 = important; 4 = very important; 5 = extremely important where necessary.

3.4 Sampling

3.4.1 Population

The research population is the whole set of people, things or events which the researcher wishes to investigate (Sekaran, 2003). Due to the difficulty in obtaining the number of contractors registered with the Ministry of Water Resource Works and Housing (MWRWH), the population of the study was based on the number of contractors registered with the Accra Metropolitan Assembly. The population was 250 contractors as employed by Kheni and Ackon (2015) since that of 2016 was not available at the time of the study. The Accra Metropolis was selected to avoid any further time delay during the collection of data.

3.4.2 Sample Size and Sampling Technique

Out of the population of 250 contractors, the sample size was determined. To determine the sample size of contractors in this Metropolis, the Kish Formulae which gives a scientific

procedure for determining sample size was used (Kish, 1965). The Kish equation is given below:

$$n = \frac{n_1}{1 + (n_1/N)}$$

Where

n = Sample Size from finite population

N= Total Population

n₁= Sample Size from infinite population calculated from;

n₁ = s²/v², where

v= Standard error of sample population equal to 0.05 for the confidence level of 95% and t = 1.96

s² = Standard error variance of population elements,

s²= P (1- P); Maximum at P = 0.5

Using Kish formula, the sample size for the study was calculated as follows:

$$n_1 = s^2/v^2 = (0.5)^2 / (0.05)^2 = 100$$

$$(n) = \frac{100}{1 + (100/250)}$$
$$= 71.43$$

A nonresponse rate of 30% was assumed to overcome a low response that could threaten the generalization and validity of the study's findings (Lahndt, 1999, Enshassi et al., 2010). The adjusted sample size taken into consideration non response was:

$$(130/100) \times 71.43 = 92.85$$

=93 construction firms

The researcher targeted construction professionals responsible for quality management in these firms. The study employed convenience sampling to beat the time delays since all construction professionals could not be identified and administered with questionnaires. The researcher distributed the questionnaire to the person in charge of quality management who was available at the time of visit and willing to aid in the study.

3.5 Data Analyses

Data was classified under several topics pertinent to the study and discussed accordingly. Applicable explanations from the respondents was used to support the findings. The questionnaires was entered twice and referred to original paper-based questionnaires and Statistical Package for Social Sciences (SPSS) version 16 was employed to analyze the data collected.

In this study, the ordinal scale of data (Likert-Scale) was used whereby 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree and 1 = not important; 2 = least important; 3 = important; 4 = very important; 5 = extremely important where necessary.

The Relative Importance Index (RII) of the factors was adopted as confirmed by Enshassi et al. (2007) in the data analysis. These were calculated using the equation below.

Relative Importance Index (RII) = $\frac{(5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1)}{(5(n_5 + n_4 + n_3 + n_2 + n_1))}$

$$(5(n_5 + n_4 + n_3 + n_2 + n_1))$$

Where: n_1 = number of respondent who answered 'Not Important'

n_2 = number of respondent who answered 'Least Important'

n_3 = number of respondent who answered 'Important'

n_4 = number of respondent who answered 'Very important'

n_5 = number of respondent who answered 'Extremely Important'

Results from the relative importance index calculation were ranked 1st, 2nd, 3rd etc. in order to identify which variables respondents placed importance on.

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This section of the study deals with the analysis of data, presentation of findings and discussions of results on the implementation of Total Quality Management in the Ghanaian construction industry. The analysis is divided into three sub-sections. The first sub-section analyses the demographic characteristics of respondents. The second sub-section deals with the analysis on Total Quality Management practices that improve stakeholder satisfaction. The third sub-section of the analysis addresses the benefits gained from implementing quality management practices.

4.2 Demographic Characteristics of Respondents

This section of the analysis deals with the demographic variables of the respondents used in the study which included profession, tenure in that capacity, type of quality management system they operate, how long they had used the quality management system, their motivation for implementing such a system and their perception of quality.

4.2.1 Profession

The first question on the demographic characteristics is the profession of the respondent. Table 4.1 showed that out of the total respondents of 78 from the selected construction stakeholders, 10.3% were architects, 25.6% were civil engineers, 26.9% were project managers, 32.1% were quantity surveyors and 5.1% were structural engineers. These professions can be said to be the stakeholders on most construction projects in Ghana and gives the indication that respondents understand the quality management on the construction site.

4.2.2 Years of Experience

Table 4.1 also shows the years of experience of the respondents. The study revealed that, out of the 78 respondents, majority of them had been working in this capacity for 0 - 10 years representing 73.1% while between the years of experience of 11 to 25years represented 21.8%. The years of experience of 25 years and above category recorded 5.1%. According to data collected, 73.1% comprised of young professionals who are dedicated to their roles in their organizations. It can also be deduced that respondents had worked long enough to provide substantial information on Total Quality Management implementation.

4.2.3 Implementation of a Quality Management System

It is shown Table 4.1 that 88.5% of the respondents employed the use of quality management system for their projects whilst 11.5% did not employ its use. It can be deduced that the use of quality management systems has become wide spread in the Ghanaian construction industry.

4.2.4 Years of Employing Quality Management Systems

From the questionnaire, the researcher sought to find out the how long the stakeholders who implemented quality management systems had used these systems. It is showed in Table 4.1 that majority of the respondents had used it for a period of 0 – 5 years representing 42.3% whereas 41% had used it for 6 – 10 years. It was as well revealed that 5.1% of the respondents had employed quality management practices for over 10 years. This shows that, although the implementation of quality management systems on a project had become widespread, it had been implemented over a period of 0 – 5 years.

4.2.5 The Reason for Not Employing Quality Management Systems

Table 4.1 showed that the respondents who do not practice quality management systems were 9 out of the 78 total representing 11.5%. 5 out of the 9 respondents did not practice quality management systems because they believed that their company had thrived without such a system in place. The remaining 4 did not practice quality management systems because they lacked knowledge of its implementation. It was revealed that although the use of quality management system has become wide spread, some people are still of the view that their companies thrive without its use.

Table 4.1: Demographic characteristics of respondents

	Frequency	Percentage (%)	Cumulative Frequency (%)
<i>Profession:</i>			
Architect	8	10.3	10.3
Civil engineer	20	25.6	35.9
Project manager	21	26.9	62.8
Quantity surveyor	25	32.1	94.9
Structural engineer	4	5.1	100.0
Total	78	100	
<i>Respondents experience:</i>			
0 -10years	57	73.1	73.1
11 - 25 years	17	21.8	94.9
Above 25 years	4	5.1	100.0
Total	78	100	
<i>Implementation of a Quality management system:</i>			
Yes	69	88.5	88.5
No	9	11.5	100.0
Total	78	100	
<i>How long Quality Management System (QMS) has been used:</i>			
Firms that did not use QMS	9	11.5	11.5
0 - 5years	33	42.3	53.8
6 -10years	32	41.0	94.9
Above 10 years	4	5.1	100.0
Total	78	100	

Source: Field Data, 2016

	Frequency	Percentage (%)	Cumulative Frequency (%)
<i>Why a quality management system(QMS) is not implemented:</i>			
Firms that implemented QMS	69	88.5	88.5
Lack of knowledge of its implementation	4	5.1	93.6
Company has thrived without such a system in place	5	6.4	100
Total	78	100	

Source: Field Data, 2016

4.3 Quality Management Practices Adopted By Ghanaian Construction Firms

This section of the analysis is concerned with identifying the quality management practices adopted by Ghanaian construction firms. The analysis was done through the development of variables for quality improvement programs. The result is therefore presented in Table 4.2.

The analysis revealed that 73.1% of respondents employed quality assurance and quality control as their quality improvement program. Ten point three percent (10.3%) of respondents employed ISO 9000 as their quality improvement program. The analysis revealed that 5.1% of stakeholders practiced Total Quality Management as its quality improvement program. Although Ismail (2012) found that in developed countries, quality management has evolved from inspection to quality control to quality assurance and now to Total Quality Management, that cannot be said about Ghanaian construction firms. Most Construction firms in Ghana consider the implementation of Quality assurance or quality control as implementing Total Quality Management.

Quality Control and Quality Assurance deal with identifying defects after they have occurred and design to ensure good quality to the customer; whereas the ISO 9000 series stipulates the

requirement for the use of quality frameworks. Total Quality Management however, uses the idea of quality assurance to ensure the job is done right the first time, all the time and on time. It aids cost reduction, the innovation of high quality goods and services, customer satisfaction, employee empowerment, the measurement of results and pursues to satisfy customer needs and expectations (Anthony, 2009; Li et al., 2006; Gunasekaran & McGaughey, 2003; Crosby, 1979). It is therefore important that Ghanaian construction firms implement Total Quality Management.

Table 4.2 Quality improvement program used

	Frequency	Percentage (%)	Cumulative Frequency (%)
<i>Type of Quality Improvement Program(QIP) used</i>			
Firms that do not employ QIP	9	11.5	11.5
Total quality management	4	5.1	16.6
ISO 9000	8	10.3	26.9
Quality control/quality assurance	57	73.1	100
Total	78	100	

Source: Field Data, 2016

4.3.1 Motivation for the Implementation of Total Quality Management

The researcher sought to find out from the respondents their reason or drive for implementing Total Quality Management. Table 4.3 showed that majority of the respondents implemented quality management because of the need to reduce costs and improve their performance; they represented 46.2%. Those that practiced this due to the demands from clients represented 20.5%. 11.5% practiced Total Quality Management due to pressure from their competitors and 10.3% were motivated by their company's Chief executive. The analysis showed that in order to enhance performance and reduce costs, Total Quality Management had to be employed.

Table 4.3 Motivation for implementing quality management systems

	Frequency	Percentage (%)	Cumulative Frequency (%)
<i>Factors that provided motivation to implement Total Quality Management (TQM)</i>			
Firms that did not implement TQM	9	11.5	11.5
Pressure from competitors	9	11.5	23.0
Demanding customers	16	20.5	43.5
Your Company's Chief Executive	8	10.3	53.8
Need to reduce costs and improve performance	36	46.2	100
Total	78	100	

Source: Field Data, 2016

4.3.2 Perception of Quality

The researcher sought from the respondents their perception of quality in the questionnaire distributed. Table 4.4 showed that the greater part of the respondents saw quality as elimination of defects; they represented 46.2%. 32.1% perceived quality as an avenue for increasing the organizations turnover and 21.8% saw quality as a competitive advantage. The analysis showed that quality is a tool for eliminating defects. It is necessary that stakeholders viewed quality in its entirety which is by meeting the specifications of the design team and regulatory authority as proposed by Asim et al. (2013). This will change their approach to ensuring quality at all times on their projects.

Table 4.4 Respondents perception of quality

	Frequency	Percentage (%)	Cumulative Frequency (%)
<i>Perception of quality</i>			
A tool to increase profit	25	32.1	32.1
Elimination of defects	36	46.1	78.2
A competitive advantage	17	21.8	100
Total	78	100	

Source: Field Data, 2016

4.4 Quality Management Practices That Improve Stakeholder Satisfaction

This section of the analysis is concerned with identifying the quality management practices implemented that improve stakeholder's satisfaction in the construction industry in Ghana. Adenikinju (2003) identified the quality management practices which involve the quality management foci of technical, motivational and process aspects of construction projects and influence stakeholder satisfaction. These three aspects were considered.

The result is therefore presented in Tables 4.5, 4.6 and 4.7 with descriptive statistics revealing the mean values obtained. The mean or average score from the five point Likert scale with 5 as extremely important and 1 as not important for all the variables as computed to deduce the list of variables considered as important or not important in achieving stakeholder's satisfaction.

Where the mean for the variable exceeds half of the 5 point Likert scale (i.e. 2.5) the respondents' noted that that quality management practice was important and where the mean for the variable is less than half of the 5 point Likert scale (i.e. 2.5) the respondents' noted that the quality management practice was not important in achieving stakeholders satisfaction on a project. The relative importance index was used in the ranking the variables.

4.4.1 Technical Aspect of Quality Management Practices That Improve Stakeholder Satisfaction

Table 4.5 shows the technical aspect of quality management practices that improve stakeholder's satisfaction. These variables were noted as important by respondents since each recorded a mean of above 2.5. The respondents concluded that all the quality management practices discussed under the technical aspect were worth considering if they wanted to achieve stakeholder satisfaction on their projects. These practices included utilizing specialists for key aspects of construction, demanding accountability of personnel and materials throughout the project life cycle, offering a beneficial and safe working environment, employing quality standards such as ISO 9001, ISO 14000 to the construction project and identifying and emulating best practices from construction leaders. Others were utilizing strategic thinking and forecast into the future construction processes, training employees to implement quality management practices on all projects, ensuring a certain acceptable level of quality in the construction project, incorporating lessons from your previous projects to present projects, measuring quality improvements on all projects after the implementation of its quality management system, clear definition for quality on all projects and encouraging your engineer/ project manager to keep a checklist for better quality assurance. However, using the Relative Importance Index in ranking, some quality management practices were considered as more important than others.

Table 4.5 Quality management practices that improve stakeholder satisfaction – technical aspect

TECHNICAL ASPECT	Mean	RII	RANK
<i>Utilization of specialists for key aspects of construction</i>	4.36	0.87	1 st
<i>Demanding accountability of personnel and materials throughout the project life cycle</i>	4.14	0.83	2 nd
<i>Offering a beneficial and safe working environment</i>	4.05	0.81	3 rd
<i>Ensuring the employment of quality standards such as ISO 9001, ISO 14000 to the construction project</i>	4	0.80	4 th
<i>Identifying and emulating best practices from construction leaders</i>	3.95	0.79	5 th
<i>Utilizing strategic thinking and forecast into the future construction processes</i>	3.9	0.78	6 th
<i>Employees are trained to implement quality management practices on all projects</i>	3.79	0.76	7 th
<i>Necessitating a certain acceptable level of quality in the construction project</i>	3.73	0.75	8 th
<i>Incorporating lessons from your previous projects to present projects</i>	3.65	0.73	9 th
<i>Your organization measures quality improvements on all projects after the implementation of its quality management system</i>	3.54	0.71	10 th
<i>Clear definition for quality on all projects</i>	3.53	0.66	11 th
<i>Encouraging your engineer/ project manager to keep a checklist for better quality assurance</i>	3.13	0.63	12 th

Source: Field Data, 2016

4.4.2 Process Aspect of Quality Management Practices That Improve Stakeholder Satisfaction

Table 4.6 shows the process aspect of quality management practices that improve stakeholder's satisfaction. All 10 variables in this aspect recorded a mean score from 3.08 to 4.24. The respondents agreed that these quality management practices are very important if they want to achieve stakeholder satisfaction on their projects. They added that some of the practices such as ensuring testing of the materials on site and inspection of supplier's materials have not practiced these days as they used to some years ago.

They also mentioned that they needed to pay much attention to their process design and revisit the use of work breakdown structures and method statements if they wanted to achieve quality on site. They stated that appraisals needed to be carried out during the execution of the project to ensure that the client is receiving value for money.

Table 4.6 Quality management practices that improve stakeholder satisfaction – process aspect

<i>PROCESS ASPECT</i>	Mean	RII	RANK
<i>Planned assessment of current construction processes to meet objectives and attain goals</i>	4.24	0.85	1 st
<i>Testing procedures are implemented on site to improve product quality</i>	4.10	0.82	2 nd
<i>Effective process design</i>	3.95	0.79	3 rd
<i>Smooth approach to information and management</i>	3.79	0.76	4 th
<i>Learning at the end of any project</i>	3.79	0.76	4 th
<i>Supplier materials are conducted to examination before installation to ensure meeting project/clients demand and high quality</i>	3.44	0.72	5 th
<i>Indicators to determine project progress</i>	3.46	0.70	6 th
<i>Valuation of the project planning, design and development, to ascertain that the quality of construction is of the same kind as the designed quality</i>	3.47	0.69	7 th
<i>Well-defined and concise understanding of the customers' requirements</i>	3.38	0.68	8 th
<i>Practical and professional appraisal of construction projects to ensure that the client has received value for money</i>	3.08	0.62	9 th

Source: Field Data, 2016

4.4.3 Motivational Aspect of Quality Management Practices That Improve Stakeholder Satisfaction

Table 4.7 shows the motivational aspect of quality management practices that improve stakeholder's satisfaction. All 8 variables in this section recorded a mean score from 3.17 to 3.62 and the relative importance index was used in ranking the variables. Respondents agreed that each variable was very important.

They stated that they are empowered to work harder when they have their managements support. Also there have been few instances when they were rewarded with bonuses when quality and project objectives were achieved. They added that they can achieve quality if their construction processes are quality centered and the necessary information to achieve this is easily communicated on site to all the relevant parties.

Table 4.7 Quality management practices that improve stakeholder satisfaction – motivational aspect

MOTIVATIONAL ASPECT	Mean	RII	RANK
<i>Top management continually demonstrates their commitment to quality</i>	3.62	0.72	1 st
<i>Your organization is willing to adapt cultural change to fit with the changes in the business environment</i>	3.47	0.69	2 nd
<i>Allowing employees' to demonstrate expertise while conforming to design requirements</i>	3.33	0.67	3 rd
<i>Founding strong information exchange between stakeholders in the supply chains, setting quality acceptance criteria</i>	3.32	0.66	4 th
<i>Goal centered construction processes through the use of teams to improve both performance and job satisfaction</i>	3.31	0.66	4 th
<i>Exploiting experience from team members to solve problems</i>	3.28	0.66	4 th
<i>Using rewards and bonuses for meeting quality targets</i>	3.23	0.65	5 th
<i>Establishing an empowering environment to allow employees contribute in planning and making decisions while reestablishing employee responsibility for quality of project</i>	3.17	0.69	6 th

Source: Field Data, 2016

Table 4.8 shows the motivational, process and technical aspects of quality management practices that improve stakeholder's satisfaction to identify the aspect to which respondents paid much attention. The technical aspect recorded highest mean.

Table 4.8 Measuring Technical Aspect (TA), Process Aspect (PA), Motivational Aspect (MA) variables as a single construct

<i>ASPECT</i>	Mean	Std Deviation	RANK
<i>Technical Aspect(TA)</i>	3.82	0.486	1 st
<i>Process Aspect(PA)</i>	3.67	0.531	2 nd
<i>Motivational Aspect(MA)</i>	3.34	0.548	3 rd

Source: Field Data, 2016

4.5 Benefits of Implementing Total Quality Management

This section of the analysis is concerned with identifying the benefits of implementing quality management practices in construction firms in Ghana. The result is shown in Table 4.9 with descriptive statistics revealing the mean values obtained. The mean or average score from the five point Likert scale with 5 as strongly agree and 1 as strongly disagree for all the variables as computed to show the proportion of the respondents that are in agreement or disagreement with the list of variables.

Where the mean for the variable is more than half of the 5 point Likert scale (i.e. 2.5) the respondents') the respondents' agreed and where the mean for the variable is less than half of the 5 point Likert scale (i.e. 2.5) the respondents' disagreed. Ranking of these variables was done using the relative importance index to identify the most important of all variables presented.

The benefits of implementing total quality management was shown in Table 4.9. All the variables in this section were noted as important by respondents since each recorded a mean of above 2.5.

Table 4.9 Benefits of implementing total quality management

<i>BENEFITS OF TOTAL QUALITY MANAGEMENT IMPLEMENTATION</i>	Mean	RII	RANK
<i>Reduces waste and rework</i>	3.95	0.90	1 st
<i>Reduce client's complaints</i>	4.18	0.84	2 nd
<i>Reduced construction cycle time</i>	4.10	0.82	3 rd
<i>Save Money</i>	4.04	0.81	4 th
<i>Improve quality, competitiveness and performance</i>	3.99	0.80	5 th
<i>Reduction in the quantity of goods damaged in transit and construction</i>	3.95	0.79	6 th
<i>Enhance company reputation</i>	3.90	0.78	7 th
<i>Increase service quality</i>	3.88	0.78	7 th
<i>Build strong relation with suppliers</i>	3.85	0.77	8 th
<i>Improvement in customer perceptions of the company</i>	3.79	0.76	9 th
<i>Meeting customers requirement</i>	3.77	0.75	10 th
<i>Work carried out correctly right from the start</i>	3.74	0.75	10 th
<i>Reduced delivery time to the site</i>	3.68	0.74	11 th

Source: Field Data, 2016

4.6 Discussions of Findings

This part discusses the findings of the study. The findings are discussed by relating it to the study objectives and the relevant literature reviewed.

4.6.1 Identifying the Quality Management Practices Adopted By Ghanaian Construction Firms

Analysis of the data collected showed that Quality assurance and Quality Control were adopted as quality management systems in the Ghanaian construction industry. Few construction stakeholders practice the use of the ISO 9000 series and Total Quality Management as their management system for improving quality on their projects. The

implementation of Total Quality Management has not gained full ground as a system of managing quality management system in Ghanaian Construction firms.

4.6.2 Identify Quality Management Practices That Improve Stakeholder's Satisfaction

The three aspects of quality management practices considered comprised the technical, process and motivational aspects. From Table 4.5, the top five technical aspect of quality management practices identified that improve stakeholders satisfaction in the Ghanaian Construction industry were the utilization of specialists for key aspects of construction which ranked 1st. Demanding accountability of personnel and material throughout the project life cycle was ranked 2nd. Offering a beneficial and safe working environment was ranked 3rd. Ensuring the employment of quality standards such as ISO 9001, ISO 14000 to the construction project and identifying and emulating best practices form construction leaders were ranked 4th and 5th respectively in the table.

The top five process aspects of quality management identified that improve stakeholders satisfaction from Table 4.6 were planned assessment of current construction processes to meet objectives and attain goals which scored a mean of 4.24 and ranked 1st. Ensuring testing procedures are implemented on site to improve product quality which scored was ranked 2nd with a mean of 4.10. Effective process design which scored a mean of 3.95 and was ranked 3rd. this showed that the preparation of work breakdown structure and method statements play an important role in achieving quality on site. Two quality management practices recorded a mean of 3.79 and were ranked 4th. These were ensuring a smooth approach to information and management and employing new techniques in achieving quality on new projects after learning from past projects. Examining and approving supplier materials before installation to ensure they are achieving project/clients requirement and high quality which scored a mean of 3.44 and was ranked 5th.

The top five motivational aspects that improve stakeholder satisfaction from Table 4.7 are top management continually demonstrating their commitment to quality which ranked 1st. The willingness to adapt cultural change to fit with the changes in the business environment ranked 2nd. Allowing employees' to demonstrate expertise while conforming to design requirements ranked 3rd. Goal centered construction processes through the use of teams to improve both performance and job satisfaction, exploiting experience from team members to solve problems, founding strong information exchange between stakeholders in the supply chains, setting quality acceptance criteria all ranked 4th. Using rewards and bonuses for meeting quality targets ranked 5th.

4.6.3 Benefits of Implementing Total Quality Management

The top five benefits obtained from implementing Total Quality Management shown in from Table 4.9 are reduction of waste and rework which recorded the highest RII and was ranked 1st. The 2nd ranked benefit was the reduction of client's complaints. The ability to save money was ranked 3rd on the table. The improvement of quality, competitiveness and performance and reduction in the quantity of goods spoiled in delivery and construction were ranked 4th and 5th respectively in the table.

Bardoel and Sohal (1999) reported that the benefits of Total Quality Management are a reduced construction duration; better control of processes resulting in consistency from design through to delivery; reduction in the quantity of goods damaged in transit and construction, reduced delivery time to the site, increased productivity and improvement in customer perceptions of the company and decreased fallout of chemicals. Ismail (2012) also described the benefits of adopting Total Quality Management philosophy as a way to help reduce waste of resources, rework and improve quality, performance and competitiveness, increase output and effectiveness of quality systems and reduce customer complaints.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The study had three basic objectives relative to the application of Total Quality Management in the construction industry in Ghana. They were to identify the quality management practices, identify quality management practices adopted by Ghanaian construction firms and identify the benefits of these quality management practices in achieving stakeholder's satisfaction.

5.2 Review of Objectives

5.2.1 Objective 1 - To identify the quality management practices that improve stakeholders' satisfaction.

The study revealed that quality management practices in the Construction Industry is an extremely important aspect for companies that aim at enhancing turnovers and competitive advantage. Presently most of the construction companies in developed countries practice total quality management. The effective implementation of Total Quality Management has ensued in unceasingly value-added services and products accounting to more gratified clients. A quality culture has been adopted by these construction companies that succeeds on organization commitment, preparation, and collaboration, emphasizes on the way tasks are executed and employees' satisfaction.

5.2.2 Objective 2 - To identify the quality management practices adopted by Ghanaian construction firms.

The study confirmed that the implementation of Total Quality Management has not gained ground in Ghanaian construction firms. Most construction firms still employed Quality

assurance and Quality control as their quality improvement program. They had an office for a Quality Control Manager who assesses that all projects are executed according to the quality specifications of the contract. They experienced a few shortfalls in their bid to execute their job and perceived quality as the elimination of defects. Few perceived it as a tool to increase profit or a competitive advantage.

Quality improvement on projects have been by inspection of the works by consultants or supervisors and the issuing of corresponding instructions to correct defective works. Few consultants have also employed the ISO 9000 series in their design and specifications for projects. However there is the communication gap existent on site when these have to be implemented on site. Thus they have to go by the old method of inspection and quality control in their bid to attain quality on the construction project.

The quality management practices were discussed in the light of them being part of the technical, process or motivational aspect of quality management implementation practices. The technical aspect was what most stakeholders considered as important. Their primary focus after analyzing data using the relative importance index was on the utilization of specialists for key aspects of construction, demanding accountability of personnel and materials throughout the project life cycle, offering a beneficial and safe working environment, ensuring the employment of quality standards such as ISO 9001, ISO 14000 to the construction project and identifying and emulating best practices from construction leaders.

The process aspect that improve stakeholders satisfaction were planned assessment of current construction processes to meet objectives and attain goals, ensuring testing procedures are implemented on site to improve product quality, the smooth management of information as

well as the whole construction process plays helps stakeholders achieve quality on their projects, effective process design; the adherence to project specification, preparation of work breakdown structure and method statements play an important role in achieving quality on site, employing new techniques in achieving quality on new projects after learning from past projects and examining and approving supplier materials before installation to ensure they are meeting project/clients demand and high quality. This was established after the variables were analyzed using the relative importance index.

In their order of importance after analyzing the data with the relative importance index, the motivational aspect that improve stakeholders satisfaction were top management continually demonstrating their commitment to quality, willingness to adapt continuous improvement, allowing employees' to demonstrate expertise while conforming to design requirements, execution of objective focused activities through the use of teams to improve both performance and job satisfaction, exploiting experience from team members to solve problem encountered, founding strong information exchange between stakeholders, setting quality acceptance criteria and using rewards and bonuses for meeting quality targets.

5.2.3 Objective 3 - To identify the benefits of implementing quality management practices in achieving stakeholder's satisfaction

The benefits of employing quality management practices can only be attained if these are utilized on a project. Most respondents attested that quality management practices were important to their practice because there was reduction of waste and rework, reduction of client's complaints, savings on money, improvement of quality, competitiveness and performance and reduction in the quantity of goods damaged in transit and construction when

they employed these practices. These benefits were the top five ranked after the analysis of data was done using the relative importance index.

5.3 Conclusion

The research was successful in identifying the quality management practices that improve stakeholder satisfaction, the quality management practices adopted by Ghanaian Construction firms and the benefits of these quality management practices in achieving stakeholder's satisfaction. This study has provided an excellent and solid information on the quality management practices that improve stakeholder satisfaction that will benefit consultants, contractors and other construction stakeholders.

5.4 Recommendations

One proven method of improving quality and satisfying customers is the implementation of Total Quality Management in the industry. Based on this recommendations were made that

- Management and employees should be frequently trained on the employment of Total Quality Management on their projects. This should also be transferred to their relations with subcontractors and suppliers to ensure a well trained workforce at all times;
- The various institutions in the Ghanaian Construction industry should emphasize and enforce the implementation of quality standards on construction projects by organizing training programs for construction firms; and
- Ghanaian construction companies should aim at achieving quality on their projects at all times.

5.3.1 Recommendations for Further Research

Recommendations made for further studies were to;

- Future study may concentrate on the measurement of the different perceptions of each construction professional on Total Quality Management implementation; and
- In addition a research can be conducted to investigate the impact of Total Quality Management implementation in the Ghanaian Construction Industry.

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APPENDIX A - Questionnaire

QUESTIONNAIRE

SECTION A: RESPONDENT'S PROFILE

1. **What is your professional background?**
 - a) Quantity Surveyor
 - b) Architect
 - c) Civil Engineer
 - d) Project Manager
 - e) If Other Please Specify.....

2. **What is your years of experience in this field?**
 - a) 0-10years
 - b) 11-25years
 - c) Above 25years
 - d) If Other Please Specify.....

3. **Do you implement a formal quality management system on your projects or in your organization?**
 - a) Yes
 - b) No
 - c) If Other Please Specify.....

4. **If yes, how long have you implemented this system**
 - a) 0-5years
 - b) 6-10years
 - c) Above 10years
 - d) If Other Please Specify.....

5. **If no, why**
 - a) Lack of knowledge on its implementation
 - b) The implementation of a formal quality management system is expensive
 - c) The company has thrived without such a system in place
 - d) If Other Please Specify.....

6. **What type of quality improvement program do you have?**
 - a) Total Quality Management (TQM)
 - b) ISO 9000
 - c) Quality Control / Quality Assurance
 - d) If Other Please Specify.....

7. **Which of the following factors provided the motivation to start Total Quality Management**
 - a) Pressure from competitors
 - b) Demanding customers
 - c) Your Company's Chief Executive
 - d) Need to reduce costs and improve performance
 - e) International standards

f) If Other Please Specify.....

8. What is your perception of quality?

- a) Elimination of defects
- b) A tool to increase profits
- c) A competitive advantage
- d) If Other Please Specify.....

SECTION B: QUALITY MANAGEMENT PRACTICES

In your experience, please indicate the quality management practices which cut across the quality management emphases of technical, process and motivational aspects of the construction project and improve stakeholder’s satisfaction in the Ghanaian Construction Industry by ticking the appropriate boxes.

Use a scale of 1= not important, 2= least important, 3= important, 4 = very important, 5= extremely important

No	PRACTICES	1	2	3	4	5
TECHNICAL ASPECTS						
1.	Employees are trained to implement quality management practices on all projects	<input type="checkbox"/>				
2.	Identifying and emulating best practices from construction leaders	<input type="checkbox"/>				
3.	Incorporating lessons from your previous projects to present projects	<input type="checkbox"/>				
4.	Implementation of the quality management practices are geared towards improving the construction processes on all projects	<input type="checkbox"/>				
5.	Utilizing strategic thinking and forecast into the future construction processes	<input type="checkbox"/>				
6.	Necessitating a certain acceptable level of quality in the construction project	<input type="checkbox"/>				
7.	Offering a beneficial and safe working environment	<input type="checkbox"/>				
8.	Utilization of specialists for key aspects of construction.	<input type="checkbox"/>				
9.	Ensuring the employment of quality standards such as ISO 9001, ISO 14000 to the construction project	<input type="checkbox"/>				
10.	Demanding accountability of personnel and materials throughout the project life cycle	<input type="checkbox"/>				
11.	Encouraging your engineer/ project manager to keep a checklist for better quality assurance	<input type="checkbox"/>				
12.	Your organization measures quality improvements on all projects after the implementation of its quality management system	<input type="checkbox"/>				
13.	Clear definition for quality on all projects	<input type="checkbox"/>				

	<i>If Other Please Specify</i>				
	PROCESS ASPECTS				
14.	Planned assessment of current construction processes to meet objectives and attain goals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.	Smooth approach to information and management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Well-defined and concise understanding of the customers' requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.	Effective process design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.	Indicators to determine project progress	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.	Valuation of the project planning, design and development, to ascertain that the quality of construction is of the same kind as the designed quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.	Learning at the end of any project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21.	Practical and professional appraisal of construction projects to ensure that the client has received value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22.	Testing procedures are implemented on site to improve product quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23.	Supplier materials are conducted to examination before installation to ensure meeting project/clients demand and high quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<i>If Other Please Specify</i>				
	MOTIVATIONAL ASPECT				
24.	Your organization is willing to adapt cultural change to fit with the changes in the business environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25.	Top management continually demonstrates their commitment to quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26.	Allowing employees' to demonstrate expertise while conforming to design requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27.	Establishing an empowering environment to allow employees contribute in planning and making decisions while reestablishing employee responsibility for quality of project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28.	Goal centered construction processes through the use of teams to improve both performance and job satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29.	Exploiting experience from team members to solve problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

30.	Founding strong information exchange between stakeholders in the supply chains, setting quality acceptance criteria	<input type="checkbox"/>				
31.	Using rewards and bonuses for meeting quality targets	<input type="checkbox"/>				
	<i>If Other Please Specify</i>					

SECTION C: BENEFITS OF APPLYING TOTAL QUALITY

Which of the following describe the results of best implementation of Total Quality Management?

Please Mark the Appropriate Answer by (√), where

1. Strongly agree 2. Agree 3. Neutral. 4. Disagree 5. Strongly disagree

No	BENEFITS OF TOTAL QUALITY MANAGEMENT IMPLEMENTATION	1	2	3	4	5
1.	Better control of processes resulting in consistency from design through to delivery	<input type="checkbox"/>				
2.	Reduced construction cycle time	<input type="checkbox"/>				
3.	Reduction in the quantity of goods damaged in transit and construction	<input type="checkbox"/>				
4.	Reduces waste and rework	<input type="checkbox"/>				
5.	Reduced delivery time to the site	<input type="checkbox"/>				
6.	Increase service quality	<input type="checkbox"/>				
7.	Improve quality, competitiveness and performance	<input type="checkbox"/>				
8.	Improvement in customer perceptions of the company	<input type="checkbox"/>				
9.	Enhance company reputation	<input type="checkbox"/>				
10.	Save Money	<input type="checkbox"/>				
11.	Build strong relation with suppliers	<input type="checkbox"/>				
12.	Work carried out correctly right from the start	<input type="checkbox"/>				
13.	Meeting customers requirement	<input type="checkbox"/>				
14.	Reduce client's complaints	<input type="checkbox"/>				
	<i>If Other Please Specify</i>					

APPENDIX B - SPSS Analysis
SECTION A

Respondents profession

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Architect	8	10.3	10.3	10.3
Civil engineer	20	25.6	25.6	35.9
Project manager	21	26.9	26.9	62.8
Quantity surveyor	25	32.1	32.1	94.9
Structural engineer	4	5.1	5.1	100.0
Total	78	100.0	100.0	

Respondents experience

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0 -10years	57	73.1	73.1	73.1
11 - 25 years	17	21.8	21.8	94.9
Over 25 years	4	5.1	5.1	100.0
Total	78	100.0	100.0	

Implementation of QMS

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid No	9	11.5	11.5	11.5
Yes	69	88.5	88.5	100.0
Total	78	100.0	100.0	

APPENDIX B - SPSS Analysis continued

How long QMS has been implemented

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	9	11.5	11.5	11.5
0 - 5years	33	42.3	42.3	53.8
6 -10years	32	41.0	41.0	94.9
Above 10 years	4	5.1	5.1	100.0
Total	78	100.0	100.0	

Why QMS is not implemented

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	69	88.5	88.5	88.5
Lack of knowledge of its implementation	4	5.1	5.1	93.6
Company has thrived without such a system in place	5	6.4	6.4	100.0
Total	78	100.0	100.0	

Type of QIP used

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	9	11.5	11.5	11.5
TQM	4	5.1	5.1	16.6
ISO 9000	12	10.3	10.3	26.9
Quality assurance or quality control	57	73.1	73.1	100.0
Total	78	100.0	100.0	

APPENDIX B - SPSS Analysis continued**Motivation for implementing TQM**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	9	11.5	11.5	11.5
Pressure from competitors	9	11.5	11.5	23.1
Demanding customers	16	20.5	20.5	43.6
Company's CEO	8	10.3	10.3	53.8
Need to reduce cost and improve performance	36	46.2	46.2	100.0
Total	78	100.0	100.0	

APPENDIX B - SPSS Analysis continued

TECHNICAL ASPECT

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Employees are trained to implement quality management practices on all projects	78	3.79	.779	3	5
Identifying and emulating best practices from construction leaders	78	3.94	.610	3	5
Incorporating lessons from your previous projects to present projects	78	3.65	.680	2	5
Ensuring the employment of quality standards such as ISO 9001, ISO 14000 to the construction project	78	3.94	.709	3	5
Utilizing strategic thinking and forecast into the future construction processes	78	3.90	.572	3	5
Necessitating a certain acceptable level of quality in the construction project	78	3.73	.638	3	5
Offering a beneficial and safe working environment	78	4.05	.701	3	5
Utilization of specialists for key aspects of construction	78	4.36	.755	3	5
Ensuring the employment of quality standards such as ISO 9001, ISO 14000 to the construction project	78	4.00	.739	3	5
Demanding accountability of personnel and materials throughout the project life cycle	78	4.14	.751	3	5
Encouraging your engineer/ project manager to keep a checklist for better quality assurance	78	3.13	.812	2	5
Your organization measures quality improvements on all projects after the implementation of its quality management system	78	3.54	.893	2	5
Clear definition for quality on all projects	78	3.53	.879	2	5

APPENDIX B - SPSS Analysis continued

PROCESS ASPECT

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Planned assessment of current construction processes to meet objectives and attain goals	78	4.24	.724	3	5
Smooth approach to information and management	78	3.79	.779	3	5
Well-defined and concise understanding of the customers' requirements	78	3.38	.760	2	5
Effective process design	78	3.95	.701	3	5
Indicators to determine project progress	78	3.49	.769	2	5
Valuation of the project planning, design and development, to ascertain that the quality of construction is of the same kind as the designed quality	78	3.47	.751	2	5
Learning at the end of any project	78	3.79	.903	2	5
Practical and professional appraisal of construction projects to ensure that the client has received value for money	78	3.08	.908	2	5
Testing procedures are implemented on site to improve product quality	78	4.10	.862	2	5
Supplier materials are conducted to examination before installation to ensure meeting project/clients demand and high quality	78	3.44	.616	3	5

APPENDIX B - SPSS Analysis continued

MOTIVATIONAL ASPECT

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Your organization is willing to adapt cultural change to fit with the changes in the business environment	78	3.47	.817	2	5
Top management continually demonstrates their commitment to quality	78	3.62	.871	2	5
Allowing employees' to demonstrate expertise while conforming to design requirements	78	3.33	.677	3	5
Establishing an empowering environment to allow employees contribute in planning and making decisions while reestablishing employee responsibility for quality of project	78	3.17	.673	2	5
Goal centered construction processes through the use of teams to improve both performance and job satisfaction	78	3.31	.565	3	5
Exploiting experience from team members to solve problems.	78	3.28	.662	3	5
Founding strong information exchange between stakeholders in the supply chains, setting quality acceptance criteria	78	3.32	.655	3	5
Using rewards and bonuses for meeting quality targets	78	3.23	.788	2	5

MEASURING TA, PA, MA VARIABLES AS A SINGLE CONSTRUCT

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
TA	78	3.82	.486	3	5
PA	78	3.67	.531	3	5
MA	78	3.34	.548	3	5

APPENDIX B - SPSS Analysis continued

Descriptive Statistics

BENEFITS OF QUALITY MANAGEMENT PRACTICES	N	Mean	Std. Deviation	Minimum	Maximum
Better control of the process	78	3.99	.798	1	5
Reduced construction cycle time	78	4.10	.862	1	5
Reduction of damage to materials in transit or construction process	78	3.95	.836	1	5
Reduces waste and rework	78	3.95	.771	1	5
Reduced delivery time	78	3.68	.747	2	5
Increase service quality	78	3.88	.664	2	5
Improve quality, performance and competitiveness	78	3.99	.798	1	5
Improve customers perception of the company	78	3.79	.779	1	5
Enhance company reputation	78	3.90	.799	1	5
Save Money	78	4.04	.763	1	5
Build strong relation with suppliers	78	3.85	.704	2	5
Works carried out correctly right from the start	78	3.74	.729	1	5
Meeting customers requirement	78	3.77	.737	1	5
Reduce client's complaints	78	4.18	.818	1	5

APPENDIX C - Data Entry with Relative Importance

TQP – TECHNICAL ASPECT	1	2	3	4	5	TOTAL	RII	Rank
B1		0	33	28	17	78	0.76	7
	0	0	99	112	85	296		
B2		0	17	49	12	78	0.79	5
	0	0	51	196	60	307		
B3		4	24	45	5	78	0.73	9
	0	8	72	180	25	285		
B4	0		22	39	17	78	0.79	5
	0	0	66	156	85	307		
B5			17	52	9	78	0.78	6
	0	0	51	208	45	304		
B6	0		29	41	8	78	0.75	8
	0	0	87	164	40	291		
B7	0		17	40	21	78	0.81	3
	0	0	51	160	105	316		
B8	0		13	24	41	78	0.87	1
	0	0	39	96	205	340		
B9	0		21	36	21	78	0.80	4
	0	0	63	144	105	312		
B10	0		17	33	28	78	0.83	2
	0	0	51	132	140	323		
B11	0	16	41	16	5	78	0.63	12
	0	32	123	64	25	244		
B12		8	33	24	13	78	0.71	10
	0	16	99	96	65	276		
B13		8	33	25	12	78	0.66	11
	0	0	99	100	60	259		

TQP- PROCESS ASPECT	1	2	3	4	5	TOTAL	RII	Rank
B14		0	13	33	32	78	0.85	1
	0	0	39	132	160	331		
B15		0	33	28	17	78	0.76	3
	0	0	99	112	85	296		
B16		4	49	16	9	78	0.68	8
	0	8	147	64	45	264		
B17	0		21	40	17	78	0.79	3
	0	0	63	160	85	308		
B18		4	41	24	9	78	0.70	6
	0	8	123	96	45	272		
B19	0	4	41	25	8	78	0.69	7
	0	8	123	100	40	271		
B20	0	4	29	24	21	78	0.76	4
	0	8	87	96	105	296		
B21	0	20	41	8	9	78	0.62	9
	0	40	123	32	45	240		
B22	0	4	13	32	29	78	0.82	2
	0	8	39	128	145	320		
B23	0		41	26	11	78	0.72	5
	0	0	123	104	55	282		

TQP – MOTIVATIONAL ASPECT	1	2	3	4	5	TOTAL	RII	Rank
B24		4	45	17	12	78	0.69	2
	0	8	135	68	60	271		
B25		4	38	20	14	76	0.72	1
	0	8	114	80	70	272		
B26			61	8	9	78	0.67	3
	0	0	183	32	45	260		
B27	0	8	53	13	4	78	0.63	6
	0	16	159	52	20	247		
B28			58	16	4	78	0.66	4
	0	0	174	64	20	258		
B29	0		65	4	9	78	0.66	4
	0	0	195	16	45	256		
B30	0		61	9	8	78	0.66	4
	0	0	183	36	40	259		
B31	0	8	53	8	9	78	0.65	5
	0	16	159	32	45	252		

BENEFITS	1	2	3	4	5	TOTAL	RII	Rank
C1	1		19	37	21	78	0.80	4
	1	0	57	148	105	311		
C2	1		19	28	30	78	0.82	3
	1	0	57	112	150	320		
C3	1		23	32	22	78	0.79	5
	1	0	69	128	110	308		
C4	1		19	14	80	114	0.90	1
	1	0	57	56	400	514		
C5		1	35	30	12	78	0.74	10
	0	2	105	120	60	287		
C6		1	19	46	12	78	0.78	6
	0	2	57	184	60	303		
C7		1	19	37	21	78	0.80	4
	0	2	57	148	105	312		
C8		1	27	36	14	78	0.76	8
	0	2	81	144	70	297		
C9	1		23	36	18	78	0.78	6
	1	0	69	144	90	304		
C10	1		15	41	21	78	0.81	3
	1	0	45	164	105	315		
C11		1	23	41	13	78	0.77	7
	0	2	69	164	65	300		
C12		1	27	40	10	78	0.75	9
	0	2	81	160	50	293		
C13	1		26	40	11	78	0.75	9
	1	0	78	160	55	294		
C14	1		14	32	31	78	0.84	2
	1	0	42	128	155	326		