

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI,  
GHANA**

**Assessment of Quality Management Practices at The Construction Stage of Projects Undertaken by  
Municipal Assemblies: A Case of Offinso Municipal Assembly**

**By**

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degree of**

**MASTER OF SCIENCE**

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## DECLARATION

I, hereby declare that apart from sources duly acknowledged in the reverence section, this thesis is the outcome of my own research work presented for the award of the Master of Science (MSc.) degree in Construction Management and that, to the best of my knowledge, it contains no material previously published by another person nor submitted to this or any other University or institution for the award of any degree.

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## **ABSTRACT**

International Standards Organization defines quality as the make-up of the features of an item that can fulfill stated or implied needs. There are myriads of challenges affecting Quality management in the construction industry in Ghana. Specifications are mostly not adhered to and materials used for projects are invariably substandard, amongst others. The aim of this study was to assess the quality management practices in construction project delivery at the construction stage with Offinso Municipal Assembly as a case study. This aim was further broken down into three objectives: Identifying the quality management practices, challenges to implementation of Quality Management Practices, and identifying strategies that can improve Quality Management Practices in the Offinso Municipality. This study adopted the quantitative approach, collectively employing the purposive sampling technique in representing the population. The data collected was analyzed using the SPSS software package. Descriptive Statistics were used in analyzing the data and presented in tables and charts. The Relative Importance Index (RII) was used in ranking the factors that were presented in the survey carried out. The study found that “Optimized material resource management” practices as the most common quality management practice. “Lack of effective communication processes” was ranked respondents as the primary challenge to implementing quality management practices. “Providing training” was also ranked as the best strategy to improving quality management practices. This study recommends that there should be adequate education and training on quality management practices, as well as optimal material resource management practices in reducing waste on projects. Also, this study recommends that management should be committed to implementing quality management practices while imbuing a culture of managing quality in the organization. Ultimately, this study points to

personnel training, in effective communication and quality management awareness, as the best way of enhancing quality management at Offinso Municipal Assembly.

**Keywords:** Quality Management, Specification, Construction Practices, Projects

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## **DEDICATION**

I dedicate this work firstly to the Almighty God for the gift of life and how far he has brought me. In addition, I dedicate this work to my wife Mrs. Mary Ampomah Frimpong and my Children.

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# **CHAPTER ONE**

## **GENERAL INTRODUCTION**

### **1.1 BACKGROUND OF THE STUDY**

The construction business universally is one of the biggest supporters of Gross Domestic Product (GDP), and also assuming a critical part in deciding a nation's financial development. Worldwide, the construction business accounts for 11% of GDP and by 2020 it will represent 13.2 % of the world's GDP. The construction business in Ghana has over the past couple of years experienced development and has been one of the significant enterprises adding to the country's GDP (Ghana Statistical Service, 2013). Every construction project goes through phases. The stages are; conceptual planning, feasibility study, design, procurement, construction, acceptance, operation and maintenance (Ashokkumar, 2014).

International Standards Organization (ISO 8402:1994) defines quality as the make-up of the features of an item that can fulfill stated or implied needs. It has also been defined in the past as compliance to laid standards. In recent times it is found to be replaced with the present definition of “customer fulfilment” i.e. meeting the requirements of the customer. (Abdel-Razek, et al., 2001).

According to Lysons and Farrington (2012) revision of requirements of quality should be considered at fixed intervals because needs vary with time. It is therefore important to ensure quality management throughout the construction process. International Standards Organization (ISO 8402: 1994) mentions that in a contractual setting specification are stated where as in other settings implied specifications should be made out and made known. A measure of quality can therefore be stated specifications.

Quality Management has progressively been received by development organizations around the globe and in Ghana as a means of managing how products and services meets the requirements of clients (Adusa-Poku, 2014). Quality administration in development begins from development destinations.

## **1.2 STATEMENT OF PROBLEM**

In Ghana, technological, economic and socio-political reasons are attributed to failures that occur in construction projects without any prove to back it empirically (AfDB, 2006). There are myriads of challenges affecting Quality management in the construction industry in Ghana. Specifications are mostly not adhered to and materials used for projects are invariably substandard. Projects are frequently delayed, resulting in cost overruns which in turn suffer poor workmanship and usage of material as a result of speedy works done. Conflict is increasing, resulting in litigation.

All around, development organizations have embraced quality management practices and standards however the reception and usage of these quality management practices by Ghanaian development organizations is somewhat moderate. Additionally, a look into has demonstrated that numerous Ghanaian development firms don't take after the global standard for quality management as determined in the ISO 9001(2015). Considering the advantages both on the organization's side and on the customer's side, that collect because of the execution of value administration in development, this investigation was done to evaluate the absence of, the difficulties in receiving and actualizing, and the advantages of actualizing quality administration in development.

In addition, the non-existence of quality which occurs as a result of lack of construction quality management, is noticed when construction procedures are not well adhered to

Quality directly affects cost of production and supervision, but most of the industry players seem careless to achieving total quality of the overall construction processes. In essence, the quality of any construction work is the manifestation of total adherence to quality management practices by all stakeholders in the industry from inception stage to finish (Harrison, 2005). It is based on this premise that this study seeks to assess the quality management practices of undertaking Municipal Assembly's projects in Offinso.

### **1.3 RESEARCH QUESTIONS**

1. What re the current quality management practices of the Offinso Municipal Assembly?
2. What challenges do construction firms on Offinso Assembly's projects face in adopting and implementing quality management practices?
3. What strategies can be put in place to improve on the existing quality management practices by construction firms in the Offinso Municipality?

### **1.4 AIM AND OBJECTIVES**

#### **1.4.1 Aim of the study**

The main aim of the study is to assess the quality management practices in construction project delivery at the construction stage with Offinso Municipal Assembly as a case study.

#### **1.4.1 Objectives of the study**

The following were the specific objectives of this study set to achieve the aim:

1. To assess the quality management practices of the Offinso Municipal Assembly in project delivery.
2. To examine the challenges to the implementation of Quality Management Practices by construction firms on Offinso Assembly's projects.
3. To identify strategies that can improve Quality Management Practices by the in the Offinso Municipality.

## **1.5 RESEARCH METHODOLOGY**

An in-depth review of pertinent literature was undertaken to exhaust the theme of this study. Thus, secondary information sourced from reliable information from books, internet, journals, and previous thesis. In order to achieve these objectives, in undertaking this research, the quantitative research approach was adopted. Under this approach, well-structure questionnaires were administered in a survey as a way of gathering the data required for analysis. The research population was limited to construction professionals handling construction projects by the Offinso Municipal Assembly in the Kumasi Metropolis of the Ashanti Region of Ghana. Purposive sampling technique was adopted for study as the appropriate technique of choice.

The data collected was transformed into statistical form using the SPSS 20 version and Microsoft Excel 2016, and then ultimately analyzed using the Relative Importance Index (RII).

## **1.6 SIGNIFICANCE OF THE STUDY**

The study will make contributions to the areas of on-site quality management. It has been noticed that a number of problems in the construction industry caused by bad on-site quality management and control, and the situation seems to be compounding. Understanding the quality management practices will make it possible to handle the quality difficulties caused by the



challenges construction companies face in implementing on-site quality management practices much better.

Also, this research will serve as a resource material for use in the construction industry and as a reference material for further research activity.

Subsequently, quality expectations at both administration and task levels are frequently not as straightforward and quantifiable as guaranteed in venture plans and contracts. Based on this fact, the study is significant as it would throw more light on the importance and benefits of implementing quality management in construction projects in Ghana. Moreover, this study will add to existing knowledge that will form a basis of assessing quality management practices.

## **1.7 ORGANIZATION OF THE STUDY**

The study has been systematically subdivided into five chapters. The first chapter presents the general background of the study, the problem statement, the research aim and objectives, research questions and the significance of the research. Chapter two gives a review of relevant literature and outlines the importance and benefits of quality management. Chapter three outlines the methodology to be use in carrying out the research. It also gives details on the research design, target population, sample size and the instrument used in collecting data. Chapter four focuses on the analysis of the collected data and discusses the findings. The final chapter; Chapter five concludes the study by giving a summary of the study, recommendations based on the findings of the study and the conclusion.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

Hart (1998), defined literature review as “the use of ideas in the literature to justify the particular approach to the topic, the selection of methods, and demonstrations that the research contributes something new”. Webster and Watson (2002) also defined literature review as one that “creates a firm foundation for advancing knowledge”. It facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed”. In this regard, this chapter seeks to explore the published and existing works concerning quality control practices within the informal sector in the construction industry. Insights and background knowledge obtained from the literature review will be used to bring something new to the subject area. According to Lester (2007), quality is the totality of features and characteristics of a product, service or facility that bear on its ability to satisfy a given need

The construction industry of any country is the backbone of its infrastructure and economy. Though it is a major contributor to the economy of any country, it faces the problems of high fragmentation, instability, low productivity, poor quality and lack of standards. Abd. Majid and McCaffer (1998) further established that most countries are dealing with the same common problems despite the differences in their economies. Due to the above-mentioned quality problems, construction clients are not satisfied with the performance achieved on many of their projects (Kometa and Olomolaiye 1997). Kometa and Olomolaiye (1997) stated that despite many efforts, apart from time and cost overruns, unsatisfied clients and other difficulties continue to plague the industry.

Thus, the reputation of the construction industry is ill suited for meeting the competitive challenges of today's fast changing market (Torbica and Stroh 1999), where the competitive edge is with those who manage their resources most effectively and offer a timely response to the demands of the market. What this literature review intends to do, is to look into the present standing of the Ghanaian Construction industry with prominence placed on the informal sector of the construction industry so as to promote competitive advantage within the sector. Quality control practices (QCP) as a concept is deeply interrogated to enhance its development stages and major frameworks with a contrast to bring out the benefits that comes with it.

It is recognized that there are two aspects to the application of quality management in projects; that of the project processes and that of the project's product. A failure to meet either of these dual aspects may have significant effects on the project's product, the project's customer and other interested parties, and the project organization.

These aspects also emphasize that the achievement of quality objectives is a top management responsibility, requiring a commitment to the achievement of quality objectives to be instilled at all levels within the organizations involved in the project. However, each level should retain responsibility for their respective processes and products.

The creation and maintenance of process and product quality in a project requires a systematic approach. This approach should be aimed at ensuring that the stated and implied needs of the customer are understood and met, that other interested parties' needs are understood and evaluated, and that the originating organization's quality policy is taken into account for implementation in the management of the project (BS ISO 10006:2003).

## **2.2 OVERVIEW OF THE CONSTRUCTION INFORMAL SECTOR**

Much research has been carried out into the characteristics, causes and effects of the informal sector. There are many different terms used to describe the informal sector: irregular economy (Ferman and Ferman, 1973), the subterranean economy (Gutmann 1977), the underground economy (Simon 1982), the black economy (Dilnot and Morris 1981), the shadow economy (Frey 1982) and the informal economy. Van Eck (1987) lists nearly 30 terms that are used as synonyms for, or are closely related to, what he called the underground economy, including: Black, Concealed, Dual, Hidden, Invisible, Irregular, Non-observed, Parallel, Shadow, Underground and Unofficial.

Most construction sectors around the world have a high percentage of output being produced informally. In developing countries informal construction activities can account for as much as 80% of employment. In general, the informal sector equates to a significant percentage of country's GDP - 40% in developing countries and 18% in the OECD high-income countries (Schneider 2002).

The International labour office (ILO) first used the phrase "informal sector" in reports on Ghana and Kenya in the early 1970s. Their definition of the informal sector one which essentially covers the unorganized spectrum of economic activities in commerce, agriculture, construction, manufacturing, transportation and services. They estimated that this economy absorbs as much as 60% of the labour force in urban areas of developing countries.

Smith (1994) defines it as "market-based production of goods and services, whether legal or illegal, that escapes detection in the official estimates of GDP."

Repair, maintenance and improvement (RMI) is a growing area. Estimates of the size of the RMI informal sector in the UK range from between 10% and 60% of the value of the work done formally in the RMI sector (Economist, 2000). Many small firms that work in this part of the industry also undertake small housebuilding work and extensions to property.

Construction companies operating in the informal sector do not (or cannot) use traditional financing options as they are tax/regulation evaders. This lack of access reduces their capital intensity of production and they operate over shorter time horizons, a characteristic that will inevitably have an effect on long-term economic growth (Eilat and Zinnes 2000). The decision to operate in the informal sector may be a response to wasteful government spending, or particular policy decisions. This first step into this kind of ‘anarchy’ is often followed by further avoidance of the regulations and legislation that exist in the formal sector.

Farrell et al, (2000) based on their behavioural approach, explained that the informal sector is based on whether or not activity complies with the established judicial, regulatory, and institutional framework.

## **2.3 IMPRESSION OF THE INFORMAL SECTOR OF THE CONSTRUCTION INDUSTRY IN GHANA**

According to Ferguson and Caylon (1988), quality in the construction industry can be defined as meeting the requirements of the designer, builder and regulatory agencies as well as the owner. Bennett, (2003) posited that “quality in its broad sense is a degree of excellence: the extent to which something is fit for its purpose”. Likewise, Clift (1996), explained that “quality is the degree to which the design and specification meet the requirements for that building”.

After a long period of time, attaining acceptable levels of quality in the construction industry has been a problem but a great potential of quality improvement exists in the industry (Arditi and Gunaydin, 1997). Emmitt and Gorse, (2005) state that for building structures to perform as expected, certain qualities must be ensured right from the beginning to their completion stages. They continue that, “The quality of a completed building as well as the process that brings it about will be determined by the quality of materials and products specified and the quality of the work undertaken”. Even though good quality materials and workmanship initially goes with higher cost than lower quality alternative, the overall advantage of its long-term durability and serviceability is improved considerably hence assuring users of their safety, security, ease of use and operation amongst others (Gauld, 1995; Emmitt and Gorse, 2005).

Lack of attention to quality issues at the building sites has resulted in collapse of building structures leading to loss of precious lives and major properties running into millions of cedis. In Ghana’s quest to uphold quality in the building construction industry the National Building Regulation (NBR), 1996 L.I. 1630 has been established mainly to ensure that acceptable standards are observed with respect to designing, siting and general construction of building structures. Arthiabah (2013) stated that, there is still the encounter of poor quality work at some building sites ending in the collapse of buildings due to structural failures in the country. Moreover, most clients adamantly shy away from the building professionals due to the lax attitude of the building regulations (Sampson, 2006). In the pursuit for more houses to be constructed to reduce the housing deficit of about one million in the country, government as well as the private individuals and the estate developers are making unrelenting effort to ensure that at least people get decent accommodation for living, working and playing. Hence building structures are springing up across the country with all manner of expertise and workforce.

Ayedun et. al., (2012) and Ede, (2011) identified the use of sub-standard materials, poor workmanship among others as the contributory factors of building failures in Lagos State. Additionally, inadequate design information and poor site practices are a consequence of building defects (Ilozor et al, 2004). The prominent causes may be attributed to bad design, awarding contract to unqualified builders, low quality materials coupled with incorrect dose of batching materials for concrete and mortar as well as inadequate columns and beams (Kattamaney, 2007).

Quality control involves monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory results. It should be performed throughout the project. Project results includes both product results such as deliverables and management results such as cost and schedule performance. Quality control is performed by a Quality control department or similarly titled organizational unit but it does not have to be. The project management team should have a working knowledge of statistical quality control, especially sampling and probability to help them evaluate quality control outputs. They should also know the difference between:

- Prevention (keeping errors out of the process) and inspection (keeping errors out of the hands of the customer)
- Attribute sampling (the results conforms or it does not) and variables sampling (the results is rated on a continuous scale that measures the degree of conformity)
- Special causes (unusual events) and random causes (normal process variation)
- Tolerances (the result is acceptable if it falls within the range specified by the tolerance) and control limits (the process is in control if the result falls within the control limits).

Ghana is a self-governing state situated on the Gulf of Guinea and Atlantic Ocean in the Sub Saharan Africa Enclave. Ghana is a country who borders with countries like Togo to the East, Ivory Coast to the west, Burkina Faso to the north and the Gulf of Guinea and Atlantic Ocean found at the southern part of the country. Ghana has been segmented into ten (10) regions with a total population of 24,658,823 in the last population census conducted in the year 2010, which indicated an increase from the year 1960 census of 6,726,815 and that of the year 2000 which was 18,912,079 as shown in the table below (GSS, 2013).

**Table 2.1 Population Size**

<b>Year</b>	<b>Population</b>
1960	6,726,815
1970	8,559,313
1984	12,296,081
2000	18,912,079
2010	24,658,823

Source: Ghana Statistical Service (GSS, 2013).

## **2.4 CONCEPT OF QUALITY AND QUALITY MANAGEMENT**

According to Carstea et al (2014), there came a time when prices were exposed to an ever-increasing pressure and the competitive struggle moved from price towards quality. Quality as a consequence became a factor to beat competitors. Organizations therefore focused their efforts and management strategies through continuous upgrading of their products and procedures to meet the dynamic and increasing demand of customers. It is therefore important that the process of procurement and management of material resources performs a significant role in the guaranteeing quality of the end product since the quality of the materials supplied defines the



quality of the final product. According to in Chan (1996), Low and Seymour (1990), Tang and Kam (1999), Walters (1992), Yates and Aniftos (1997) in Ahmed et al. (2005), quality and quality systems have received amassed attention worldwide.

#### **2.4.1 Concept of quality**

Reid and Sanders (2007) cited in Sabah (2011) mentioned that the notion of quality has been in existence for some time now and its definition has evolved and improved with time. Many researchers and practitioners have diverse opinions and definitions of the term “quality”.

According to Zantanidis and Tsiotras (1998), “in construction quality has a three-way meaning: it means finishing the job on time; making sure works are executed according to stated specifications and completing within cost”. Crosby (1979) in Imbeah (2012) defined quality as the conformance to requirement or standards. Palaneeswaran et al, (2005) in Imbeah (2012) gave a more elaborate definition when he defined quality as “the whole features of a product or service that meets drawn requirements/specifications as well as satisfying the user’s need”. Sanvido et al. (1992) and opines that quality on construction works can be perceived as the satisfaction of needs and specifications of the participants involved on the project.

#### **2.4.2 Quality management**

Quainoo (2014) opines that quality in procurement has an important role in procurement of public works and services. The end user (Public) expects value for money, lowered costs of services, doing it right the first time, removing the bottleneck associated with rework, operating within schedules and on budget for the assembly. Kaufmann and Wiltshko (2006) in Agbenyega (2014) stated that the quality management system concept is said to be built to meet the International Organization for Standardization (ISO) 9000-series and the “Plan, Do, Check, Act” PDCA-cycle. EN ISO 9000 termed quality management as the management and supervision of

activities in an organization with respect to quality”. The level of perception and expectation of public procurement activities are in line with the degree to which the work or the item procure meets the public expectation. Quality has exact meaning unless related to a detailed function and or object (Peter Baily et al. 2008). Quality is a perceptual, conditional and somewhat subjective attribute (Peter Baily et al. 2008; Kenneth, 2003). Therefore, quality management is the ability to satisfy the public or meet fully the customers’ needs and expectations through proper compliance with the procurement process in creating value proposition. It is also the sum of attributes of works, service, process or entity stands on its ability to meet specifications.

### **2.4.3 Quality management systems**

Quality management systems provide the best platform to achieve conformance to standards and fitness for use if properly implemented into procurement processes. Various authors have diverse definition of quality management systems. Crosby (1979) cited in Battikha (2002) opines that it is “a management duty to create mechanisms that make prevention possible”. Agbenyega (2014) recognized that the achievement of quality management system will confirm that two important needs are met:

- **The customers’ requirements:** by meeting the customer’s needs and expectations there is a sureness that the company will reliably deliver; and
- **The organization’s requirements:** by meeting the organizational needs there is an efficient use of organizational resources at an ideal cost both internally and externally.
- **Plan Quality:** it is the practice of getting to know quality needs or specifications for a project and expressing how compliance will be established (PMBOK 4, 2006).

- **Perform Quality Assurance:** it is the periodic checks of quality requirements to guarantee suitable quality standards and operational definitions are used (PMBOK 4, 2006).
- **Perform Quality Control:** it is the practice of observing and documenting results of the benefits of the quality activities to assess performance and advice on the necessary changes (PMBOK 4, 2006).

#### **2.4.4 Quality Defined in Construction**

With respect to any examination of value issues in the development business, there are three fundamental normal terms that require target definition and dialog. They are - what is really implied by 'quality', 'quality administration framework (QMS)', and what constitutes an 'aggregate quality administration (TQM)' rationality. There is no exact or single meaning of 'value', and albeit a considerable lot of the pioneers of the quality development and masters, for example, Deming, Juran, Crosby, Feigenbaum, Taguchi and others, had their own particular individual meanings of "value", ISO DIS 9000:2000 for the most part characterizes "quality" as "how much an arrangement of inalienable attributes satisfy necessities" (Tricker, 2008). This implies in the development business, quality gives off an impression of being accomplished at whatever point the necessities of each one of those substances and people engaged with tasks or creation or arrangement of administrations, for example, specialists, constructors, venture clients, and other related partners, are satisfied. To be sure, understanding the principle ideas of value is basic for a development organization in executing a "quality administration framework" as a key administration apparatus to pick up profits by the effective usage of a quality framework. Lam, et al (1994), with regards to development, characterize "quality administration" as "that part of the general administration work that decides and actualizes the quality strategy", and "quality

framework" as "the hierarchical structure, obligations, methodology, procedures and assets for executing quality administration". Doyle (1994) demonstrates that the creation of attractive quality items does not occur by possibility, yet rather it must depend on the utilization of a quality framework as the administration suite to meet the greater part of the built-up quality objectives. Henceforth, the embodiment of comprehension "quality in development" identifies with accomplishing quality in the development business execution through the usage of a quality administration framework (QMS). A QMS in organizations as "a formal explanation of an association's business strategy, administration obligations, forms and their controls, that mirrors the best and productive approaches to meet (or surpass) the desires of those it serves, while accomplishing its own particular prime business destinations". It is by and large consistent with say that, in the worldwide development industry, one of the points of each development firm is to win the trust and affirmation of clients as a method for picking up business intensity and making more prominent benefits. It consequently takes after this ought to likewise be one of the principle explanations behind QMS to end up noticeably a prime concentration in each development organization, for the satisfaction of clients' needs and fulfillment.

Quality has various parts, and an emphasis on just a single viewpoint may bring about lost clients (Center for the Advancement of Process Technology 2011). The utilization of a QMS so as to consider the critical parts of the quality, is one of the key quality ideas evaluated by the authors on quality, these quality ideas including the accompanying:

- A administration sense of duty regarding mirror that 'quality issues' must begin from the best;
- Management frameworks to guarantee consistency of operations;

- The utilization of measurements as the instrument to run and assess forms as productively as could be allowed;
- Team work; and
- Training to furnish groups with the required learning of administration frameworks, measurements, and change strategies.

While trying to utilize quality as a key segment of the achievement of development organizations today, numerous scientists express that it requires an all-around executed QMS with a specific end goal to guarantee the adequacy of the QMS (Ahmed et al, 2005; Cachadinha, 2009; Farooqui and Ahmed, 2009; Shibani, 2010).

The proposed various major ideas for a successful QMS that incorporate the accompanying:

- A framework that empowers an organization to relate to, and totally address, clients' issues;
- A framework that obviously characterizes the obligations regarding completing characterized capacities and exercises;
- A framework that is illustrative of the best and productive association for completing business forms and different discrete exercises;
- A framework that perceives the sound exhortation offered by measures, for example, ISO 9001 (2015);
- A framework that is effective on account of individuals' comprehension of duty, due a feeling of possession; and,
- A framework that is formally and consistently audited in a journey for progressing enhancements.

These rule ideas ought to have the capacity to help development organizations in the foundation and execution of their QMSs, in a way that empowers their associations to apply an all-encompassing and precise way to deal with quality administration, as upheld in the rationality of Total Quality Management (TQM) of Deming (1986) and others.

Add up to Quality Management (TQM) is for the most part thought to be a more elevated amount idea of vital accomplishment than that gave by a QMS. TQM, right off the bat, is a way to deal with guarantee that an entire association is engaged with delivering fantastic results in all that they do-; besides, in enhancing the persistent execution of value administration; lastly, in accomplishing the essential target of the idea; that of consumer loyalty. In light of these destinations and rules for giving nonstop enhanced quality administration in development organizations, a successful TQM-based arrangement of qualities is likewise a basic prerequisite for administrations' suppliers, to produce qualified exercises and accomplish the coveted results.

In a few academic articles composed by Wong and Fung (1999), Low and Teo (2004), Ahmed et al (2005), Farooqui and Ahmed (2009), Shibani (2010), it is for the most part presumed that the ideas of QMS and TQM are at about a similar level. Some development organizations have received a TQM approach as an activity to help raise quality and efficiency, while others, who were accounted for to be embracing TQM, were in reality really applying the eight essential components of an ISO 9001 (2015) based QMS. Development organizations that are anxious to profit by the TQM approach, begin by setting up a QMS idea as their initial step on what Grossman and Helpman (1989) among others have called the 'quality stepping stool'.

The principle purpose behind endeavor a survey of these two quality ideas is that among Indonesian development organizations, the ideas of QMS and TQM are not generally surely knew. In view of preparatory meetings, while some nearby contractual workers comprehend

what a QMS is, they don't have an unmistakable comprehension of the theory of TQM. Be that as it may, for national level temporary workers who effectively execute QMS, they eventually target TQM in their mission for add up to quality accomplishment in their organizations.

## **2.5 BENEFITS OF QUALITY MANAGEMENT**

The provision of an atmosphere of competitiveness of amongst firms, creates a constant improvement of every aspect of the firm because of competitive advantage (Cheng and Liu, 2007). Thus companies are able to maintain long-term connections, improve on their products and processes, create an amiable fellowship, more customer centered, employee job fulfillment, high earnings, decrease in costs of quality, encourage open addressing of problems, better control over the construction process, improved safety, help to realize project objectives and benefits with the application of quality management programs. (Low and Peh, 1996; Low and Teo., 2004). Confirming (Chindo, and Adogbo, 2011)'s statement that application of quality management techniques is diverse and can be very helpful in the construction industry. The benefits of quality management practices at the pre-contract stage will be felt by the contractors executing the works. The use of total quality management in the construction industry realized a higher customer satisfaction, improved schedule performance, improved relationships amongst contractors and consultants and also reduced rework.

## **2.6 CONTRIBUTIONS FROM QUALITY PIONEERS**

Dr. Joseph Juran worked in the quality programme at Western Electric. He became famous in 1951, after the publication of his book Quality Control Handbook. Juran (1988) introduced the management dimensions of planning, organizing, and controlling and he focused on the responsibility of management to achieve quality and the need for setting goals. According to

Juran (1988) quality is defined as fitness for use rather than simply conformance to specifications. He was a pioneer in teaching the Japanese on Quality Management Improvement and believed in top management commitment, support and involvement in the quality effort.

Juran (1998) established a ten step to quality management and they are as follows:

- i. Build awareness of opportunity to improve;
- ii. Set-goals for improvement;
- iii. Organize to reach goals;
- iv. Provide training;
- v. Carry out projects to solve problems;
- vi. Report progress;
- vii. Give recognition;
- viii. Communicate results;
- ix. Keep score; and
- x. Maintain momentum by making annual improvement part of the regular systems and processes of the company.

Philip B. Crosby is another recognized expert in the area of Total Quality Management. He developed the phrase “Do it right the first time” and the notion of zero defects, arguing that no amount of defects should be considered acceptable. Crosby (1979) coined the term ‘zero defects’ and stated there is absolutely no reason for having errors or defects in any product or service. He said the cost of quality is understated when in comparison with cost of improving quality. Crosby concluded that the cost of quality included all things that are not included in getting it right the first time.



The first quality expert to emphasize the importance of the ‘internal customer’ the next person in the production process was “**Kaoru Ishikawa**”. He was one of the first people to stress on the significance of total company quality control, rather than just focusing on products and services. Ishikawa (1985) promoted the use of teams or quality circles and the seven tools of quality in performance improvement. The Cause-Effect Diagram known as Fishbone Diagram was developed by him. According to Ishikawa (1985), quality is the development, design, production and service of products that are most economical, most useful, and always satisfactory to the customer. He emphasized the importance of training, the usage of cause-effect diagrams for problem solving, and quality circles as a way to achieve continuous improvement.

## **2.7 CRITICAL SUCCESS FACTORS OF QUALITY MANAGEMENT**

There have been various views on the basic elements of Quality Management and Control since its inception in 1920. The basic principles of Quality Management and control are based on these concepts as championed by Metri (2005), Imbeah (2012), Harrington and Voehl (2012). Metri (2005) examined the critical success factors of the fourteen (14) most prominent total quality management frameworks. Based on this, he proposed the following ten critical success factors (CSF) of Quality Management and Control for the construction industry.

- a. Top management commitment;
- b. Quality culture;
- c Strategic quality management;
- d Design quality management;
- e. Process management;

- f. Supplier quality management;
- g. Education and training;
- h. Empowerment and involvement;
- i. Information and analysis; and
- j. Customer satisfaction.

### **2.7.1 Management Strategy and Commitment**

Management is fundamentally a way of planning, organising, and understanding the activities in a project and this involves each person at each level. The role of management in Quality Control is to have a strategic quality management overview that places emphasis on quality as problem prevention and not inspection. Both top and middle management personnel, responsible for Quality Control principles to all staff must demonstrate their commitment and understanding of these basic principles. Therefore, an effective Quality Management/control must first start with the leadership of the organization. Management must prepare a well-thought out quality control policy which must be known to all employees. Within an appropriate organisational culture, management implements and monitors carefully this policy to ensure the observance of its contents. In addition, it is the responsibility of Management to provide all resources, training and requisite tools needed to build an effective and efficient Quality control system in the Construction Company. Effective leadership and good quality management result in the company doing the right things, right first time (Battikha, 2002). In his book 'What is Total Quality Control?' Ishikawa (1985) states the fact that, top management cannot be disconnected from the total quality management of the company. The Business Roundtable (1983) on cost

effectiveness concluded that poor management practices are a primary cause for the decline of construction productivity. Other researchers such as Abdul-Rahman (1996) and Tsiotras and Gotzamani (1996) also indicated that lack of long-term commitment to quality from top management is one of the reasons of quality management failure. This assertion is also confirmed by Polat et al (2011) who concluded that three most important barriers to Total Quality Management implementation are lack of top management's support, commitment and leadership. In a survey conducted by Arditi and Gunaydin (1997) to investigate TQM in the design, construction, and operation phases of projects undertaken in the USA, they indicated that the level of management commitment to continuous quality improvement was one of the most important factors that affect the quality of the constructed facility.

In conclusion, they stated that Management must participate in Quality Control and Management implementation process and be fully committed to its success. The responsibility is therefore on the leader to build an environment that promotes quality for every employee. Such environment is achieved by articulating the vision, core values, and purpose for existence and mission statements clearly to employees.

## **2.8 THE NEED FOR QUALITY CONTROL / QUALITY ASSURANCE**

### **2.8.1 Project Structure**

Quality control (QC) of construction occurs only during the construction phase, which (while it is the most visible portion of the project) takes only about one-half or in some cases one-third of the time consumed from original concept and approval of the project through move-in and utilization. Although Quality control duties are confined to the construction period, it is helpful to the quality assurance (QA) program to understand the roles and attitudes of the various

characters within the project cast (Deming, 1986). By the time the job reaches the field, the designer, owner, and various government reviewing bodies-such as building code specialists-have developed certain definite opinions, and the project itself may be popular within the community or highly unpopular. This history and set of attitudes are carried forward into the construction phase and will affect the quality control role. There are four major categories of project progress:

- i. Pre-design activities, with the owner having primary responsibility for progress. Quality Assurance policies and procedures should be in place;
- ii. Design phase, with the architect, engineer, A-E, or in-house staff having primary responsibility for progress and implementation of QA;
- iii. Construction, with the contractor or the in-house construction force responsible for progress, but the owner (and/or the owner's agents) responsible for QC; and
- iv. Furnish and move-in, (also termed Start-up) with the contractor having primary responsibility and the owner applying QC in accord with the QA procedures (Deming, 1986).

The successful accomplishment of start-up depends on the following general components:

- i. **Properly trained participants:** All personnel must understand the requirements of the project, as related to their specific duties and responsibilities. How effectively they work in accomplishing the common objective of completing the project will largely determine the quality of the project.
- ii. **Material resources:** The material used in accomplishing tasks and incorporated in the finished facility must have established and known performance characteristics and

- be available at the specified time in the construction process, start-up, and operations phases.
- iii. **Equipment:** Equipment must be prequalified and pretested prior to use and properly maintained so that it performs its intended function.
  - iv. **Processes:** A system's structure presupposes that information has been entered into the system and something will be done according to determined methods. Procedures outline the methods necessary to accomplish the objectives of a system, whether they be manual or automated. Procedures combine and manipulate input and data base content to achieve specified results or output. Procedures must be established to deal with routine, nonroutine (but anticipated), and unanticipated events. Procedures include programming, design, equipment setup, calculations, clerical and administrative operations, and many types of automated and human/machine interactions (Deming, 1986).

Materials and equipment are other key elements in a quality start-up program. Start-up planning should identify inspection and test measurements critical to indicate quality. Planning also should identify "measurement" methods and the type of equipment to be used. Calibration control of equipment should be mandated for any measuring device used to collect inspection or test data. If decisions are made using data obtained from a measuring device, then the source of the data (the measuring device) should be calibrated. Calibration control involves use of approved calibration procedures which identify the interval for which the calibration is satisfactory. The equipment should be identified clearly, with the date for recalibration visible. If recalibration is needed, the equipment must be removed from service. The process begins again after recalibration. Equipment not readily calibrated should be separated from the calibrated

equipment. Procurement items (materials and products) should be controlled to conform with specified requirements. Activities typically involved in the procurement-control process are procurement planning, procurement document preparation (content), procurement document review, supplier evaluation, bid evaluation, supplier performance evaluation, control of deficiencies, corrective action, product acceptance, and records (Deming, 1986).

## **2.9 QUALITY CONTROL IMPLEMENTATION IN CONSTRUCTION**

Traditionally there are two sets of documents that are used to determine the required quality of a construction project. These are the specifications and the contract drawings. The contractor uses these two documents during the site-operations stage of any project to facilitate ‘quality’ construction. The process of actual construction is dissimilar to that of a production line in that there are no fixed physical and time boundaries between each operation of the process, hence the positioning and timing of quality inspection cannot be predetermined. In construction, quality checks are undertaken as each operation or sub-operation is completed. The majority of quality checks are undertaken visually. Visual quality checks of each section of construction are undertaken by the contractors’ engineers and foremen, and then by the resident engineers and inspectors, to ensure that it complies with the drawings and specification. Quantifiable quality checks are also made during the construction stage. These include testing the strength of concrete cubes, checking alignment of brickwork, and commissioning of services installations. The results of these quality checks are recorded and passed to the resident engineer. The weakness of quality control is the development of the inspection mentality or culture whereby the construction contractors’ operatives and engineers set their standards to that which they can ‘get past the inspector’. In addition to potentially surrendering the standards of workmanship to an inspector,

it exposes the contractor to expensive re-work if the standards of workmanship obtained do not meet with the inspector's approval. It would be much better if the contractors' engineers and operatives had a clear understanding of the quality required and were able to recognise it themselves, achieve it first time or regulate it by self-inspection. This concept, being the basis of quality assurance, potentially reduces the risks of producing unsatisfactory work and being involved in expensive re-work. Notwithstanding the existence of quality assurance and the emergence of total quality management, most clients still engage inspectors through their resident engineers or architects to reassure themselves. However, the impact and importance of the clients' inspectors are much reduced in a quality-assured or total-quality-managed company (Harris et al 2013).

## **2.10 CHALLENGES IN IMPLEMENTING QUALITY MANAGEMENT**

There is proof of negative effects in many organizations' due to obstacles in the execution of their attempt to implement quality management (Yusoff et al, 2006). Poor work approach, negative opinions of management and employees, inadequate resources and lack of training as well as uncondusive environments for operation results in obstacles in implementation. Hassin et al., (2007) recommend that the key factors in the implementation of TQM are training and education. Other factors are client fulfilment, employee involvement and quality plan.

### **2.10.1 Public Procurement Challenges: Internal Factors**

A variety of internal factors on the procuring entity have directly challenged public procurement practitioners. A model was developed by Thai (2004), portraying the extent of public procurement that comprises of five elements: policy making and management; authorizations and appropriations; procurement regulations; procurement function in operations (processes,

methods, organizational structure, and procurement workforce; and feedback). Public procurement practitioners have always been restricted in accomplishing procurement objectives due to internal forces comprising:

Interactions between the public procurement systems, different officials and organizations in the three arms of government, agencies and sub agencies within a department which creates a bureaucratic approach and slows down the procurement process;

Resources needed for the agency's objectives, a lack of resources like stationary, transportation etc to procure inhibits the progress of the procurement process and also demotivates procurement practitioners;

Competence of procurement workforce, the use of a competent workforce with an understanding of the procurement process is beneficial to the procurement process but an incompetent workforce will be a challenge to the procurement process;

Proportion of procurement practitioners to contract actions and budget resources, this is the ratio of the procurement staff to the work available. A few procurement practitioners handling a procurement in a large company might cause mistakes to occur during the process;

Procurement organizational structure, the centralized or decentralized procurement structure in the organization may hinder the procurement process if the right structure is not selected for the organization;

Regulations, rules and guidance internal rules and regulations may some cause certain bureaucracies which may slows down the procurement process; and

Internal mechanisms may some cause certain bureaucracies which may slows down the procurement process (Thai, 2004)



### **2.10.2 Public Procurement Challenges: External Factors**

A variety of environmental factors on the procuring entity such as market, legal, political, organizational and socio-economic environments has challenged public procurement experts Thai (2004).

#### **2.10.2.1 Market Environment**

Market conditions affects the maximization of competition by Public procurement experts. Moreover, the accomplishment of socioeconomic objectives of procurement is determined by the market which influences governmental entities ability to fulfil its needs; the timeliness of fulfilment; and the quality and costs of purchased goods, services and capital assets. Due to different levels of economic growth among countries in the world some markets more favorable than others (Thai, 2004).

Public procurement practitioners face a greater challenge due to globalization. These challenges include communication, currency exchange rates and payment, customs regulations, lead-time, transportation, foreign government regulations, trade agreements, and transportation. Thus, before taking on international purchasing program, the total cost implications must be assessed by public procurement practitioners and compared to domestic costs (National Institute of Governmental and management).

#### **2.10.2.2 Other Environmental Forces.**

Culture and technology has also influenced public procurement system. Bribes and gifts have become difficult to distinguish in cultures where there's the habit of giving gifts. Rapid progressive knowledge has driven public procurement to embrace new procurement approaches, such as the use of e-signature and purchase cards; and be well-informed.

## Practices

CHALLENGES OF QUALITY MANAGEMENT PRACTICES	REFERENCES
INTERNAL FACTORS	
<b>Policy making</b>	(Thai, 2004)
<b>Authorizations and appropriations</b>	(Thai, 2004)
<b>Professionalism or quality of procurement workforce</b>	(Thai, 2004)
<b>Procurement organizational structure such as the issue of centralization vs. decentralization</b>	(Thai, 2004)
<b>Procurement regulations, rules and guidance; and</b>	(Thai, 2004)
<b>Internal controls and legislative oversight</b>	(Thai, 2004)
EXTERNAL FACTORS	
<b>Market forces</b>	(Thai, 2004)
<b>Environmental factors</b>	(Thai, 2004)

## 2.11 EFFECT OF QUALITY MANAGEMENT PRACTICES

### 2.11.1 Top Management Commitment and Leadership

The attainment of total quality management agenda of a construction organization in the construction industry is heavily linked with management's commitment and its leadership, Arditi and Gunaydin, (1997); Low and Teo, 2004; cited in Gherbal et al. (2012) defined leadership as: "a guidance applied in a situation and through an interaction process toward the achievement of an objective. Therefore, quality management agendas must be keenly lead by management and the assumption of duty to assess and enhancing quality system at stated period's intervals Imbeah (2012). Furthermore, the deliverance of policies stimulates client or customer fulfillment; active

transmission of quality approach to its workers (internal and external) creates employee satisfaction. Thus objective and an approach concerning commercial targets must be set by management. Additionally, the supply of requisite materials and employee training to push the Total Quality Management objectives must be provided by management. Juran and Gryna, (1993)

### **2.11.2 Human Resources Management**

Every quality expert acknowledges the significance of human resource management. Management faces difficulty in controlling total quality management in order to achieve quality improvement. Thus, the essence of personnel management which comprises how the employees are assisted to grow and apply their abilities with the company's goals. The execution of particular activities or a specific job can be taught through training courses. On the other hand, employees must be educated on general knowledge which is broader so that they can be used in varying situations (Rao et al., 1999). Tailored training programs for professional, support personnel and field labor must be organized by construction organizations in line with organizations quality mission (Arditi and Gunaydin, 1997). This will ensure that less TQM training will be required for employees switching from one organization to the other. Education and training must therefore be encouraged. Furthermore, on the job decisions must be allowed by employees, to encourage teamwork and to work efficiently to achieve results (Eisman, 1992).

### **2.11.3 Customer Focus**

Quality in construction should be customer focused. The construction industry must therefore be concerned about meeting and exceeding the customer expectations and also place emphasis on customer feedback. This can therefore be termed as the extent to which a company always meets

their client needs (Gherbal et al., 2012). The client's opinion must be sought during product development at every stage which is key to quality management (Gherbal et al., 2012)

#### **2.11.4 Strategic Planning**

Strategic planning aids in the setting of clear objectives and making choices on assigning resources. It also gives lay down rules for managing, implementing, and reviewing the development of tactical ideas (Metri, 2004). Thus, the way in which an organization comes up with tactical policies, defines a means of achieving them, and turns them into an efficient management scheme is known as strategic planning. In addition, this strategy includes the growth and distribution of plans (Lee et al., 2003) to enhance stakeholder relationships (Prybutok et al., 2008) planning in a team helps to attain long and short-term goals of an organization.

#### **2.11.5 Process Management**

By including quality into the production process, the objective of process management will be met by realizing a reduction in process disparities (Flynn et al., 1995; Anderson et al., 1994). Where Process management is the combinations of resources used in production (Jaafreh and Al-abadallat, 2012). Interestingly TQM works on the belief that the quality of a product and the quality of the production process are directly related, thus an increase in the quality of the product affects the quality of the process (Ahire and Dreyfus, 2000) thus increases the quality of process causes a decrease in the costs such as rework costs and waste costs (Anderson et al., 1994; Flippini and Forza, 1998). According to Metri (2005) process management aims at running an incident free construction.

### 2.11.6 Quality Culture

The work culture must be very favorable thus within the TQM culture the organization's management has to create a co-operative and open culture in which all the employees have to be made to feel a sense of duty in fulfillment of the organization's customer's needs.

According to Gherbal et al. (2012) culture within organization is defined by Hofstede (2001), as "Interpersonal relationships within a company encourages participation of the employees in the realization of the vision and strategies of the organization.

**Table 2.2 Effects of Quality Management Practices**

<b>EFFECTS OF QUALITY MANAGEMENT PRACTICES</b>	<b>REFERENCES</b>
<b>Top Management Commitment and Leadership</b>	Gherbal et al. (2012)
<b>Human Resources Management</b>	(Rao et al., 1999)
<b>Customer Focus</b>	Gherbal et al. (2012)
<b>Strategic Planning</b>	(Lee et al., 2003),
<b>Process Management</b>	(Jaafreh and Al-abadallat, 2012).
<b>Quality Culture</b>	Gherbal et al. (2012)

## 2.12 THE ROLE OF THE DISTRICT ASSMBLIES

### 2.12.1 Quality Control Inspection Team

It is an unfortunate commentary on human nature and the psychology of the individual that we need construction inspection-but need it we do. Even more unfortunate is the apparent drive for conformity that makes company managers often do things they would not do as individuals,

again underscoring the need for inspection. Without a doubt, there is a requirement for inspection, and those being inspected will usually be quick to affirm this. Our entire economy is built on the roles of buyer and seller, and we all play our part. The rule of caveat emptor (let the buyer beware) is not just philosophical but is a legal reality. In construction, where the product is built in place and often takes years to develop, the buyer has an unusual opportunity to look over the shoulder of the seller. In turn, the seller puts enough in his cost (he hopes) to pay for this interference. In the face of the real and accepted need for inspection, the inspector assumes another unfortunate general attitude-that of the adversary (Deming, 1986).

With the seller (contractor) placed diametrically opposite the buyer (owner, designer, agency), sides are clearly taken at the beginning of a construction project. The less intuitive inspector supposes that anything that can be done to slow down, impede, or control the contractor is to the advantage of the owner. Nothing could be further from the truth. Without exception, jobs that go smoothly cost the owner less, and those that are dogged with problems cost everybody more. It is vital that the inspector control quality, but if this impedes progress, it inevitably costs the owner money. This is not always obvious to the owner. The experienced inspector, realizing that, after all, it is the contractor who ultimately builds the job, must tread a careful line between the owner's interest and that of the contractor (Deming, 1986).

### **2.12.2 Building Inspectors**

There are biblical references to inspectors, and early monumental projects such as the pyramids had working scribes as well as overseers. In fact, the term "clerk-of-the-works" is probably a carryover from the early material counters. The role implied by the title "clerk-of-the-works" is as archaic as the term itself. No longer (if in fact it was ever true) is the inspector able to stand by and count materials coming into the job. Perhaps a hundred years ago when labour was cheap

and materials were scarce, there were widespread instances of short changing through the use of shoddy materials. In today's construction industry, it is more usual to find that good material is used, but it is installed improperly, with connections not made or controls not operable. This is where quality control is important-making certain that the labour and materials bought and paid for are properly applied. In most cases, mistakes benefit no one; everyone is the loser. The craftsman becomes less productive, the contractor acquires a tarnished reputation, and the owner (at some point) must dig deeper into its own pocket to make up for problems created by installation mistakes (Deming, 1986).

### **2.12.3 The Role of the Inspector**

Historically, government agencies tend to view the role of inspection in the traditional, ultra-narrow sense. Nevertheless, this role is a base for the things that an inspector can and should do. The following description is from the manual on "Construction Inspection Procedures" prepared by the General State Authority of Pennsylvania, discussing the role of the inspector:

The primary function of the field personnel of the construction division is inspection, and the persons assigned to this task are designated as inspectors. There are three classifications of field inspectors: general, mechanical, and electrical. The Inspector must be able to look upon and view critically the particular phase of the construction project to which he is assigned. This requires some degree of experience in the construction field. In addition to experience, the Inspector must also have the ability to evaluate and analyze what he is inspecting. Therefore, a most important and necessary requirement is that the Inspector be able to fully read, comprehend, and interpret the contract plans and specifications. It is also very important that the Inspector have the ability to maintain records that will fully reflect the inspections performed (Deming, 1986). The Inspector must closely follow the progression of each stage of construction. He must be alert to

existing conditions and be able to foresee future problems. When the Inspector notices through his daily inspections that certain phases of the work are not being done in accordance with the plans and specifications, or when other problems occur, he is to immediately report these errors, violations, or problems to "management" for further action. In effect, the Inspector is not authorized to revoke, alter, substitute, enlarge, relax, or release any requirements of any specifications, plans, drawings or any other architectural addenda. In addition, the Inspector must not approve or accept any segment of the work which is contrary to the drawings and specifications. At no time is the individual Inspector allowed to stop the construction work or interfere with the contractor's employees. It must be recognized that the title "Inspector" creates a barrier between him and the contractors on the job. How effective he can be in his role depends mainly on how he handles himself in this relationship. He must display knowledge, experience, integrity, ability and the use of good judgment (Deming, 1986). The role described is a narrow one of quality control. It suggests that the inspector cannot give up any of the prerogatives of the owner, and, at the same time, cannot delay the work. This situation is mitigated in many cases by the assignment of resident engineers with concomitant duties to inspect. Even in these cases, where the inspector represents management, work may not be disrupted except in accordance with the contract. In a cost-plus contract, the owner often has prerogatives to stop the work-if any such stoppage will be paid for directly by him. In fixed-price and negotiated contracts, the owner's representatives must be much more careful, or they will be liable for a claim of interference.

The Corps of Engineers offers the following suggestions to the inspector on his role:



- i. An Inspector should at all times be thoroughly familiar with all the provisions of the contract which he is administering. This includes familiarity with the plans and specifications including all revisions, changes, and amendments.
- ii. In addition, the Inspector must be thoroughly familiar with pertinent Corps of Engineers, individual district, and supervisor's administration policies.

An inspector has different responsibilities and authorities, dependent upon the organizational setup under which he is working and his own capabilities. Each inspector should know his (or her) part in the organization and should be aware of the importance of high-quality construction. He (or she) should understand his (or her) own level of technical knowledge and accept his (or her) responsibilities without overstepping his (or her) authority. In order to do this, the inspector must be aware of the extent of his (or her) authority. To that end, the inspector always has the authority to require work to be accomplished in accordance with the contract plans and specifications. Procedures and policies on stopping work for safety violations or construction deficiencies should be reviewed with the appropriate supervisors before being employed (Deming, 1986).

According to O'Brien (1989), in dealing with contractors, the inspector should be impersonal but friendly, fair, and firm. He/she should be business-like and cooperative with the contractors, and should attempt to have a clear, accurate, and appreciative understanding of their problems. With this perspective, the inspector's decisions and instructions should provide the greatest latitude possible to the contractor without prejudice and without waiving contract requirements in choice of equipment, material, or methods. Further, not only must the inspector make the right decisions and issue proper instructions but must issue them and see that they are executed promptly and at

the right time. Any such decisions or instructions should be based on detailed knowledge of all the facts, good judgment, and protection of the owner's interests. Conversely, the inspector must consider whether or not these instructions may have any adverse consequences-and, if so, appropriate management must be informed beforehand. The inspector should be cautious and avoid dictating methods of construction to the contractor, unless the methods are clearly spelled out in the contract. Further, the inspector should be careful not to discuss items directly with the contractor's craftsmen or with subcontractors unless this is done with the contractor's knowledge and even then, it is a questionable practice. Any disputes with the contractor should be settled promptly (Deming, 1986).

### **2.13 THE COST OF POOR QUALITY**

Perhaps the most obvious tangible benefit of quality improvement is the reduction of costs associated with non-quality. If we have to throw a product away because we have made an error in its manufacture, it is clear that there is an immediate financial impact as all the costs sunk into the product are lost. Similarly, doing an incorrect operation over again absorbs cost (operator time, power, additional materials etc).

### **2.14 CHAPTER SUMMARY**

Architects and engineers are becoming more aware that quality in construction cannot be assumed. It must be committed to, and then planned. Owners must be made aware that there is a cost involved in the assurance of quality. During pre-design, QA/QC is a policy matter. During the design phase, implementation of the QA/QC policy requires specific work scope which entails funding for the QA required quality reviewers. Quality Control (QC) during construction

carries out the QA plan. It is not unusual for QA/QC to cease with turnover of the project to the owner for the start-up stage.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 INTRODUCTION**

This chapter discusses the research methodology adopted for this study to achieve the research objectives. The chapter presents in depth explanations of the research strategy, research design, types and sources of data, sampling methods, techniques of data collection and data management and analysis.

#### **3.2 RESEARCH STRATEGY**

Nenty (2009) argued that it is usually very critical that, in order to resolve a research problem, the relationship existing among and between variables be identified in any given situation, unaffected by extraneous influences in the analysis of that relationship. In that regard, research design constitutes the procedures with which we explore and analyse the relationship existing among variables in a research problem. This section subsequently justifies the choice or preference of any particular procedure over others. A research design is purposed to assist the researcher gather important evidence without sacrificing much effort, time and money (Kothari, 2004). In general, research design functions as the master plan that shows how the research will be conducted (Nenty, 2009).

Walliman (2011) confirmed that it is the research aims, derived from the research problems that decide on the choice of the type of research design adopted. Each research design can be broken down into a number of research methods used in collecting and analyzing data. The quantitative and qualitative approaches are the two main approaches to collecting and analyzing data (Pathirage et al., 2005). Pathirage et al. also (2005) proceeded to add that the main requirement

for a total and complete empirical study is the design of a research strategy. Three main research strategies exist according to Baiden (2006), and they are the qualitative, quantitative and triangulation approaches. The choice of any rest extensively on the purpose of the study, the type and availability of research information (Naoum, 2002, cited in Baiden, 2006).

Creswell (1994) defines quantitative research as “an inquiry into a social or human problem, based on testing a hypothesis or a theory composed of variables, measured with numbers, and analysed with statistical procedure, in order to determine whether the hypothesis or the theory holds true.” It entails the use of statistical data expressed in a quantitative form by utilizing large-scale survey research, and making use of such methods such as questionnaires, experiments and surveys (Kothari, 2004; Dawson, 2002). This approach employs numerical data and numerical analysis to describe and understand behavior (Passer, 2004). The quantitative approach to research shortens the time the researcher spends on each respondent whilst allowing him to collect more data (Dawson, 2002). It makes use of generation models, theories and hypothesis, development of instruments and measurements; experimental control and manipulation of variables; collection of empirical data; modeling and analysis of data; and evaluation of results (Gall et al., 2003). Burnham et al. (2008) further stated that this approach is advantageous in that it is quite easy for other researchers to replicate the procedure in order to produce similar results. This is because the methods of data analysis are well-known and open. Moreover, Rajasekar et al. (2006) opined that quantitative research approach is characterized by being numerical, non-descriptive, applying statistics, evaluates evidence and represents them in tabulated and graphical forms. It is also conclusive, investigating into the what, where and when of decision making.

Qualitative approach to research, on the other hand, is subject to the researcher’s insights and impressions. And it deals with the subjective assessment of attitudes, opinions, behavior and

experiences. It focuses on methods consisting of focus groups, interviews, projective techniques and in-depth interviews (Kothari, 2004; Dawson, 2002). This approach is interactive and the researcher converses with his readers' whiles appreciating the phenomenon under study (Jean, 1992). Howitt and Cramer (2011) added that it emphasizes on the description of the qualities or characteristics of the data gathered and generally involves a complete study of the text, speech and conversation. It is non-statistical and makes non-statistical conclusions (Kura and Sulaman, 2012). It also involves a number of cases from which information is drawn. The process is usually in-depth and so takes longer (Burnham et al., 2008; Dawson, 2002). Qualitative approach is non-numerical, descriptive, applies reasoning and uses words. "It intends to get meaning, feeling and describes the situation; qualitative data cannot be graphed; it's exploratory; and it's investigates the why and how of decision making" (Rajasekar et al., 2006).

Researchers in certain situations may find it beneficial combining both qualitative and quantitative approaches, particularly where the data these two methods generate can be openly distributed (Ritchie and Lewis, 2003).

This study adopts the quantitative research approach utilizing the questionnaire survey in collating the views and opinions of institutional investors as well informed members of the public. In order to acquire clarity and understanding of a group, profession, institution or organization, the most appropriate methods is to resort to the use of questionnaires (Janes, 1999).

**Table 3.1 Quantitative approach**

<b>QUANTITATIVE RESEARCH</b>	
<b><i>Outcomes</i></b>	Conclusive findings used to endorse a final course of action.
<b><i>Orientation to the role of theory to research.</i></b>	Inferential and related to verification of theory and hypothesis testing.
<b><i>Ontological orientation</i></b>	Objectivism
<b><i>Objective</i></b>	Gather accurate data and examine the correlation between relationships and facts in agreement with theory.
<b><i>Epistemological orientation</i></b>	Natural science
<b><i>Data characteristics</i></b>	Hard data, large sample size, analyzed using statistical methods.
<b><i>Common data collection techniques.</i></b>	Test, questionnaires and prevailing database

Source: Bryman (2004) and Baiden (2006)

### **3.3 SOURCES OF DATA**

The study employed the use of data obtained from primary and secondary sources. Primary data was necessary in order to obtain first-hand information on the key issues identified in the study. Secondary information also gave an insight into the study and enabled a thorough examination of the other works related to this study.

### **3.3.1 Primary Data**

Primary data was largely used for this work. This enabled the researchers to get original information from the various respondents through the administration of questionnaires to the various respondents and personal observations.

### **3.3.2 Secondary Information**

Since primary data alone will not be adequate, secondary information was employed to supplement the primary data. Therefore, the use of journals, research reports, industry reports and the internet was useful to study.

## **3.4 RESEARCH POPULATION**

According to Twumasi (2001), a study population is the universal set of all respondents or members that contain the characteristics of interest. This population possesses common characteristics which enabled the researcher to achieve its objective. The research population was limited to construction professionals handling construction projects by the Offinso Municipal Assembly in the Kumasi Metropolis of the Ashanti Region of Ghana. In all 50 professionals were identified as research respondents for the study (Offinso Municipal Assembly, 2018).

## **3.5 SAMPLING TECHNIQUES AND SAMPLE SIZE DETERMINATION**

Sampling is that part of statistical practice concerned with the selection of a subset of individual elements within a population and intended to yield some knowledge about the population of concern, especially for making predictions based on statistical inference. Kumar (1999) explains that a sample is a sub-group of the population which is an ideal representative of the entire population.



A probability sampling scheme is one in which every unit in the population has a chance (greater than zero) of being selected in the sample, and this probability can be accurately determined, while non-probability sampling is any sampling method where some elements of the population have no chance of selection or where the probability of selection cannot be accurately determined (Kothari, 2003). In order to take care of all the issues under consideration in the research objectives, this study used the probability sampling

The respondents were made up of construction professionals including construction and project managers as well as quality officers. These construction professionals were selected using purposive sampling because they have over-site responsibilities for construction projects and are therefore expected to contribute to quality practice efforts.

Purposive sampling refers to strategies in which the researcher exercises his or her judgment about who will provide the best perspective on the phenomenon of interest, and then intentionally invites those specific perspectives into the study. Purposive sampling can be very useful for situations where you need to reach a targeted sample quickly and where sampling for proportionality is not the primary concern (Atkinson & Flint, 2001).

### **3.6 QUESTIONNAIRE DEVELOPMENT**

Primary data was collected mainly by the use of questionnaire. Shao (1999) defines a questionnaire as a formal set of questions or statements designed to gather information from respondents that accomplish research objectives. Bowling (1997), note that when developing a questionnaire, items or questions are generated that require the respondent to respond to a series of questions or statements. Participant responses are then converted into numerical form and statistically analyzed. These items must reliably operationalize the key concepts detailed within specific research questions and must, in turn, be relevant and acceptable to the target group. The

main benefits of such a method of data collection are that questionnaires are usually relatively quick to complete, are relatively economical and are usually easy to analyze (Bowling 1997). The questionnaire will be developed with brevity as an intended goal.

### **3.6.1 Questionnaire Design and Distribution**

A structured questionnaire was designed and administered to each selected respondent to obtain the required data pertaining to all issues of the topic outlined in the objectives of the study. The questionnaire was structured into separate sections based on the objectives of the study. The questionnaire consisted of closed-ended and Likert-type questions. The closed-ended and Likert-type questions are used for their advantages of being quick to answer and requiring no writing by the respondent (Naoum, 1998). The various questions were obtained with the help of a detailed literature review and were simple, easy, unambiguous and void of technical terms to minimize potential errors from respondents.

### **3.6.2 Scope of Questionnaire Survey and Targeted Respondents**

The validity of the data collected depends much on the structure and the format of questions addressed. The questionnaires targeted construction professionals in various construction firms in the Offinso Municipality to solicit their views on the topic under study. For ease of understanding, the questionnaires are phrased to be self-explanatory and structured to elicit the needed information.

## **3.7 DATA ANALYSIS METHODS**

The data collected were analyzed using varied methods. Firstly, the analyses involved the use of descriptive statistics tools such as frequencies, percentages and means to summarize most of the data that were obtained through the surveys. Also, ranking indices were developed and used to rank the responses on the Likert-type questions provided by the respondents. Fowler et al (1995),

defines ranking as a comparison among given options, within pairs of options, by cardinality of importance (first, second, third), or that score items one at a time using a common scale, and it's also determines the importance of that factor. In this section Relative Importance Indexes (RII) were used to rank the variables. This was adopted because, Adnan et al (2007) asserted that to analyse data on ordinal scale (e.g. Likert scale 1-5), the application of Importance Index is also suitable. The relative importance index was developed for each variable by multiplying individual frequencies by their corresponding values of factors under each rank of 1-5 and dividing the sum by the product of total number of respondents and 5 (highest figure on the five-point Likert scale). RII is calculated mathematically from the formula:

$$RII = \frac{\sum W}{A \times N} \quad (0 \leq RII \leq 1)$$

Where:

W – is the weight given to each factor by the respondents and ranges from 1 to 5, (where “1” is “strongly disagree” and “5” is “strongly agree”);

A - is the highest weight (i.e. 5 in this case) and;

N – is the total number of respondents.

The Statistical Package for Social Sciences (SPSS) software was used for analyzing and processing most of the data that was obtained through the surveys. This information was then discussed to arrive at the results and findings. The data analysis was in the form of comprehensive statements and analytical descriptions based on the primary data as well as the

secondary information. Microsoft Excel was used to create visual presentations (bar graphs, pie charts and tables) to describe the relationships among of the variables.

## **CHAPTER FOUR**

### **DATA ANALYSIS AND DISCUSSION**

#### **4.1 INTRODUCTION**

This chapter focuses on the discussion of the data analysed from the responses collected using the S.P.S.S. module of data collection. The tools used were the Descriptive statistics and the Relative Importance Index (RII) to rank the various variables. Tables, figures and charts were used in the thorough analysis of the data collected. Fifty questionnaires were retrieved for the study in focus.

#### **4.2 DEMOGRAPHY OF RESPONDENTS**

##### **4.2.1 Job Position**

When respondents were asked to indicate their job positions as shown in the Table below, a total of 6 respondents representing 12% were Quality Assurance Managers, 7 in number were Project managers and a majority were Quantity Surveyors representing 20% of the total respondents selected for the study. The table below, shows the various job positions and the frequencies of the jobs as well as their corresponding percentage representation.

**Table 4.1 Job Position of Respondents**

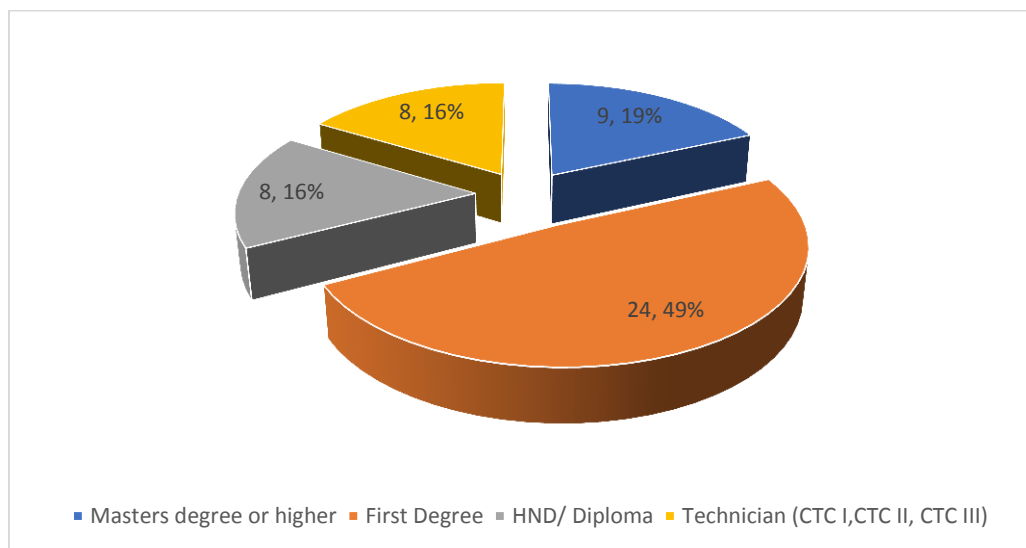
		<b>Frequency</b>	<b>Percent</b>
<b>Valid</b>	Quality Assurance Manager	6	12.0
	Project Manager	7	14.0
	Engineer	7	14.0
	Architect	3	6.0
	Quantity Surveyor	10	20.0
	Supervisor	8	16.0

	Non-responsive	9	18.0
<b>Total</b>		50	100.0

The remaining 9 respondents did not fall within the category of job positions stated in the Questionnaire. The remaining 9 respondents were Budget Analysts in the institution.

#### 4.2.2 Educational Level

The respondents chosen for the study were asked to indicate their level of education for the purposes of validation and to give credibility to the findings of this study. From the data analyses, a majority of them were First Degree holders representing 49% of the respondents. 19% were holders of a Masters Degree or higher. The remaining were HND/Diploma holders and Technicians representing a total of 16% each. This goes to show that respondents used were literates and fully capable of disseminating and properly answering issues raised in this study.



**Figure 4.1 Educational Level of Respondents**

#### 4.2.3 Experience in the Construction Industry

The respondents were asked to provide their years of experience in the construction industry. This was done to further validate the findings and responses obtained. From the table below, it is evident that a total of 18 respondents representing 36% had between 6 to 10 years of experience in the industry. The second highest frequency being 15 of the responses received had less than 5 years of working experience, whereas 26% (13 in number) of respondents had between 11 to 15 years of experience and 4 respondents had accrued a total of above 16 years of working experience in the industry

**Table 4.2 Working Experience of Respondents**

		Frequency	Percent [%]
	Less than 5 years	15	30.0
	6 to 10 years	18	36.0
	11 to 15 years	13	26.0
	Above 16 years	4	8.0
	Total	50	100.0

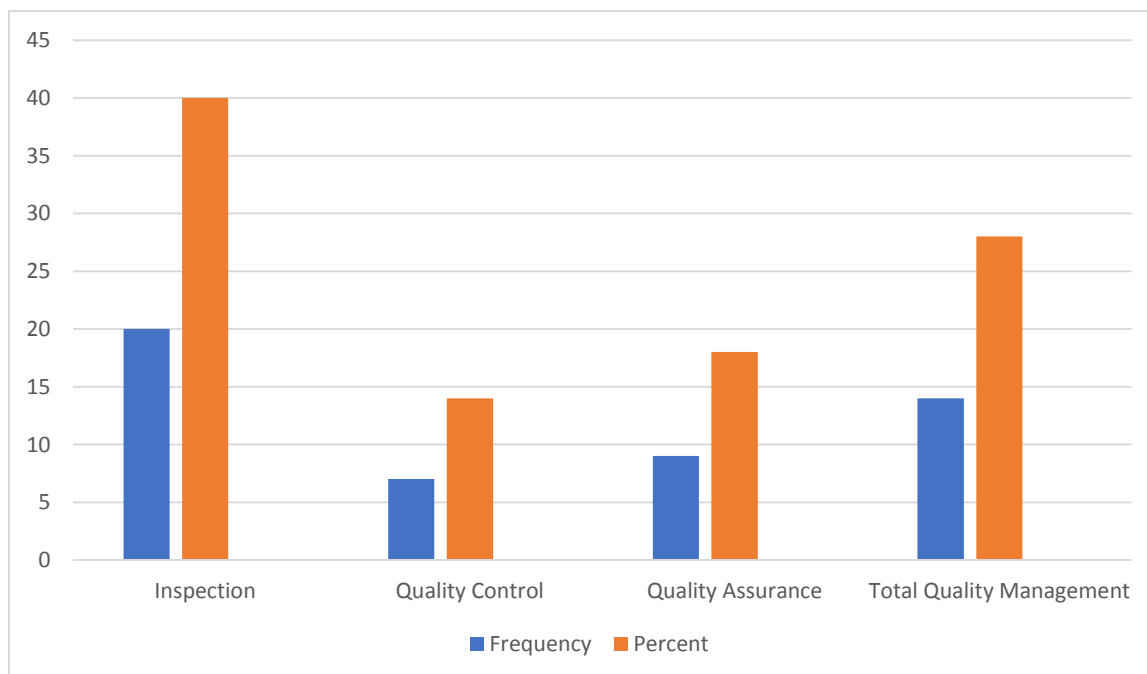
#### 4.3 QUALITY IMPROVEMENT PROGRAMME IN USE

In a bid to identify which Quality Improvement Programme was being applied within the organization, respondents were asked to tick in their opinion which programme was being applied. The results are represented in the table below.

**Table 4.3 Quality Improvement Program used within the organization**

		Frequency	Percent	Valid Percent	Cumulative Percent
<b>Valid</b>	Inspection	20	40.0	40.0	40.0
	Quality Control	7	14.0	14.0	54.0
	Quality Assurance	9	18.0	18.0	72.0
	Total Quality Management	14	28.0	28.0	100.0
	Total	50	100.0	100.0	

The table above shows that majority of the respondents representing 40% of responses received were of the opinion that Inspection was the most used program in the improvement of Quality within the organization. 14 in number representing 28% chose Total Quality management whereas Quality Assurance and Quality Control had a percentage of 18 and 14 respectively. Graphically it is represented below.



**Figure 4.2 Quality Improvement Program**



#### **4.4 QUALITY MANAGEMENT PRACTICES WITHIN THE OFFINSO MUNICIPAL ASSEMBLY**

Respondents in this study were required to grade in their opinion the degree to which quality management practices aided in project delivery. The Likert Scale used ranged from 1 to 5 where 1- Not Influential, 2- Barely influential, 3- Neutral, 4- Influential and 5- Highly Influential .

**Table 4.4 Ranking of Quality Management Practices**

<b>Factors</b>	<b>RII</b>	<b>Rank</b>
<b>Optimized material resource management practices</b>	0.784	1 <sup>st</sup>
<b>Quality culture</b>	0.756	2 <sup>nd</sup>
<b>Support and commitment from top management</b>	0.744	3 <sup>rd</sup>
<b>Quality system audits</b>	0.744	4 <sup>th</sup>
<b>Information and analysis</b>	0.736	5 <sup>th</sup>
<b>Support for site-based workers</b>	0.732	6 <sup>th</sup>
<b>Continuous improvement</b>	0.732	7 <sup>th</sup>
<b>Workmanship supervision</b>	0.732	8 <sup>th</sup>
<b>Skill enhancement and training</b>	0.728	9 <sup>th</sup>
<b>Adherence to ISO quality guidelines</b>	0.712	10 <sup>th</sup>
<b>Procedural adherence</b>	0.704	11 <sup>th</sup>
<b>Competence assurance practice</b>	0.7	12 <sup>th</sup>
<b>Specialist subcontractor system</b>	0.7	13 <sup>th</sup>
<b>Supplier quality management</b>	0.696	14 <sup>th</sup>
<b>Customer checklist satisfaction</b>	0.696	15 <sup>th</sup>
<b>Continuous improvement of procurement systems</b>	0.696	16 <sup>th</sup>
<b>Jobsite Quality plan</b>	0.692	17 <sup>th</sup>
<b>Proper material storage</b>	0.684	18 <sup>th</sup>
<b>Efficient facilities management</b>	0.684	19 <sup>th</sup>
<b>Custom-based design systems</b>	0.676	20 <sup>th</sup>

#### **4.4.1 FINDINGS**

From the results presented above, optimized material resource management practices was ranked the highest in the RII analysis. This goes to show that personnel of Offinso Municipal Assembly considered the optimization of material resource management as the most effective quality management practice. As materials wastage continues to be a problem for personnel in the construction industry, accounting for the loss of predictable proceeds from projects undertaken. To clients, materials waste leads to increased costs and a reduction in the quality of final products developed. From planning the quantities of materials to be used to the receipt of the materials, usage of the materials and turning them into final products. The production process in the construction industry demands and utilizes a lot of materials conversion in the entire process. It is therefore not so surprising for materials waste to be one of the leading causes of project overruns. Maintaining a quality

With an RII value of 0.756, the development of a Quality Culture was ranked 2<sup>nd</sup>. Respondents believed developing a quality culture integrated in every aspect of the organisational process. Establishing an organisational understanding of the necessity of integrating quality is a crucial step towards the attainment of organisational goals for client ultimate satisfaction. The practice of obtaining support and commitment from top management in the organisation was ranked the third most effective quality practice by respondents with an RII of 0.756. It is undeniable that the commitment and support from top management trickles down through the organisation. A such, when leadership shows enthusiasm in committing to the practices of quality in the organisational process, it is easily adopted and implemented. Quality system audits was ranked 3<sup>rd</sup> followed by information and analysis ranking the 4<sup>th</sup>. With RII's of 0.744 and 0.736 respectively. The practices receiving the lowest ranks were proper material storage, efficient facilities management

and custom-based design systems coming up with RII scores of 0.684, 0.684 and 0.646 respectively.

#### **4.4.2 DISCUSSION OF FIRST FIVE RANKED VARIABLES**

##### **4.4.2.1 Optimized material resource management practices**

Material resource management is crucial to quality management. Regardless, respondents deemed this factor the most influential driver of quality management. Optimizing materials resources implies making the best use of these materials in a way that minimizes waste and reduces cost (Clift, 1996). It also entails the selection of the right materials that meets specified quality. The materials must add to the durability and efficient functionality of the end product (Farooqui and Ahmed, 2009). These reasons may point to why respondents will ascribe greater significance to this quality management practice, resulting in an RII of 0.784.

##### **4.4.2.2 Quality culture**

Organisations that inculcate quality adherence into their culture do show a higher expression of quality in their products and or services. When quality adherence becomes a habit and a way of life, ensuring quality output becomes certain (Cheng and Liu, 2007). This lends to why respondents ranked this quality management practice second with an RII of 0.756. Culture denotes the way of life of a group. It denotes their belief systems, habits, inclinations, etc. Culture across all industries affects the way things are done and therefore what results are obtained. So if quality is to be achieved in construction, the culture adopted will play a major role (Cheng and Liu, 2007). It will define the awareness and the actions of all professionals involved. A quality culture creates an organizational atmosphere that prioritizes quality management. To consistently produce at a high quality level, the quality culture must be adopted and sustained.

#### **4.4.2.3 Support and commitment from top management**

Effective leadership and good quality management result in the company doing the right things (Battikha, 2002). Top management cannot be disconnected from the total quality management of the company (Juran, 1992). Within an appropriate organisational culture, management implements and monitors carefully policies set to ensure quality management to ensure the observance of its contents. Without managements' input in ensuring quality management, the likelihood of it achieving it is highly implausible. Respondents therefore ranked this third with an RII of 0.744.

#### **4.4.2.4 Quality system audits**

Record keeping and evaluation has always been a proven way of ensuring accountability and revision. Auditing quality systems allows for management to review quality management practices and effectiveness (Tang and Kam, 1999). Such review allows the revision of quality management practices in adopting or discarding certain aspect of these practices in order to improve upon it. This is a powerful way to keep alive the consciousness of the need to ensure quality. Respondents ranked this fourth on the list of influential factors affecting quality management. It obtained an RII score of 0.744. Auditing quality systems aids to identify loop holes where quality adherence practices were neglected and subsequently resolved.

#### **4.4.2.5 Information and analysis**

This was ranked fifth by respondents with RII of 0.736 as a major influence on quality management at the construction stage. In order to ensure effective quality management, there must available working information to enable its achievement (Shibani, 2010). This information

informs on what needs to be eliminated, adopted and incorporated, then what needs improvement. Analysis of such information will reveal essential.

#### **4.5 CHALLENGES OF IMPLEMENTING QUALITY MANAGEMENT PRACTICES WITHIN THE OFFINSO MUNICIPAL ASSEMBLY**

This section required respondents to indicate the level of influence the challenges presented affected the implementation of Quality Management Practices by most construction firms. The Likert scale used ranged from 1 to 5 represented as; 1- not at all challenging, 2- slightly challenging, 3- moderately challenging, 4- very challenging, 5- extremely challenging. The results are presented in Table 4.5

##### **4.5.1 FINDINGS**

As communication is the basis for the success of any organizational process, a breakdown in communication ultimately hinders the attainment of organizational goals. With an RII of 0.608, the lack of an effective communication process hinders the successful implementation of the Quality management practices. The second highest ranked challenge with an RII of 0.608 was the willingness to sacrifice quality for profits as seen with the many failed projects scattered across the country. It is almost unarguable the extent to which quality is forfeited to rake in more profits. By this principle, the process of ensuring quality is present in projects undertaken is almost non-existent as most professionals are looking to cut costs ignoring the future implications of possible deaths succeeding the use of the building. Furthermore, respondents were of the view that Bad attitudes and behaviour from staff prevented the successful implementation of quality management practice. In that, in as much as inculcating change into old processes maybe received with much resistance, an effort to adapt to this change positively

would go a long way in aiding organizational reforms. Attitudes of unyielding resistance to change only seek to create barriers in implementing quality management practices.

The factors receiving the least ranks were excess documentation required, ccurrent processes in tendering and bidding climate and the lack of human resources development (HRD) strategies with RII scores of 0.504, 0.50 and 0.488 respectively. These factors were seen by respondents not to hinder to a great extent the implementation of quality management practices within the organisation.

**Table 4.5 Challenges to the Implementation of Quality Management Practices**

<b>Challenges</b>	<b>RII</b>	<b>Rank</b>
<b>Lack of effective communication processes</b>	0.608	1 <sup>st</sup>
<b>Willingness to sacrifice quality for profits</b>	0.608	2 <sup>nd</sup>
<b>Bad attitudes and Behaviour</b>	0.596	3 <sup>rd</sup>
<b>Readiness to sacrifice quality for low bid</b>	0.588	4 <sup>th</sup>
<b>Weak development and deployment of policy and strategy</b>	0.584	5 <sup>th</sup>
<b>Lack of statistical quality control techniques</b>	0.564	6 <sup>th</sup>
<b>Lack of employee commitment to quality management</b>	0.556	7 <sup>th</sup>
<b>Lack of Skilled Expertise</b>	0.552	8 <sup>th</sup>
<b>No developed standardized procedures</b>	0.552	9 <sup>th</sup>
<b>Lack of Management Commitment</b>	0.544	10 <sup>th</sup>
<b>Time and cost of implementing quality management</b>	0.544	11 <sup>th</sup>
<b>Insufficient supervision in Quality management</b>	0.54	12 <sup>th</sup>
<b>Perception that quality management is for manufacturing industry only</b>	0.532	13 <sup>th</sup>
<b>Difficulties in mapping processes</b>	0.528	14 <sup>th</sup>
<b>Lack of expertise and resources required for quality management</b>	0.52	15 <sup>th</sup>
<b>Changing trends in procurement system</b>	0.512	16 <sup>th</sup>

<b>Perception that too much paper work is required for quality management</b>	0.512	17 <sup>th</sup>
<b>Excess Documentation required</b>	0.504	18 <sup>th</sup>
<b>Current processes in tendering and bidding climate</b>	0.5	19 <sup>th</sup>
<b>Lack of human resources development (HRD) strategies</b>	0.488	20 <sup>th</sup>

## **4.5.2 DISCUSSION OF FIRST FIVE RANKED VARIABLES**

### **4.5.2.1 Lack of effective communication processes**

Respondents ranked this first with an RII of 0.608. Poor communication can be a major barrier in almost all spheres of life. It certainly plays a challenge in quality management even at the construction stage (Cachadinha, 2009). Lack of or poor communication between the various professionals, from the client to the consultant, from the consultant to the contractor among others instances, can militate against quality assurance. Misinterpretation, unreasonable assumptions, unclear information, all these will affect the ability of the construction team to ensure quality.

### **4.5.2.2 Willingness to sacrifice quality for profits**

There is this trade-off between quality and profits in construction. Achieving quality comes at a higher cost which includes cutting back on materials, using cheaper and lower quality materials among others (Crosby, 1979). It is obvious how this can be a major barrier to quality management. This is a challenge especially in this part of the world where quality is not prioritized on most projects in order to make more profits. Intense competition causes some bidders to underbid in order to win a contract. In the end, quality has to be sacrificed in order for such underbidding contractors to make some profits in the end (Bennett, 2003). This challenge was ranked second by respondents with an RII of 0.608.



#### **4.5.2.3 Bad attitudes and Behaviour**

Within the service industry, bad attitudes and behavior is a major causal correlation with customer dissatisfaction and customer loss (Cachadinha, 2009).. Respondents ranked this second with an RII of 0.596. Construction is both a product-oriented and service-oriented industry. The entire process of executing a project involves the communication and interaction of people. This creates the avenue for attitude to be a problem. A good attitude toward the client and even amongst the various professionals is a key element in quality service delivery. It enhances rapport, effective communication, exchange and effective inter-personal relations.

#### **4.5.2.4 Readiness to sacrifice quality for low bid**

It is a well-known practice among contractors to strategically cut back the price quotation when bidding for contracts in order to increase their odds of winning (Crosby, 1979). Having established this trade-off between quality and cost previously, a lower price quotation on bids may imply a sacrifice of quality in material, in procedure, in labour etc. As competition over limited projects increases, the more this practice becomes a commonplace. This challenge was ranked fourth by respondents with an RII of 0.588.

#### **4.5.2.5 Weak development and deployment of policy and strategy**

Respondents ranked this fifth with an RII of 0.584. Policies and strategies set by the leadership and management are supposed to guide achievement of quality in product and services. However, in some organizations, these strategies and policies are ineffectively executed. In others, they are neglected. Some organizations have no created policy and strategy to enable them ensure quality management (Chindo and Adogbo, 2011). No such existing policies or the poor execution of these policies can lead to quality management. In the construction stage of a project, with no guiding policy or strategy from the contractor or consultant on how to ensure

quality management, achieving quality will be a matter of coincidence. In order to guide operations and activities toward managing quality and ensuring that this aspect of construction is achieved, there must guiding policies and strategies to regulate it.

#### **4.6 STRATEGIES FOR IMPROVING QUALITY MANAGEMENT PRACTICES WITHIN THE OFFINSO MUNICIPAL ASSEMBLY**

Respondents were inquired in this section to identify in their opinion the strategies for improving the Quality management practices of organizations using a 5- point Likert scale where 1- not at all significant, 2- slightly significant, 3- moderately significant, 4- very significant and 5- extremely significant.

Following the analysis of the data collected using the RII, the following scores and corresponding ranks are represented in the RII ranked table, Table 4.6.

**Table 4.6 Strategies for Improving Quality Management Practices**

<b>Strategies</b>	<b>RII</b>	<b>Rank</b>
<b>Provide training</b>	0.788	1 <sup>st</sup>
<b>Organize to reach goals</b>	0.764	2 <sup>nd</sup>
<b>Report progress</b>	0.764	3 <sup>rd</sup>
<b>Experimenting to improve an operation or work process</b>	0.752	4 <sup>th</sup>
<b>Set-goals for improvement</b>	0.748	5 <sup>th</sup>
<b>Communicate results</b>	0.74	6 <sup>th</sup>
<b>Preventing the occurrence or recurrence of a problem</b>	0.74	7 <sup>th</sup>
<b>Upgrading machines, methods and techniques</b>	0.74	8 <sup>th</sup>
<b>Comparing results against quality objectives</b>	0.736	9 <sup>th</sup>
<b>Delegating managerial activities and increasing employee involvement</b>	0.732	10 <sup>th</sup>
<b>Developing plans of daily routine work</b>	0.728	11 <sup>th</sup>
<b>Carry out projects to solve problems</b>	0.72	12 <sup>th</sup>
<b>Responding to an immediate problem</b>	0.72	13 <sup>th</sup>
<b>Cost control techniques for activities and process</b>	0.72	14 <sup>th</sup>
<b>Developing an attitude of “Doing things right the first time”</b>	0.696	15 <sup>th</sup>
<b>Creating a new opportunity to anticipate the developing needs of a customer</b>	0.692	16 <sup>th</sup>
<b>Maintain momentum by making annual improvement part of the regular systems and processes of the company</b>	0.688	17 <sup>th</sup>
<b>Give recognition</b>	0.644	18 <sup>th</sup>
<b>Keep score</b>	0.632	19 <sup>th</sup>
<b>Build awareness of opportunity to improve</b>	0.628	20 <sup>th</sup>

#### **4.6.1 FINDINGS**

The highest ranked strategy was the provision of training which goes hand in hand with education. Respondents were of the opinion that providing training to staff within the organization is the key to implementing and improving Quality within the organization. It ranked

1<sup>st</sup> with a score of 0.788. 2<sup>nd</sup> on the ranked scores was the organizing to reach set goal and milestones. This impacts on the delivery of projects to laid down schedules and plans and avoid delays in project delivery. The third highest ranked score was the strategy on reporting progress. This ranked 3<sup>rd</sup> with a score of 0.764. Progress reports serves as a good monitoring and control tool needed in the management of quality within the firm.

The least ranked were; the giving of recognition, keeping scores and building awareness of opportunities to improve receiving ranks of 0.644, 0.632 and 0.628.

## **4.6.2 DISCUSSION OF FIRST FIVE RANKED VARIABLES**

### **4.6.2.1 Provide training**

Respondents found this the most significant strategy in improving quality management at the construction stage. It ranked first with an RII of 0.788. Training professionals by creating an awareness of the need of quality management and be equipping them with the tools and skills needed to ensure quality management will great affect the assurance of quality even at the construction stage (Shibani, 2010). Training top management and leaders in effective policy making and strategy planning and immediate execution will be a great step toward quality management. Further enhancing the skills of professionals, increasing their capacity and ability enables them perform better at what the task (Savido et al, 1992). This move ensures that quality in service delivery and project execution is adhered to.

### **4.6.2.2 Organize to reach goals**

This strategy adds to the previous one discussed. In policy making and strategic planning, specific goals must be set that will serve as a yardstick and a mark to measure quality as a way of ensuring quality management (Wong and Fung, 1999). Without definite goals on what is expected to be achieved in the course of construction, an undesired product may likely be

produced. The consultants must set definite goals and specific criteria that must be met. Goals must be defined for the materials used, the quality and criteria they must meet, time deadlines, qualification of professionals etc. This strategy to improving quality management was ranked second with an RII of 0.764.

#### **4.6.2.3 Report progress**

Regular assessment of work must be conducted. Progress report not only informs on work done so far, but it also informs through critical analysis which aspects need improving especially on subsequent projects (Bennett, 2003). Regular reporting of progress was ranked third by respondents with an RII of 0.764. These reports provide data which serves as the basis for determining what is working and what needs improvement on. Progress reports also enables one to observe if initial plans are being adhered to or otherwise (Ayedun et al, 2012). Regular reports let the consultant know on the state of and proceeding on site. This ensures contractors are held accountable to follow the consultant's directives. This ensures that quality is achieved.

#### **4.6.2.4 Experimenting to improve an operation or work process**

This was ranked fourth with an RII of 0.752. In organizations, the way to improve is to identify what works and what doesn't work and using the resulting data to make necessary adjustments, particularly, to what doesn't work in order to improve upon it. Approaches to construction can be explored to find the most efficient way of undertaking a work activity in a way that guarantee quality. Studies can be conducted on systems and procedures used elsewhere that produce results in order to implement them for same effect. Several work activities are currently inefficiently, wasting time, resources, and money (Ayedun et al, 2012). These activities can be improved upon. By searching for more efficient ways and implementing them to assess their viability,

there is a likely chance of finding a working system, procedure, or approach that enhances speed, reduces cost, and minimizes waste.

#### **4.6.2.5 Set-goals for improvement**

This relates to the previous strategy discussed on organizing to reach set goals. Goal-setting is an important activity to the construction process because it almost invariably ensures that these set objectives are achieved (Abdel-Razek, et al, 2007). The chances of success increases when goal are set. This strategy was ranked fifth with an RII of 0.748. Definite goals must be set for each aspect of the construction process including the components of construction. There must be goals to be met by materials used with regards to their durability, functionality, and even cost (Ashokkumar, 2014). Goals set should also pertain to ways of improving operations and work activity. Continuous improvement is at the heart of the Japanese technological revolution. Kaizen, their principle of small continual improvement, over several decades has made them one of the leaders in technology in the modern world (Chan, 1996). This kaizen principle if applied to construction will go extensively to guarantee quality of the ultimate completed project.

## **CHAPTER FIVE**

### **CONCLUSION AND RECOMMENDATIONS**

#### **5.1 INTRODUCTION**

The previous chapters of this study were the introduction, literature review, methodology and findings respectively. This Chapter outlines the discoveries of the research established on the information gathered and analyzed. Furthermore, the research provides recommendations for future work.

#### **5.2 ACHIEVEMENT OF RESEARCH OBJECTIVES**

##### **5.2.1 Quality Management Practices of the Offinso Municipal Assembly**

Data collected was analysed using SPSS and the RII ranking method was used in obtaining the practices most pertinent to the staff of Offinso Municipal Assembly in the improvement of Quality management. They were identified to be optimized material resource management practices, quality culture, support and commitment from top management, quality system audits and information and analysis

##### **5.2.2 Challenges to the Implementation of Quality Management Practices within the Offinso Municipality**

Data collected and ranked using the RII ranking technique revealed the challenges that were faced by the organization in the implementation of Quality Management Practices. The findings of the study identified key challenges faced by the organization to be lack of effective communication processes, willingness to sacrifice quality for profits, bad attitudes and behaviour, readiness to sacrifice quality for low bid and the weak development and deployment of policy and strategy.

### **5.2.3 Strategies for Improving Quality Management Practices in the Offinso Municipal Assembly**

Respondents were asked to rank strategies in their opinion improved quality management practices in the Offinso Municipal Assembly. The data was collected and analyzed using the RII rank technique. Strategies identified in implementing transparency practices includes providing training, organizing to reach goals, report progress, experimenting to improve an operation or work process and set-goals for improvement

## **5.3 RECOMMENDATIONS**

Following the literature reviewed and the objectives identified for the study as well as the survey performed, the following recommendations were drawn from the study.

- As much as possible, there should be an optimized material resource management practice to reduce the incidence of waste on the various projects carried out by the organization.
- Additionally, a Culture of Quality should be imbibed in the personnel of the organization if the implementation of Quality management practices is to be successful
- Support and commitment from top management is crucial to the implementation of quality and should be encouraged as such
- Training and education of personnel on the importance and use of quality management practices should be made available for the personnel regularly.
- Achievable goals and milestones should be set and persons assigned to such tasks closely monitored to ensure goals achieved and products resulting from these goals are of



ultimate quality. This would additionally aid in the proper scheduling of activities and resources to meet the demands.

- Regular and periodic progress on tasks assigned to individuals should be made available and should conform with the actual progress of works to allow for proper monitoring and control practices in quality management.

#### **5.4 RECOMMENDATIONS FOR FURTHER RESEARCH**

- This study focused on the quality management practices at the Offinso Municipal Assembly and hence further studies should be conducted on other Municipalities to ascertain the root causes of poor quality in project delivery within the Ghanaian Construction Industry

#### **5.5 CONCLUSION**

Spanning worldwide, quality management practices are gradually being assimilated into development organizations. However, its reception and usage by Ghanaian development organizations is somewhat moderate, even with regards to the Offinso Municipal Assembly. In light of this, the aim of this study was to assess the quality management practices in construction project delivery at the construction stage with Offinso Municipal Assembly as a case study.

Well-structured questionnaire was developed through adequate and in-depth review of extant literature. The entire study adopted the quantitative approach to research, and data gathered was analyzed using the Relative Importance Index. The findings and conclusions from this study,

however, are considered in the light of the limitations of the study, methodology used and the analysis adopted.

The research objectives of this study outlined at the beginning of this study have been fully achieved under consideration of the stated scope and boundary. This thesis adds to and contributes to the body of knowledge. The recommendations suggested by this study is hoped to contribute to the organizations in their pursuit of quality management. Finally, the finding suggested in this study have the potential to improve quality management practices in Ghana and thus must be given adequate attention.

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**APPENDIX**  
**QUESTIONNAIRE SURVEY**

**ASSESSMENT OF QUALITY MANAGEMENT PRACTICES AT THE  
CONSTRUCTION STAGE OF PROJECTS UNDERTAKEN BY MUNICIPAL  
ASSEMBLIES: A CASE OF OFFINSO MUNICIPAL ASSEMBLY**

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI**

**COLLEGE OF ART AND BUILT ENVIRONMENT**

**Department of Building Technology**

(MSc. Construction Management)

Dear Sir/Madam

Many thanks for your participation. This questionnaire survey aims to assess of Quality Management Practices at the Construction Stage of Projects undertaken by Municipal Assemblies: A Case of Offinso Municipal Assembly. Please fill in the questionnaire using the instructions, which will only take you about 10 to 15 minutes. Please take note that all the information you provide is anonymous and will only be used for academic purpose. Thank you once again for your valuable time. If you have any queries, please feel free to contact:

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## SECTION A

### DEMOGRAPHIC DATA

This section contains a list of questions geared towards obtaining information on the background of respondents chosen for the study. Please answer the following questions by ticking the response boxes.

1. What job position do you occupy in the organisation?
  - ☐ Quality assurance manager
  - ☐ Project Manager
  - ☐ Engineer
  - ☐ Architect
  - ☐ Quantity Surveyor
  - ☐ Supervisor
  - Other (please specify) .....
2. What is your level of education or professional qualification?
  - ☐ Masters degree or higher
  - ☐ First Degree
  - ☐ HND/ Diploma
  - ☐ Technician (CTC I, CTC II, CTC III)
3. How many years of working experience do you have in the industry?
  - ☐ Less than 5 years
  - ☐ 6 to 10 years
  - ☐ 11 to 15 years
  - ☐ Above 16 years

4. Which of these Quality Improvement Programme is normally used in your organisation?

Item	Quality Management Programme	Tick
1	Inspection	
2	Quality Control	
3	Quality Assurance	
4	Total Quality Management	

## SECTION B

### QUALITY MANAGEMENT PRACTICES WITHIN THE OFFINSO MUNICIPAL ASSEMBLY

Below are some Quality management practices identified from literature. In your experience, indicate on the 5-point Likert Scale where; **1- Not Influential, 2- Barely influential, 3- Neutral, 4- Influential, 5- Highly Influential** the degree at which these quality management practices help in project delivery by ticking the appropriate boxes

No.	PRACTICES	Levels of Influence				
		1	2	3	4	5
1	Support and commitment from top management					
2	Quality culture					
3	Supplier quality management					
4	Skill enhancement and training					
5	Jobsite Quality plan					
6	Information and analysis					
7	Customer checklist satisfaction					
8	Competence assurance practice					
9	Support for site-based workers					
10	Continuous improvement					
11	Procedural adherence					
12	Proper material storage					

13	Workmanship supervision					
14	Efficient facilities management					
15	Specialist subcontractor system					
16	Adherence to ISO quality guidelines					
17	Continuous improvement of procurement systems					
18	Custom-based design systems					
19	Quality system audits					
20	Optimized material resource management practices					

## SECTION C

### CHALLENGES OF IMPLEMENTING QUALITY MANAGEMENT PRACTICES WITHIN THE OFFINSO MUNICIPAL ASSEMBLY

In your experience, indicate the level of influence of each challenge to the implementation of Quality Management Practices by construction firms by ticking the appropriate boxes. On this 5-point Likert Scale *1- not at all challenging, 2- slightly challenging, 3- moderately challenging, 4- very challenging, 5- extremely challenging*

No.	CHALLENGES	Levels of Influence				
		1	2	3	4	5
1	Lack of Management Commitment					
2	Excess Documentation required					
3	Current processes in tendering and bidding climate					
4	Lack of effective communication processes					
5	Lack of Skilled Expertise					
6	Difficulties in mapping processes					
7	No developed standardized procedures					
8	Lack of statistical quality control techniques					
9	Bad attitudes and Behaviour					
10	Insufficient supervision in Quality management					
11	Weak development and deployment of policy and strategy					



12	Lack of expertise and resources required for quality management					
13	Lack of employee commitment to quality management					
14	Lack of human resources development (HRD) strategies					
15	Willingness to sacrifice quality for profits					
16	Readiness to sacrifice quality for low bid					
17	Time and cost of implementing quality management					
18	Changing trends in procurement system					
19	Perception that quality management is for manufacturing industry only					
20	Perception that too much paper work is required for quality management					

## SECTION D

### STRATEGIES FOR IMPROVING QUALITY MANAGEMENT PRACTICES WITHIN THE OFFINSO MUNICIPAL ASSEMBLY

In your experience, kindly rate the following strategies identified, that can aid in improving the Quality Management Practices of construction firms by ticking the appropriate boxes on this 5-point Likert Scale where; *1- not at all significant, 2- slightly significant, 3- moderately significant, 4- very significant, 5- extremely significant*

No.	STRATEGIES	Levels of Influence				
		1	2	3	4	5
1	Build awareness of opportunity to improve					
2	Set-goals for improvement					
3	Organize to reach goals					
4	Provide training					
5	Carry out projects to solve problems					
6	Report progress					
7	Give recognition					
8	Communicate results					
9	Keep score					
10	Maintain momentum by making annual improvement part of the regular systems and processes of the company					
11	Preventing the occurrence or recurrence of a problem					

12	Upgrading machines, methods and techniques					
13	Experimenting to improve an operation or work process					
14	Creating a new opportunity to anticipate the developing needs of a customer					
15	Responding to an immediate problem					
16	Developing plans of daily routine work					
17	Comparing results against quality objectives					
18	Cost control techniques for activities and process					
19	Developing an attitude of “Doing things right the first time”					
20	Delegating managerial activities and increasing employee involvement					