

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**COLLEGE OF ARCHITECTURE AND PLANNING**

**DEPARTMENT OF BUILDING TECHNOLOGY**

**KNUST**  
**QUALITY MANAGEMENT PRACTICES OF BUILDING**  
**CONSTRUCTION FIRMS IN GHANA**

**BY**

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**A THESIS SUBMITTED TO THE DEPARTMENT OF BUILDING TECHNOLOGY IN**  
**PARTIAL FULFILMENT OF THE REQUIREMENT OF THE MASTER OF SCIENCE**  
**IN CONSTRUCTION MANAGEMENT**

**June, 2014**

## DECLARATION

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

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## ABSTRACT

The construction industry has been heavily criticized in recent times for its performance and productivity in relation to other industries. With the turn of time, it appears that the construction industry is going through an intense period of introspection, which is worsened by increased technological and social change. These changes are altering the tempo of the environment within which construction operates. Besides, such changes significantly affect the way business is conducted. Many of the management practices used to support construction organizations are being challenged. The industry's clients are moving forward and demanding improved quality service, faster project delivery and innovations in technology. It is no accident that the construction industry has turned to the manufacturing sector as a point of reference and source of innovation. Quality Management has increasingly been adopted by construction companies as an initiative to solve quality problems and to meet the needs of the final customer. This research therefore aims at evaluating the Quality Management Practices of Ghanaian Contractors with emphases on D1 K1 contractors registered with the Ghana Cocoa Board and to achieve this aim, three specific objectives were set for the study and they are; to determine whether Ghanaian contractors are committed to Quality Management Planning in the delivery of construction projects; to determine the challenges encountered by contractors while implementing quality assurance during the execution of projects and proposing measures for effective quality assurance practice.

The study was situated in the positivist paradigm which enabled the researcher to make an objective analysis. This stance facilitated the researcher to use the quantitative research strategy and also questionnaire survey as the main data collection instrument for soliciting information from construction firms registered with the Ghana Cocoa Board. It was found out that while most

respondents were familiar with quality management practices; its application was relatively low. Several authors also pointed out that most of the hindrances to the application of quality management practices is the lack of information in the area. Further to this, it came to light that the potential barriers to the attainment of project quality among construction firm are: lack of effective Supervision, lack of effective Communication, lack of Management's Commitment to Quality Assurance, lack of Proper Equipment available for use and lack of a Quality Assurance Team to lead the process. More importantly, in curbing the above mentioned potential barriers the study revealed the following as measures for effective quality management practices, namely: Management Commitment, Communication between Managers and Employees, Employee Involvement, Detailed and Logical Work Program, Regular Inspection and Audit of Quality Report, Training and Education of Team Members and Review/Analysis. Substantial evidence again in literature suggests that construction problems relating to Ghana are similar to the situations in many African and some Asian countries.

The research therefore recommended that construction companies should create a flexible and conducive organizational atmosphere which encourages the development of quality management practices in all aspect of their work. Further, construction firms should be encouraged to apply quality management techniques during the execution of project and engage/include personnel in charge of Quality as part of an integrated team in the Project Management and Delivery process. In addition, training programs and refresher courses in Quality Management should be instituted among construction firms to broaden the knowledge of their employees in this regard and also enhance timely delivery of projects.

**Keywords:** Construction industry, Construction project, Quality Management, Practices.

## ACKNOWLEDGEMENT

My first and foremost thanks go to God Almighty, the foundation of life and the fountain of all knowledge; indeed He has been gracious to me throughout my life and I am very grateful to Him.

My sincere gratitude and appreciation also goes to my supervisor, **Hon. Joe Hackman**, for his priceless guidance and constructive criticisms in the successful completion of this thesis. You have not only been a lecturer and a supervisor but also my mentor.

I express my appreciation to all my friends especially **Mallam Issah Issahaku** and **Ernest Kissi** for their moral support and encouragement any time the going was tough.

To my beloved parents, who have devoted their energies in making me who I am today, their courage and love has enabled me undertake this course I say God richly bless you. To my siblings, I love you more than you can ever imagine and I am most grateful for your prayers and encouragement.

To all the above, I express my deep appreciation and God Bless you all.

## DEDICATION

This work is dedicated to my beloved wife; **Mrs. EVELYN MANNA AGBENYEGA** and  
cherished children; **SEFAM** and **SELIKEM AGBENYEGA**

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# **CHAPTER ONE**

## **GENERAL INTRODUCTION**

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

The concept of quality management is to ensure efforts to achieve the required level of quality for a product which is well planned and organized. From the perspective of a construction company, quality management in construction projects should mean maintaining the quality of construction works at the required standard so as to obtain customers' satisfaction that would bring long term competitiveness and business survival for the companies (Tan & Abdul-Rahman, 2005). Further to this, Olatunji et al (2012) also reiterated that the term quality management as used in the construction industry is all encompassing and embedded in the phenomenon itself and are concepts such as quality control, quality assurance, quality improvement, quality standards etc. The authors revealed that the earliest form of formal quality management practices in construction can be traced back to ancient Greece and Rome. In addition to the aforementioned, Harris and McCaffer, (2001) opined that quality management practices include all the means employed by managers in an effort to implement their quality policies. These activities include quality planning, quality control, quality assurance and quality improvement.

Construction quality according to Battikha, (2002) is a critical factor in determining project acceptance and resultant contractual payment levels. This has made participants in the construction industry to become notably conscious of the role of quality as an essential means to achieve client satisfaction and gaining competitive advantage in the industry. It was revealed that

acceptable quality levels in construction have long been a problem in attaining on time and within budget projects in a highly dynamic, complex, and competitive environment.

Kanji & Wong, (1998) as cited in Hoonakker (2006, p.1) advanced the view that Quality management has increasingly been adopted by construction companies as an initiative to solve quality problems and to meet the needs of the final customer. As suggested by Oakland and Aldridge (1995, p.1) cited by Hoonakker et al (2010, p.953) 'if ever an industry needed to take up the concept of Total Quality Management it is the construction industry'.

Quality has remained in the forefront amongst factors used to determine the degree of success or failure of a project. This long term development has made it imperative for all parties involved in construction projects to strive at all times to produce commendable structures (Feigenbaum, 1993).

Naoum, (1994) cited in Olatunji et al (2012) indicated that performance on a global level represents results of activities undertaken. He proceeded further to explain that performance of a project is measured as its ability to deliver the building or structure at the right time, cost and quality as well as achieving a high level of client satisfaction. It therefore stands to reason that quality performance in construction is results oriented and seeks evidence of quality awareness within the operations and output of a building/construction team. Quality performance is also defined over the long term for the effect to be permanent Yasamis et al (2002). In other words, quality performance improvements are expected to increase the productivity and profitability of contractors as well as increasing client satisfaction.

## 1.2 STATEMENT OF PROBLEM

With inefficient or nonexistent quality management procedures, significant expenditures of time, money, and resources are wasted on construction projects (Rounds and Chi, 1985) cited in (Battikha, 2002). In addition, the lack of quality due to deficient construction quality management is detected through nonconformance to established requirements. In construction, non-conformance occurs when the finished state of a project and its components deviates from the established requirements. Quality-related problems during construction can be projected on the operating life of the finished project. To a contractor, nonconformance can yield penalties as well as cost time burdens for re-work, which can convert into productivity loss (Battikha, 2000a).

During the last fifty years the construction industry has been heavily criticized for its performance and productivity in relation to other industries. With the turn of the new millennium, it appears that the construction industry is going through an intense period of introspection which is exacerbated by increased technological and social change. These changes are altering the tempo of the environment within which construction operates. Loushine et al (2006). In a related study, Oyegbile et al (2012) revealed that over the last 10 years, the incidence of building collapse in Nigeria has become so alarming and does not show any sign of abating. A Graphic online (2013) report also states that a section of the Methodist Church building under construction at Sakaman, a suburb of Accra had collapsed. Subsequently, a two storey building was also reported to have collapsed at “Asene Dzornshie” near Old Accra or Bukom Square, while another three-storey structure also collapsed in the Ashanti Regional town of Obuasi (ghanaweb, 2013). In a similar manner The Chronicle (2012) reported the collapse of the entire verandah of a two-storey building at Krofrom, a suburb of Kumasi. The (GBN, 2013) also



reported the collapse of a two-storey building under construction at Antwirifu, near Dormaa-Ahenkro, in Brong Ahafo Region.

A Structural Engineer at the Ghana Institution of Engineers (GIE), Dr Desmond Aryee-Boi, has attributed the collapse of the Melcom Shopping Mall on the Achimota road to the lack of supervision and the use of substandard materials (Ghana.gov.gh, 2013). Similarly it was discovered that the possible causes of the collapse of the six-storey melcom building is largely due to the inferior quality of materials used in construction. (myjoyonline, 2012). In a related development Osei Assibey (2005) found that a lot of concern has arisen over the quality of construction projects being executed at the district level in Ghana, similarly in Bangladesh a Government investigation has established that extremely poor quality construction materials coupled with series of violations caused the collapse of a garment factory building now regarded as the worst garment-industry disaster in history (The journal, 2013).

The aforementioned study and reports clearly demonstrates the value of Quality on the performance of a building/structure. It is against this background that this study seeks to identify the effect of quality on the performance of a project and offer some recommendations where appropriate.



### **1.3 DISSERTATION QUESTIONS**

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

- Do Ghanaian Building Contractors commit themselves to Quality management Plans during the execution of projects to deliver structurally sound buildings?
- Do Ghanaian Contractors encounter challenges in their effort to adhere to Quality Assurance during execution of projects?
- Does Quality Assurance have any bearing on the durability of completed Buildings?

### **1.4 AIM OF STUDY**

The aim of this study is to evaluate the Quality Management Practices of Ghanaian Contractors with emphases on D1 K1 contractors registered with the Ghana Cocoa Board.

### **1.5 OBJECTIVES OF STUDY**

The objectives of this dissertation are;

- To determine whether Ghanaian contractors are committed to Quality Management Planning in the delivery of construction projects
- To determine the challenges encountered by contractors while implementing Quality Assurance during the execution of projects.
- Proposing measures for effective quality assurance practice

## **1.6 SIGNIFICANCE OF STUDY**

This study is of value to Building Contractors who wish to know the impact an effective Quality Management Practice with particular focus on Quality Assurance would have on their deliveries. It will also attempt to reveal how Quality Assurance is used in project procurement in the Ghanaian construction industry.

## **1.7 SCOPE OF STUDY**

The dissertation intends to assess the Quality Management Practices of Ghanaian Building Contractors with the focus limited to the Class D1 K1 contractors in Accra registered with the Ghana Cocoa Board, located in the Greater Accra Region of Ghana.

## **1.8 DISSERTATION METHODOLOGY**

The research hypothesis and question require a general overview of the current Quality Management Practices of Ghanaian Contractors with emphases on the Quality Assurance. The study will demand that the researcher collect both primary and secondary data for assessment and analysis. The primary data will adopt a combination of descriptive (quantitative) and exploratory (qualitative research) survey methods, involving a three-stage data-gathering approach. At the first stage, quantitative and qualitative research approach (mixed method) involve the use of surveys and non-standardised interview to determine the Quality Management Practices adopted by Class D1 K1 Building Contractors in Accra registered with the Ghana Cocoa Board (GCB). The mixed method survey will be conducted among fifteen (15) Contractors in Accra registered with the GCB to determine how the Quality Management Practices with emphases on Quality Assurance practices are employed during the execution of projects. The second stage of the study will take a qualitative approach; an exploratory study will

be conducted to determine and understand the specific challenges encountered when conducting Quality Assurance while executing projects in Accra. The essence of this approach is to find data solely based on contractor's view.

The secondary source of data to be used will be collected and critically evaluated from relevant literature, databases, and internet sources to examine the theoretical bases of the knowledge level of Quality Management Practices with emphases on Quality Assurance. The third stage will take the quantitative approach: this involves descriptive study by using ideas generated at the exploratory survey stage in designing questionnaires.

For the quantitative approach, the researcher intends to use the Statistical Package for the Social Science (SPSS). These involve the use of independent sample t-test, cross tabulation analysis and mean score analysis.

In other words, the proposed methodologies that would be employed in this dissertation include the following;

- Structured Interviews
- Internet Sources
- Library Search
- Questionnaires, Surveys and Checklists
- Observations (Physical Survey) and Photographs where necessary

### **1.8.1. Structured Interviews**

This method would be adopted to enable one to fully understand stakeholder's impression about the aforementioned topic.

### **1.8.2. Internet Sources**

To match up with the global trend of technological advancement, the writer intends sourcing/searching information on the internet. This would enable him have broader knowledge of the topic in general.

### **1.8.3. Library Search**

The writer intends visiting the library to carry out an in-depth study of already published data relating to the topic at hand. This would include books, journals, published and unpublished student's dissertations and other relevant articles of interest.

### **1.8.4. Questionnaires, Surveys and Checklist**

Well-structured questionnaires will be prepared and sent out to stakeholders such as Class D1 K1 Building Contractors registered with the Ghana Cocoa Board in Accra to get quick and accurate information. This would be carried out in a non-threatening way.

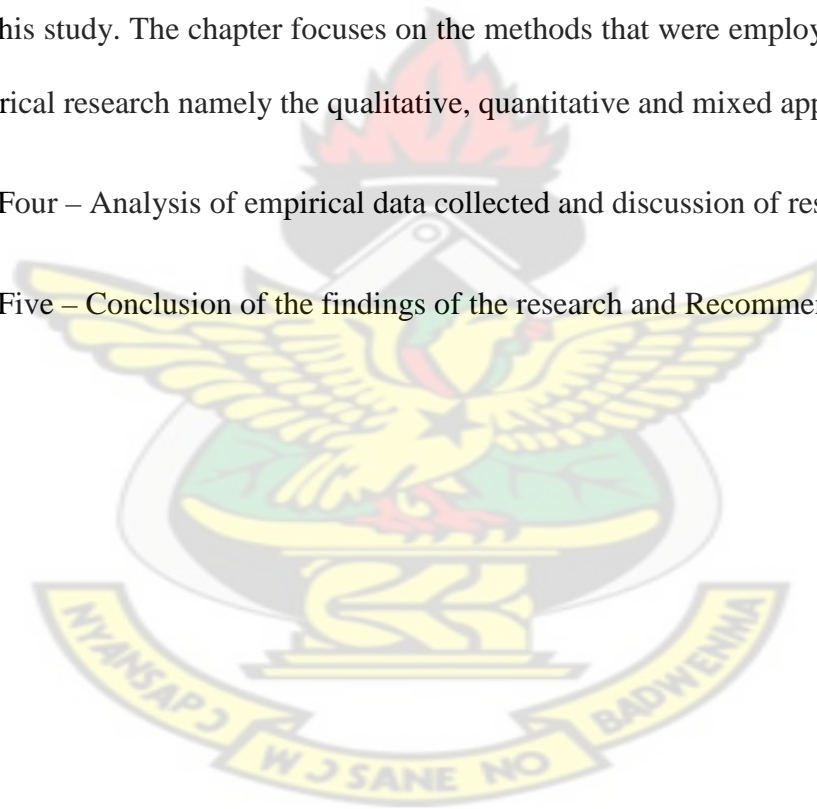
### **1.8.5. Observations**

A physical survey of the project sites located in the jurisdiction of study will be conducted. It shall be by visual inspection and taking of photograph with a digital camera.

## 1.9 ORGANISATION OF THE STUDY

The report is presented in a five chapter document. Details of these chapters are as follows:

- Chapter One - General introduction and background of study
- Chapter Two - Review of existing literature on quality management practices in construction.
- Chapter Three – Methodology – This will entail a description of the research method used in this study. The chapter focuses on the methods that were employed in conducting the empirical research namely the qualitative, quantitative and mixed approaches.
- Chapter Four – Analysis of empirical data collected and discussion of results.
- Chapter Five – Conclusion of the findings of the research and Recommendations.



# **CHAPTER TWO**

## **LITERATURE REVIEW**

### **2.1 INTRODUCTION**

This chapter presents a literature review for the research. Relevant literature on quality management is discussed, the concepts of quality and quality management are explored and the tools and techniques used in quality management in the construction projects are examined.

### **2.2 OVERVIEW OF QUALITY MANAGEMENT**

Quality is one of the aims of standardization. The quality of a product or a complete building or other constructions is the totality of its attributes that enable it to perform a stated task or to fulfill a given need satisfactorily for an acceptable period of time. For a building and civil engineering work, a satisfactory product, although essential in itself, is not on its own sufficient. It must be incorporated in the design and construction in a correct manner. In buildings, more defects and failures arise from inadequacies in the treatment of products in design and construction than from shortcomings in the products themselves (Atkinson, 2005). In their work, Harris et al (2006) stated that Quality Management has seen a transition from reacting to the outcome of site production activities to becoming a strategic business function accounting for the raison d'être of construction companies. Unless a construction company can guarantee its clients a quality product, it cannot compete effectively in the modern construction market.



### **2.3 THE CONCEPT OF QUALITY MANAGEMENT**

The concept of quality has existed for many years, but its meaning has changed and evolved over time. Before the early twentieth century, quality management meant inspecting products to ensure that they met specifications (Reid and Sanders, 2007 cited in Sabah 2011). This is evident in the Egyptian wall painting circa of 1450BC which showed evidence of measurement. Stones used in the pyramids which were cut so well that a knife could not go between them (Evans and Lindsay, 2008 cited in Sabah 2011). According to (Reid and Sanders, 2007 cited in Sabah 2011) around 1940s, during World War II, quality became more statistical in nature. Statistical sampling techniques were used to evaluate quality, and quality control charts were used to monitor the production process. In the 1960s, with the help of so-called “quality gurus,” the concept took on a broader meaning. Quality began to be viewed as something that encompassed the entire organization, not only the production process. All functions were responsible for product quality and shared the costs of poor quality. However, in the 1970s and 1980s many U.S. industries had to make changes to their quality policies when they lost market share to foreign competition particularly in the auto industry. Many hired consultants and instituted quality training programs for their employees (Reid and Sanders, 2007 cited in Sabah 2011).

Hoonakker, (2006) established in his study that many of the management practices used to support construction organizations are being challenged. The industry’s clients are moving forward. Clients demand improved service quality, faster buildings and innovations in technology. In Kaufmann and Wiltchko, (2006), Quality Management Concept is said to be structured in general according to the “International Organization for Standardization” ISO



9000-series and the “Plan, Do, Check, Act” PDCA-cycle. It further illustrated the two main structures stated above as follows;

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

- **Quality planning** is focused on setting quality objectives and specifying necessary operational processes and related resources to fulfill the quality objectives
- **Quality control** is focused on fulfilling quality requirements
- **Quality assurance** is focused on providing confidence that quality requirements will be fulfilled
- **Quality improvement** is focused on increasing the ability to fulfil the quality requirements

### **PDCA-cycle**

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

- **Plan:** Establish objectives and processes necessary to deliver results in accordance to specification
- **Do:** implementation of processes

- **Check:** Monitor and evaluate processes and results against objectives and specifications
- **Act:** Take actions to the outcome for necessary improvement (e.g. improve, standardize)

## 2.4 QUALITY MANAGEMENT SYSTEMS

If properly implemented, formal quality management systems provide a vehicle for achieving quality (i.e. conformance to established requirements). As defined by ANSI, a quality system is “the organizational structure, responsibilities, procedures, processes, and resources for implementing quality management” (Arnold, 1994 cited in Battikha, 2002). In other words, Quality management systems refers to the set of quality activities involved in producing a product, process, or service, and encompasses prevention and appraisal (Burati et al., 1992). It is “a management discipline concerned with preventing problems from occurring by creating the attitudes and controls that make prevention possible” (Crosby, 1979 cited in Battikha, 2002). Quality activities include the determination of the quality policy, objectives, and responsibilities and implementing them through quality planning, quality control, quality assurance, and quality improvement, within the quality system (ASQC, 1997 cited in Battikha, 2002).

Other views expressed by ([www.abahe.co.uk/business](http://www.abahe.co.uk/business)) is that, a quality management system is a management technique used to communicate to employees what is required to produce the desired quality of products and services and to influence employee actions to complete tasks according to the quality specifications. In like manner, ([bussinessballs.com/dtiresources](http://bussinessballs.com/dtiresources)) also explained quality management system as a set of co-ordinated activities to direct and control an organisation in order to continually improve the effectiveness and efficiency of its performance. These activities interact and are affected by being in the system, so the isolation and study of each one in detail will not necessarily lead to an understanding of the system as a whole. The

main thrust of a QMS is in defining the processes, which will result in the production of quality products and services, rather than in detecting defective products or services after they have been produced. The paper continued to say that a fully documented QMS will ensure that two important requirements are met:

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

#### **2.4.1 Purpose of Quality Management in the Construction Industry**

The U.S. Army Corps of Engineers, (2004) states that Construction Quality Management “CQM” is the performance of tasks, which ensure that construction is performed according to plans and specifications, on time, within a defined budget, and a safe work environment. For purposes of this study, quality is defined as conformance to properly developed requirements. For a construction project, quality begins with requirements carefully developed, reviewed for adherence to existing guidance and ultimately reflected in criteria and design documents which accurately address these needs. Therefore, the designer establishes the quality standards and the contractor in building to the quality standards in the plans and specifications, controls the quality of the work. The purpose of CQM is the Government's efforts, separate from, but in coordination and cooperation with the contractor, assure that the quality set by the plans and specifications is achieved. CQM is the combined effort of the contractor and the Government. The contractor has primary responsibility for producing construction through compliance with plans, specifications, and accepted standards of the industry.

### **2.4.2 Principles of Quality Management.**

Quality Management is based on three fundamental principles (Evans and Lindsay, 2008) cited in Sabah (2011); these are:

1. Focus on customer and stakeholders;
2. Participation and teamwork by everyone in the organisation;
3. A process focus supported by continuous improvement and learning.

### **2.5 PROJECT QUALITY PERFORMANCE MEASUREMENT**

Performance measurement is a fundamental building block of quality management and a total quality organisation. Historically, organisations have always measured performance in some way through the financial performance, be this success by profit or failure through liquidation. However, traditional performance measures, based on cost accounting information, provide little to support organisations on their quality journey because they do not map process performance and improvements seen by the customer. In a successful total quality organisation, performance will be measured by the improvements seen by the customer as well as by the results delivered to the shareholders ([bussinessballs.com/dtiresources](http://bussinessballs.com/dtiresources)). According to Takim, et al. (2003), performance measurement in the manufacturing and construction industries is used as a systematic way of judging project performance by evaluating the inputs, outputs and the final project outcomes. However, very few companies systematically measure their performance in a holistic way. Moreover, the existing systems tend to focus more on product and less on process and design. This can lead to the suboptimal quality of the performance measurement system, the misjudging of relative performance, complacency and the denying of appropriate rewards to the deserving. Previous studies have revealed that performance can be measured in terms of financial

and non-financial measures, or the combination of both. When measurements are being implemented, contractors, consultants and the management team's performances are blamed as the major reasons for the failure of a particular project. The other project stakeholders such as client, suppliers, trade contractors and the community at large are neglected.

## **2.6 QUALITY PLANNING**

Harris and McCaffer, (2001) defined quality planning as a set of activities whose purpose is to define quality system policies, objectives, and requirements, and to explain how these policies will be applied, how these objectives will be achieved, and how these requirements will be met. Subsequent to this definition, Construx, (2003) stressed that quality plan is different from a test plan. The study continued that quality plan defines the quality goals, is realistic about where defects come from, Selects appropriate detection and prevention methods, and has means not to "go dark". The Project Management Book of Knowledge "PMBOK" 4 also addressed quality planning from a different position to enhance the thoughts earlier expressed. It said that quality planning has a process input generated by predecessor processes referred to as the Project Scope Statement and Project Management Plan. These processes are introduced by external units like Enterprise Environmental Factors and Organizational Process Assets. PMBOK4 further defined quality planning as the process for "identifying which quality standards are relevant to a project and determining how to satisfy them": In other words, it means planning how to fulfill process and product (deliverable) quality requirements: "Quality is the degree to which a set of inherent characteristics fulfill requirements". By planning the quality one has to respect some principles, and these are:

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



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

These sentences implicate the rule, that gold plating is not an indicator of quality; it has to be avoided.

## 2.7 QUALITY ASSURANCE

In recent years, increasing concern has been expressed at the standards of performance and quality achieved in building works. The need for structured and formal systems of construction management to address the aspect of performance, workmanship and quality has arisen as a direct result of deficiencies and problems in design, construction, materials and components. Many of the problems experienced in building appear as a range of inadequacies from minor technical and aesthetic aspects to major building defects. Irrespective of their degree of severity, such problems are known to cost the industry so much annually, yet, many difficulties might be alleviated through greater care and attention to standards of performance and quality at the briefing, design and construction stages of the building process (Griffith, 1990). If buildings are to be trouble-free, more attention needs to be given to applying quality assurance principles to design and site-work, including project selection and specification, and to supervision of the handling and protection on site (Atkinson, 2005).

Harris and McCaffer, (2001) defined quality assurance as a set of activities whose purpose is to demonstrate that an entity meets all quality requirements. Quality Assurance activities are carried out in order to inspire the confidence of both customers and managers, confidence that all quality

requirements are being met. According to EuroRoadS, (2006), the main objective of quality assurance measures in information processes is to fulfill a required quality level. By using described probabilistic model, cause and effect diagram, one is able to analyse existing processes and to detect existing quality gaps within these processes. Reference to Hendrickson (1999) cited in Khan et al, (2008), quality requirements should be clear and verifiable so that all parties in the project can understand them for conformance. Harris and McCaffer, (2001) continued that Quality assurance (QA) emphasizes defect prevention, unlike quality control that focuses on defect detection once the item is produced or constructed. It was further established that quality assurance concentrates on the production or construction management methods and procedural approaches to ensure that quality is built into the production system.

### **2.7.1 Quality Assurance in Construction**

The importance of Quality Assurance is based on the principles of getting things right first time. By implementing, maintaining, reviewing and continually improving a Quality Assurance System, a construction company can achieve and reap the benefits of having such a system in place. Quality Assurance exists because of the degree of dissatisfaction experienced by the industry's clients over a long period, combined with a growing impatience by some of their advisers to achieve value for money. An increasing number of building companies are also frustrated by the inadequacy of a system which however valiantly they try, leaves their efforts lacking in some regards. A revolution has occurred in the assembly of buildings from what was a craft process to one where the critical work of connecting interdependent units is done in the main by semi-skilled labour from a multiplicity of separate employers. This makes great demands upon supervision and management systems. (StudyMode.com, 2008)



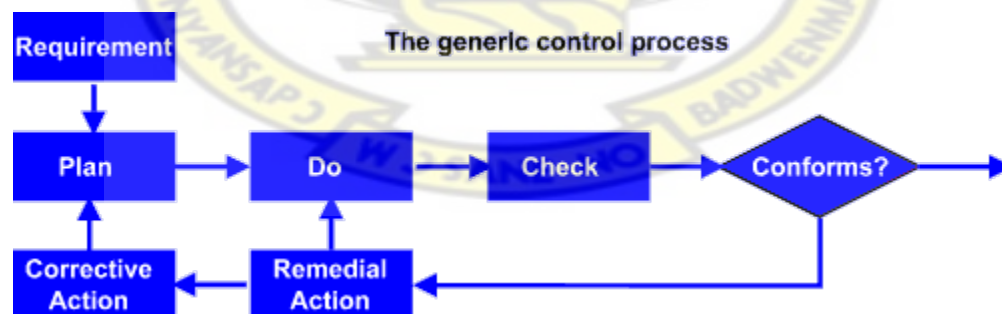
A Quality System is designed to provide an assurance to Clients, which can be supported through documented records, that all contracts will be completed in accordance with the agreed time, cost and specification. It should also further ensure that the company personnel, sub-contractors and key suppliers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

## **2.8 QUALITY CONTROL**

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

is safety. Additionally, quality control is also meant to ensure that buildings are reliable and sustainable.

The ISO definition also states that quality control is the operational techniques and activities that are used to fulfill requirements for quality. This definition could imply that any activity whether serving the improvement, control, management or assurance of quality could be a quality control activity. What the definition fails to tell us is that controls regulate performance. They prevent change and when applied to quality, it regulates quality performance and prevent undesirable changes in the quality standards. It continued that quality control is a process for maintaining standards and not for creating them. Standards are maintained through a process of selection, measurement and correction of work, so that only those products or services which emerge from the process meet the standards. In simple terms quality control prevents undesirable changes being present in the quality of the product or service being supplied. The simplest form of quality control is illustrated in the Figure below. Quality control can be applied to particular products, to processes which produce the products or to the output of the whole organisation by measuring the overall quality performance of the organisation.



*Source: Quality Management Systems, (2013)*

It is often deemed that quality assurance serves prevention and quality control detection but a control installed to detect failure before it occurs serves prevention such as reducing the tolerance band to well within the specification limits. So quality control can prevent failure. Assurance is the result of an examination whereas control produces the result. Quality Assurance does not change the product, Quality Control does. Harris and McCaffer, (2001) defined quality control as a set of activities or techniques whose purpose is to ensure that all quality requirements are being met. In order to achieve this purpose, processes are monitored and performance problem are solved. Scatterfield, (2005) in other words said quality control is critically important to a successful construction project and should be adhered to throughout a project from conception and design to construction and installation. Inspection during construction will prevent costly repairs after the project is completed. The inspector, engineer, contractor, funding agency, permit agency, and system personnel must work together to inspect, document, and correct deficiencies.

### **2.8.1 Importance of Quality Control in Construction**

Quality Control (QC) in construction is the process of verifying that the project is built to plan, that the tolerances allowable by industry standard and engineering practices have been met or bettered, and that the finished project (and all phases to get there) meet with the quality standards of the architect, engineer, owner, and general contractor. On construction projects there are dozens of subcontractors, all of which have specific responsibilities. Superintendents and project managers try to maintain high quality standards but they can't be everywhere at once. Required inspections by cities and counties (as well as other jurisdictions, depending on the project) help to ensure safety and code issues. In addition, a good general contractor or developer will have on staff a QC person, someone who is responsible for going through the building or project,

ensuring compliance, and maintaining an ongoing list of corrective items that must be accomplished before the contractor who installed it is paid or leaves the job. QC technicians generally keep a very detailed binder, separated by areas/rooms/phases of the project with notes of items that must be either verified or corrected, with sign-off as each is accomplished. This binder becomes part of the project record and is an important element to completing the project on time and with expected quality maintained (Wiki.answers.com).

## **2.9 QUALITY IMPROVEMENT**

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

Empirical studies on quality management in construction have shown that various quality improvement practices are common among non-residential builders and developers. Most of these practices have been collectively grouped under a successful management philosophy termed, "Total Quality Management" or TQM. (Shofoluwe et al 2012)

# CHAPTER THREE

## RESEARCH METHODOLOGY

### 3.1 INTRODUCTION

This chapter examines the research methodology adopted in this thesis. It first outlines the philosophy that reinforces the approach taken for the study, discussing the researcher's positivist stance to research and the consequent choice of a quantitative approach. The next section discusses the approach to data collection and then the data collection instrument. The chapter then provides an overview of the research population and sampling technique and the unit of analysis. The chapter concludes with a section on the survey coverage and response rate validity.

### 3.2 PHILOSOPHICAL UNDERPINNING OF THE RESEARCH

Hussey *et al.* (1997) noted that some writers use the terms 'methodology' and 'method' interchangeably. They revealed that methodology refer to the overall approach taken, as well as to the theoretical basis from which the researcher comes, and that method is the various means by which data is collected and analysed (Hussey *et al.*, 1997). Similarly, Mason (2002) separates "the concept of methodological strategy" from the method, while noting that a particular method will be a part of the strategy. In line with these writers, the approach taken here is to include all facets of the research process under the overall heading of methodology. Therefore, the research design, the approach taken, the particular data collection methods chosen and the means of analysis, are all considered to be part of this thesis's methodology, and are set out in the following sections.



However, underpinning the methodology, by necessity, is a philosophical stance in relation to the purpose of research in general (Marsh *et al.*, 2002). Therefore, a research philosophy is a belief about the way in which data about a phenomenon should be gathered, analyzed and used; it consists of the following components: ontology, epistemology, and methodology (Galliers, 1991). A researcher's stance on ontology and epistemology will underlie the entire research process and govern the particular theoretical perspective (for example positivism or interpretivism) (Marsh *et al.*, 2002). The theoretical perspective will be implicit in the objectives of the research and dictate the researcher's choice of methodology. Finally this methodology or plan of action will in turn inform the choice of research methods employed (for example, questionnaires or interviews). To Marsh and Furlong (2002) these stances a researcher takes are pivotal to his research, as "they shape the approach to theory and the methods" utilized.

### **3.2.1 Discussion and Rationale for Choice of Approach**

The research was situated in the positivist paradigm recognising the following parameters:

- The research tends to produce quantitative data: this would fit well with the survey approach which is explained in section 3.5;
- Data is objective: the gathering process would be objective due to the distance between the researcher and the respondent;
- Samples are not large: The researcher tends to use a small sample; and
- Independence: In this study, the observer is independent and is not part of what is observed.

Research based on a positivist philosophy tends to be based on deductive theorising, where a number of propositions are generated for testing, with empirical verification then sought (Babbie, 2005).

### **3.3 DEDUCTIVE AND INDUCTIVE REASONING OF SCIENTIFIC INQUIRY**

It is important also to classify the research approach in terms of whether it is inductive or deductive. The choice between the deductive or inductive reasoning of scientific enquiry has been discussed by a number of authors (Cavaye, 1996, Hussey *et al.*, 1997, Perry, 2001). A researcher should explain clearly which approach is being followed in his or her research project. Saunders *et al.* (2003) explained that the inductive approach which is known as building a theory, involves the researcher collecting data in an attempt to develop a theory. Hussey *et al.* (1997) added that inductive research is a study in which theory is, “developed from the observation of empirical reality; thus general inferences are induced from particular instances, which is the reverse of the deductive method since it involves moving from individual observation to statements of general patterns or laws,”.

The deductive approach known as testing a theory is when the researcher develops a theory or hypotheses and designs a research strategy to test the formulated theory. In explaining deductive research, further it is a study in which a conceptual and theoretical structure is developed which is then tested by empirical observation; thus particular instances are deducted from general influences (Perry 2001). Deductive research is a study in which theory is tested by empirical observation. The deductive method is referred to as moving from the general to the particular and it often requires considerable data (Hussey *et al.*, 1997).



This study is shaped using the deductive research design as it tends to use considerable data which would in turn favour the use of quantitative methods to analyse as established by (Travers, 2001).

### **3.4 RESEARCH STRATEGY**

According to Boumaet *al.* (1995) research strategy can be taken to mean the way in which the research objectives are questioned. They continued that there are two types of research strategies, namely, 'quantitative research' and 'qualitative research'. Deciding on which type of research to follow, depends on the purpose of the study and the type and availability of the information which is required.

#### **3.4.1 Qualitative and Quantitative Research Strategy**

Denzinet *al.* (1998) intimated that qualitative research emphasises the process of discovering how the social meaning is constructed and stresses the relationship between the investigator and the topic studied. Berg (2001) added that qualitative research refers to the meanings, concepts, definitions, characteristics, metaphors, symbols and descriptions of things.

Quantitative research is 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 procedures, in order to determine whether the hypothesis or the theory hold true (Creswell, 1994). Boumaet *al.* (1995) indicated that quantitative data is, therefore, not abstract, they are hard and reliable; they are measurements of tangible, countable, sensate features of the world (Boumaet *al.*, 1995), it uses structured tools to generate numerical data and uses statistics to interpret, organize and represent the collected data (Burns *et al.*, 2001). Mark *et al.* (2005) noted that qualitative and quantitative research approaches differ basically in some major areas,

including: their analytical objectives; types of questions posed; types of data collection methods used; types of data produced; degree of flexibility in study design (Mack *et al.*, 2005).

In this study, the research strategy was quantitative as the main data collection techniques used in this research was questionnaires. This method allowed the researcher to ask all respondent the same question with predetermined responses, which allowed objective data to be collected throughout the study therefore being in tandem with the positivist tradition with survey as the main data collection approach.

### **3.5 APPROACH TO DATA COLLECTION**

According to Naoum (2007) there are two approaches to data collection namely, fieldwork (primary data collection) and desk study (secondary data collection). Patton (2002) noted that using more than one data collection instrument strengthens and gives credibility to the study. The researcher used multiple sources of data because of the added benefits (such as the validity of the data gathered) associated with multiple sources (Owusu, *et al.*, 2007).

The approach for collecting data in this study was divided into two main parts desk survey and field survey.

#### **3.5.1 Desk Survey**

The desk survey (literature review) forms an essential aspect of the research since it sets the pace for the development of field survey instruments using questionnaires, and interview (Fadhley, 1991 and Owusu, 2008). Secondary sources of information were identified and collected in books, articles, technical journals and from databases. The secondary source of information for this research was collected from two sources; mainly internal and external sources.

### **3.5.1.1 Internal Secondary Sources**

These are published within companies or organizations, such as annual reports, information booklets, brochures, magazines, financial information memoranda, financial reports, plant and equipment registers. This type of internal secondary source of information for the research was collected from the selected consultancy firms.

### **3.5.1.2 External Secondary Sources**

External secondary source of data gathering was described by Wahab (1996) as a primary literature source. Accordingly, it is the most accurate source of information as it contains the original research. Alternative sources of external secondary sources of information include textbooks, technical journals, newspapers, magazines and internet sources.

### **3.5.2 Field Survey: Primary Data Source**

The field survey is involved with the collection of empirical data. Fieldwork can be associated with three practical approaches; the survey approach, the case study approach and the problem-solving approach (action research) (Naoum, 2007). A survey is used to collect original data for describing a population too large to observe directly (Mouton 2001). A survey obtains information from a sample of people by means of self-report, that is, the people respond to a series of questions posed by the investigator (Polit *et al.*, 1993). The researcher used surveys because according to Robson (2002), surveys are used for relatively large number of respondents within a limited time frame. Robson (2002) added that there are two types of surveys available: the descriptive survey and the analytical survey (Robson, 2002).

### 3.5.3 Descriptive survey

Burns *et al.* (2001) in explaining descriptive survey intimated that it is a study that observes and describes the presence, frequency or absence of characteristics of a phenomenon as it naturally occurs, in order to gain additional information. The primary purpose of a descriptive survey research is to describe the situation, preferences, practices, opinions, concerns or interests of the phenomenon of interests (Polit *et al.*, 2006). Naoum (2007) added that the descriptive survey aims to answer such questions as: How many? Who? What is happening? Where? and When? It deals with counting the number of respondents with certain opinions/attitudes towards a specific object. The counting can be later analysed to compare or illustrate reality and trends. Descriptive studies provide valuable base line information. The method is also flexible and can be used to collect information from a large group of respondents (Mouton, 2001).

The descriptive survey was selected because it provides an accurate portrayal or account of the characteristics, for example behaviour, opinions, abilities, and knowledge of a particular individual, situation or group (Naoum, 2007). This design was chosen to meet the objectives of the study, namely to determine whether Ghanaian contractors are committed to Quality Management Practices in the specific area of Quality Assurance to deliver structurally sound buildings, to determine the problems and challenges encountered by contractors while implementing Quality Assurance during the execution of projects and finally to determine whether Quality Assurance has any bearing on the durability of a completed structure.

### **3.6 DATA COLLECTION INSTRUMENT**

#### **3.6.1 Questionnaire**

A questionnaire is a printed self-report form designed to elicit information that can be obtained through written responses of the subjects. The information obtained through a questionnaire is similar to that obtained by an interview, but the questions tend to have less depth (Burn *et al.*, 1993). Questionnaires were developed because of the following: They offered possibility of anonymity because subjects' names were not required on the completed questionnaires. There was less opportunity for bias as they were presented in a consistent manner. Most of the items in the questionnaires were closed, which made it easier to compare the responses to each item. They required less time and energy to administer.

#### **3.6.2 Content of Questionnaires**

Generally, the questionnaire was designed to collect data from contractors registered with the Ghana Cocoa Board in Accra. These questions were grouped in categories to collect data on knowledge in quality management and its effects on project performance. Part one solicited personal and general information from the construction firms on their commitment to quality management practices in the specific area of quality assurance using interviews.

Part two solicited information on firm's management philosophy towards quality. It also seeks to determine whether the construction companies are committed to ensuring quality in their deliveries. In Part three, the researcher seeks to find out whether the contractors encounter challenges while implementing Quality Assurance. The final part of the questionnaire was



designed to solicit the views of the respondents on measures for effective Quality Assurance Practices.

### **3.6.3 Questionnaire Administration**

The research questions were developed by the researcher and were reviewed by some experts in academia and in construction project practice. Subsequently, a pilot test of the questionnaire and interview was conducted for five (5) contractors to identify and eliminate potential ambiguity in the questionnaire. Some questions were reviewed as a result of non-response from the respondents of the pilot study. This was done to improve the reliability and validity of the questionnaire. The questionnaires were self-administered on one-to-one basis. To improve the response rate, a number of follow-up procedures and strategies were considered, such as sending reminder surveys or notices to non-respondents. However, this was not considered to be viable, as Schneider (1985; cited in Dunn and Huss, 2004) observed that increasing the response rate may negatively affect the reliability of the information obtained. That study further states that increased pressure by a researcher on subjects to respond will result in more uninformed responses.

To overcome that, a range of measures to improve the response rate based on established principles of reciprocity, social proof, and legitimacy and authority as recommended by Bednarek *et al.*, (2006) were incorporated within the survey. These included measures such as having a shorter questionnaire two pages each in part one and two, and one page in part three. To reciprocate their gesture, some respondents were promised a summary report of the results of the study. The primary data collected was reviewed by the researcher to ensure maximum accuracy, legibility, completeness, consistency and to reduce ambiguity.



### **3.7 SCOPE OF THE STUDY**

Geographically, the study would be carried out exclusively in Ghana and specifically in Accra. The dissertation intends to assess the Quality Management Practices of Ghanaian Building Contractors with the focus limited to the Class D1 K1 contractors in Accra registered with the Ghana Cocoa Board, located in the Greater Accra Region of Ghana.

### **3.8 RESEARCH POPULATION AND SAMPLING TECHNIQUE**

#### **3.8.1 Research Population**

A research population can be defined as the totality of a well-defined collection of individuals or objects that have a common, binding characteristics or traits (Polit *et al.*, 2006). Burns *et al.*, 1993 added that a population is defined as all elements (individuals, objects and events) that meet the sample criteria for inclusion in a study. The research covers a population of Fifteen (15) respondents made up of construction firms based in Accra. The main reason for using this category of firms is that their activities directly or indirectly have a bearing on quality management in the execution of projects. The criteria for inclusion or exclusion of the respondents are stated below.

##### **3.8.1.1 Inclusion criteria**

Inclusion criteria are the characteristics that the respondents must have in order to be included in the study (Burns *et al.*, 2001). The respondents included in this study were D1 K1 contractors registered with the Ghana Cocoa Board based in Accra.

### **3.8.1.2 Exclusion Criteria**

Exclusion criteria are the characteristic that the respondents lack in order not to be included in the study (Burns *et al.*, 2001). In this study the respondents not willing to participate in the study and contractors who were not registered with the Ghana Cocoa Board were excluded.

## **3.9 SAMPLING**

Sampling is a process of selecting a portion of the population to represent the total population and the findings from the sample represents the rest of the group (Burns *et al.*, 2001). The advantage of selecting a sample is that it is less costly and time saving than collecting information from a large group of respondents. The selected sample should therefore, have similar characteristics to the population under study to allow generalisability of the results to represent the population (Burns *et al.*, 2001, Politet *et al.*, 2006). There are two types of sampling, namely probability and non-probability sampling (Burns *et al.*, 2006). In this study non-probability sampling is used.

### **3.9.1 Non-Probability Sampling**

Non-probability sampling is a sampling technique where the samples are gathered in a process that does not give all the individuals in the population equal chances of being selected. In any form of research, true random sampling is always difficult to achieve. In contrast with probability sampling, non-probability sample is not a product of a randomized selection processes. Subjects in a non-probability sample are usually selected on the basis of their accessibility or by the purposive personal judgment of the researcher. ([www.explorables.com/non-probability-sampling](http://www.explorables.com/non-probability-sampling))

The non-probability sampling technique was used because the researcher was bounded by time, money and workforce and because of these limitations, it is almost impossible to randomly sample the entire population.

### 3.9.2 Criteria for Selecting Respondents

Non-probability sampling techniques include convenience sampling, consecutive sampling, quota sampling, purposive sampling and snowballing sampling. The purposive sampling technique was used to select D1 K1 construction firms from the registered list of D1 K1 contractors obtained from the Ghana Cocoa Board in Accra. This was carried out to enable the researcher select experienced and active contractors for the study.

### 3.9.3 Sample Size

**Table 3.1: Sample size**

Item	Respondents	Unit of analysis	Population	Number of sample frame
A	D1 K1 Construction Firms – Firms registered with Ghana Cocoa Board	Contractor	15	15
	<b>Total</b>		<b>15</b>	<b>15</b>

Samples size was chosen purposively due to the scope of work, the knowledge of the population and the purpose of 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 main concern. The above information was gotten from the Ghana Cocoa Board.

### **3.10 UNIT OF ANALYSIS AND STUDY VARIABLES**

The unit of analysis is that unit about which information is collected and that provide the basis for analysis. The unit of analysis according to Kumekpor (2002) is the actual empirical units, objects, occurrences, which must be observed or measured in order to study a particular phenomenon. Therefore, the unit of analysis must be appropriate to the problem being investigated and focuses on the essentials of the objectives of the study. For the purpose of this study, the unit of analysis are Contractors and Project Managers.

The variables considered for the study are the knowledge of contractors and project managers in quality management and whether they consider quality assurance as key in the delivery of their final products. These variables were considered with reference to the study objectives and the research questions.

### **3.11 ANALYSIS OF THE DATA**

The data was duly analyzed using SPSS software computer program. Descriptive and inferential statistics, such as frequency tables, percentages and cross tabulations were used in the data analysis and summaries. Simple tests of associations were undertaken by using One Sample t-Test and Descriptive Analysis to compare relationships between variables.

#### **3.11.1 Descriptive Analysis**

Another method used in this research for the data analysis includes both descriptive and quantitative data analysis. The primary data obtained was tabulated to give a good visual impression as well as interpretation of the information provided by the respondent.

### **3.12 CONSTRAINTS ENCOUNTERED**

Coming out with a research work of this kind has not been easy to the researcher due to numerous constraints encountered during compilation of information for this research work.

Some of these constraints include the following:

- Lack of research grants to cushion one from the hardship of transportation to the information centres;
- The inability of respondents to release information for fear of letting out company secrets;
- As a student, the researcher has to concentrate on his academic curriculum activities as well as writing this project work;
- The unavailability of time at the disposal of the researcher;

In all, the process undertaken to come out with this work was tasking and challenging.

### **3.13 SUMMARY**

The importance of this chapter was to explain the research methodology thus the sample selection and the procedure adopted in designing the data collection instrument. It further seeks to provide an explanation of the statistical procedures used to analyse the data.

# CHAPTER FOUR

## ANALYSIS AND DISCUSSION

### 4.1 INTRODUCTION

This chapter of the study presents result and discusses the data collected to answer the various objectives the study set to achieve. This chapter elaborates on the profile of the respondents and the surveyed firms, the firm's management philosophy, the percentage of the firm's turnover in some of their activities, the number of years of establishment of some of the departments within the firms, and the priority given to some major factors within the firms. The study further identified the best measures or indicators for quality in the construction firms, the factors that influences quality of projects of the firms, and the firms practice and essence of bidding strategies. The last section also assessed the barriers or challenges to quality assurance implementation on projects. The variables in this section of the study were tested with the aid of one sample tailed t-test at a significance level of 1% (test value of 2.25). Test value of 2.25 (confidence level of 99%) is the most preferred significance level with a minimal level of statistical error (Maddala, 2001).

### 4.2 RESPONDENT AND FIRM'S PROFILE

The surveyed respondents and the firms profile are discussed in this section of the study. The major variables discussed in an attempt to describing the profile of the respondents included the respondents' position in the firm, the highest level of qualification, and the experience of the respondents in the construction industry. The major variables also discussed in an attempt to describing the profile of the firm were the type of organisation, the firm's years of operation, and



the major works undertaken by the firms for the past 5 years, the firm's major clients, and the category of firm. The results of the section are presented in Tables 4.1 and 4.2.

**Table 4.1: Profile of Respondent**

Respondents profile	Frequency (n=13)	Percent (%)
<b>Position in the firm</b>		
Project manager	6	46.2
Site manager	1	7.7
Site engineer	4	30.8
Architect	1	7.7
Others	1	7.7
<b>Highest level of qualification</b>		
HND	4	30.8
BSc.	6	46.2
MSc.	3	23.1
<b>Experience in the construction industry</b>		
0-1 year	1	7.7
2-5 years	1	7.7
6-10 years	4	30.8
More than 10 years	7	53.8
<b>Area based in the organization</b>		
Site	10	76.9
Office	3	23.1
<b>Management course participated</b>		
Project management professional	3	23.1

MSc. Procurement management	7	53.8
Integrated quality management	3	23.1

Source: Field Survey, 2013

From Table 4.1, out of the total respondents (n=13), the majority (46.2%) were project managers in the surveyed construction firms. However, significant percentages (30.8%) of the respondents were also site engineers in the construction firms surveyed. The highest level of qualification of the majority (46.2%) of the surveyed respondents was Bachelor of Science (BSc.). Moreover, the majority (53.8%) have also participated in management course like MSc. Procurement Management. The experience of the majority (53.8%) of the surveyed respondents in the construction industry was more than 10 years. Within the construction firms surveyed, the majority (76.9%) of the respondents are predominantly based on site.

Table 4.2: Profile of Organisation

Profile of organization	Frequency (n=13)	Percent (%)
<b>Type of organization</b>		
Building contractor	12	92.3
Road contractor	0	0.0
Civil works	1	7.7
<b>Firm's years of operation</b>		
< 5 years	2	15.4
5-10 years	4	30.8
> 10 years	7	53.9
<b>Major works undertaken by firm the past 5 years</b>		
Building works	10	76.9
Road works	1	7.7

Maintenance work	1	7.7
Water systems	1	7.7

#### **The firms major clients**

Public	7	53.9
Private	2	15.4
Cooperate	3	23.1
Others	1	7.7

#### **Category of firm**

D1 K1	13	100.0
D2 K2	0	0.0
D3 K3	0	0.0
D4 K4	0	0.0

Source: Field Survey, 2013

From Table 4.2, the majority (92.3%) of the surveyed firms were typically building construction firms. However, one of the firms was also engaged in civil works. The majority (53.9%) of the surveyed construction firms have predominantly been in business or operation for more than 10 years. The major business undertaken by the majority (76.9%) of the firms for the past five years was building works. The construction firms' major clients have predominantly been the public sector. However, some of the firms also have served private and cooperative organisation since operation. All the surveyed construction firms in the studied area were D1 K1 construction companies. This finding is obvious since the researcher sampled only D1 K1 contractors registered with the Ghana Cocoa Board based in Accra.

### 4.3 FIRM'S MANAGEMENT PHILOSOPHY

This section of the study discusses the surveyed firm's management philosophy. The section discusses the various departments that exist in the firms, some of the areas adhered to by the firms, and the Item that best describes top management philosophy of firms competitiveness or quality achievement effort. The section also discusses the percentage of turnover of the surveyed construction firm in several activities, the years of existence of the departments in the firms, and the priority given to some factors in the firms. The results are presented in Tables 4.3, 4.4, 4.5 and 4.6.

**Table 4.3: Management Philosophy of the Firm**

Management Philosophy	Frequency (n=13)	Percent (%)
<b>Department that exist in the firm</b>		
Human resource	8	61.5
Contract planning unit	0	0.0
Estimating department	3	23.1
Quality assurance unit	1	7.7
Marketing department	0	0.0
Health & safety department	1	7.7
<b>Some areas of adherence by firm</b>		
Strategic marketing policy	1	9.1
Information management plan	1	9.1
Quality management plan	6	54.5
Organisational sales guidelines	0	0.0
Maintenance management plan	3	27.3
Product evaluation report	0	0.0

**Item that best describes top management philosophy of firms competitiveness/quality achievement effort**

Faster project delivery	0	0.0
Safety performance	1	8.5
Quality during/after	7	58.3
Meeting construction budget	2	16.7
Making adequate profit	2	16.7

Source: Field Survey, 2013

From Table 4.3, it is evident that the predominant department that existed in majority (61.5%) of the surveyed construction firms was human resource department. However, a significant percentage (27.3%) of the construction firms also had estimating departments. A major area of adherence by the majority (54.5%) of the surveyed construction firms was quality management plans. Also, 27.3% of the surveyed construction firms adhered to maintenance management plans of the companies. The item that best describes top management's philosophy guiding the firm's competitiveness or quality achievement effort was quality during and after the execution of projects. By implementing, maintaining, reviewing and continually improving a Quality Assurance System, a construction company can achieve and reap the benefits of having such a system in place. This finding is therefore contrary to the U.S Army Corps of Engineers (2004) definition of construction quality management that emphasizes on time of delivery, budget definition, and safe working environment.

#### **4.3.1 Percentage of Turnover of the Firms in their Activities**

The percentage of turnover of the surveyed firms in several activities including contract bidding, human resource training, marketing management, quality management, and project planning or

control are discussed in this sub-section of the study. The result of the sub-section is presented Table 4.4.

**Table 4.4: Firms Percentage of Turnover**

Activities of the Firm	Percentage Of Firms Turnover			
	1 – 10%	11 – 20%	21 - 30%	Other
Contract bidding Strategies	5(45.5)	4(36.4)	1(9.1)	1(9.1)
Human Resource Training	8(72.7)	2(18.2)	1(9.1)	
Marketing Management	5(45.5)	4(36.4)	1(9.1)	1(9.1)
Quality Management	2(18.2)	5(45.4)	4(36.4)	
Project Planning / Control	6(54.5)	2(18.2)	3(27.3)	

Percentages are in parentheses

Source: Field Survey, 2013

From Table 4.4, out of the total construction firms surveyed, the majority (81.9%) had a percentage turnover of 1 to 20 with regards to contract bidding strategies. The turnover percentage of the majority (72.7%) of the surveyed construction firms in human resource training activities was between 1 and 10 percent. With regards to the marketing management of the majority (81.9%) of the construction firms surveyed, the percentage of turnover was between 1 and 20 percent. However, the percentage turnover of the majority (81.8%) of the surveyed construction firms in quality management was between 11 and 30 percent, relatively higher than



the rest of the activities of the construction companies considered in Table 4.4. finally, the turnover percentage of the majority (54.5%) of the surveyed firms in project planning or control was between 1 and 10 percent.

#### 4.3.2 Number of Years of Establishment of the Departments in the Firm

The number of years of existence of some of the department in the surveyed construction firms has been discussed in this sub-section of the study. The result is presented in Table 4.5.

**Table 4.5: Number of Years of Establishment of the Departments in the Firm**

Department in the firm	Number of Years			
	0-2	3-4	5-6	> 6
Human Resource	3(25.0)	2(16.7)		7(58.3)
Contract Planning Unit	6(66.7)	1(11.1)		2(22.2)
Estimating Department	2(18.2)	2(18.2)		7(63.6)
Quality Assurance Unit	4(33.3)	3(25.0)	1(8.3)	4(33.3)
Marketing Department	4(36.4)	2(18.2)	2(18.2)	3(27.3)
Health and Safety Department	4(44.4)	2(22.2)	1(11.1)	2(22.2)

Percentages are in parentheses

Source: Field Survey, 2013

From Table 4.5, out of the total respondents surveyed, the number of years of establishment of human resource departments of the majority (58.3%) of the construction firms was more than six years. The number of years of existence of the department of contract planning units of the majority (66.7%) of the surveyed construction companies was between 0 and 2 years. The estimating departments of the majority (63.6%) of the surveyed construction firms have been in existence for greater than six years. Furthermore, the quality assurance units of the majority (58.3%) of the surveyed construction companies have been in existence of for 0 to 4 years. Also, the marketing departments of the majority (54.6%) of the surveyed construction companies have been in existence for 0 to 4 years. Finally, the health and safety departments of the majority (66.6%) of the construction firms have also been existence for 0 to 4 years.

#### **4.3.3 Priority Given To Some Factors within the Firms**

In every organisation of firm priority is often given to certain areas or factors relatively to others. The priority given to some factors within the surveyed firms in the construction industry have been discussed in this sub-section of the study. The respondents were to rank the factors in Table 4.6 from high priority (1) to low priority (3), and the result is presented in Table 4.6.

**Table 4.6: Priority Given to the Factors**

Factors	Mean Rank	Rank
Meeting Project Time / Deadline	1.25***	1
Meeting Quality Standards	1.25***	1
Achieving Success in bidding	1.33***	3

Satisfying Client's brief	1.42***	4
Meeting Project Cost Budget	1.67***	5
Meeting Health and Safety Standard	1.75**	6
Having a cordial relationship with client's representative	1.92	7

Rank: [High Priority (1), Moderate Priority (2), Low Priority (3)]

Source: Field Survey, 2013

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

From Table 4.6, the most important and highly prioritized factor in the construction firms surveyed were meeting of project deadline or time and meeting of quality standards with mean rank of 1.25 and statistically significant at 1%. This finding is therefore consistent with the U.S Army Corps of Engineers (2004) definition of construction quality management that emphasizes on time delivery of projects and meeting of quality standards. These two variables were subsequently followed by achieving success in bidding, satisfying clients brief and meeting project cost budget ranked 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> respectively. The least prioritized factor in the construction industry as indicated by the respondents was meeting health and safety standards. However, the factor ranked 7<sup>th</sup>, having a cordial relationship with clients representatives was found to be statistically insignificant.

#### **4.4 BEST MEASURE/INDICATOR FOR QUALITY IN THE ORGANISATION**

The best measures or indicators for quality in the construction firms surveyed have been discussed in this section of the study. To do this, the respondents were presented with nine

measure or indicators of quality to rank from least (1) to highest (5). The result of the surveyed respondents is presented in Table 4.7.

**Table 4.7: Measures or Indicators for Quality in the Firm**

Measures/Indicators	Mean Rank	Rank
Getting more jobs as a result of previous good work done	4.83***	1
Management commitment to quality	4.50***	2
Overall Client/Customer satisfaction	4.42***	3
Adherence to certified quality programs such as the ISO 9000 and 14000 series	4.42***	3
Meeting general construction standards	4.00***	5
Having a skilled work force	3.92***	6
Training and education for team members on quality	3.42***	7
The length of warranty (in years) the company can give on their work (Probably beyond the defect liability period)	3.08**	8
Winning Quality Awards	2.73	9

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

Source: Field Survey, 2013

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

From Table 4.7, getting more jobs as a result of previous good works done is deemed the best measure or indicator of quality in the surveyed construction firms. This quality indicator variable was subsequently followed by management commitment to quality, overall client or customer satisfaction, adherence to certified quality programs such as the ISO 9000 and 14000 series, and meeting general construction standards ranked 2<sup>nd</sup>, 3<sup>rd</sup>, 3<sup>rd</sup> and 5<sup>th</sup> respectively. A Quality System is designed to provide an assurance to Clients or customers (StudyMode.com, 2008). Previous studies have revealed that performance measurements can be measured in terms of financial and

non-financial measures or the combination of both (Takim et al., 2003) that includes improvements seen by the customer as well as by the results delivered to the shareholders which aids in more jobs acquisition. However, the least three ranked measure or indicators of quality in the construction firms surveyed were having a skilled work force, training and education for team members on quality and the length of warranty the company can give on their work ranked 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> respectively. Winning awards as a quality measure was however found to be statistically insignificant.

#### 4.5 FACTORS THAT INFLUENCE QUALITY OF PROJECTS OF THE FIRM

This section of the study assesses the factors that influence the quality of project of the construction firms surveyed. From Table 4.8, the respondents were presented with five variables to rank from ‘great influence’ (1) to ‘no influence’ (3) on the bases of their influence on the quality of projects in the construction firms surveyed. The result of the responses is presented in Table 4.8.

**Table 4.8: Factors Influencing Quality of Projects**

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

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

Source: Field Survey, 2013

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

From Table 4.8, contract documents, design drawings and improved schedule performance ranked 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> respectively are deemed the three most important factors in the determinant of the quality of projects undertaken by the construction firms surveyed. Existing literature indicates that a quality system is designed to provide an assurance to Clients, which can be supported through documented records, that all contracts will be completed in accordance with the agreed time, cost and specification. Moreover, all these three ranked variables were also statistically significant at 1%. However, the least influential factor in terms of the quality of projects undertaken by the surveyed construction firms was craftsmen training and improved relationship with subordinates ranked 4<sup>th</sup> and statistically significant at 5%. However, the last ranked factor improved relationship with subordinates was found to be statistically insignificant.

#### 4.5.1 Firms Practices and Essence of Bidding Strategies

This section of the study assesses the surveyed construction firms practices and essence of bidding strategies in the construction industry. The result of the responses of the surveyed persons is presented in Table 4.9.

**Table 4.9: Firms Practices and the Essence of Bidding Strategies**

	Frequency (n=13)	Percent (%)
<b>Company's practice is driven by</b>		
Technology	4	33.3
Innovation	1	8.3
Profit	1	8.3
Client satisfaction	6	50.0
Research	0	0.0



### **Bidding strategies that enables firm achieve best result**

concentrate on communicating our fast Project Deadline	9	69.2
focus on the particular client's needs requirement to the project	7	53.8
promote the competence of our technical team	8	61.5
promote our safety records	9	69.2
promote value for money and cost	9	69.2

Source: Field Survey, 2013

From Table 4.9, out of the total respondents, the practices of the majority (50.0%) of the construction firms surveyed are driven by client satisfaction. A significant percentage (33.3%) of the respondents also believed the construction firms practices are driven by technology. The majority (69.2%) of the respondent surveyed believed that the bidding strategies enabled the surveyed construction firms to achieve best result in communicating fast project deadline. The majority of the surveyed respondents also believed that the bidding strategies of the construction companies enabled the firms to achieve best result in the focus on particular clients' needs requirement to the project, promote the competence of the firms technical team, promote safety records and value for money and cost.

#### 4.5.2 Techniques Practiced by Firm in an Attempt to Achieving Project Objectives

The techniques practiced by the surveyed firms in an attempt to achieving project objectives have been assessed in this section of the study. The section assessed the usage of the techniques, and later assessed the level of importance of the practiced factors in achieving project goals. The result of the section is presented in Table 4.10.

**Table 4.10: Practiced Techniques and Their Importance to the Firm**

Techniques practiced by firm	Usage		Level of Importance				
			← Not Important/Most Important →				
	Yes	No	1	2	3	4	5
Project Design Evaluation	9(69.2)	4(30.8)			1(11.1)	4(44.4)	4(44.4)
Quality Manual	9(69.2)	4(30.8)			1(11.1)		8(88.9)
News Letters	3(23.1)	10(76.9)		1(33.3)	1(33.3)		1(33.3)
Seminars on Quality Management	8(61.5)	5(38.5)		1(12.5)	4(50.0)		3(37.5)

Short Courses	2(15.4)	11(84.6)	1(50.0)	1(50.0)		
Training Programmes	8(61.5)	5(38.5)	1(12.5)	2(25.0)	1(12.5)	4(50.0)

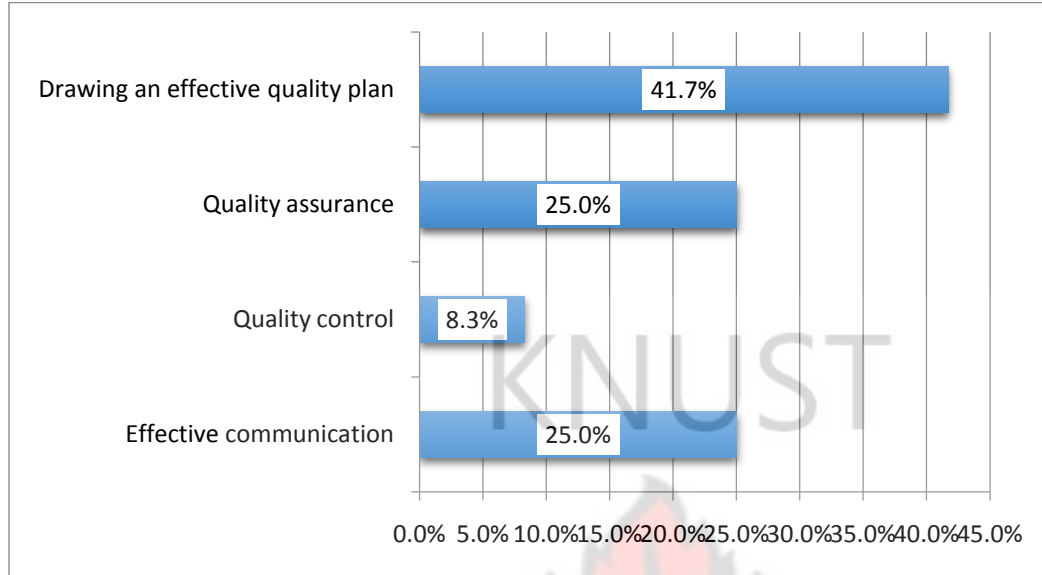
**Rank:** [(1) Not Important, (2) Least Important, (3) Important, (4) Very important, (5) Most Important] Percentages are in parentheses. Source: Field Survey, 2013



From Table 4.10, the majority (69.2%) of the surveyed respondents believed that the construction companies are engaged in project design evaluation. Out of this majority, a greater percentage also believed that the project design evaluation of the surveyed firms are very important or most important. The construction firms surveyed also practice quality manual techniques. The practiced manual technique of the surveyed construction firms was also deemed most important by the majority (88.9%) of the respondents. Existing literature indicates that conformance with requirements of the detailed procedures developed in accordance with the Quality Manual has to be mandatory for all staff employed in construction companies (StudyMode.com, 2008). Furthermore, the construction firms surveyed also organized seminars on quality management as indicated by 61.5% of the respondents. The seminar organized by the surveyed construction companies on quality management was deemed important by 50.0% of the respondents. Finally, the majority (61.5%) of the surveyed construction firms are also engaged in the organisation of training programmes for employees. The surveyed respondents also deemed the training programmes of the construction firms as most important. This finding is supported by Investopedia which explains that to achieve the goal of quality of projects, there is the need to training personnel and organized further skill enhancement courses.

#### **4.6 Challenges Encountered During Quality Assurance Implementation**

The challenges encountered during quality assurance implementation policies of the construction firms have been assessed in this section of the study. The various activities that are difficult to conduct before and during the execution of projects by the surveyed firms have also been assessed. The result of this section is presented by Figure 4.1 and Table 4.11.



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

**Source: Field Survey, 2013**

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

#### **4.6.1 Potential Barriers to the Attainment of Project Quality in the Firm**

To assess the potential barriers to the attainment of project quality in the surveyed construction firms, the respondents were presented with 15 barrier items to rank from least (1) to highest (5). The result of the section is presented in Table 4.11.

**Table 4.11: Barriers to Project Quality in the Firm**

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



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

Source: Field Survey, 2013

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

From Table 4.10, the five major barriers in the order of their rank were lack of effective supervision, lack of effective communication, lack of management's commitment to quality assurance, lack of proper equipment available for use and lack of a quality assurance team to lead the process ranked 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> respectively. However, the least ranked three challenge or barrier to project quality in the construction firms surveyed were Personnel inability to thoroughly read and understand contract documents (especially specification for works), setting unrealistic deadlines, and field employees regarding quality assurance as irrelevant ranked 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> respectively. However, the remaining considered factors or barriers were found to be statistically insignificant and so were excluded.

#### **4.7 MEASURES FOR EFFECTIVE QUALITY ASSURANCE PRACTICES**

This section of the study discusses the desirable measures for effective quality assurance practices in the surveyed construction firms. To do this, the respondents were presented with 12 items to rank from least challenged (1) to highest challenged (5). The result of the rank t-test is presented in Table 4.11.

**Table 4.11: Measures for Effective Quality Assurance**

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

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

Source: Field Survey, 2013

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

From Table 4.11, the highest ranked seven factors or measures for effective quality assurance as given by the surveyed respondents were management commitment, communication between managers and employees, employee involvement, detailed and logical work program, regular inspection and audit of quality report, training and education of team members and review/analysis used to improve performance in their order of rank. However, the least ranked five factors or measures for effective quality assurance in the surveyed construction firms were

well-defined roles and responsibilities of project participants, clearly defined goals and objectives, incentives for good performance, subcontractor's involvement in the quality process, and regular meetings of project participants in the descending order of rank.

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# CHAPTER FIVE

## CONCLUSION AND RECOMMENDATIONS

### 5.1 INTRODUCTION

The aim of the study was to evaluate the Quality Management Practices of Ghanaian Contractors with emphases on D1 K1 contractors registered with the Ghana Cocoa Board and to accomplish this aim, a number of objectives which were being guided by research questions were set. In this chapter, the research questions and the objectives are revisited to bring into light the extent to which the aim of the study has been achieved throughout the various phases of the study. The chapter also presents recommendations of the researcher based on the findings of the study and states the difficulties that were encountered throughout the study. Lastly, recommendations are made for further studies.

### 5.2 REVIEW OF OBJECTIVES

The first objective was to determine whether Ghanaian contractors are committed to Quality Management Planning in the delivery of construction projects. This objective was achieved by undertaking an extensive review on Ghanaian contractor's commitment to Quality management planning in the delivery of construction projects (*see chapter 2*). The literature revealed various challenges encountered by contractors while implementing Quality Assurance during the execution of projects. It revealed that Ghanaian contractor, lack an attitude towards commitment to quality practices, which has been the source bane to the development of the construction industry.

In addition, objective two was to determine the challenges encountered by contractors while implementing Quality Assurance during the execution of projects. In achieving these, questionnaires were administered to thirteen (13) construction firms registered with Ghana Cocoa Board. This was evaluated by use of likert scale: 1-5 to rate the level of influences each factor identified. Hence, one sample t-test was used to analyze. Similarly the last objective was to propose measures for effective quality assurance practice. This was also achieved through literature review. In addition, questionnaires were developed and given to respondents who were involved in the study. Hence, it was ranked with the help of one-sample t-test.

### **5.3 SUMMARY OF FINDINGS**

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

- **Priority Given to the Factors that determines the meaning of Quality Assurance:**

In determining the priority given to the factors which determine what quality assurance means, the research revealed that meeting of project deadline or time and meeting of quality were the two main factors project participant consider to be the most in term of project performance measurement. This finding is therefore consistent with the U.S Army Corps of Engineers (2004) definition of construction quality management that emphasizes on time delivery of projects and meeting of quality standards.

- **Indicators for Quality in a Firm or an Organization:**

On measures or indicators for quality in the firm the research revealed that getting more jobs as a result of previous good works done, management commitment to quality, overall client or customer satisfaction and adherence to certified quality programs such as the ISO 9000 and 14000 series were deemed to be the best measure or indicator of quality in the survey as confirm by the construction firms contacted.

- **Factors that influence Quality of Projects of firms:**

In seeking the factor which influence quality of projects of firms, the research revealed that contract documentations, such as design drawing, bills of quantities, bond for tender's and others remain influential part of quality practices of a firm. More importantly, improved schedule performance meaning time was also not left out by respondents due to the extent that effective quality practices system among construction firms is hinged on time. To this extent, it remains a foundation for quality management practices by contractors.

- **Practicing Quality Assurance Among Construction Firms:**

For the effectiveness of practicing quality assurance among construction firms, the study revealed that construction firm's practice of quality is driven by technology and client satisfaction. However, in terms of bidding strategies the survey revealed that construction firms achieved best result in communicating fast project deadline, promoting value for money and cost promote our safety records.

- **Quality Techniques Practiced in an attempt to achieve Project Objectives:**

It is important to note that for every system to be effective and efficient practice in the construction industry there should be techniques to adopt. Here, the study revealed that project design evaluation and Quality Manual Training Programmes are the effective techniques practiced by firms in an attempt to achieved project objectives, which quality remain an integral part of.

- **Challenges Encountered During Quality Management Implementation:**

The study opined that challenges encountered during quality management implementation include drawing an effective quality plan and effective communication



and quality. Again, it indicates that these challenges come during and after the execution of the project. Consequently, the research revealed the following as the potential barriers to the attainment of project quality among construction firm, namely lack of effective supervision, lack of effective communication, lack of management's commitment to quality assurance, lack of proper equipment available for use and lack of a quality assurance team to lead.

Lastly in solving the above mentioned potential barriers the study revealed the following as measures for effective quality management practices, namely: management commitment, communication between managers and employees, employee involvement, detailed and logical work program, regular inspection and audit of quality report, training and education of team members and review/analysis.

#### **5.4 CONCLUSION**

The study evaluated the Quality Management Practices of Ghanaian Contractors with emphases on D1 K1 contractors registered with the Ghana Cocoa Board and the objectives set for this purpose were to determine whether Ghanaian contractors are committed to Quality Management Planning in the delivery of construction projects, determine the challenges encountered by contractors while implementing Quality Assurance during the execution of projects and proposing measures for effective quality assurance practice leading to a higher levels of satisfaction in the Construction Industry.

The main findings of the study revealed that meeting project deadline and quality were the two key factors considered to be the most relevant in project performance measurement. In addition, indicators for Quality were discovered as getting more jobs as a result of previous good works done, management commitment to quality and the overall client or customer satisfaction. The

findings further revealed some challenges encountered during the implementation of Quality management and these are; lack of effective supervision, lack of effective communication, lack of management's commitment to quality assurance, lack of proper equipment available for use and lack of a quality assurance team to lead.

Quality Management practices remain optimum for achieving effective project performance in all types of infrastructural development, both in developed and developing countries. To this end, the commendations submitted in this research would assist Ghanaian contractors in practicing effective quality management during the execution of their projects.

## **5.5 RECOMMENDATIONS AND POLICY IMPLICATIONS**

The primary aim of this study was thoroughly to evaluate the Quality Management Practices of Ghanaian Contractors with emphases on D1 K1 contractors registered with the Ghana Cocoa Board. In view of the findings of this research, the following recommendations are therefore prescribed as measures and strategies for the development quality management practices in the Ghanaian construction industry.

- Construction companies should create the flexible and conducive organizational atmosphere which encourages the development of quality management practices in all aspect of the construction industry.
- Managers of the various construction firms should be encouraged to used quality management techniques in the execution of projects.
- Encouraging the integration of quality management practices in the early stage of the project and ensuring quality system are well instituted.

- Construction companies should employ quality officers as part of their integrated teams in the management of their projects.
- Construction firm should institute training procedures or refresher courses in quality management as part of their annual plan for their employees.
- Institutions in the built environment such Ghana Institution of Surveyors, Ghana Institute of Architect and the Ghana Institution of Engineers should institute award scheme for the best firm which adhere to quality practices as a way of encouraging construction firms to use quality management techniques.

## **5.6 FURTHER RESEARCH**

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

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

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## APPENDIX:

Questionnaires for the Study

# KNUST

