

# **FRAMEWORK FOR THE IMPLEMENTATION OF TOTAL QUALITY MANAGEMENT(TQM) IN REAL ESTATE FIRMS IN GHANA**

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Programme

By

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## DECLARATION

This work or any part thereof has not previously been submitted in any form to the University or to any other body whether for the purpose of assessment, publication or for any other purpose. Put aside any expression, acknowledgements, reference and/or bibliographies cited in the work, I confirm that the intellectual content of this work is the result of my own efforts and no other person.

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## ABSTRACT

With the globalization of economy, firms world-wide are actively engaged to achieve internationally accepted quality levels to ensure their position in the emerging international market especially those from developing economies. Unfortunately the Construction industry, generally, has lagged behind other industries in implementing Total Quality Management (TQM) which provide excellence in customer satisfaction through continuous improvements of products, processes or services. The main reason for that has been the perception that TQM is for manufacturing and service sectors only. Notwithstanding this challenge most current studies focuses on superior quality companies in advanced industrial environments, leaving companies in the developing economies largely unstudied.

Against this backdrop, this research addresses the identified problem that has frustrated the construction industry on “how to implement TQM” by focusing on developing a framework for an effective implementation of total quality management for real estate firms in Ghana, a developing economy, through an investigation of critical quality factors.

A survey of 62 real estate development companies registered with the Ghana Real Estate Developers Association (GREDA) was conducted to establish the current quality management practices and managers perception of factors required for a successful implementation of TQM. The data was analysed using descriptive Statistics, Importance indices and Exploratory Factor Analysis (EFA). The findings indicated that although these firms are aware of the importance of quality, their knowledge about QM is limited as well as their perception about quality is of corrective actions (Quality control) rather than preventive actions (Quality assurance, process and continuous improvement approach). Again, the survey

indicates that the major problems affecting implementation of QM program are lack of expertise/resources in QM, changing the behaviour and attitude, lack of education and training to drive the improvement process, lack of employee commitment/understanding, lack of top-management commitment/understanding. Eleven factors were also identified as drivers for an effective quality management. These factors are to be given attention to minimize difficulties related to the implementation of total quality management and ensure the successful implementation of total quality management in this industry.

In addition managers will be able to use this instrument to evaluate their quality management implementation so as to identify areas for improvement.



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## DEDICATION

To my loving family for their unflinching support and encouragement throughout my academic life

# KNUST



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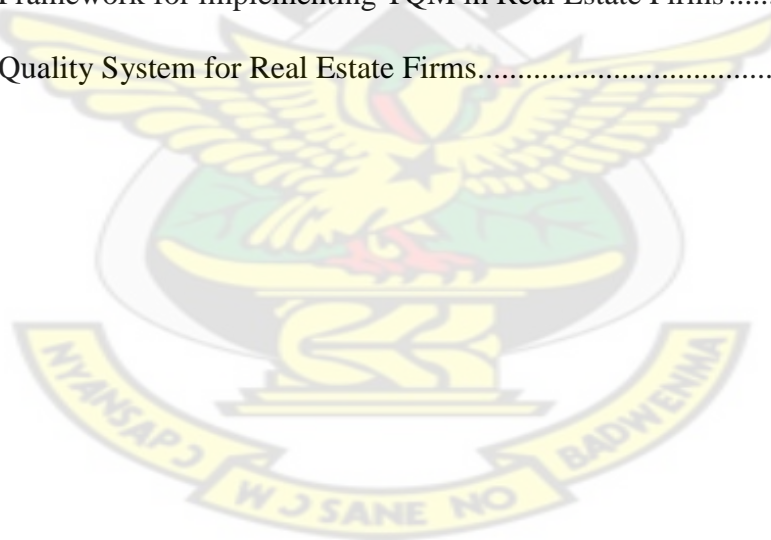
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# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 BACKGROUND TO THE STUDY**

Global competition has increased as countries increasingly embrace the free market model and open up their borders for external investments and trading (Lee, 2002). To stay competitive, companies have to focus their business strategies on strategic advantages through the enhancement of business excellence and performance. Quality management provides an effective approach to achieving this goal. Companies are striving to adopt and implement different forms of quality management systems such as International Organization for Standardization (ISO), British Standards (BS) and Total Quality Management (TQM). Quality-based companies have become reputable and attract more customers through the provision of higher quality services and products in contrast with non quality-based companies (Low and Teo, 2004).

Total Quality Management is a quality management system which pursues excellence in customer satisfaction through continuous improvements of products and process by the total involvement and dedication of everyone involved in the process or the products (Chase et al., 2001; McAdam and Kelly, 2002). When applied effectively, TQM enables a company to improve long-term relationships, create a harmonious team spirit, enhance professionalism and skills in all spheres of the business sector, encourage open addressing of problems and help to achieve the

intended project objectives and benefits (Low and Peh, 1996). Other benefits to be gained from TQM implementation includes improved clients, consultants and supplier relation, reduced “cost of quality”, on time and within budget projection completions, reduction in delays in construction works, and increased profit (Love et al., 2000).

However, other evidence shows that many organisations are disappointed in an attempt to implement TQM. A survey of 500 American Executives showed only about one-third who believed that their TQM program made a competitive difference (Etlie, 1997). TQM is based on continuous improvement. It is an ongoing process, not a quick fix, and organisations that reap benefits from TQM usually do so by advancing gradually and adjusting their strategy as they improve. This can be in a form of reducing the cycle time (the total time it takes to complete a process) or focusing on the customer and not on the organisation itself. Careful planning and vast amount of time and effort are required for successful adoption and implementation of TQM in an organisation (Lee, 2002). Again, non-existent or inefficient quality management procedures contribute to TQM implementation failures (Arditi and Gunaydin, 1997; Martínez-Lorente et al., 2000; Martinez –Costa et al., 2009).

Most studies examining the implementation of TQM have been based on advanced industrial environments notably in United States of America (USA), United Kingdom (U.K), Australia and Japan, and the subject of these investigations has largely been big companies with advanced management systems leaving the developing countries mostly with small and medium companies unstudied. This suggests that the operating environment, peculiarities of management in small and

medium companies, characteristics of developing economy environment corporate backgrounds and traditions and the management demands of real estate development companies have a role to play in the successful implementation of TQM in the real estate industry in Ghana.

Real estate development companies in Ghana generally undertake Mass Housing Building Projects and account for up to about 60% of all building projects (Zawdie et al,2000). The term Mass House Building Projects (MHBP) is used in the construction industry to describe mass production techniques of housing development projects (Ashley,1980), and is defined as “the design and construction of speculative standardized residential house unit usually in the same location and executed within the same project scheme” (Ahadzie et al 2007). Unlike many one – off projects undertaken by general construction firms, the responsibility for the management of the design and construction of these projects lie within a single real estate development company.

## **1.2 STATEMENT OF THE PROBLEM**

### **1.2.1Lack of Quality Management in Construction Works**

Generally, every business client regardless of his/her profession would like to receive the final product according to the predefined requirements. Although these requirements may differ according to the product nature in general, they represent the client’s interests. Therefore, contractors are responsible to do their best to conform to these requirements according to the contractual agreement with their clients, otherwise, it will be considered as a breach of contract.

However, according to Bryde and Robinson (2005), most contractors have failed in meeting stakeholders' needs on cost, quality and time objectives. The failure of these objectives are caused by design deficiencies, products failure and poor workmanship (Low and Peh,1996) and these problems are common and faced by most countries irrespective of the differences in their economies (Metri,2005). Metri (2005) attributes it to the fact that construction industry has generally lagged behind other industries in implementing reform through total quality management principles.

Low and Peh (1996) opine that fifteen percent (15%) savings on total cost of construction can be achieved through eliminating re-work and wasted work with the introduction of quality management and it should form the preliminary focus in rectifying the ills of the construction industry.

Against this background there is the need for all construction companies to be encouraged to be proactive in quality management.

### **1.2.2Lack of Empirical Research in the Developing Economies**

Numerous studies examining the elements that constitute quality management and the factors that are critical to the success of quality management implementation (e.g., Black and Porter, 1996; Powell, 1995; Saraph et al., 1989; Yosuf and Aspinwall, 1999; Low and Teo, 2004) just to mention a few, reported findings from developed countries.

Sila and Ebrahimpour (2002) conducted a study on 347 published survey articles of TQM from 1989 to 2000. In their analysis, it was revealed that majority of these studies were conducted in USA, U.K and Australia. This is due to the fact that these

countries quality management research and implementation are at a more developed stage relative to other countries or regions especially Africa, and the Middle East and can invariably be due to lack of information about the nature and stage of quality management practices in these regions. And for that matter, more research evidence is needed around the world to compare other understanding and implementation of quality management practices and how country factors (culture) impacts on the nature of critical factors of TQM.

Studies on quality management in construction organization and on projects in developing countries such as Ghana are few in number and as such relatively limited research has been devoted to studying the factors that influence the success of quality management in developing countries and how TQM can be successfully implemented in such countries.

This study seeks to fill this research gap by identifying the critical success factors and develop a framework for an effective Total Quality Management implementation in residential real estate industry in Ghana.

Thus, this research is founded on a contention that if TQM has been implemented in some countries and are yielding enormous benefits, then its implementation in the construction industry in Ghana will improve quality practices and encourage continuous improvement and hence, effective quality management system which will guide them in achieving quality in their products, services and higher organisational performance. Even though the study focuses on the construction industry and for that matter real estate firms, the repetitive processes in these organisations will make it easy for its implementation in manufacturing industries, and hence, easy adoption and implementation in developing economies.

### **1.3 AIM OF THE STUDY**

The principal aim of this research is to develop a Framework for the introduction of Total Quality Management in residential Real Estate development firms in Ghana. To accomplish this aim, a number of objectives were set.

### **1.4 OBJECTIVES OF THE STUDY**

The specific objectives of this research are:

- To investigate current practices of quality management in the Real Estate Industry;
- To identify any present problems with these practices;
- To identify critical success factors for TQM implementation;
- To assess how the quality managers in the Real Estate Industry perceive these critical success factors and;
- Finally, to develop a framework leading to its implementation in the Real Estate development firms in Ghana.

### **1.5 RESEARCH QUESTIONS**

The specific questions to the study include:

- What are the main elements that drive and sustain TQM implementation?
- What are the problems confronting the Real Estate companies in implementation of quality management?

### **1.6 RESEARCH SCOPE**

In terms of geographical coverage, this study will centre on only Ghana and again it will be on Real Estate development firms.

In order to achieve the objective and with wider analysis, the researcher deems it necessary to select population for the study on members of Ghana Real Estate Developers Association (GREDA). The primary business of most members of GREDA is the construction of Mass House Building Projects (MHBPs). The repetitive nature of the process in the construction of MHBPs makes the choice suitable.

There are 353 registered members of GREDA as of March, 2010. Over 96% of these firms are registered and operate in the capital city, Accra. Kumasi the second largest city accounts for only 2.6% whilst the remaining eight regional administrations account for a mere 1.2%. Given the relatively insignificant size of the membership in the other regions, the survey was limited to the Greater Accra and Ashanti Regions.

### **1.7 SIGNIFICANCE OF STUDY**

Based on the research problem above, there is the need for a TQM to be implemented in the Real Estate Industry which can reduce the cost of construction.

This work will not change the ongoing quality activities, but it will synchronize them to facilitate the performance of quality Management.

Finally, results obtained from this research will assist future efforts to develop and build a concrete TQM for Real Estate developers in Ghana.

### **1.8 OUTLINE OF METHODOLOGY**

The research adopted quantitative approach spanning on four processes. In the preliminary process, an extensive literature review on the subject matter of the study

was undertaken .The literature review covered the management structure of Real Estate development firms in Ghana, concepts of quality and Total quality management in the construction sector to surface and ultimately establishing constructs for implementation of TQM in the Real Estate Industry.

Based on the literature review, a standardized questionnaire was developed to collect data from members of Ghana Real Estate Development Association (GREDA) about their quality management practices and their perception of factors contributing to the successful implementation of TQM. The targeted respondents were project managers, project engineers, Quality managers of active Real Estate Development firms. A total of 103 construction firms in Accra and Kumasi were targeted to respond to a set of close-ended questionnaires.

The third process was data analysis. The data were analyzed using Statistical Package for Social Scientist (SPSS.16). Factor Analysis, and Ranking Analysis using importance index.

Finally, the information which was obtained, regarding the quality management practices and critical success factors contributing to the successful implementation of TQM was used to develop a framework for TQM implementation, which is the aim of the research.

The methods employed as well as the questionnaire design and development processes are detailed out in chapter three, four and five of this thesis.

## **1.9 ORGANISATION OF THE THESIS**

The thesis comprises of six chapters and these have been organised as follows:

Chapter one deals with the introduction to the research including, background to the study, statement of the problem, aim and objectives of study, key questions, scope of research, significance of study and organisation of the research.

Chapter two addresses the Ghanaian construction industry which looks at its demography and economics, Real Estate Industry in Ghana. It also reviews the fundamentals of TQM necessary for a greater understanding of the concepts and an in-depth review of the critical quality factors for TQM implementation.

Chapter three addresses the research methodology adopted. The research concept is described including the design of the research instrument and method for collecting and analysing the relevant data.

Chapter four presents data analysis of the results on quality management as currently practised by real estate developers in Ghana and critical factors for successful implementation of TQM. From these discussions a proposed framework would be developed that can be used to implement TQM in Ghana.

In chapter five, design of appropriate quality management framework for implementation of TQM was looked at.

Finally, chapter six presents the summary, conclusions of this research and the recommendations for future research.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

This chapter provides an overview of the construction industry in general, its significance in terms of Gross Domestic Product (GDP) on the economy. A brief on the Real Estate industry in Ghana is also given. This is followed by the general overview of concepts of quality and Quality Management (QM), critical success factors necessary for TQM implementation, obstacles affecting the implementation of quality management and finally the benefits that will arise from effective implementation of quality management.

#### **2.2 GHANA CONSTRUCTION INDUSTRY**

##### **2.2.1 Overview of Ghana and Economy**

Ghana is situated in West Africa. It has a land area of approximately 238,537sqkm with a population of slightly over twenty million (20,000,000). It is bounded to the north by Burkina Faso, the east by Togo, the south by Atlantic ocean and west by Cote d' Ivoire.

Again, it is divided into ten regional administrative areas with the capital, Accra, located near the south close to the sea (the Gulf of Guinea) (Figures 2.1).



**Fig 2.1: Map of Ghana.**

Source: <http://clinton4.nara.gov/Africa/ghana-y.html>

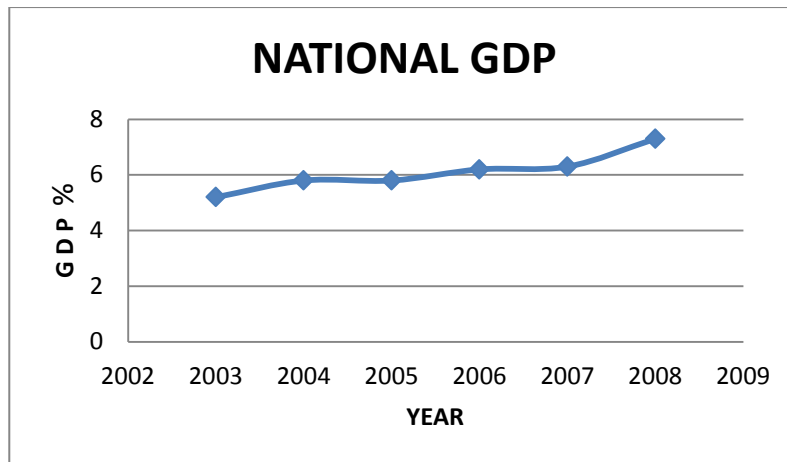
Ghana has experienced rapid economy for the past twenty years. The growth rate of its economy showed a better performance with an increase of the annual gross domestic product (GDP) from year to year. The GDP was around 5.2% in 2003 and has increased steadily to 7.3% in 2008 (Source: IYF, 2009; ISSER, 2005; IMF 2009; ODI 2009). The rapid economic development and growth of population has led to significant demand for housing, commercial, infrastructure such as roads, transportation etc. Table 2.1 below outlines the annual GDP from 2003-2008

Construction Industry Contribution to GDP

**Table 2.1 Shows Annual GDP of Construction Industry Contribution to GDP**

Year	GDP National Average	GDP(Contribution of Construction Sector)
2003	5.2	6.1
2004	5.8	6.6
2005	5.8	7.0
2006	6.2	8.2
2007	6.3	10.3
2008	7.3	11.0

Source: ISSER 2005, IYF 2009, IMF 2009, DI 2009



**Fig2.2: Graphical Representation of National GDP from 2003-2008**

Typical of many developing countries, the economic growth is strongly concentrated in the capital city, Accra and its nearest peripheries (Ghana Living Standard survey, 2008; UN-habitat, 2010). Available estimates indicate that the urban population growth rate in the Greater Accra Region is given as 4.3% per annum as compared to about 2.1% for the national average (UN-Habitat, 2010). The implication is that, business activities including construction activities are strongly concentrated in the Greater Accra Region.

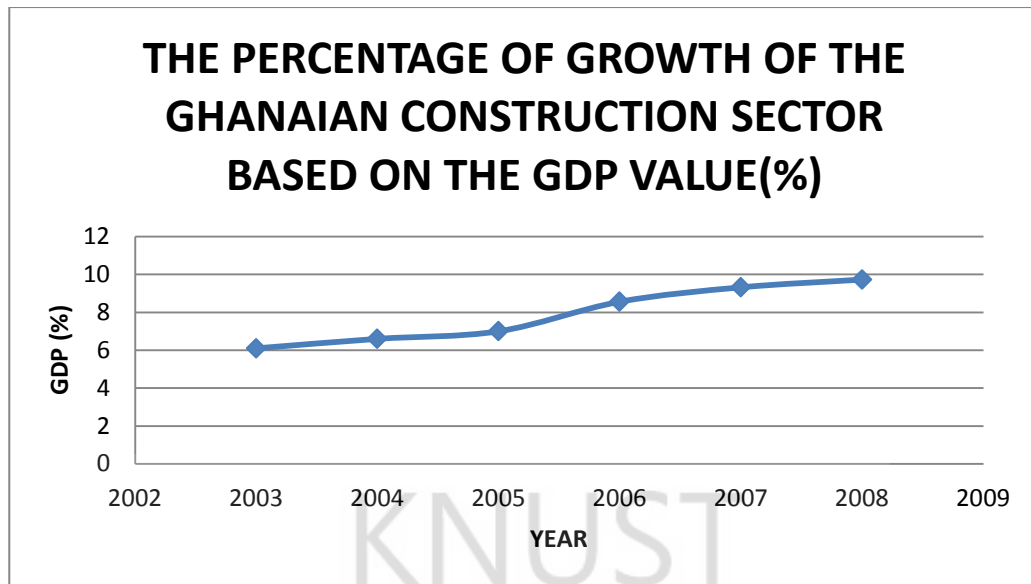
Despite the economic growth, Ghana still faces socio-economic challenges such as poor Infrastructure (Roads, Transportation etc.), Telecommunication, Water and Power supply which also pertain in other developing countries in sub-Saharan Africa, South-East Asia (Ofori, 1994, cited in Ahadzie, 2007) and it evolved from the weak technological, economic and structural conditions.

Ghana actually has immense opportunity in property development and construction. The varied opportunities are in the areas of residential houses as well as commercial properties.

### **2.2.2 Construction Industry**

In Ghana, the construction industry is faced with myriad of challenges, notably amongst them are excessive bureaucratic conditions, a weak material supply base, financial uncertainties, an unregulated labour market and poor management practices (Amoa-mensah, 2002)

Notwithstanding these challenges, it contributes significantly to its GDP (See Table 2.1 and fig 2.3) In Ghana, just like many other developing countries the industry is playing a vital role in socio-economic development goals, providing shelter, infrastructure and employment and above all contributing significantly to the GDP of the country. For instance, since 2003 to 2008, the industry has consistently provided an average GDP growth of 6.1% to economy. Table 2.1 and Figure 2.3 below indicate the contributions of the construction industry to the Ghana's GDP



**Fig.2.3: Growth of Construction Sector based on GDP from 2003-2008**

Like most economies, the industry does not only provide a structural base to the economy but also determines the productivity of investment and accordingly the rate of development (Ahadzie et al., 2007).

### **2.3 HOUSING IN GHANA**

Housing has been a major priority of governments of Ghana since colonial era, and was embarked upon in that regard through the establishment of state-owned institutions such as State Housing Corporation (now State Housing Company) and Tema Development Corporation (TDC).

Private sector participation in housing is just recent which led to the establishment of Ghana Real Estate Developers Association (GREDA) in 1989.

Real Estate Development firms in Ghana are into Mass House Building Projects (MHBP) and represent the largest and most established projects-based sectors in

many developing countries due to its contribution to construction GDP (Ahadzie et al,2007). They account for up to about 60% of all building projects. (Zawdie et al,2000)

The term Mass House Building Projects (MHBPs) is used in the construction industry to describe mass production techniques of housing development projects (Ashley,1980), and is defined as “the design and construction of speculative standardized house unit usually in the same location and executed within the same project scheme”.(Ahadzie et al., 2007) They are usually standardized residential designs constructed speculatively within an area under the same scheme (Ahadzie, 2007). Unlike many one –off projects, the responsibility for the management of the design and construction of these projects often lie within a single organisation, the property developer or home builder.

Currently, the membership of GREDA stands at 353 as of March, 2010. According to Ahadzie (2007), over 95% of these firms are registered and operate in the capital city, Accra. Kumasi the second largest city accounts for only 2.4% whilst the remaining eight regional administrations account for a mere 2.6%.

Though GREDA members are mostly based in the capital city, it is evident that most of these members are responsible for delivering a majority of the residential houses in all parts of Ghana.

It is observed that property developers have made a giant stride and account for the largest share of the housing sector (Amoa –Mensah, 2003).

Ghana's property market is dominated by residential (low cost housing, high rise quality apartments, retirement villages); and commercial development (regional and local shopping centres/malls, office accommodation, storage etc.) (Ghana Investment Promotion Centre- GIPC report, 2009)

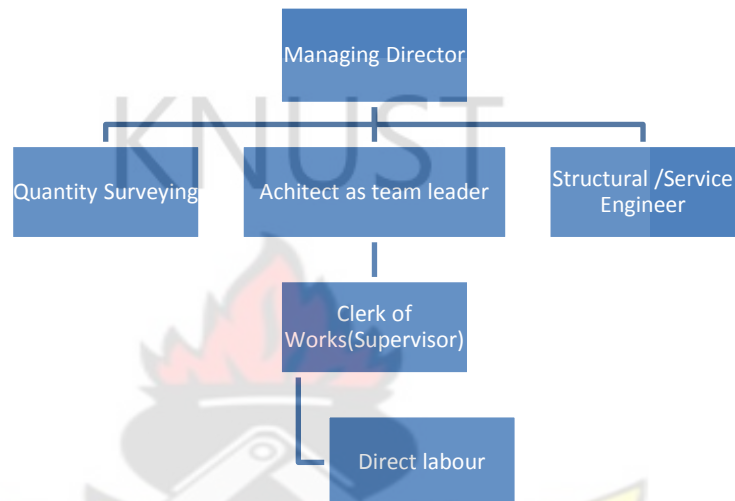
The residential market is the most active, registering an estimated 85,000 transactions per annum over the past decade. Commercial property is the second largest segment in the market and includes office accommodations and retail space. The industrial segment is significantly smaller in size than the commercial market, while recreational and civic/cultural property development is virtually non-existent (Ghana Investment Promotion Centre- GIPC report, 2009).

A housing study conducted by UN-Habitat (2010) indicates a shortage of 400,000 units of houses nationwide. It is further estimated that to replace this shortfall, annual national housing delivery should be approximately 120,000 housing units. The supply capacity nationally is 42,000 units per annum. Thus 60 percent of the national requirement remains unsatisfied each year. From the above figures, it is evident that Ghana has a housing problem. (UN-Habitat, 2010)

### **2.3.1 Management Practices of Real Estate Firms**

According to Ahadzie (2007) the earliest MHBP's built in Ghana were implemented in the late 1950s using traditional management practices (Fig 2.4). At that time government of Ghana was solely responsible for housing supply and these projects were mostly implemented by the then state owned, State Housing Corporation (SHC), now (State Housing Company Limited).

The management of the execution of these projects was undertaken largely using direct labourers (artisans and labourers). Direct labourers were engaged as full time employees by the SHC. With this management approach, the Architect was the team leader responsible for supervision and management of the projects.



**Fig.2.4 Typical Organisational Structure of MHBPs in the 1950s**

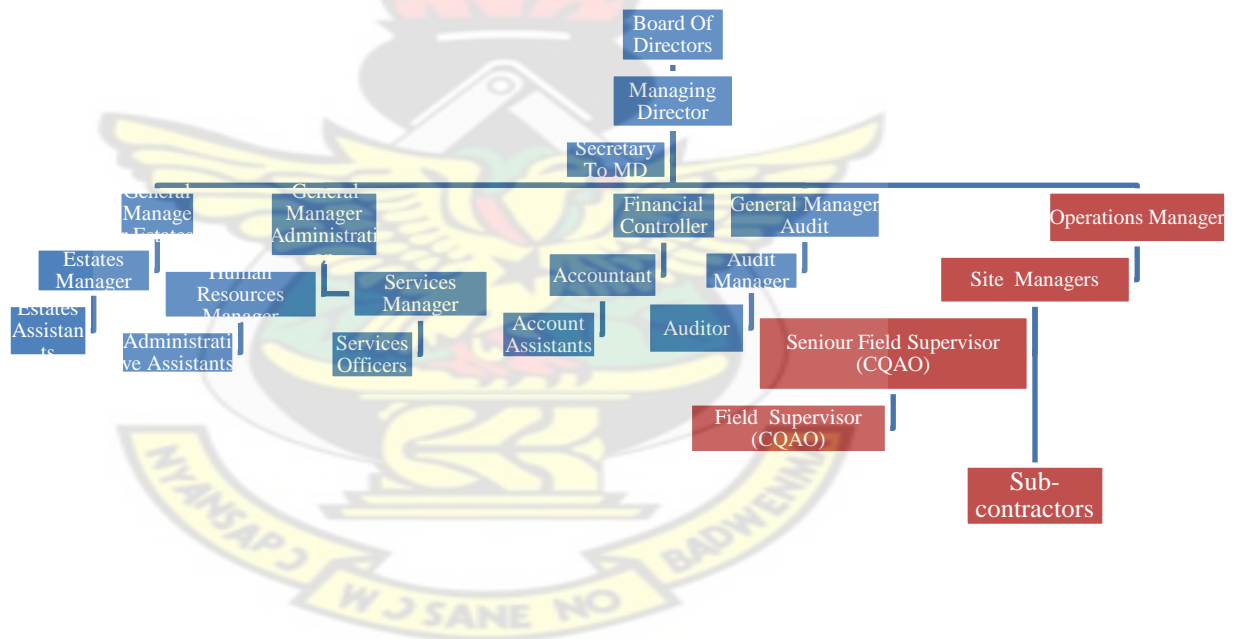
**Source:** Ahadzie (2007)

SHC faced-out its direct labour engagement and employed the service of sub-contractors for the provision of houses. The sub-contractors became responsible for the management of physical construction by engaging their own labour force unlike the direct labour engagement. There was a contractual relationship between the property developer (i.e. SHC) and the contractors while the architect played a supervisory role on behalf of the property developer.

This management approach was also adopted by private real estate developers; however, some do not have in-house design teams and hence employ the service of consultants to manage the design aspect of the project on their behalf.

A management practice of the real estate industry is usually one in which the developers provide the managerial and supervisory role and the sub-contractors are responsible for the actual construction work.

### **TYPICAL ORGANIZATIONAL STRUCTURE OF REAL ESTATE DEVELOPMENT FIRMS**



**Fig 2.5: A Typical Organisational Structure of a Real Estate Development Firm**

Source: Author's survey, 2010

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

### **2.4.1 Concept of Quality**

Quality is an important issue in the modern competitive business world and it is acknowledged by most academia, researchers and practitioners, hence, defining it is very important for any organization embarking on quality improvement journey. Thus, it enables employees and management channel their efforts in the vision of the company and their quality improvement goal. However, there is no universally accepted definition for it (Dale, 2003). The definition of quality has gone through a range of thoughts based on the one putting it forth was able to support the definition by facts, perception of excellence or supporting literature (Dale, 2003; Dahlgaard et al., 2002). Hence, one can find a variety of definitions of quality. For example, ISO defines it as “the totality of features and characteristics of a product or service that bears on its ability to satisfy stated or implied needs” (ISO 8402, 1994). Palaneeswaran et al, (2005) also defines it as the totality of characteristics of a product or service that bears on its ability to effectively and efficiently meeting the outlined requirements/specifications as well as satisfying the stakeholders’ needs. W. Edward Deming defines quality as a product or service "that helps somebody and enjoys a good and sustainable market" (Deming, 2000). Joseph Juran describes it with the phrase "fitness for use by the customer" as a definition of quality (Juran and Gryna, 1993). Crosby defines it as “Conformance to requirements or standard” (Crosby, 1980). Feigenbaum defines quality as "the total composite product and service characteristics of marketing, engineering, manufacture and maintenance through which the product and service in use will meet the expectations of the customer" (Feigenbaum, 1991).

Oakland (2000) also presents the following definition of quality "meeting the customer requirements. The requirements may include availability, delivery, reliability, maintainability, and cost effectiveness amongst many other features".

Garvin (1988) who studied and investigated many quality definitions suggested that it is possible to classify definitions of quality into five broad categories:

- transcendent (excellence);
- product-based (amount of desirable attribute);
- user-based (fitness for use);
- manufacturing-based (conformance to specification);
- value-based (satisfaction relative to price).

According to Dahlgaard et al., (2002), Harvey and Green (1993) also suggested five discrete and interrelated definitions of quality. They are:

- exceptional
- perfection
- fitness for purpose
- value for money
- transformative.

#### **2.4.2 Quality Management**

Quality Management refers to all activities of overall management functions, especially top management leadership, that determine quality policy objectives and responsibilities for all members of the organization. It includes all activities that managers perform in an effort to implement their quality policy. These activities

include quality planning, quality control, quality assurance and quality improvement, (McCafer and Harris. 2001). Quality management is also defined as “coordinated activities to direct and control an organisation with regard to quality” (ISO 9000:2000). The activities are normally management driven and integrated into a system. This is known as the systems approach to managing quality and people are required to participate or are inspired to participate. The most common quality management implemented in recent history are ISO quality management system and Total Quality Management (TQM).

#### **2.4.2.1 Total Quality Management**

Companies in the construction industry provide infrastructure for the economy and constitute an important backbone of many economies, yet they face problems of instability, low productivity, poor quality and lack of standards (Metri, 2005) in the face of high fragmentation in the industry. Total Quality Management provides an effective approach to prevent or reduce these problems and provide higher quality services and products. Its management and control processes are designed to focus on the entire organization and all of the employees in providing products or services that satisfy the customers (Talha, 2004).

TQM, like quality, has many conceptual and operational definitions; it does not have a universal definition between its users (Zhang, 2000) for example, ISO defined it as the management approach of an organization, which concentrates on quality, based on the participation of its members which aims at long-term success through satisfaction and benefits to all members of the organization and society (ISO 8402, 1994). Zhang et al., (2000) defined TQM as a management philosophy for

continuously improving overall business performance based on leadership, supplier quality management, vision and plan statement, evaluation, process control and improvement, product design, quality system improvement, employee participation, recognition and reward, education and training, and customer focus. Dahlgaard et al., (2002) saw TQM as: "a corporate culture characterised by increased customer satisfaction through continuous improvement, in which all employees in the firm actively participate."

TQM is different from traditional management as its philosophy seeks to integrate all organizational functions including marketing, finance, design, engineering and production, customer service whilst focusing on meeting customer (internal and external) needs, employees satisfaction and organizational objectives by ensuring that the processes being carried out is right, first time and every time. It embraces principles, processes, practices and procedures necessary for providing customer satisfaction and achieving improvement in productivity and business performance (Love et al., 2000)

In reality, no firm can fully implement TQM; it is a continuous improvement process and as such never ending. Its culture and philosophy must infiltrate an organisation, and can thrive only under senior management when it establishes it as a top management priority and commit itself to its success.

#### **2.4.2.1.1 Historical Evolution of Total Quality Management**

It is widely believed that total quality management evolved gradually and took place in four stages namely, quality inspection, quality control, quality assurance and Total Quality Management (Dahlggaard et al, 2002).

The first stage of this development started in the 1910s and began with craftsmen **quality control (inspection)**. During that period craftsmen were responsible for manufacturing and exclusively controlling the quality of their products. Quality was in the hands of the craftsmen, and building quality into a product was the aim of craftsmen (Dahlggaard et al., 2002). However, the industrial revolution created a factory system when large scale productions of goods and services in factories developed. Craftsmen were grouped together and supervised by supervisors (foremen) for their quality work. Thus, the master foremen maintained a form of quality control by inspecting the finished products before selling them (Juran, 1991). The quality of the product depended largely on the skills of the craftsmen and the effectiveness of the master foremen. According to Feigenbaum (1991), the emphasis at this stage was on product' uniformity, and inspection was thought to be the only way to ensure quality. Under a simple inspection- based system, one or more characteristics of a product were examined, measured, tested or assessed, and compared with specified requirements to assess conformity. The role of the, quality professionals was mainly inspection; ' sorting, counting and grading of products. The approach here was to inspect-in quality (Garvin, 1988). In general, simple inspection-based systems were usually wholly found in-house and did not involve customers (Dale, 2003).

With further industrial advancement and the Second World War came the second stage of TQM development when manufacturing system was complex and quality thinking is very essential due to mass production and high military standards for product and services. During that era quality was controlled through supervised skills, written specification, measurement and standardization. Thus, sophisticated methods and system were required in controlling and maintaining quality. Statistical quality control i.e control charts and sampling methods was then developed to inspect the post-production effort by separating the good product from the bad product. Shewhart, Dodge and Roming are credited for the advancement of quality improvement by developing this new method of inspection to improve and maintain quality- the quality control charts (Rahman, 2004).

Shewhart advocated that the process variations in product, that is variation resulting from random causes, and variation resulting from assignable causes or special causes can be distinguished by using control charts, sampling techniques, and economic analysis techniques for maintaining quality. These philosophical foundations of Shewhart's continuous improvement process were captured in a diagram later to be known as the Shewhart/Deming/ PDCA cycle (Rahman, 2004). Shewhart's cycle stage led to greater process control and fewer incidences of non-conformance contributing significantly to quality management and formed the foundation for modern quality assurance, the next stage in the evolution of TQM.

The third stage of this development is the **quality assurance**. This contains all the previous stages in order to provide sufficient confidence that a product or service will satisfy customers' needs (Dahlgaard et al., 2002). During this stage, more

emphasis was put on problem prevention rather than detection. Thus, there was paradigm shift from detection to prevention through the use of tools and methods such as quality manuals, use of cost of quality, development of process control and auditing of quality systems to progress from quality control to the quality assurance era of Total Quality Management. Quality assurance is widely known as a prevention-based system which improves product quality by placing emphasis on product and process design. This approach stressed detection of error at source. Emphasis was on the entire production chain from design to market, and the contribution of all functional departments. Quality planning and improvement certainly begin when top management include prevention as opposed to detection in organisational policy and objectives, and start to integrate the improvement efforts of various departments (Garvin, 1988). In the 1990s, the ISO 9000 standards emerged and embodied these concepts of quality (Dahlgaard et al., 2002). This stage took on board the first two initial stages to the evolution of TQM in its endeavour to produce products or services that meet customer needs.

Finally, the fourth stage, which is **Total quality control/management** evolved in the early 1980s through a dramatic increase in user quality requirements and quality as a competitive weapon for organisations. This shift to the view of quality as an aggressive competitive weapon in the West arose from competition from Japanese manufacturers, an increase in customer demand for higher-quality products, a loss in profit and market due to poor quality (Garvin 1988; Dahlgaard et al., 2002). Western manufacturers recognized the inadequacy of the existing in-plant quality practices and techniques contributing to excessive quality cost, due to inspection, testing,

laboratory checks, scrapping and reworking imperfect products, and customer dissatisfaction.

These problems highlighted the dual quality challenge: providing significant improvement in the quality of products and practices while at the same time, effecting substantial reductions in the overall cost of maintaining quality. Statistical quality control could never meet the challenge; thus, a totally new concept was developed based upon the principle that in order to provide genuine effectiveness, control must start with the design of the product and end only when the product has been placed in the hands of a customer who remains satisfied ( Syed et al,2002) hence a new concept called total quality control or management. TQM was seen as the most effective and stylish management concept in the economic crisis and capable of taking an organisation into the global market.

TQM is a company - wide approach focusing on managing quality through collective effort, commitment of every member of the Organisation and even goes beyond the organisation by recognising the contributions made by suppliers and customers, and establishing formal and close working links and relations with them (Zhang, 2000; Dahlgaard et al., 2002). According to Oakland (2000), TQM is accompanied by the use of sophisticated quality management tools and techniques (the hard aspects of quality control) and increased emphasis on people and personal values (the soft aspects of TQM).

Various characteristics of the different stages in the development of Total Quality Management can be seen in Table 2.2. In the table, QI, QC, QA and TQM are

abbreviations of Quality Inspection, Quality Control, Quality Assurance and Total Quality Management respectively.

**Table 2.2 Characteristics of the different stages in TQM**

Stage	Characteristics
QI (1910)	Salvage Sorting Corrective action Identify sources of non-conformance
QC (1924)	Quality manual Performance data Self-inspection Product testing Quality planning Use of statistics Paperwork control
QA (1950)	Third-party approvals Systems audits Quality planning Quality manuals Quality costs Process control Failure mode and effect analysis Non-production operation
TQM (1980)	Focused vision Continuous improvements Internal customer Performance measure Prevention Company-wide application Interdepartmental barriers Management Leadership

Source: Dahlgaard et al., 2002

#### **2.4.2.1.2 Perspectives on TQM**

Total quality management is often termed a journey not a destination (Low and Teo, 2004). In view of that, numerous studies have been conducted in the field of TQM and its implementation and as such different researchers have adopted different frameworks based on their own understanding and objectives (Zhang, 2000). However, these studies on TQM (e.g., Black and Porter, 1996; Powell, 1995; Saraph et al., 1989; Flynn et al., 1994; Yosuf and Aspinwall, 1999) developed their ideas from quality leaders such as Deming (2000), Juran (Juran and Gryna, 1993), Crosby (1980), and Ishikawa (1985)

Their propositions are the foundation for understanding the concept of TQM and have exerted an influence upon later studies; hence, literature on TQM has progressively developed from their initial contributions.

The concepts of Total Quality Management as perceived by quality leaders are reviewed.

The theoretical essence of the Deming approach to TQM concerns the creation of an organizational system that fosters cooperation and learning for facilitating the implementation of process management practices, which, in turn, leads to continuous improvement of processes, products, and services as well as to employee fulfilment, both of which are critical to customer satisfaction, and ultimately, to firm survival (Zhang, 2000)

Deming (2000) placed stress on top management taking responsibility in quality management initiatives, process and systems. He advocated identifying and measuring customer requirements creating supplier relationship, and the use of functional teams. He opined the use of specific tools, statistical process control and PDCA (Plan-Do-Check-Act) cycle as a means of quality improvement. According to him, there are two causes of errors or variations: “common cause” and “special cause”. His management method was to reduce the inevitable variation that occurs from “common cause” which he defines as errors or variations caused by operating machines or products or system and can be reduced by managements. With the “special cause” he said it relates with the employees, that is to say, it is caused by lack of knowledge or skills and poor performance and can be handled by the employees.

Deming (2000) prescribed TQM in 14 points, which he claimed to be a set of principles (of transformation) to remain competitive in providing products and

services and encompasses continuous improvement of product and service, leadership and commitment supplier focus, training and zero defect (Zhang, 2000).

According to Juran and Gryna (1993), Juran believes that TQM is the system of activities directed at achieving delighted customers, empowered employees, higher revenues, and lower costs.

He accentuates that quality problems are due to management rather than employees, and for that matter, quality attainment requires wider action from all functions of the firm. Juran's approach place much emphasis on teams (QC circles and self managing teams) which can promote quality improvement, top management commitment and empowerment, participation, recognition and rewards. He proposed quality management theories such as 'trilogy' of management processes: quality planning, quality control, and quality improvement for managing and improving quality, 'The Triple Role Concept' to confirm the need for customer focus. He stressed that customers are the underlying factor of quality improvement.

He explained that every party in a process has three roles: supplier, processor, and customer, and these three roles are carried out at every level of the processes in a firm. He also introduces quality cost and defined it in four (4) broad categories as internal failure cost, external failure cost, appraisal cost and preventive cost which can be used to evaluate the firm's costs related to quality.

Crosby (1980) identified a number of important principles and practices for a successful quality improvement program, which include, for example, management

participation, management responsibility for quality, employee recognition, education, reduction of the cost of quality (prevention costs, appraisal costs, and failure costs), emphasis on prevention rather than after-the-event inspection, doing things right the first time, and zero defects (Zhang, 2000). To attain zero defects, Crosby suggested that prevention must be given preference over inspection.

Crosby prescribed a 14-step quality programme that focused on how to change organizations using management and organisational processes rather than statistical tools and techniques. Thus, his programme is primarily behavioural and its audience is mainly top management (Rahman, 2004).

Ishikawa's approach to quality management goes beyond the product and it includes after-sales service, the quality of system and the firm's quality culture and the quality of individuals in the firm. Like the others, he also suggested that customer focus, supplier focus, continuous improvement, employee management, and Quality circles are the key to total quality management (TQM) implementation. He also developed the seven QC tools (Pareto chart, Cause and effect diagram, Stratification chart, Scatter diagram, Check sheet, Histogram) for quality improvement.

In summary, his concept encompasses the following principles: Quality first not short-term profits first; Customer orientation-not producer orientation; customer-breaking down the barrier of sectionalism; Using facts and data to make presentations-utilization of statistical methods; Respect for humanity as a management philosophy, full participatory management; Cross-functional management.

Even though the approaches to TQM are different, they share common points on the management of the process: leadership and commitment, training and education, using teams, planning and quality measures for continuous improvement and having the appropriate culture. They believe that it is the management's responsibility to provide commitment and leadership, empowerment through training and education, and the appropriate support to technical and human processes. It is necessary that management encourages the participation of the employees in quality improvement, and develops a quality culture by changing perception and attitudes toward quality.

Again, all the authors emphasize that the customer defines quality which consequently creates the need for customer satisfaction which leads to an improved competitive position. Equally consistent is the view that the costs of waste and rework are high and should be eliminated. Similarly, employees should be recognized and rewarded for their quality improvement efforts. They also stressed on evaluation and feedback, prevention of products defects, and not inspection and detection of defective products.

#### **2.4.2.2 ISO Quality Management System**

##### **2.4.2.2.1 ISO 9000 Series**

In 1987, the International Organization for Standardization released the ISO 9000 quality standard series. The ISO quality standards are a series of internationally accepted guidelines as to how companies should set-up quality assurance systems (Karthi, 2004). The standards are designed to guarantee a consistent level of quality of products and services provided by companies through the use of procedures, controls, and documentation, to identify mistakes and streamline its operations.

The ISO quality management system is generic in nature and applicable to all companies, regardless of the type and size of the business, including small and medium enterprises (SMEs) (Sroufe and Curkovic, 2008; Kartha, 2004) and is being used by many organizations as a stepping-stone to TQM (Conca et al, 2003; Zhang, 2000; Kartha, 2004; Escanciano et al., 2001; Hiyassat, 2000).

The original ISO quality standards underwent a major revision in 1994 and 2000 (Sroufe and Curkovic, 2008). The recent revision of the standards, ISO 9000:2000 actually addresses the challenges or issues that the 1994 version could not address

Table 2.3

**Table 2.3 Items not covered by ISO 9000:1994 version**

<b>Items Not Covered By ISO 9000:1994 Version</b>
Competitive comparisons and benchmarks
Analysis and uses of company-level data
Strategic quality and company performance planning process
Quality and performance plans
Employee involvement
Employee well-being and morale
Product and service quality results
Company operational results
Business process and support service results
Customer relationship management
Commitment to customers
Customer satisfaction determination, results, and comparison
Continuous improvement

Source: Sroufe and Curkovic, 2008

The new standards have a completely new structure and are based on eight principles that emphasize the core values and concepts of quality management and also incorporate several of the principles underlying the Malcolm Baldrige National Quality Award criteria. Some of the most significant aspects of the revised standard include its emphasis on using a process-related structure, using information from the system to facilitate quality improvement, and including customer satisfaction in improvement activities. The eight quality management principles as defined by ISO, with explanations as to how they should be interpreted in the standards, are as follows:

- ***Customer focus***, resulting in meeting customer requirements and striving to exceed them;
- ***Leadership***, aiming to create an internal environment in which people are fully involved;
- ***Involvement of people*** who are the essence of an organization;
- ***Process approach***, resulting in improved efficiency to obtain desired results;
- ***System approach*** to management, leading to improved effectiveness and efficiency through identification, understanding and management of interrelated processes;
- ***Continual improvement***, which becomes a permanent objective of the organization;
- ***Factual approach*** to decision-making, based on the analysis of data and information; and
- ***Mutually beneficial supplier relationships***, based on an understanding of their interdependence.

## **2.5. BENEFITS OF QUALITY MANAGEMENT**

The potential benefits offered by Quality Management techniques are varied and the consensus from various studies is that it has been successfully applied in other industries and can be very beneficial in the construction industry (Chindo, and Adogbo, 2011). The application of quality management programs enables companies to improve long-term relationships, product and process improvement, create a harmonious team spirit, more customer focused, employee job satisfaction, increased revenues, reduction in quality costs, decreasing waste and rework, better coordination of activities, improved customer service and market competitiveness, enhance professionalism and skills in all spheres of the construction sector, encourage open addressing of problems, better control over the construction process, improved safety, subcontractors with proper quality management systems, and closer relationships with subcontractors and suppliers and help to achieve the intended project objectives and benefits (Low and Peh, 1996; Low and Teo., 2004; Khan, 2003; Chindo and Adogbo, 2011). Thus, Competitive advantage is created in these firms by providing that environment of sustainability of competitiveness of a firm against intense global competition through continuously improving every facet of the firm (Cheng and Liu, 2007).

## **2.6 OBSTACLES TO IMPLEMENTING QUALITY MANAGEMENT PROGRAMME**

There is evidence of disappointing results in many organisations' attempt to implement quality management due mainly to obstacles in implementation (Yusoff et al, 2006). Obstacles in implementation arise from improper attitudes and

perception of management and employees, inadequate resources and training as well as inappropriate environments for implementation.

Bubshait and Al-Atiq (1999) enumerated eight obstacles to Quality Management as seen by contracting firms and they include: High cost, especially initial cost, Resistance to change at various levels in the organization, Loss of productivity of the workforce due to the effort exerted in learning the new system and implementation, besides their regular duties, Management interference, Limited ability of personnel, Remote job sites, making it hard to control and track the quality system implementation in all sites, Communication problems between personnel because of language differences and Cultural differences within the workforce.

In reality, no firm can fully implement TQM; it is a continuous improvement process and as such never ending. Its culture and philosophy must infiltrate an organization, and can thrive only under senior management when it establishes it as a top management priority and commit itself to its success.

Hassin et al., (2007) recommend that training and education are key factors in the implementation of TQM. Other factors include customer satisfaction, employee participation and quality policy. Love et al., (2000) made a case for a cultural and behavioural shift in the mind-set of practitioners, academics and professional institutions if the construction industry is to improve its performance and competitiveness. This view was reiterated by Ramachandran (2010) and Mahmood and Mohammed (2008) stating that the implementation of TQM requires a culture change and change in management behaviour.

## **2.7 CRITICAL SUCCESS FACTORS (CSFs) FOR TQM**

To successfully implement TQM it is important to identify the factors required for the implementation process. Saraph et al (1989) defined CSFs as “critical areas of managerial planning and action that must be practised to achieve effective quality management in a business unit”. These factors may be constructs with latent variables which cannot be measured directly, but can still be assessed indirectly from their manifestation. Saraph et al., (1989) in a pioneering study developed a quality management instrument, identifying eight (8) critical success factors of TQM: Role of divisional top management and quality policy, Role of quality department, Training, Product/service design, Supplier quality management, Process management/operating, Quality data and reporting and Employee relations. Their study had considerable influence on later studies, and subsequent research has resulted in the development of different frameworks and constructs based on varying perceptions and objectives (Zhang, 2000). Although these frameworks or models have different TQM approaches, they all lay emphasis on leadership, strategic planning, customer and market focus, human resources focus, process management, continuous improvement, supplier management and business results in one way or the other ( Dale, 20003; Conca et al., 2004).

The constructs or critical success factors identified in frameworks for TQM point to two categories of factors; soft and hard dimensions of TQM (Rahman, 2004; Powel., 1995; Dow et al., 1999; Oakland., 2000). “Hard” components of TQM concentrate on the tools and techniques, systems and the supplementary measurement and control of the work process, ensuring conformance to performance standards and the reduction of variability whereas “soft” components relate to areas behavioural concerns such as increasing customer orientation, employee management,

organizational and quality culture. These dimensions are interrelated and together are very important for the successful implementation of TQM.

A great deal of research has been conducted in the field of TQM and its implementation. The study by Sila and Ebrahimpour (2002) reviewing 347 articles on TQM from 1989 to 2000 identified seventy-six studies that employed factor analysis to extract factors for successful implementation of TQM. Out of these, they compiled twenty five TQM constructs which are widely used by researchers to measure TQM implementation. Their study revealed eight common cores of the factors viz: customer focus and satisfaction, employee training, leadership and top management commitment, teamwork, employee involvement, continuous improvement and innovation, and quality information and performance.

Literature also reveals that different countries have adopted similar TQM factors as criteria for quality awards under different titles (Metri, 2005). However, the criteria for all these quality awards are derived from three basic frameworks: the Malcolm Baldrige National Quality Award (MBNQA), the European Quality Award (EQA) now called European Foundation for Quality Management (EFQM) Excellence Award and the Deming Prize (DP).

A comparative description of the TQM constructs derived from major studies on TQM, the quality management program (three basic award frameworks) in the MBNQA, EFQM, and DP is depicted in Table 2.4.

**Table 2.4a. Summary of Studies on Success Factors for TQM Implementation**

**Frameworks**

Saraph et al. (1989)	Flynn et al. (1994)	Ahire et al. (1996)	Black and Porter (1996)	Zhang 2000	Sila& Ebrahimpour(2002)
Management leadership	Top management support	Top management commitment	Corporate quality culture Strategic quality management	Leadership	leadership and top management commitment
Role of the Quality Department					
Training		Employee training		Education and Training	Employee Training
Employee relations	Workforce management	Employee empowerment	People management	Employee Participation	Employee involvement
		Employee involvement			
Quality data and reporting	Quality information	Internal quality information usage			quality information and performance
Supplier quality management	Supplier involvement	Supplier quality Management & performance	Supplier partnerships	Supplier Quality Management	
Product/service design	Product design			Product Design	
Process management	Process management	Design quality management		Process Control & Improvement	
	Customer involvement	Customer focus	customer management	Customer Focus	customer focus and satisfaction
		Benchmarking			
				Vision and Plan Statement	
			Teamwork structures		Teamwork
				Evaluation	
				Quality System Improvement	continuous improvement and innovation
			Operational quality planning		
		Statistical process control usage		Recognition and Reward	

**Table 2.4b Summary of studies on success factors for TQM implementation**

Kaynak,H(2003)	Conca et al(2004)	Sila & Ebrahimpour(2005)	Baidoum & Zairi(2003)	MBNQA (2000)	EFQM model(2004)
Management leadership	leadership	leadership	top management commitment and involvement	Leadership	Leadership
Training	Training				
Employee relations	SpECIALIST training	Human resource management	employee commitment and involvement	Human resource focus	Employee management
Quality data and reporting		Information and Analysis		Information and analysis	
Supplier quality management	Supplier management	Supplier management			Resources
Product/service design					
Process management	Process management	Process management		Process management	Processes
	Customer focus	Customer focus	customer-driven System and processes	Customer and market focus	
	Learning				
	Continuous Improvement		continuous improvement culture		
	Quality Planning	Strategic Planning		Strategic planning	Planning and strategy
	Communication				

### 2.7.1 Selection of Factors for Survey

From the summary of the literature review of the 12 frameworks, a total of 20 critical factors with their frequencies of occurrence indicated against them (Table 2.5)

The factors were regrouped to ensure that factors addressing similar issues were combined into one construct. A final list of nine constructs for this study: 1. Top management commitment and leadership; 2. Quality planning; 3. Customer focus; 4. Human resource management; 5. Process management; 6. continuous improvement; 7. supplier management; 8. Information Analysis and Evaluation; 9. Teamwork

**Table 2.5 Frequency of Occurrence of Critical Success Factors in Literature.**

No Of CSF	CRITICAL SUCCESS FACTORS	FREQUENCY OF OCCURRENCE
1	Top management commitment and leadership	12
2	Employee relations	12
3	Customer management	9
4	Supplier quality management	9
5	Process management	9
6	Information and Analysis	7
7	Education and Training	5
8	Planning	5
9	Continuous Improvement	4
10	Product/service design	4
11	Teamwork	2
12	Role of the Quality Department	1
13	Employee involvements	1
14	Benchmarking	1
15	Vision and Plan Statement	1
16	Evaluation	1
17	Communication	1
18	Statistical process control	1
19	Learning	1
20	Recognition and Reward	1

**Table 2.6 Constructs With Their Inherent Success Factors**

NO. OF CONSTRUCT	TQM CONSTRUCT	CRITICAL SUCCESS FACTORS
1	Top management commitment and leadership	Top management commitment and leadership
2	Human resource management	Employee relations
		Employee involvements
		Education and Training
		Recognition and Reward
3	Customer management	Customer management
4	Supplier quality management	Supplier quality management
5	Process management	Process management
		Product/service design
6	Information Analysis and Evaluation	Information and Analysis
		Evaluation
7	Planning	Planning
		Vision and Plan Statement
		Communication
8	Continuous Improvement	Continuous Improvement
		Benchmarking
		Statistical process control
9	Teamwork	Teamwork
		Role of the Quality Department
		Learning

**2.7.1.1 Top Management Commitment and Leadership**

The degree of visibility and support that management takes in implementing a total quality environment is critical to the success of TQM implementation (Low and Teo, 2004). Without upper –management involvement, commitment and leadership, a TQM program cannot succeed. Allocation of budgets, planning for change and provision of monitoring structures of progress of works are normally done by top management which clearly accentuate the importance of top management involvement in TQM implementation. Lack of top management commitment is one of the reasons for the failure of TQM (Zhang, 2000). Though its self is not sufficient for total failure of TQM, it is however, very important that top management

commitment is essential so as to provide drive and long term vision for the firm in its attainment of quality standards. It provides leadership in employee empowerment and involvement in quality management activities (Metri, 2005), planning and implementation of organisational changes, establishing quality policies, deploying quality goals and resources.

Baidoun et al., (2003) pointed out that this success factor is consistent with all previous studies and the existing literature (e.g., Ahire et al., 1996; Black and Porter, 1996; Flynn, et al., 1994; Saraph et al., 1989; Zhang et al., 2000), and with all major quality awards (e.g., the Malcolm Baldrige National Quality Award; the European Quality Award; and the Deming's Prize). He asserts that there is unanimity in opinion among these authors and any author of quality management on the importance of top management commitment and participation as an essential quality management element. Research has revealed that the major problem of quality management implementation is a lack of top management commitment and participation, which eventual leads to its failure.

#### **2.7.1.2 Human Resource Management**

Management participation in quality activities is not enough to contribute to quality improvements as costs of total quality is difficult to control by management alone (Khan, 2003). Employees are encouraged to show commitments to quality issues. When workers themselves are committed to delivering quality, they take greater initiative towards meeting product and process specifications; detecting and eliminating bottlenecks; improving product and process designs and setting realistic

yet challenging performance targets. This is better enhanced if resources are provided for employees for effective training and developmental activities.

Training programs attempt to teach employees how to perform particular activities or a specific job. Education, on the other hand, is much more general, and attempts to provide employees with general knowledge that can be applied in many different settings (Rao et al., 1999)

The importance is recognized by every quality expert. With TQM, quality becomes everyone's responsibility and the training must be targeted for every level of the company (Arditi and Gunaydin, 1997). Customized training plans or programmes should be organised for management, engineers, technicians, home and field office staff, support personnel and field labour in line with quality objectives and goals of the organisation. The training can be in a form of in-service, external experts on quality, seminars on quality improvement programmes or TQM philosophy. In order to have effective learning activities, a firm should continually encourage employees to accept education and training. If education and training on TQM concepts become widely accepted throughout the construction industry, workers switching from one company to another should require less TQM training since all workers would have received basic quality awareness in their previous employment.

#### **2.7.1.3 Customer Management**

In the TQM philosophy, total customer satisfaction is the goal of entire system, and a persistent customer focus improves a firm's performance. The function of the construction organisation is to provide customers with facilities that meet their

needs. Customers may be either internal or external. The external customer is the consumer or client, in other words the end user of the products or services being offered. An internal customer is a second process or department within the organization, which depends on the product of the first. These internal customers receive products and information from other groups of individuals within their organization. Thus, satisfying the needs of these internal customers is an essential part of the process of supplying the final external customer with a quality product. Every party in a process has three roles: supplier, processor, and customer. Juran defined this as the triple role concept. These three roles are carried out at every level of the construction process. It is also established that increased market competition has led many firms to emphasize customer focus hence customer satisfaction to gain a competitive edge. The greater the degree of market competition, the more positive the relationship between the quality management practice of customer focus and organizational performance.

#### **2.7.1.4 Supplier Management**

Supplier quality is an important dimension of quality management as defective incoming materials and parts lead to process and product quality problems (Kanapathy, 2007). Purchased materials and parts often become the major contributors to quality problems. Most research identified good supplier relationship as a necessity of maintaining competitive advantage which leads to quality supplier of products and services.

### **2.7.1.5 Process Management**

A process is a way of getting things done. A process consists of the tasks, procedures and policies necessary to carry out an internal or external customer need (Rizwan et al., 2003). According to the TQM philosophy if the process is correct, so will be the end result (product). Thus the organization should work to improve the process so as to improve the end product or service.

### **2.7.1.6 Information Analysis and Evaluation**

Documentation and control of document is an important element which facilitate in the review process, assessment and attainment of quality management in a firm.

Review/Audit is an organised effort that promotes quality in designs and construction works.

It is systematic and independent examination to determine whether quality activities and related results comply with planned arrangements, and whether these arrangements are implemented effectively and are suitable to achieve objectives. Quality audit can be used for quality system, processes, products, and services. One purpose of a quality audit is to evaluate the need for improvement or corrective action (ISO 8402, 1994). There are several peer reviews, however, the important ones are organisational peer review and projects peer review. The reviews can be focusing on procedures and practices in an organisation, designs (aesthetics, functionality capacity, calculations and capacity), standards and regulations, and construction processes. Quality programs should also be reviewed and its status and adequacy to the firm should also be checked regularly. Audit/Review can also be done on Progress and the incorporation of improvements and “lessons learned” into the plan for future years.

#### **2.7.1.7 Planning**

Strategic quality management concepts must be put into practice by the inclusion of quality objectives in the strategic planning process and through strategic planning frameworks, like quality function deployment (QFD), which provides specific instructions for approaching, executing, and evaluating the development of strategic concepts.

This should be used to plan, develop and implement quality strategies that should result in improving customer and employee satisfaction.

#### **2.7.1.8 Continuous Improvements**

Continuous improvement is essential for the very survival of a company due to ever changing tastes of customers and pressures from competitors. Incremental and breakthrough improvements enhance productivity by decreasing costs and/or improving performance. Performance is enhanced through greater responsiveness, shorter cycle times for new products or services, better products, unique marketing, engineering or production strategies. (Khan, 2003)

The goal of continuous improvement is common to many managerial theories. This process consists of nine steps as below: Identify the process, Organize a multi-disciplinary team to study the process and recommend improvements, Define areas where data is needed, Collect data on the process, Analyze the collected data and brainstorm for improvement, Determine recommendations and methods of implementation, Implement the recommendations outlined in step six, Collect new data on the process after the proposed changes have been implemented to verify their effectiveness, and Circle back to step five and again analyze the data and brainstorm for further improvement.

The nine-step cycle emphasizes on: focusing the progress, measuring the process, brainstorming for improvement and verification and re-measurement.

Under TQM, management in the construction industry has two functions:

- (1) To maintain and improve current methods and procedures through process control and
- (2) To direct efforts to achieve, through innovation, major technological advances in construction processes.

The incremental improvement of the process is achieved through process improvement and control. In every construction organization there are major processes by which all the work is accomplished. However, there are innumerable parts in the construction process. Through the use of flow diagrams, every process can be broken down into stages. Within each stage, input changes to output, and the methods and procedures directing the change of state (i.e. the construction procedures) can be constantly improved to better satisfy the customer at the next stage. During each stage the employees should communicate closely with their supplier and customer to optimize the work process for that stage. This requires each employee to recognize their place in the process and their respective supplier and customer.

Benchmarking should be used periodically, and reengineering can be launched occasionally to achieve dramatic breakthrough. A strong emphasis in process improvement centres on measurement of variation, the control of variation, and the knowledge of variation to seek improvement. This analysis is referred to as statistical process control or statistical analysis..

### **2.7.1.9 Teamwork**

Quality teams provide companies with the structured environment necessary for successfully implementing and continuously applying the TQM process (Arditi and Gunayadin, 1997). The eventual aim of the team approach is to get everyone, including contractors, designers, vendors, subcontractors, and owners involved with the TQM process. Team work is necessary to encourage competitive activities internally among employees and externally with respect to suppliers and customers.

According to Arditi and Gunayadin (1997), teamwork among construction parties such as structural, electrical, environmental, civil engineers, architects, and owners is essential to reach the quality goals for design and construction. Again, a well planned team structure ensures that quality training is conducted and the continuous improvement processes are well executed in a construction firm.

At the company level, teams can be composed of department representatives who are necessary to implement TQM throughout the organization. The same team approach can be used at the project level.

The formation of Initial Pilot Project Teams not only provides the opportunity to resolve “burning issues” but also serves primarily to help management assess the magnitude of resource, time, and management involvement required by a TQM process on a small scale.

## 2.8 TOOLS AND TECHNIQUES FOR TQM

Total quality management has been developed around a number of critical factors. However, TQM is much more than a number of critical factors; it also includes other components, such as tools and techniques for quality improvement (Tarí and Sabater, 2003).

The techniques and tools are vital to support and develop the quality improvement process (Tarí and Sabater, 2003).

It is evident that some firms fail when they implement TQM because suitable quality management methods such as tools and techniques for quality were not used (Zhang, 2000; Tarí and Sabater, 2003). Researchers have identified a number of tools and techniques for quality improvement. Tool is defined as a device with a clear function and usually applied on its own whereas a technique has a wider application and is understood as a set of tools (Tarí and Sabater, 2003), hence, Ishikawa(1985), Dale (2003), identify tools and techniques most widely used by firms as shown in table

2.7

**Table 2.7 Commonly Used Tools and Techniques**

The seven basic quality control tools	The seven management tools	Other tools	Techniques
Cause and effect diagram	Affinity diagram	Brainstorming	Benchmarking
Check sheet	Arrow diagram	Control plan	Departmental purpose analysis
Control chart	Matrix diagram	Flow chart	Design of experiments
Graphs	Matrix data analysis method	Force field analysis	Failure mode and effects analysis
Histogram	Process decision programme chart	Questionnaire	Fault tree analysis
Pareto diagram	Relations diagram	Sampling	Poka yoke
Scatter diagram	Systematic diagram		Problem solving methodology
			Quality costing
			Quality function deployment
			Quality improvement teams
			Statistical process control

Source: Tarí and Sabater (2003)

### **2.8.1 Basic Quality Control Tools**

It is prudent to start with the more simple tools and techniques: Check-sheet, Check list, Histogram, Pareto Diagram, Cause-and-Effect Diagram (Fishbone Diagram), Scatter Chart and Flowchart.

#### ***Check-sheet***

Check-sheet is used to record events, or non-events (non-conformances). They can also include information such as the position where the event occurred and any known causes. They are usually prepared in advance and are completed by those who are carrying out the operations or monitoring their progress. The value of check-sheet can be retrospective analysis, so they help with problem identification and problem solving.

### ***Checklist***

Checklist is used to tell the user if there is a certain thing, which must be checked. As such, it can be used in the auditing of quality assurance and to follow the steps in a particular process

### ***Histogram***

Histogram provides a graphical representation of the individual measured values in a data set according to the frequency of occurrence. It helps to visualize the distribution of data and there are several forms, which should be recognized, and in this way they reveal the amount of variation within a process. It should be well designed so that people who carry out the operation can easily use them.

### ***Pareto Analysis***

It is a technique employed to prioritize the problems so that attention is initially focused on those, having the greatest effect. It was discovered by an Italian economist, named Vilfredo Pareto, who observed how the vast majority of wealth (80%) was owned by relatively few of the population (20%). As a generalized rule for considering solutions to problems, Pareto analysis aims to identify the critical 20% of causes and to solve them as a priority.

### ***Cause and Effect Diagram (Fishbone Diagram)***

Cause and Effect Diagram, which was developed by Karo Ishikawa, is useful in breaking down the major causes of a particular problem. The shape of the diagram looks like the skeleton of a fish. This is because a process often has a multitude of tasks footing into it, any one of which may be a cause. If a problem occurs, it will

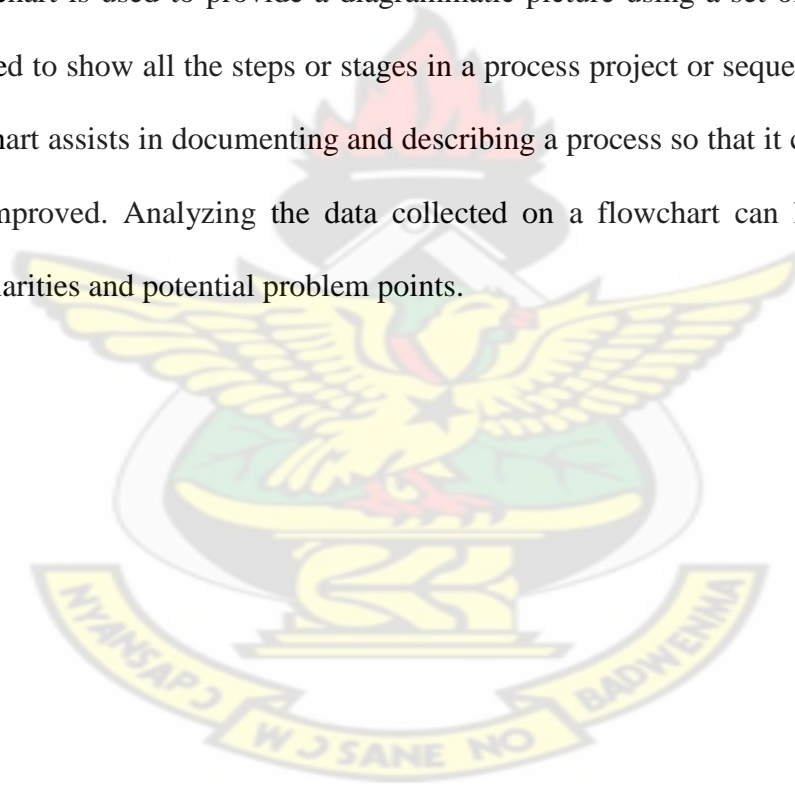
have an effect on the process, so it will be necessary to consider the whole multitude of tasks when searching for a solution.

### ***Scatter Diagram***

The relationship of two variables can be plotted in the scatter diagrams. They are easy to complete and obviously linear pattern reveals a strong correlation.

### ***Flowcharts***

Flow chart is used to provide a diagrammatic picture using a set of symbols. They are used to show all the steps or stages in a process project or sequence of events. A flowchart assists in documenting and describing a process so that it can be examined and improved. Analyzing the data collected on a flowchart can help to uncover irregularities and potential problem points.



## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

This chapter discusses the methodology adopted for the study. Research methodology involves the systemic rules and procedures upon which this research agenda is based and against which the data collected is interpreted and the findings evaluated (Ahadzie, 2007).

As noted earlier in chapter one, the aim of this research is to develop a framework for the introduction of Total Quality Management in Real Estate Development firms in Ghana. Generally, to achieve the aim of a study, one of the important areas to consider is the kind of method that is adopted (Naoum, 2001). For this reason, the research methodology adopted in this study is in three distinct phases, but complementary to each other. The three phases upon which these methods were applied to are;

- preliminary phase;
- second phase; and
- finally, data analysis phase

#### **3.2 PRELIMINARY PHASE**

Information on TQM was gathered from literature and the sources of the reviewed literature were in two categories:

- **Primary source:** This includes desk review of both published and unpublished material including policy documents, newspapers, internet, journals, articles and reports on quality and quality management.

- **Secondary source:** - This includes textbooks on construction management and quality management.

The **Preliminary phase** was to recognise, analyse to get a deeper understanding of theoretical concepts related to the construction of MHBPs and TQM. The purpose of it is to enhance the understanding of the theory regarding quality management in the construction industry and also to give an overall view of the research statement and helps the researcher to meet the objectives highlighted

The information gathered from the preliminary phase helped guide the second phase of the fieldwork, which is distribution of questionnaires and collection of data from the key respondents.

### **3.3 SECOND PHASE**

The second phase of the study includes:

- research method employed;
- design of research instrument and;
- data collection

In collecting data for analysis the strategy and approach to deploy are very crucial for and effective and reliable data to address the purpose of the research.

### **3.3.1 Research Strategy and Approach to Data Collection**

Research strategy is defined as the way in which the research objectives can be questioned (Naoum, 2001). There are two types of research strategies, and this includes quantitative and qualitative. For this study, quantitative method was used in order to give a broad generalized set of findings concisely and parsimoniously by measuring reaction of large number of people to limited questions which helps in comparison and statistically aggregating of data (Zhang, 2000) and it requires the use of standardized instrument so that the varying perspectives and experience of people can fit a limited number of predetermined response categories, to which numbers are assigned and measured statistically.

The approach to be adopted for collecting data in social science research depends on the nature of the investigation and the type of data and information that are required and available (Naoum, 2001). This includes experimental, archival, case study, problem –solving and survey (Naoum, 2001). This study was based on survey because; it enabled the researchers to use smaller groups of people to make inferences about larger groups which was prohibitively expensive to study (Holten and Burnett, 1997). Again, researchers on TQM such as Seraph et al. (1989), Badri et al. (1995), Black and Porter (1996), Flynn et al., (1994), Ahire et al. (1996), Quazi et al., (1998), Rao et al., (1999), Terziovski & Samson (1999), Zhang (2000), Kaynak (2003) and Conca et al., (2004) used surveys in their studies.

### 3.3.2 Questionnaire Development

The data for this research was collected through the use of questionnaires targeting quality managers in real estate developers in Ghana:

- i. to investigate current practices of quality management in the real estate industry;
- ii. to identify any present problems with these practices;
- iii. to identify critical success factors in TQM;
- iv. to assess how the quality managers in the real estate industry perceive these critical success factors and;
- v. finally to develop a framework leading to its implementation in the real estate industry in Ghana.

The Questionnaire was in two sections.

- Section one was developed to elicit information to address objectives one (i) and two (ii).
- Section two was also developed to address objectives three (iii) four (iv) and five(v)

#### 3.3.2.1 Section One

Section one is divided into two Parts, Parts A and B. Part A is to identify the types of companies and the kind of personnel from whom information is being sought and indeed this is to establish the credibility of the data. The information included in Part A of section one was work experience of personnel, position in company, types of construction works performed, years in business, annual volume of work and number of employees. Part B covers questions on eight (8) key areas of Quality

Management (QM) and this includes perception of quality, data acquisition methods, quality improvements, review/audits, training, teamwork, tools and techniques, quality policy and one (1) question on obstacles in quality management implementation.

### **3.3.2.2 Section Two - TQM Construct Development and Measure**

Regarding the development of the instrument for the quality factors (construct), the method adopted by Saraph et al (1989), Zhang (2000), Conca et al., (2004) was chosen for the study. This method was developed by psychologists and it has been widely accepted in the development of an instrument for measuring variables in social sciences (Conca et al., 2004). For this thesis, the method was pursued in three stages namely,

- Stage 1- identification of critical success factors
- Stage 2 – measurement of construct by selecting initial quality items
- Stage 3 – performing reliability, detailed item analysis and constructs validity measurement. See data analysis in section 3.4

#### ***Stage 1***

Stage one involves carrying out review of literature in order to identify critical success factors on TQM. The process of developing the questionnaire was based on the review of empirical works done by (Saraph et al. (1989), Badri et al. (1995), Black and Porter ( 1996), Flynn et al (1994), Ahire et al. (1996), Kaynak(2003) Baidoun and Zairi (2003), Aspinwall et al., (2005), Rao et al., (1999). Nine constructs were developed with Eighty –five (85) preliminary quality items selected.

## *Stage 2*

Stage two involves ensuring that the instrument covers all the relevant spheres of quality management and the whole proposed survey instrument is well worded and understood. Thus, content validity. An instrument has content validity if researchers agree that the instrument is made up of a group of items covering the issues to be measured (Conca et al., 2004). Content validity is judged by the researchers subjectively. An initial questionnaire was sent to three experts on the subject (an academician well versed in quality management studies, a project manager in a real estate firm, and a quality management consultant) to check the comprehensiveness of the items under each construct. The feedback from these experts was used to improve the content as well as ease understanding to eliminate ambiguity and duplication of test. The final questionnaire had 65 initial quality items for evaluation. See table 3.1. In all, Sixty-five (65) items or questions were developed and measured within a five point Likert scale of 1-5 where;

1=not significant; 2=slightly significant; 3=moderately significant; 4=very significant; 5=exceedingly significant. (Table 3.1, Appendix A)

**Table 3.1 TQM Construct and Questionnaire Sources**

CONSTRUCT NO.	TQM CONSTRUCT	CRITICAL SUCCESS FACTORS IDENTIFIED IN LITERATURE	NO. OF ITEMS FOR QUESTIONNAIRE	SOURCES OF ITEMS FOR QUESTIONNAIRE
1	Top management commitment and leadership	<ul style="list-style-type: none"> <li>• Top management commitment and leadership</li> </ul>	7	Saraph et al(1989) Kaynak,H(2003) Baidoun et al (2003) Aspinwall et al (2005) ISO:9001:2000
2	Human resource management	<ul style="list-style-type: none"> <li>• Employee relations</li> <li>• Employee involvements</li> <li>• Education and Training</li> <li>• Recognition and Reward</li> </ul>	12	Kaynak(2003) Baidoun et al(2003) Seraph et al(1989) Conca et al(2004) ISO:9001:2000
3	Customer management	<ul style="list-style-type: none"> <li>• Customer management</li> </ul>	7	Baidoun et al (2003) Conca et al(2004) Rao et al(1999)
4	Supplier quality management	<ul style="list-style-type: none"> <li>• Supplier quality management</li> </ul>	7	Conca et al(2004) Kaynak(2003) ISO:9001:2000
5	Process management	<ul style="list-style-type: none"> <li>• Process management</li> <li>• Product/service design</li> </ul>	6	Baidoun et al(2003) Conca et al(2004) ISO:9001:2000
6	Information Analysis and Evaluation	<ul style="list-style-type: none"> <li>• Information and Analysis</li> <li>• Evaluation</li> </ul>	6	Conca et al(2004) Kaynak(2003) ISO:9001:2000
7	Planning	<ul style="list-style-type: none"> <li>• Planning</li> <li>• Vision and Plan Statement</li> <li>• Communication</li> </ul>	8	Conca et al(2004) Seraph et al (1989) ISO:9001:2000
8	Continuous Improvement	<ul style="list-style-type: none"> <li>• Continuous Improvement</li> <li>• Benchmarking</li> <li>• Statistical process control</li> </ul>	8	Conca et al(2004) Baidoun et al(2003) ISO:9001:2000
9	Teamwork	<ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Role of the Quality Department</li> <li>• Learning</li> </ul>	4	Flynn et al(1994)

### **3.3.3 Data Collection**

#### **3.3.3.1 Sampling Technique**

##### **3.3.3.1.1 Population**

In order to achieve the objectives of the study, members of Ghana Real Estate Developers Association (GREDA) were selected to be the population. The primary business of most members of GREDA is the construction of MHBP. The repetitive nature of the process in the construction of MHBP makes the choice suitable. Unlike the manufacturing and service industry where lots of researches on TQM have been undertaken, the design and construction process in MHBP will make lessons easily learnt to be incorporated in construction practices which the traditional one-off projects cannot provide that opportunity.

##### **3.3.3.1.2 Sampling Frame**

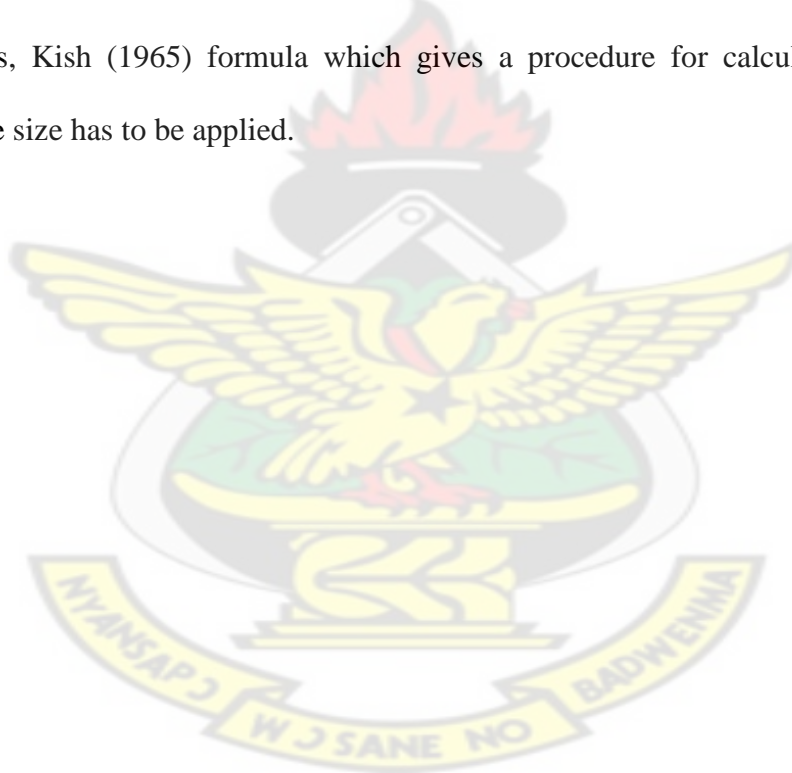
The study drew its sample frame from the registered list of members kept by the secretariat of GREDA. There were 353 registered members of GREDA as at March, 2010 when the study was undertaken. To this number, 96.2% of them operate in Greater Accra Region (capital town of Ghana). Kumasi which is regional capital of Ashanti Region and the second largest city in Ghana has 2.6% of the total number of the GREDA members. The remaining eight Regions in Ghana account for 1.2% of the GREDA members. Given the relatively insignificant size of the membership in the other regions, the survey was limited to the Greater Accra and Ashanti Regions. This means that the total number of GREDA members in both Accra and Kumasi is approximately 349.

According to Kish (1965) and Israel (1992), a sampling frame list should be screened to eliminate or identify foreign elements. Hence, decision was taken and the list was

screened to ensure that firms selected for sampling have more experience and active in project activities per year since the list contain new members to GREDA and non –active members as well. Consequently the sample frame was 169 firms.

#### **3.3.3.1.3 Sample Size Determination**

Sample size is defined as a subset or proportion of the total population (Neumann, 2007). The sample size, as Neumann (2007) indicated ought to depend on the proportions of the population that have the characteristics the researcher is interested in. To determine the minimum sample size of GREDA members in these two regions, Kish (1965) formula which gives a procedure for calculating minimum sample size has to be applied.



# KNUST



Building Technology of Kwame Nkrumah University of Science and Technology (KNUST) for assessment was short.

#### **3.3.3.2 Survey Participant**

The survey participants in this study are project managers/operations managers or site managers and the chief executives of real estate's firms. These respondents are selected because Kumar et al., (1993) has indicated that the selections of key respondents are generally based on those who have knowledge about the problem and subject area being researched into. Indications are that their responses will minimise response error.

In this study project managers/operations manager are selected because it has been established by fact that most project engineers have the widest exposure to construction projects, and are involved in various project phases including planning, design, and construction. They are most often than not responsible for setting up and implementing quality management policies in the firms, hence, their roles in Quality Management are explicit.

#### **3.3.3.3 Distribution and Collection of Data**

Data collection is a term used to describe a process of preparing and collecting data and the purpose of these processes is to obtain information to keep on record, to make decisions about important issues, and to pass information on to others. The developed questionnaires were distributed to and retrieved in person from real estate firms in Greater Accra and Ashanti Regions who have active construction sites. This process of distribution and retrieving of the questionnaires in person was taken

for two reasons as suggested by Ahadzie (2007), first, to make sure that the questionnaires get to the intended recipients and secondly, to help improve the response rate. The top management of these real estate firms were (the chief executive or project manager or site engineer) given one set of questionnaire for a response. In all, some of the questionnaires were collected back on the same day while others were collected later from the respondent.

Out of the 103 questionnaires distributed, 67 were returned .However, 5 were found to be invalid for analysis as a result of improper filling yielding an effective response rate of 60.2% This response rate is considered adequate as, according to Oladapo (2005), Idrus and Newman (2002) and Ellhag and Boussabaine (1999), a response rate of 30% is good enough in construction studies.

### **3.4 DATA ANALYSIS**

Statistical package for social scientist (SPSS.16) was used to analyse the data retrieved from the survey as the research was more of quantitative in nature.

Measurement for reliability was done to determine the measurement scale that had been developed. This would produce consistent results if measurement is done on a repeated basis. This study utilized internal consistency method in determining the instrument reliability with the Cronbach coefficient, Alpha, as the relevant coefficient to evaluate. Construct validity was determine by conducting exploratory factor analysis (through principal component analysis) using SPSS.16

The next section explains how reliability, detailed item analysis and constructs validity measurement were done.

### **3.4.1 Reliability**

Reliability refers whether you get the same answer by using an instrument to measure more than once (Zhang, 2000). Reliability is a statistical tool to measure how reproducible the surveying instrument data is (Zhang, 2000). Four methods are used in measuring reliability namely; the split-halves, test-retested, alternative form and internal consistency methods (Zhang, 2000; Hair et al., 2006). For the purpose of this research internal consistency method is used because it is the most widely used reliable estimate in empirical research (Zhang, 2000; Conca et al., 2004). It is more reliable because it requires simple administration (Suresh Chander et al., 2001). The internal consistency of each factor was determined by examining each item inter-correlation and computing the Cronbach's Alpha. The minimum advisable level is 0.7 (Nunnally, 1978; Cronbach 1951) although it may be reduced to 0.6 in exploratory research (Hair et al., 2006; Conca et al., 2004) and anything less than 0.6 is usually eliminated (Malhotra and Grover, 1998). The proposed success factor whose calculated Cronbach's  $\alpha$  greater than the critical point of 0.70, is said to be highly reliable and internally consistent.

### **3.4.2 Construct validity**

Construct validity is also statistical tool that measures the extent to which the items in a scale measures the same construct (Flynn et al 1994) and can be evaluated by the use of factor analysis. There are two forms of factor analysis; exploratory factor analysis and confirmatory factor analysis (Hair et al 2006). According to Hair et al., (2006) factor analysis condenses or summarise the information into a smaller set of a new composite dimensions (factors).

However with this study exploratory factor analysis was used. There are two methods of exploratory factor analysis; Principal Component Analysis (PCA) and Common Factor Analysis. PCA is appropriate when researcher is primarily concerned with the number of factors.

### **3.4.3 Exploratory factor Analysis (Principal Component Analysis)**

Before conducting principal component analysis, two tests are done to screen the presence of multicollinearity or correlation among the items and then appropriateness of factor analysis.

The two tests are Kaiser-Meyer-Olkin (KMO) and Bartlett's tests. KMO quantifies the degree of inter-correlation among the variables and the appropriateness of factor analysis (Field, 2005).

Bartlett test of sphericity checks for the presence of correlation among the variables and provides the probability that correlation matrix has significant correlation among at least, some of the variables (Hair et al 2007; Field, 2005).

Kaiser-Meyer-Olkin (KMO) measure is performed to check the degree of inter-correlation among the items and the appropriateness of factor analysis. Kim and Mueller (1978) suggested that KMOs in the range of 0.5-0.6 are considered poor, those in the range of 0.6-0.7 are average, those in the range of 0.7-0.8 are considered good, 0.8-0.9 are great and values greater than 0.9 are superb.

From table 4.30 most of the KMO values obtained are greater than 0.7 which indicate that the data is adequate and appropriate for factor analysis

#### 3.4.4 Important Indices

Fowler and Floyd (1995), defines ranking as a comparison among given options, within pairs of options, by cardinality of importance (first, second, third), or that score items one at a time using a common scale, and it also determines the importance of that factor. In this section, Importance Indices were used to rank the variables. The Importance Index (I.I) of determination of significance of factors was adopted because, Enshassi et al., (2007) asserted that to analyse data on ordinal scale (e.g. Likert scale 1-5), the application of Importance Index is also suitable.

Important Index (I I) facilitated the identification of the level of criticality or significance of the critical factors contributing to the successful implementation of TQM in the real estate industry .A ranking of important indices were undertaken to ascertain the most prominent of the factors. The important index determination was adopted from Lim and Alum (1995) and Enshassi et al., (2007) in their study of construction productivity: issues encountered by contractors in Singapore and factors affecting labour productivity in building projects in the Gaza strip respectively.

Having identified factors critical for successful implementation of Total Quality Management in real estate industry through factor analysis, it is necessary to rank these factors according to their relative importance (significance) from the real estate developers view point and it was determined by the formula below

$$\text{Important index (I. I)} = \frac{(5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1) * 100}{(5(n_5 + n_4 + n_3 + n_2 + n_1))}$$

Where:  $n_1$  = number of respondent who answered ‘Not significant’

$n_2$  = number of respondent who answered ‘Slightly significant’

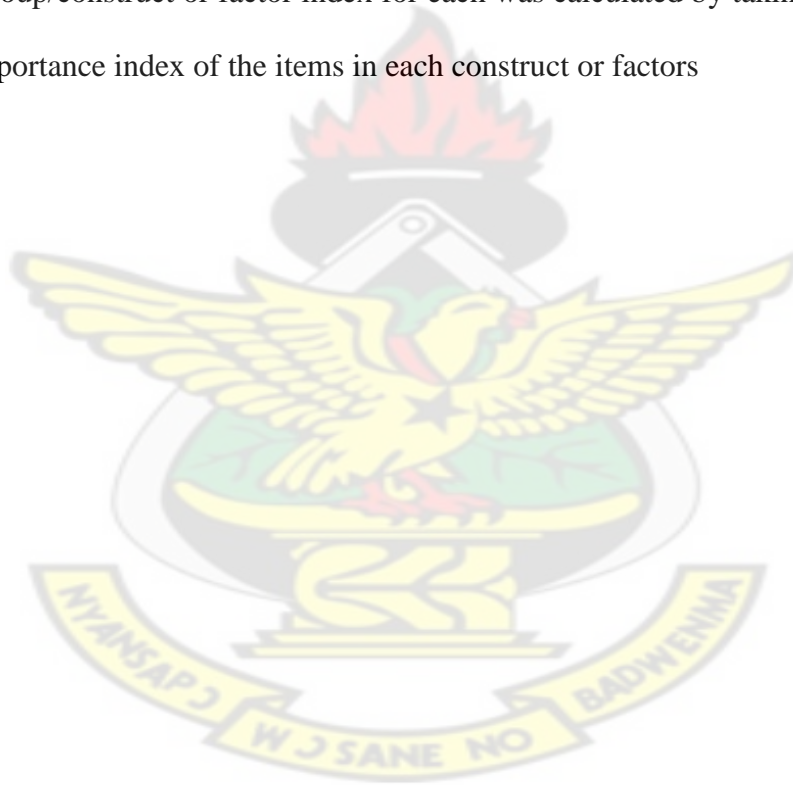
$n_3$  = number of respondent who answered ‘Moderate significant’

$n_4$  = number of respondent who answered ‘Very Significant’

$n_5$  = number of respondent who answered ‘Exceedingly Significant’

The importance index (I) for each item was calculated.

The group/construct or factor index for each was calculated by taking the average of the importance index of the items in each construct or factors



## **CHAPTER FOUR**

### **DATA PRESENTATION, ANALYSIS AND DISCUSSION**

#### **4.1 INTRODUCTION**

This chapter focuses on analyzing the gathered data from respondents through interviews and questionnaire. The descriptive statistics of the data provide quantitative insight to this investigation and as such provides an invaluable contribution to the aims of this research. To this regard, the analyses presented here are based on data from the demographics of respondents' firms and respondents, quality management practices of respondents' firms.

And again, an in-depth analysis is presented to understand the factors which are critical in the implementation of TQM in construction industry, precisely real estate industry in Ghana. The results are actually structured to determine the critical success factors and assess the level of importance of the critical success factors using Factor Analysis and Important Indices.

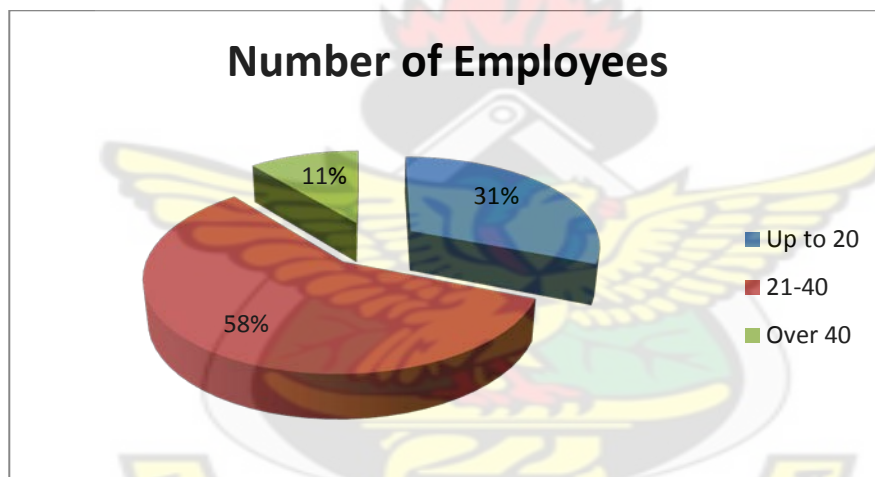
The findings have been presented here in a statistical format such as charts and tables to enable examination and description on the pattern of the responses.

## 4.2 PROFILES OF RESPONDENT FIRMS

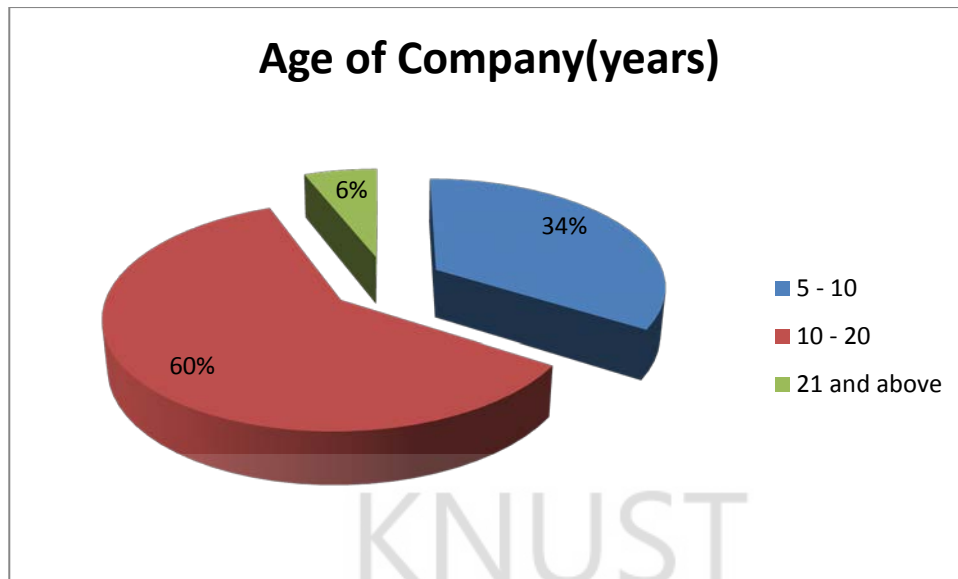
### 4.2.1 The Demographics

Figures 4.1, 4.2, and 4.3 present the Number of the firms' employees, years of operation as a Real Estate Developer (Age Of the company) and Annual Volume of houses built respectively.

In fig.4.1, Respondents were asked to specify the number of employees in their respective firms. 58% of the respondents indicated that they have 21 up to 40 employees, 31% indicated that they have up to 20 employees whereas 11% said they have over 40 employees in their respective firms.

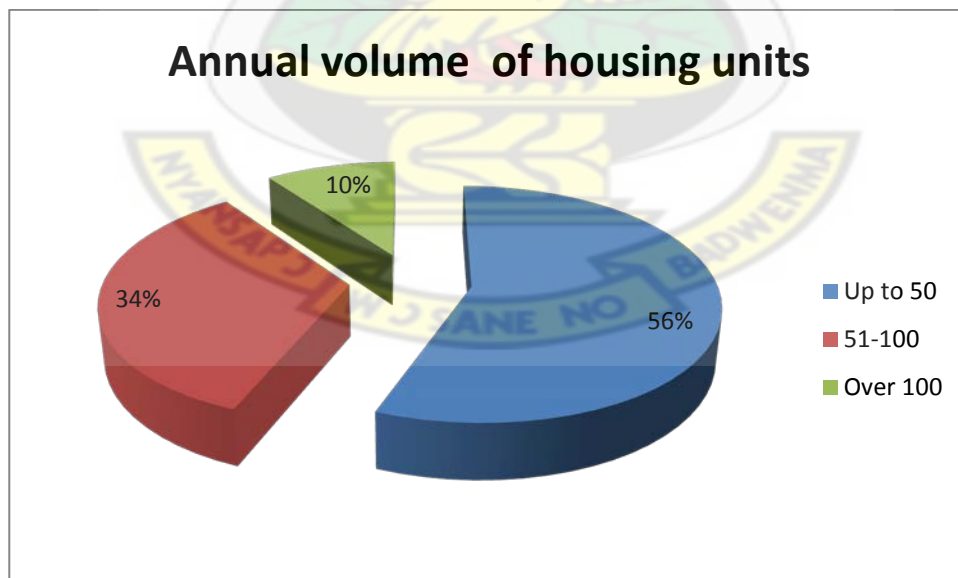


**Fig.4.1 Number of Employees in a Firm**



**Fig.4.2 Age of the companies**

Fig.4.2 summarises how long the respondent had been into real estate business. Whereas 6 % indicate that they have been in the business for over 21 years, 34% said they have been in the business for 5 to 10 years. Majority of these firms (60%) have being in this business for about 10 to 20 years.



**Fig.4.3 Annual Volume of housing unit completed/handled**

Respondents were asked to indicate the average quantity of housing –units they built in a year (refer to fig 4.3). Fifty-six percent (56. %) indicated that they built an average of up to 50 housing units per year. Thirty-four percent (34%) indicated that they built between 50-100 house units per year, and the remaining 10% stated that they deliver over 100 housing units per year.

### **4.3 PROFILE OF RESPONDENTS**

The respondents' profile provides descriptive information on the individual respondents. Specifically, it provides information on position, experience and educational level. This information was necessary to confirm the validity of the results obtained and to develop an understanding of the background respondent with accompanying experience in real estate environment.

#### **4.3.1 Experience of respondents**

The greater the experience of the respondent in this sector the greater the understanding of the questions and necessary requirement for this sector. The highest frequency for the response was (5-10 years) as shown in Table 4.1. This group accounted for 41.9 % of the respondents. Critically looking at Table 4.1, 58% of the respondents have over 5years of experience, and 25.8% have over 2 years experience.

**Table 4.1 Experience of respondents**

<b>Experience of respondents</b>	<b>0-2</b>	<b>2-5</b>	<b>5-10</b>	<b>10+</b>	<b>Total</b>
Frequency	10	16	26	10	62
% of Response	16.1	25.8	41.9	16.1	100

#### 4.3.2 Position

The position held by respondent in their respective organisation is detailed in Table 4.2. The evaluation of position by respondent was necessary to confirm the validity and reliability of response and to understand the perspective of respondents.

**Table 4.2 Position of respondent in their firms**

Position	Supervisor(Technical)	Manager(management)	Total
Frequency	19	43	62
% of Response	31	69	100

#### 4.3.3 Educational level

The Table 4.3 below provides the educational background of the respondents. The educational background ranges from HND to Masters Degree. Majority, thus, 53% had Bachelors Degree.

**Table 4.3 Educational level**

Educational Level	HND	Bsc	Msc	Phd	Total
Frequency	18	33	11	-	62
% of Response	29	53	18		100

In summary, the information detailed above indicates that the respondents and respondents' firms have reasonable experience in the real estate industry.

For that matter it is accurate to conclude that those who responded to the survey are sufficiently experienced in the real estate industry to provide data which is reliable and valid.

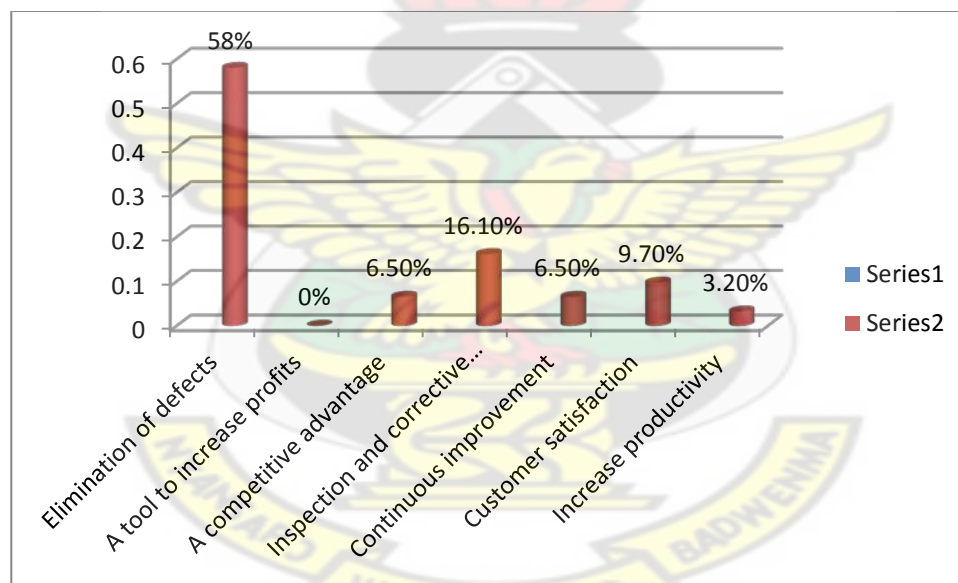
## 4.4 QUALITY MANAGEMENT PRACTICES

The Following are the results gathered from the Quality Management Practices in the Real Estate Firms in Kumasi and Accra. There were 26 questions grouped into eight (8) key areas for respondents to respond.

### 4.4.1 Perception of Quality

*One question was asked in this section to evaluate the organizations perception of quality.*

#### 1. What is your organization's perception of quality?



**Fig.4.4 Response to perception of quality**

The survey found that 58% responding firms (36 out of 62) perceive quality as elimination of defects, 6.5% constituting (4) of the respondents gave a competitive advantage as their response. The figure further shows that (10) respondents representing 16.1% gave a response to the same question as inspection and corrective actions. However, (6) respondents representing 9.7% stated that customer

satisfaction is their organization's perception while the remaining (2) respondents representing 3.2% gave increase in productivity as the answer to the question.

According to majority of respondents, their perception of quality is by the elimination of defects. This means that, emphasis is placed on quality rather than quantity. In view of this, quality is improved leading to cost reduction, productivity enhancement, profit margins increment and achievement of customer satisfaction. Here, quality is not compromised and market share increases enhancing business development.

#### 4.4.2 Data Acquisition

*Eight questions were asked in this section to evaluate the organizations data acquisition practises with respect to performance of operation, employees and customer focus.*

*Question: Do you collect data to measure the performance of operations?*

**Table 4.4 Response on Collection of Data to Measure Performance**

	Frequency	Percentages
<b>Yes</b>	60	96.8%
<b>No</b>	2	3.2%
<b>Total</b>	<b>62</b>	<b>100 %</b>

Sixty (60) respondents out of the (62) representing 96.8% said they collect data to measure the performance of operations. Only two (2) of the respondents

representing 3.2% said they do not collect data to measure the performance of operations.

***Question:** How does your company measure performance?*

**Table 4.5 Response on Collection of Data to Measure Performance**

	<b>Frequency</b>	<b>Percentages</b>
<b>Fewer customer complaints</b>	28	46.7%
<b>Increase productivity</b>	8	13.3%
<b>Profit margins</b>	4	6.7%
<b>Timely completion of projects</b>	20	33.3%
<b>Total</b>	<b>60</b>	<b>100%</b>

It can be deduced from Table 4.5 above that, 46.7% representing majority of respondents measure performance through fewer customer complaints, 13.3% measure performance by the increase in productivity, 6.7% measure performance through profit margins while 33.3% measure performance through timely completion of projects.

**Question:** *What data acquisition methodology do you follow within your organization?*

**Table 4.6 Response on Data Acquisition Methodology they Follow within their Organisation**

	Frequency	Percentages
<b>Maintenance of data base</b>	6	10%
<b>Employee feedback forms</b>	22	36.7%
<b>Progress report</b>	32	53.4%
<b>Total</b>	<b>60</b>	<b>100</b>

When the respondents were asked about the data acquisition methodology they follow within their organization, (6) respondents representing 10% stated the data collection methodology they follow is maintenance of data base. Majority of respondents representing 53.4% use progress report as the data acquisition methodology they follow within their organization. Twenty –two (22) representing 36.7% use employee feedback forms as data acquisition methodology they follow within their organization.

***Question:** How would you rate customer focus and satisfaction in your organization?*

**Table 4.7 Response on Customer Focus and Satisfaction**

	Frequency	Percentages
<b>Very important</b>	32	51.6%
<b>Important</b>	22	35.5%
<b>Somewhat important</b>	8	12.9%
<b>Not important</b>	0	0%
<b>Total</b>	<b>62</b>	<b>100%</b>

From Table 4.7, 51.6% of respondents representing the majority rated customer satisfaction in their organization as very important. Thirty-five percent (35%) are of the view that, customer satisfaction is important while 8% of respondents feel that, customer satisfaction is somewhat important. However, none of them rated customer satisfaction as not important.

***Question:** Do you have a system for gathering customer suggestion?*

**Table 4.8 Response on Customer Suggestions**

	Frequency	Percentages
<b>Yes</b>	48	77.4%
<b>No</b>	14	22.6%
<b>Total</b>	<b>62</b>	<b>100</b>

48 respondents representing 77.4% have a system for gathering customer suggestion while 14 representing 22.6% do not have a system for gathering customer suggestion.

***Question:** If yes, how do you gather customers' suggestion(s)?*

**Table 4.9 Response on Customer Suggestions**

	Frequency	Percentages
Customer feedback forms	26	54.2%
Questionnaire surveys	2	4.2%
Complaints forms	20	41.7%
<b>Total</b>	<b>48</b>	<b>100%</b>

Out of the (48) respondents who said they have a system for gathering customer suggestion, (26) of them representing 54.2% said they gather customer suggestion through customer feedback forms. Two (2) of the respondents constituting 4.2% said they use questionnaire survey while (20) of the respondents representing 41.7 % said they gather customer suggestion through complaints forms.

***Question:** Do you have a system for gathering employees' suggestion(s)?*

**Table 4.9 Response on Employees' Suggestion**

	Frequency	Percentages
<b>Yes</b>	50	80.6%
<b>No</b>	12	19.4%
<b>Total</b>	<b>62</b>	<b>100</b>

Majority of respondents representing 80.6% answered that, they have a system for gathering employees' suggestion(s) while 19.4% do not have a system of gathering employee suggestions.

***Question:** If yes, how do you gather employee suggestion(s)?*

**Table 4.10 Response on *Employees' Suggestion***

	Frequency	Percentages
<b>Feedback forms</b>	14	28%
<b>Questionnaire surveys</b>	2	4%
<b>Open forum</b>	34	68%
<b>Total</b>	<b>50</b>	<b>100%</b>

Out of the 50 respondents who said they have a system for gathering employees' suggestion(s), 14 representing 28% said, they use feedback forms to gather employees' suggestion(s). Two (2) representing 4% use questionnaire surveys while 34 representing 68% use open forum.

### ***Summary***

According to the respondents, their organizations collect data to measure the performance of operations. By majority, progress report and employee feedback forms are the preferred methodology in collecting data in their organisations. Also both employee and customer suggestions are welcomed by the organizations since they have a system for gathering both employees' and customers' suggestions. Many views are solicited since the majority of organizations use the open forum system of gathering suggestions where a lot of views are expressed. This helps the

organizations to receive inputs, complaints and feedbacks to improve upon their policies.

#### 4.4.3 Quality Improvement in Your Organization

*Five questions were asked in this section to evaluate the organizations quality improvement program*

*Question: Does your organization have a quality improvement program?*

**Table 4.11 Response on Quality Improvement Program**

	Frequency	Percentages
<b>No (Please go to question 14)</b>	14	22.6%
<b>Such a plan is under consideration</b>	20	32.3%
<b>A quality improvement program has been implemented recently</b>	4	6.5%
<b>A quality improvement plan has been a part of corporate policy for some time now</b>	24	38.7%
<b>Total</b>	<b>62</b>	<b>100%</b>

Twenty-two point six percent (22.6%) of respondents do not have a quality improvement program. Almost one-third (32.3%) said such a program is under consideration. Only 6.5% said a quality improvement program has been implemented recently. Almost 4 out of 10 (38.7%) responded that a quality improvement program has been a part of corporate policy for some time now.

*Question: What type of quality improvement program do you have?*

**Table 4.12 Response on Type of Quality Improvement Program**

	Frequency	Percentages
<b>Total Quality Management</b>	8	16.7%
<b>Quality Assurance)</b>	14	29.2%
<b>Quality Control</b>	26	54.2%
<b>Total</b>	<b>48</b>	<b>100%</b>

Eight (8) which represents 16.7% of respondents have total quality management as a type of quality improvement program implemented, 29.2% have quality assurance while 54.2% have quality control as the type of quality improvement.

*Question: Your organization's quality improvement program can be described as:*

**Table 4.13 Response on Quality Improvement Program**

	Frequency	Percentages
<b>There is no formal program</b>	20	41.7%
<b>Periodic short-range solutions or motivational program</b>	14	29.2%
<b>A formal program is underway with widespread employee awareness</b>	14	29.2%
<b>Total</b>	<b>48</b>	<b>100</b>

Forty-one point seven percent (41.7%) of respondents said there is no formal program. Twenty-nine point two percent (29.2%) said periodic short range solutions or motivational program. Likewise 29.2% of the respondents stated that a formal program is underway with widespread employee awareness.

**Question:** Does your quality improvement plan have the full support of top management?

**Table 4.14 Response on Full Support of Top management on Quality Improvement Program**

	Frequency	Percentages
<b>Yes</b>	44	91.7%
<b>No</b>	4	8.3%
<b>Total</b>	<b>48</b>	<b>100%</b>

Out of the 48 respondents who answered that they have a formal quality improvement plan, (44) representing 91.7% said that, their quality improvement plans have the full support of the top management of their plan. However, the remaining four (4) representing 8.3% answered no.

*Question: The major objectives of your quality programs are:*

**Table 4.15 Response on Objectives of the Quality Improvement Program**

	Frequency	Percentages
<b>Increase productivity</b>	6	12.5%
<b>Cost reduction</b>	8	16.7%
<b>Involvement of employees in the quality building effort</b>	2	4.2%
<b>Compliance with statutory, environment and safety requirement</b>	8	16.7%
<b>Customer satisfaction</b>	24	50.0%
<b>Total</b>	<b>48</b>	<b>100 %</b>

Twelve point five percent (12.5%) of respondents opined that, the major objectives of their quality programs are increase productivity. Sixteen point seven percent (16.7 %) are of the view that major objectives of their quality programs are cost reduction. 4.2% said Involvement of employees in the quality building effort while, 16.7% said Compliance with statutory, environment and safety requirement. However, 50% said customer satisfaction.

### **Summary**

From the survey, less than 50% of organizations have a quality improvement program and the type dominant is quality control. It can also be deduced from the responses received that, quality improvement plans have the full support of top

management and the major objectives of their programs are towards customer satisfaction and not cost reduction or increase in productivity.

#### **4.4.4 Review/ Audits**

*Five questions were asked in this section to evaluate the organizations' quality Auditing and reviewing procedures.*

*Question: Do you have a well established internal quality Audit procedure?*

**Table 4.16 Response on a well established internal quality Audit procedures?**

	Frequency	Percentages
<b>Yes</b>	34	54.8%
<b>No</b>	28	45.2%
<b>Total</b>	<b>62</b>	<b>100 %</b>

Fifty-four point eight (54.8 %) of respondents said they have a well established internal quality Audit procedure while 45.2% said they do not.

**Question:** *If yes, how often do you ensure that internal quality audits are carried out effectively?*

**Table 4.17 Response on a well established internal quality Audit procedures?**

	Frequency	Percentages
<b>Once a month</b>	4	11.8%
<b>Quarterly</b>	22	64.7%
<b>Once a year</b>	2	5.9%
<b>Once every two years</b>	6	17.6%
<b>Total</b>	<b>34</b>	<b>100%</b>

Out of the (62) respondents, 34 said they have a well established internal Audit procedures. Twenty-two (22) of the respondents representing 64.7% said they ensure that internal quality Audit is carried out effectively quarterly. The least number of respondents representing 5.9% answered that, it is done once a year. Those who said once a month were (4) representing 11.8% while (6) respondents representing 17.6% answered that once every two years.

**Question:** *Do you check for design conformance to standards /regulations?*

**Table 4.18 Response on Design Conformance to Standards or Regulations?**

	Frequency	Percentages
<b>Yes</b>	52	83.9%
<b>No</b>	10	16.1%
<b>Total</b>	<b>62</b>	<b>100 %</b>

Majority of respondents representing 83.9% said they check for design conformance to standard/regulation while 16.1% do not.

***Question:** If yes, how often do you check for design conformance to standards /regulations?*

**Table 4.19 Responses on Design Conformance to Standards or Regulations?**

	Frequency	Percentages
<b>After every design</b>	18	34.6%
<b>Before commencement of project</b>	28	53.8%
<b>During construction</b>	6	11.5%
<b>Total</b>	<b>52</b>	<b>100 %</b>

With reference to 52 respondents who answered yes to checking design conformance to standards, 34.6% said it is done after every design. 53.8% also said before commencement of project while 11.5% of them said during construction.

**Question:** *Do you carry out Peer review/project review after close out of every project?*

**Table 4.20 Responses on Peer review/project review after close out of every project?**

	Frequency	Percentages
<b>Yes</b>	38	61.3%
<b>No</b>	24	38.7%
	<b>62</b>	<b>100</b>

Out of the total respondents, 61.3% said they carry out peer review/project review after close out of every project while 38.7% said they do not.

### **Summary**

From the responses given, it can be deduced that, majority of organizations ensure adequacy and evaluate the need for improvement or corrective action through systematic and independent examination to determine whether quality activities and related results comply with planned arrangement to maintain standards. However, these practices are not regular as it should.

#### 4.4.5 Training

*Three questions were asked in this section to evaluate the organizations' training program for employees.*

*Question: Is formal training in quality improvement given to employees?*

**Table 4.21 Response on formal training given to employee**

	Frequency	Percentages
No training is given (If No please go to Q.23)	26	41.9%
Some training is available	34	54.8%
A formal training program is in effect	2	3.2%
Total	62	100 %

*Question: How do you train your employee for quality?*

**Table 4.22 Response on Type of training given to employee**

	Frequency	Percentages
On-site/On the job training	28	77.8%
Seminars /workshops on quality improvement	6	16.7%
Short courses	2	5.6%
Office library	0	0%
Total	36	100

***Question:** How many times are training organized for employees?*

**Table 4.23 Response on Type of training given to employee**

	Frequency	Percentages
Once a year	12	33.3%
Twice a year	6	16.7%
Once every two years	18	50%
Total	<b>36</b>	<b>100 %</b>

### ***Summary***

Training is an important indicator of how well a firm is prepared for quality management (Lee, 1998). Tables 4.21, 4.22 and 4.23 summarize the responses of these questions. Out of the 62 respondents, 36 representing 58% indicated that training or some form of training is given to the employees. Majority of the respondents (77.8%) pointed out that employees are trained on-site or on the job. Six (6) of the respondents representing 16.7% said they organizes seminars/workshops for their employees while 5.6% provide short courses. When interviewed, most managers stress that when employees are formally trained, they do not stay for a long time to enable the firm to enjoy the benefits of their investment, hence, only on- the -job training is given to the employees and it is once, usually for a new worker, though they conceded that employee training and education are important. The unfortunate aspect is that the training given to the employees is not regular, 33.3% of respondents said that, training is organized for employees once a year. Sixteen point seven percent (16.7%) stated twice a year and 50% said once every two years. Quality culture is achieved and maintained with the employees through regular education and training that a firm provides (Rahaman

and Siddiqui, 2006). Employee training plays a vital role in any organization/company's quality building efforts and its importance is recognized by every quality expert. Training must be targeted for every level of the company

Training programs attempt to teach employees how to perform particular activities or a specific job. Education, on the other hand, is much more general and attempts to provide employees with general knowledge that can be applied in many different settings (Zhang, 2000).

#### 4.4.6 Teamwork

*One question was asked in this section to evaluate Team work practise in the organisation*

**Question:** *How does your organization solve problems?*

**Table 4.24 Response on Teamwork**

	Frequency	Percentages
<b>Assign individual to solve</b>	36	58.1%
<b>Set up a multi-disciplinary team for each problem</b>	16	25.8%
<b>A permanent team is available</b>	10	16.1%
<b>Total</b>	<b>62</b>	<b>100 %</b>

In providing responses to how the organizations solve problems, 58.1% of respondents said specific individuals are assigned to solve problems as they arise. Twenty-five point eight percent (25.8%) stated that their organizations set up a

multi-disciplinary team for each problem while 16.1% said their organizations use a permanent team available to solve problems.

Teamwork skills are also needed to have employees work together as a complete unit. From the results it is evident that most of the employees and sections in these companies do not work together as a team.

Teamwork provides companies with the structured environment necessary for successful implementation and continuous application of quality management (QM) process. The eventual aim of the team approach is to get everyone, including contractors, designers, vendors, subcontractors, and owners involved with the QM process.

There is ample evidence from literature on the effect of teamwork on the success of quality initiatives in construction. For instance, Bulbshait and Al-Abdulrazzak (1996), Love et al. (2000), Zhang (2000), Low and Teo, (2004) have all emphasized the importance of teamwork in the implementation of QM. Teamwork is a major part of any Quality Management effort because it enables different parts of the organization to achieve results in ways that cannot be done through individual job performance.

#### 4.4.7 Tools and Techniques

*One question was asked in this section to identify the prevailing tools and techniques commonly used in these firms.*

*Question: What are the tools used in measuring improvement?*

**Table 4.25 Response on Tools and Techniques**

	Frequency	Percentages
<b>Benchmarking</b>	26	41.9%
<b>Value engineering /reengineering</b>	7	11.3%
<b>Check sheets</b>	29	46.8%
<b>Total</b>	<b>62</b>	<b>100 %</b>

Typical tools and techniques used to take measurement and improve quality were Check Sheets, Benchmarking and Value Engineering/Re-engineering as shown in Table 4.25. Out of the (62) respondents, 41.9% stated that, they use Benchmarking as a technique in measuring and improving quality. Eleven point three percent (11.3%) also said that the tools they use in measuring improvement are Value engineering/Re-engineering. Forty-six point eight percent (46.8%) use Check Sheets.

A checklist/check sheet is the most used tool in these firms from the above response (see table.4.25) hence quality management is better implemented. It is not surprising having the check sheets as the highest tool used because in construction that is the favourable tool to use. This shows the commitment to quality of such contractors.

#### 4.4.8 Quality Policy

*Two questions were asked in this section to check the quality orientation of these firms.*

*Question: Does the firm have quality manual or documents? (policy, Standards, etc)*

**Table 4.26 Response on Quality policy**

Yes	30	48.4%
No	32	51.6%
Total	62	100%

Almost half (48.4%) of the respondents responded that, there is the availability of quality manual or document but 51.6% said there is no quality manual or document.

*Question: what is the firm's mission statement in relation to quality?*

**Table 4.27 Response on Quality policy**

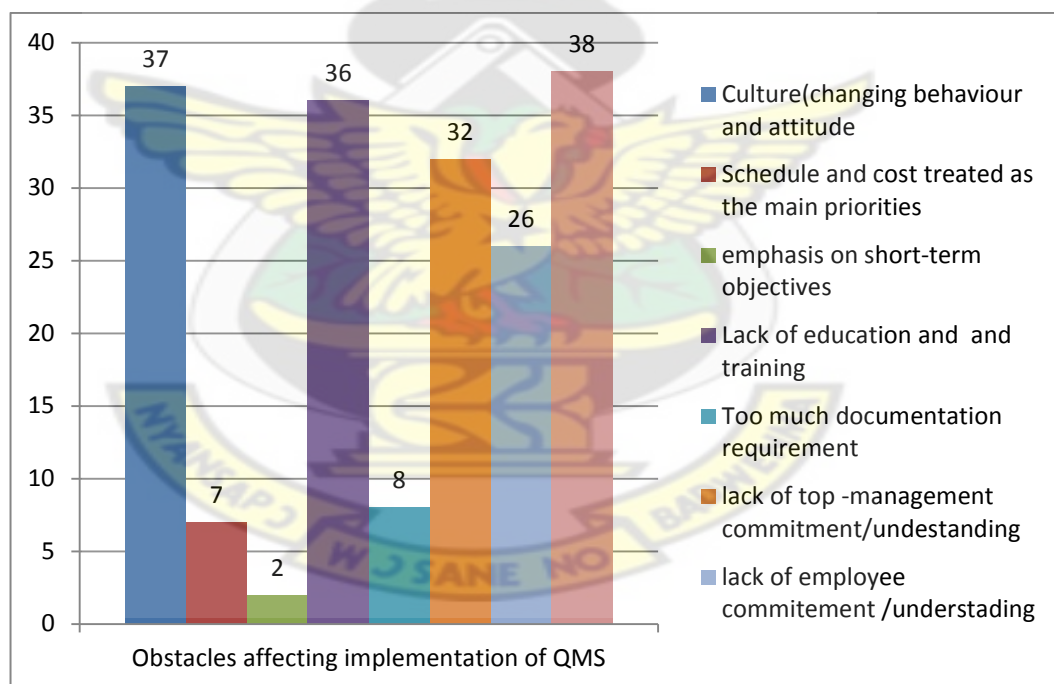
Quality is captured in the mission statement	36	58.1%
There is a standalone policy for quality	8	12.9%
Mission statement does not capture quality	18	29.0%
Total	62	100 %

Twenty –nine percent (29%) of respondents stipulated that their firms' mission statements do not capture quality while 12.9% said there is a standalone policy for quality. More than half (58.1%) said quality is captured in the mission statement when it comes to the question of what the firms' mission statements in relation to quality are.

## Summary

Quality policy in general is the intentions and directions of an organisation's relationship to quality as formally expressed by top management (Tricker and Sherring-lucas, 2001). The policy outlines how management intends achieving quality and dictates the organisation's quality management system. Surprisingly, most organizations do not have quality documents. This suggests that, they do not follow any laid down policy or have no standards to meet. However, majority of them do have quality captured in their mission statements.

### 4.5 PRESENT PROBLEMS WITH THE CURRENT QUALITY MANAGEMENT PRACTICES



**Fig.4.5 Problems with the current quality management practices**

The problems affecting the implementation of Q M program as indicated by the respondents and as shown in fig 4.5 above are listed in order of priority (based on total number of responses received against each option).

- Lack of expertise/resources in QMS
- Changing behaviour and attitude
- Lack of education and training to drive the improvement process
- Lack of top-management commitment/understanding
- Lack of employees' commitment/understanding
- Too much documents are required (Lack of documentation ability)
- Lack of communication in organisation
- Firms' emphasis on short-term objectives/gains

## **4.6 SUCCESS FACTORS FOR QUALITY MANAGEMENT IN REAL ESTATE FIRMS**

### **4.6.1 Reliability**

The internal consistency of the set of measurement items refers to the degree to which items in the set are homogenous (Badri, 2007). It can be determined using a reliability coefficient such as Cronbach's Alpha (Cronbach, 1951).

Internal consistency is usually computed for a scale based on a set of items under the scale or construct. It can also be calculated for any subset of the items under a particular scale or construct.

Reliability analysis was performed for the items of each of the nine construct/scale using internal consistency method by determining the Cronbach's Alpha.

Table 4.28 shows the construct and the original items under each scale/construct and the items dropped from the original scale to achieve higher reliability coefficient. Item 7 from the top management and leadership construct is dropped during the

reliability analysis. The reliability for each construct was again recalculated after performing detailed item analysis and some items eliminated.

**Table 4.28 Internal consistency of Critical Success Factors**

Construct(Scales)	Initial items	Number of Items	Items Deleted by number	Alpha Before deletion	Cronbach's Alpha After deletion
Top management commitment and leadership	1-7	7	1	0.755	0.799
Human Resources Management	1-12	12	none	0.812	0.877
Customer Focus	1-7	7	none	0.830	0.879
Planning	1-8	8	none	0.846	0.901
Process Management	1-6	6	none	0.873	0.873
Supply management	1-7	7	none	0.843	0.907
Continuous improvement	1-8	8	none	0.927	0.955
teamwork	1-4	4	none	0.811	0.811
Information analysis and Evaluation	1-6	6	none	0.852	0.852

The minimum advisable level is 0.7 (Nunnally,1978; Zhang, 2000; Saraph et al., 1989) for new instrument. From table 4.28, reliability coefficient ranges from 0.799 to 0.955 which is greater than the recommended value of 0.7. The ratings are within the set limit even though they are slightly lower than some of the works cited. In Zhang (2000) for instance the coefficient ranges from between 0.84-0.92; Saraph et al., (1989) between 0.71- 0.94 and higher than Conca et al.,(2004) which ranges from 0.52-0.82.

From the analysis above it indicates that the scales or construct were reliable, consequently, the instrument developed for measuring success factors for quality management was judged to be reliable.

#### 4.6.2 Item analysis

A detailed item analysis evaluates the assignment of items to the scales in an instrument. This is done by correlating each item with each scale. The corrected item-total correlation (i.e., the correlation of each item with the sum of all other items) (Hair et al., 2006; Koufteros, 1998; Malhotra and Grover, 1998; Torkzadeh and Dhillon, 2002) are used to determine if an item belongs to the scale as assigned, belong to another scale, or should be eliminated. If an item does not correlate highly with any of the scales, it is eliminated (Nunnally, 1978; Zhang, 2000). The value of that item to scale correlations should be greater than 0.5, those lower than 0.50 do not share enough variance with the rest of the items in that scale. For that reason, item(s) should be deleted from the scale (Zhang, 2000; Conca et al., 2004).

Seraph et al., (1989), Zhang et al., (2000.) and Conca et al., (2004) used this method to evaluate the assignment of items to scale in developing their instrument for measuring the critical factors of quality management.

Table 4.29 shows the correlation matrix for the nine scales or measures of the constructs. Most of the items had high correlations with the scales to which they were assigned relative to all the other scales, except items; 4, 7, 9, 11 of human resources construct; item 3 of customer focus construct; item 7 of planning construct; items 4 and 7 of supply management and item 2 of continuous improvement construct which has correlation less than 0.5 with the scale they were assigned to and as such they were eliminated accordingly. The rest were judged to be appropriately assigned to their scale.

**Table 4.29 Detailed Item Analysis (Item to Scale Correlation)**

Constructs/Scale	Item numbers											
	1	2	3	4	5	6	7	8	9	10	11	12
Top management commitment and leadership	.751	.624	.562	.652	.620	.595	--	--	--	--	--	--
Human Resources Management	.589	.581	.565	<b>.169</b>	.570	.655	<b>.407</b>	.574	<b>.161</b>	.585	<b>.269</b>	.665
Customer Focus	.742	.698	<b>.119</b>	.538	.690	.716	.718	--	--	--	--	--
Planning	.597	.796	.832	.706	.617	.793	<b>.363</b>	.562	--	--	--	--
Process Management	.687	.721	.534	.714	.635	.768	--	--	--	--	--	--
Supply management	.784	.754	.791	<b>.321</b>	.678	.778	<b>.170</b>	--	--	--	--	--
Continuous improvement	.886	<b>.212</b>	.905	.859	.735	.700	.871	.878	--	--	--	--
Teamwork	.526	.741	.550	.724	--	--	--	--	--	--	--	--
Information analysis and Evaluation	.762	.590	.733	.616	.634	.533	--	--	--	--	--	--

Note: Item number in this table is the same as the question number in the instrument;

The symbol "--" means not available

#### 4.6.3 Validity

The validity of a measure refers to the extent to which it measures what is intended to be measured (Nunnally, 1978). A measure has content validity if there is general agreement among the subjects and researchers and that the instrument has measurement items that cover all aspects of the variable being measured (Badri, 2007). Content validity is judged by the researchers subjectively. An initial questionnaire was sent to three experts on the subject (an academicians well versed in quality management studies, a project manager in a real estate firm, and a quality management consultant) to check the comprehensiveness of the items under each

construct. The feedback from these experts was used to improve the content as well as ease understanding to eliminate ambiguity and duplication of test. The final questionnaire had 65 initial quality items for evaluation.

A measure has construct validity if it measures the theoretical construct that it was designed to measure. This analysis is done using SPSS.16.0 to perform factor analysis (Principal component analysis) for each construct. In performing factor analysis each measure was assumed to be a separate construct. In this analysis (shown in tables 4.30, 4.31, and 4.32) each factor must be one dimensional that is to say that, all items in each scale should load on to one factor. When items in a scale or construct load on more than one factor, the rotated (varimax) solution was examined. All items with loadings less than 0.5 in each scale are eliminated.

It can be observed from table 4.30 that seven (7) factors or construct had one factor component except human resources management and process management. This means that, items in the seven construct or measure formed or load unto a single factor out of the nine (9) measures.

**Table 4.30 Summary of the factor matrix for each measure**

Constructs/factors	KMO	Item loadings Range	Eigen value	Percentage of variance explained
Top management commitment and leadership	0.730	0.680-0.771	3.056	50.927
Customer Focus	0.777	0.657-0.832	3.796	63.270
Planning	0.651	0.702-0.900	4.529	64.695
Supply Management	0.877	0.814-0.892	3.655	73.091
Continuous Improvement	0.864	0.760-0.939	5.508	78.685
Teamwork	0.698	0.703-0.893	2.297	64.923
Information analysis and Evaluation	0.795	0.685-0.852	3.511	58.510

From table 4.30, it is clear that all of the items had high factor loadings greater than 0.5.

The other two constructs in which the items did not load unto one factor are Human resource management and Process management. This result was obtained according to the rule of Eigen values being greater than one, which are listed in tables 4.31 and 4.32 with it rotated and un- rotated factor matrix.

**Table 4.31 Factor Extraction: Process Management**

**Total Variance Explained**

Component	Initial Eigen Values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.699	61.648	61.648	3.699	61.648	61.648	2.579	42.975	42.975
2	1.011	16.843	78.492	1.011	16.843	78.492	2.131	35.516	78.492
3	.644	10.727	89.219						
4	.284	4.725	93.944						
5	.198	3.298	97.242						
6	.166	2.758	100.000						

Extraction Method: Principal Component Analysis.

**Table 4.32 Factor Extraction: Human Resources Management****Total Variance Explained**

Component	Initial Eigen Values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.346	54.328	54.328	4.346	54.328	54.328	2.728	34.104	34.104
2	1.068	13.348	67.676	1.068	13.348	67.676	2.686	33.572	67.676
3	.629	7.867	75.543						
4	.618	7.720	83.262						
5	.467	5.835	89.097						
6	.390	4.881	93.978						
7	.277	3.469	97.446						
8	.204	2.554	100.000						

***Process management***

In the case of Process Management Construct, the two factors that emerged as shown in table 4.33, items number 1, 3 and 5 which are process flow chart, testing and reviewing for specification and clarity of instruction respectively can be described as “**Process control**” constituting separate factor from the remainder of process management items. The remaining items 2, 4, 6 formed another factor that can be interpreted as “**Process evaluation**”.

**Table 4.33 Factor Matrix: Process Management**

	<b>Un-rotated</b>			<b>Rotated(Varimax)</b>	
	Factor 1	Factor 2		Factor 1	Factor 2
1	.783	.498		.276	<b>.886</b>
2	.830	-.398		<b>.890</b>	.232
3	.653	.107		.430	<b>.503</b>
4	.830	-.451		<b>.925</b>	.192
5	.734	.586		.183	<b>.921</b>
6	.862	-.216		<b>.797</b>	.392

***Human resources management***

For human resource management, table 4.34 lists the un-rotated and rotated factor matrix (Varimax) for its construct. From table 4.34, it is clear that items 1, 2, 3, and 10 constituted a factor which can be deduced as the “**employee welfare and commitment factor**” whilst the other items (5, 6, 8, and 12) in this construct also constituted another factor which can be described as “**employee training and development factor**”.

**Table 4.34 Factor Matrix: Human Resource Management**

	<b>Un-rotated</b>			<b>Rotated (Varimax)</b>	
	Factor 1	Factor 2		Factor 1	Factor 2
1	.798	-.475		<b>.901</b>	.223
2	.698	-.425		<b>.796</b>	.188
3	.682	-.306		<b>.700</b>	.261
5	.685	.518		.123	<b>.850</b>
6	.759	.194		.404	<b>.672</b>
8	.663	.308		.256	<b>.685</b>
10	.788	-.160		<b>.673</b>	.440
12	.808	.376		.311	<b>.835</b>

The analysis process led to the identification of eleven factors (measures) of TQM (Table.4.35)

These eleven factors are the driving force that may lead to satisfactory implementation of TQM.

#### 4.6.4 Measures of TQM

**Table 4.35 Measures of TQM**

Constructs	ITEM NUMBERS	New CRITICAL FACTORS
Top management commitment and leadership	1-6	Top management commitment
Human resource management	1,2,3&10	<i>Employee welfare and commitment factor</i>
	5, 6, 8&12	<i>Employee training and development factor</i>
Customer Focus	1,2,4-7	Customer Focus
Planning	1-6,&8	Planning
Process management	1, 3 &5	<i>Process control</i>
	2, 4, 6	<i>Process evaluation</i>
Supply management	1-3 & 5,6	Supply management
Continuous improvement	1 & 3-8	Continuous improvement
Teamwork	1-4	Teamwork
Information Analysis and Evaluation	1-6	Information Analysis and Evaluation

In the TQM philosophy, total customer satisfaction is the goal of entire system, and a persistent customer focus is what will get a firm to better performance. Customers may be either internal or external and for a construction organization to outperform its competitors, there is the need to anticipate and respond quickly to customers' demands with new ideas and technologies and to produce constructed facilities that satisfy or exceed customers' expectations. This gives emphasis to the fact that the visibility and support that management takes in implementing a total quality environment is critical to the success of TQM implementation (Low and Teo, 2004).

Most quality initiatives have failed due to lack of management commitment. Management can be committed to quality through communication, defining quality values, expectation and focus, and provision of resources for quality improvement. However, management participation in quality activities is not enough to contribute to quality improvements as Costs of total quality is difficult to control by management alone (Khan, 2003). Employees are encouraged to show commitments to quality issues. When workers themselves are committed to delivering quality, they take greater initiative towards meeting product and process specifications; detecting and eliminating bottlenecks; improving product and process designs and setting realistic yet challenging performance targets. This is better enhanced if resources are provided for employees and they are taken through effective training and developmental activities. According to Low and Teo (2004), Teamwork also provides companies with the structured environment necessary for successfully implementing and continuously applying the TQM process. The eventual aim of the team approach is to get everyone, including contractors, designers, vendors, subcontractors, and owners involved with the TQM process

#### **4.7 PERCEIVED IMPORTANCE OF CRITICAL SUCCESS FACTORS FOR TQM IMPLEMENTATION IN REAL ESTATE INDUSTRY**

Having identified factors critical for successful implementation of Total Quality Management in real estate industry through factor analysis, it is necessary to rank these factors according to their relative importance (significance) from the real estate developers view point.

Important Index (I I) facilitated the identification of the level of criticality or significance of the critical factors contributing to the successful implementation of TQM in the real estate industry .A ranking of important indices were undertaken to ascertain the most prominent of the factors.

In this section the Fifty five items that were identified through factor analysis and group under the following factors: Top management commitment and leadership, Customer focus, Human Resources Management, Planning, Process Management, Supply Management, Continuous Improvement, Teamwork and Information Analysis and Evaluation are ranked according to their relative significance (importance). See appendix C for detailed results.

**Table 4.36 Ranking of Critical Success Factors**

<b>Construct/Factor</b>	<b>Average Importance indices</b>	<b>Rank</b>
Continuous Improvement Factor	<b>84.470</b>	<b>1</b>
Information Analysis and Evaluation	<b>79.731</b>	<b>2</b>
Planning Factor	<b>79.493</b>	<b>3</b>
Supplier Management Factor	<b>78.387</b>	<b>4</b>
Team Work Factor	<b>77.177</b>	<b>5</b>
Process Management Factor	<b>76.935</b>	<b>6</b>
Customer Focus	<b>76.828</b>	<b>7</b>
Top Management Commitment & Leadership Factor	<b>76.667</b>	<b>8</b>
Human Resources Management Factor	<b>76.452</b>	<b>9</b>

The result in table 4.36 shows the ranking of the nine (9) factors identified which are critical for the implementation of TQM. From the table above, it clearly shows that continuous improvement was ranked first(1<sup>st</sup>) with an average importance index of 84.470, followed by Information Analysis and Evaluation with an average importance index of 79.731. Planning is ranked third (3<sup>rd</sup>) with an average importance index of 79.493. Supplier management, teamwork, process management customer focus, top management commitment and leadership and Human resources management factors were ranked 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup> and 9<sup>th</sup> respectively with an average importance indices of 78.387, 77.177, 76.935, 76.828, 76.667, 76.452 following in that order.

From the table it can be noted that the three most highly ranked factors; Continuous Improvement, Information Analysis and Evaluation, Planning factors are “Hard” Aspect of TQM, while the three least ranked factors; Human Resources Management, Top management commitment and leadership and Customer Focus are “Soft” Aspect of TQM. The current quality management practices of these firms actually attest to these facts as majority of their practices concentrate on the “Hard” aspect of TQM.

However, the soft TQM element which is essentially the Human Resources aspect of management is also widely covered by management literature and has tremendous effect on firm’s performance. According to Rahman (2004), three (3) out of the six criteria of the MBNQA frame work are extensively covered in the management literature. In fact, prescriptions offered by both disciplines are very similar.

Many studies (Zhang,2000; Rahman,2004; Conca et al., 2004;) have concluded that the soft element of TQM has high impact on organizational performance and as such the soft element should also be considered highly essential for successful implementation of TQM and organizational performance.

“Soft” and “hard” TQM cannot be implemented separately, actually the Soft create an environment for seamless diffusion and implementation of “Hard” TQM Rahman (2004).

TQM is regarded as a systems approach that considers every interaction among the various practices and as such whatever model or framework being implemented in a firm or organization despite of it being manufacturing, service or public, construction or firm size, the key point emphasized is that its implementation requires an integrated or holistic approach as there exist synergy among the various practices that are critical to TQM.

This assertion is also emphasized by the quality expert such as Deming. (2000); Feigenbaum (1991); Ishikawa (1985) that the success of their quality philosophy and principles was conditional on implementing their principles as a whole rather than individually.

### ***Summary***

Having identified the quality management practices of these firms and their perception of factors critical for the implementation of TQM, the framework for implementation in real estate firms is proposed in chapter five.

## **CHAPTER FIVE**

### **FRAMEWORK FOR THE IMPLEMENTATION OF TQM FOR REAL ESTATE FIRMS**

#### **5.1 INTRODUCTION**

This chapter discusses how to implement Total Quality Management in the real estate firms.

The frame work is based on the TQM literature, critical success factors perceived by quality managers in the real estate firms, and the quality management practices of the real estate firms.

Again an insight to the need for framework is provided as well as the requirements needed for the design of the framework.

##### **5.1.1The Need for a Framework for TQM**

According to Dale (2003), framework is usually a well-liked output which serves as a means of presenting ideas, concept, pointers and plans in a non prescriptive manner. It allows users to choose their own starting point and specific course of action and priorities, and to develop the individual dimensions of TQM at a pace that suits the firm's situation and available resources. In this case, framework should be designed to represent the operations of the organisation, the systems to enhance the activities that will be carried out bearing in mind the ultimate goal and style of managing quality in an organization.

Aalbrecht et al., (1991), provided reasons why a framework is needed to implement TQM, namely:

- To illustrate an overview of TQM so as to communicate a new vision of the firm;
- To force management to address a substantial list of key issues which otherwise might not be addressed;
- To provide insight into the firm's strength and weaknesses; and
- Most importantly, to support implementation and to improve the chances that TQM adoption will be successful.

Najmi and Kehoe (2000) described the main characteristics of a framework as follows:

- Acts as a guideline.
- Result oriented.
- Literary and empirically supported.
- Time dependent.
- Continuous improvement oriented.

### **5.1.2 Framework Design Requirements**

In general, the following criteria can be considered as a guide in developing a good framework to suit the real estate developing characteristics (Yusof and Aspinwall, 2000):

- systematic and easily understood;
- Simple in structure;
- having clear links between the elements or steps outlined;

- general enough to suit different contexts;
- represent a road map and planning tools for implementation;
- answers “how to?” and not “what is?”; and
- Implementable at reasonable cost and time.

## **5.2 FRAMEWORK FOR TOTAL QUALITY MANAGEMENT**

### **IMPLEMENTATION IN REAL ESTATE FIRMS**

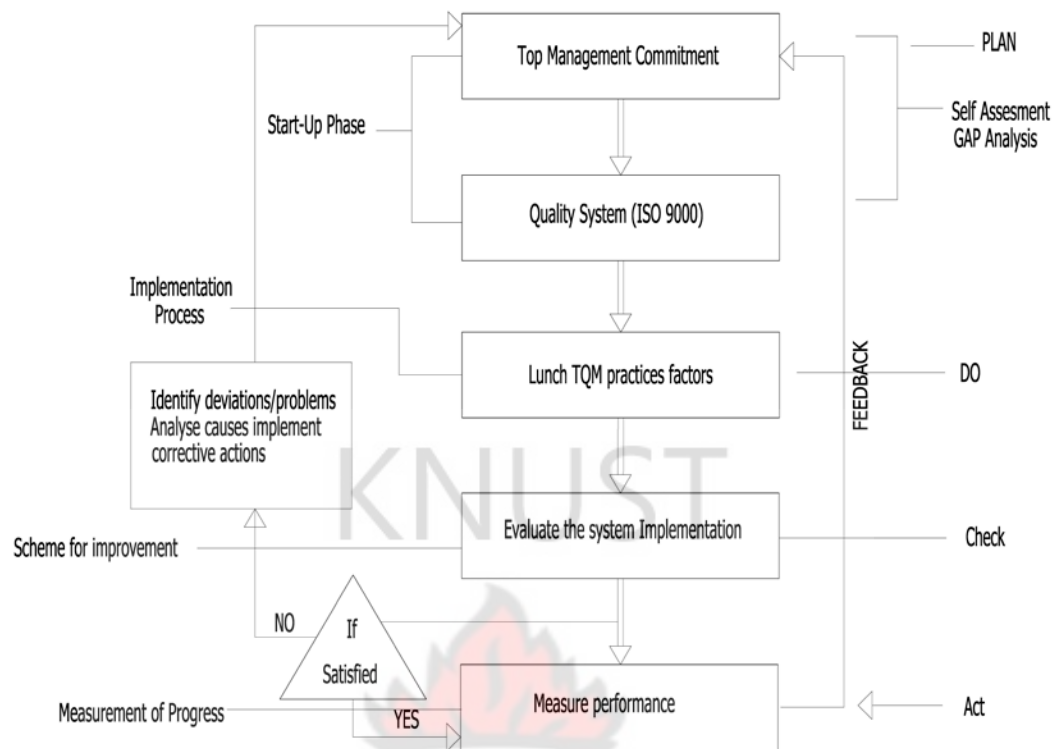
Development of any model or frame work has to start from initial idea and concept (Yusof and Aspinwall, 2000) and following that the framework for the implementation TQM is developed as a four-stage implementation process.

#### **5.2.1 Four stages of implementation**

The four-stage process of implementing TQM in real estate firms are:

1. Start-up and commitment;
2. Implementation process;
3. Scheme for improvement;
4. Measurement for improvement.

However, the above four stages of implementation can be modelled according to Deming’s PDCA cycle i.e. Plan-Do-Check-Act. Fig 5.1



**Fig.5.1 Framework for implementing TQM in Real Estate Firms**

#### **5.2.1.1 Start-up and commitment**

The start-up process which is also the planning process requires that top management commitment and involvement is consistent and visible for a successful implementation. It is the driving force for TQM process. It also requires the top management setting up an effective quality management system. The quality system will serve as a spring board for full implementation of TQM. The start-up process will inculcate quality culture and prevent cultural shock in the firm. Top management should convey the firm's vision, mission and strategic direction to employees consistently. Its strategies, planning process should effectively prepare the firms environment for change process to TQM. The quality system is modelled to suit the management structure of the real estate firms. See fig 5.2. In a typical real

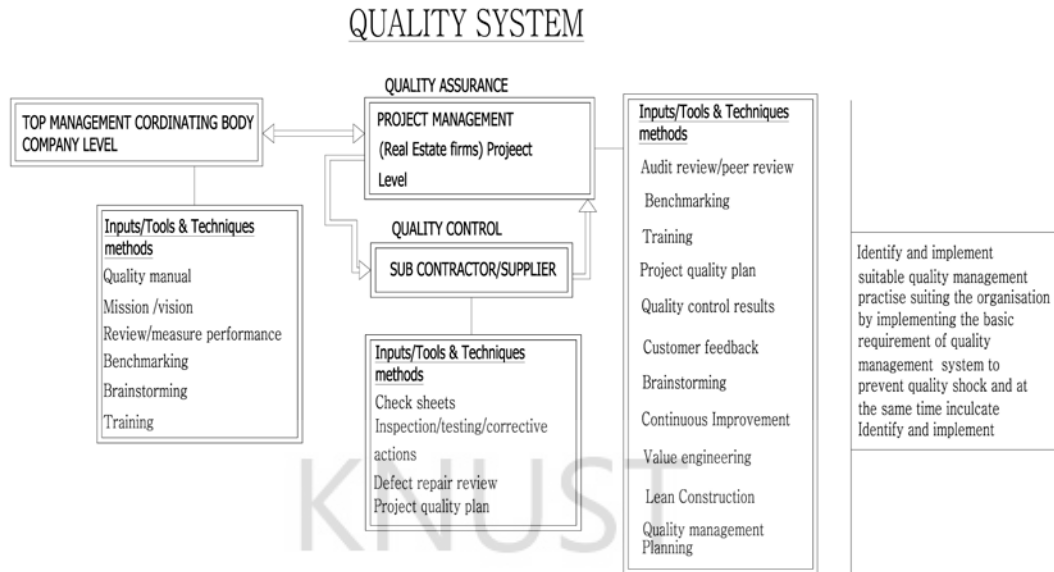
estate firms, the management and supervisory role is provided by the firms and the subcontractors are responsible for the actual construction work. Consequently, the quality management system is designed to suite the practice.

The quality management system involves three processes: Management Planning. Quality Assurance and Quality control.

Management planning: This will consist of entire organisation planning process including quality planning and strategic planning. This will be undertaken by the top management.

Quality Assurance: This will be the responsibility of the middle management level, and with a real estate firm in Ghana it is the project management team headed by the operations manager or project manager. Major responsibility is the supervision of work and Quality assurance according to the contractual requirements, this includes assuring the completion of the whole project scope in time and within budget and assuring quality of work conforms to the contractual requirements, this can be done using various methods like auditing, and analyzing Quality control results, developing and implementing project quality plan etc..

Quality Control: This will be the responsibility of the sub-contractors. Their responsibility will include corrective actions, defect repair, implementing design change. The quality control output will be used in the Quality assurance work.



**Fig 5.2 Quality System for Real Estate Firms**

#### **5.2.1.2 Implementation process**

The TQM factors identified in chapter four consisting of 13 factors manifesting through a set of practices. It is essential that all the 13 factors be considered at this stage and the TQM practices should be practised in the whole organisation. Implementing TQM is implementing these practices.

#### **5.2.1.3 Scheme for improvement**

The evaluation of the implementation practices can easily be done by developing an assessment tool. The firm should identify deviations, problems and plan towards corrective actions.

#### **5.2.1.4 Measurement**

The firm may develop its own specific measurement system that can better measure employee satisfaction, customer satisfaction, organisational efficient in the areas of reduction in rework/waste and quality cost, product /service quality and increase in

revenue. The firm should continually measure its overall business performance, analyse and compare with the firm's goals and competitors overall business performance. Conclusions made after analysis of results if not favourable i.e if implementation have not been effective, the PDCA cycle returns to the plan stage. On the other hand, if the implementation produces the desired results, the PDCA is still considers to consolidate the results and improve in the never ending PDCA cycle.

### *Summary*

The framework will provide a roadmap for implementation, and it is very dependent on a company needs and current quality initiatives. From the diagram it can be seen that the framework is simple and can be easily understood when various quality initiatives are implemented.

As shown in fig 5.1, this frame work provides an understanding of the components of TQM success in a real estate setting. This frame work considers the quality vision, senior management commitment, quality planning, and quality structure as starting points for a TQM process.

These feed into the organization's commitment to TQM, by practising the various quality activities and thus implementation.

Evaluations of the quality initiative ensure challenges face to be noted and finally feedback about these results to increase the organization's involvement in improving quality. The framework proposed is derived from the quality management practices

of these organisations, problems they faced in the implementation of their quality management and the critical success factors perceived to be significant by the quality managers.

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## **CHAPTER SIX**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **6.1 INTRODUCTION**

The aim of this research has been to develop a framework for total quality implementation in the real estate development firms in Ghana and to achieve this, a number of objectives which were 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 based on the findings of the study. The chapter also provides conclusions and recommendations based on the findings of this research work. Again, the limitations that were encountered throughout the study are also brought to fore.

#### **6.2 RESEARCH QUESTIONS**

The specific questions to the study include:

- What are the main elements that drive and sustain TQM implementation?
- What are the problems confronting the real estate companies in implementing quality management?

These research questions served as guidelines in achieving purpose of the study. The responses to these questions could be found in the five commented objectives listed.

## **6.3 SUMMARY OF FINDINGS**

### **6.3.1 Comments on Objectives One**

The first objective of this study was to investigate current practices of quality management in the real estate industry through an in-depth questionnaire. The questionnaire was divided into eight parts namely: perception of quality, data acquisition, quality improvement in their organization, review and audit, training, teamwork, tools and technique and quality policy.

The conclusions from these eight sections are briefly discussed below.

#### ***Perception of Quality***

The analysis of this section reveals that the majority of these firms perceive quality as an elimination of defect next to inspection and corrective actions. They feel that customer satisfaction is their main goal.

#### ***Data Acquisition Method***

The results of this section show that majority of the companies do collect data to measure the performance of operations. From the findings, 46.7% of the firms measure performance through fewer customer complaints, while 33.3% measure performance through timely completion of projects. The remaining 13.3% and 6.7% measure performance by productivity and profit margins respectively.

Again, 48 out of 62 of the firms have a system for gathering customer suggestions but out of this, just 54.2% constituting 26 of the firms' solicit customer suggestion through feedback forms. Almost half (41.7%) of the firms gather customer suggestions by the number of complaints they received.

It was also identified that in most of these firms, progress report and employee feedback forms are the preferred methodology in collecting data in their organisation. Also both employee and customer suggestions are welcomed by the organizations since they have a system for gathering both employees' and customers' suggestions. Many views are solicited since the majority of organizations use the open forum system of gathering suggestions where a lot of views are expressed. This helps the organizations to receive inputs, complaints and feedbacks to improve upon their policies.

### ***Quality improvement in the Organizations***

It was observed from this section that Majority of the respondents (77.5%) said that they do have a Quality Improvement Program (QIP) in place with the full support of their top management. Also, the survey showed that Quality Control, and quality assurance were the most popular quality management approach. The Main objectives of the QIP are customer satisfaction followed by employee involvement and compliance with statutory, environment and safety requirement.

### ***Review and Auditing***

From the responses given, it can be deduced that, majority of organizations ensure adequacy and evaluate the need for improvement or corrective action through systematic and independent examination , to determine whether quality activities and related results comply with planned arrangement to maintain standards. However, these practices are not regular as it should.

### ***Training***

From findings, majority of the companies, do not give formal training to their employees. Out of the 62 of the respondents, 36 representing 58% indicated that training or some form of training is given to the employees. Majority of the respondent (77.8%) pointed out that employees are trained on-site or on the job. Six (6) of the respondents representing 16.7% said they organizes seminars/workshops for their employees while 5.6% provide short courses. When interviewed, most managers' stress that when employees are formally trained, they do not stay long to enable the firm enjoy the benefits of their investment, hence, the common training offered is on- the -job training and it is mostly once every other year usually for a new worker. However, the managers conceded that employee training and education is important.

### ***Teamwork***

Teamwork is a major part of any Quality Management effort because it enables different parts of the organization to achieve results in ways that cannot be done through individual job performance. Fifty-eight point one percent (58.1%) of the respondents indicated that job execution and solutions to problems are assigned to individuals alone. This confirms that sections and employees of these companies do not work together as a team.

Teamwork is to get everyone including contractors, designers, vendors, and subcontractors involved with the QM process.

### ***Tools and techniques***

Typical tools and techniques used to take measurement and improve quality were Check Sheets, Benchmarking and Value Engineering/Re-engineering as shown in Table 4.25. Out of the (62) respondents, 41.9% stated that, they use Benchmarking as a technique in measuring and improving quality. Eleven point three percent (11.3%) also said that the tools they use in measuring improvement are Value engineering/Re-engineering. Forty –six point eight percent (46.8%) use Check Sheets.

A checklist/check sheet is the most used tool in these firms from the above response (see table.4.25) hence quality management is better implemented. It is not surprising that the check sheets are the highest tool used because in construction that is the favourable tool to use. This shows the commitment to quality of such contractors .

### ***Quality policy***

Quality policy in general is the intentions and directions of an organisation's relationship to quality as formally expressed by top management (Tricker and Sherring-lucas, 2001). The policy outlines how management intends achieving quality and dictates the organisation's quality management system. Surprisingly, most organizations do not have quality documents. This suggests that, they do not follow any laid down policy or have no standards to meet. However, majority of them do have quality captured in their mission statements

### **6.3.2 Comments on Objective Two**

The second objective of this study was to identify any present problems with these practices

The problems affecting the implementation of Q M program, as indicated by the respondents, are listed in order of priority (based on total number of responses received against each option).

- Lack of expertise/resources in QMS
- Changing behaviour and attitude
- Lack of education and training to drive the improvement process
- Lack of top-management commitment/understanding
- Lack of employees' commitment/understanding
- Too much documents are required (Lack of documentation ability)
- Lack of communication in organisation
- Firms' emphasis on short-term objectives/gains

### **6.3.3 Comments on Objective Three**

#### **To identify critical success factors for TQM implementation**

This objective has also been fulfilled in that, Eleven critical success factors of quality management were empirically identified, which are, Top management commitment & leadership, Employee welfare and commitment, Employee training and development, Customer focus, Planning, process control and process evaluation, Supplier management, Continuous Improvement, Team Work, Information analysis and evaluation. These factors are reliable, valid, and consistent and reflect with

frequent cited success factors of quality management in firms implementing a quality management as presented in chapter four.

#### **6.3.4 Comments on Objective Four**

The forth objective is to assess how the quality managers in the Real Estate Industry perceive these critical success factors.

This objective has also been fulfilled in that, the analyses of the identified critical success factors were ranked using important indices. From the analysis and discussions in chapter 4, the following findings and conclusions were drawn:

The findings indicated that the three most highly ranked factors: Continuous Improvement, Information Analysis and Evaluation, Planning factors are “Hard” aspect of TQM, while the three least ranked factors: Human Resources Management, Top management commitment & leadership and Customer Focus are “Soft” aspect of TQM. The current quality management practices of these firms actually attest to these facts as majority of their practices concentrate on the “Hard” aspect of TQM.

#### **6.3.5 Comments on Objective Five**

**To develop a framework leading to its implementation in the residential real estate development firms in Ghana.**

This fifth objective has also been addressed by developing a framework for Total Quality Management Implementation in real estate Industry. See chapter Five

## 6.4 CONCLUSION

Although these firms are aware of the importance of quality, their knowledge about QM is limited and their perception about quality is of corrective actions (Quality control) rather than preventive actions (Quality assurance, process and continuous improvement approach)

Most of the organisations do not provide any formal training for their employees. Generally, it can be concluded that the firms do not have effective quality management program in place to ensure customer satisfaction.

This study intended to identify the management areas that should be given attention for a successful quality management in Real estate companies. Eleven critical success factors of quality management were empirically identified, which are, Top management commitment & leadership, Employee welfare and commitment, Employee training and development, Customer focus, Planning, process control and process evaluation, Supplier management, Continuous Improvement, Team Work, Information analysis and evaluation. These factors are reliable, valid, and consistent and reflect with frequent cited success factors of quality management in firms implementing a quality management. It has also provided a new theoretical ground for studying the concept of Total Quality Management and contributed to knowledge on quality management in the real estate industry.

And again inferring from the results obtained, a reliable, valid instrument has been developed for measuring TQM, supplementing existing but focusing on construction industry for that matter and real estate firms in particular.

The study provided useful findings which will help quality practitioners in real estate development firms to implement their own quality management program that is unique to the industry, because the industry is characterised by service (estate management) delivery as well as products (houses).

And again, although there is no unique framework for implementation, this one will suit the management practice of the real estate firms; this is to say that it is logical and simple model closely based on empirical evidence derived from the analysis.

Yet again, from a managerial viewpoint, the findings of this study are useful to quality management practitioners in the real estate firms, because the success factors of quality management, will give management a better idea and also be able to devise their own quality management programmes that are unique in order to achieve better performance and to sustain competitive advantages. In short, the results of this study offer practical hints to management on the most profitable areas to focus their attention on when practising quality management in their firms.

In concluding, a frame work of TQM implementation has been derived from literature and empirically studies of fieldwork. This frame work will contribute a lot to the Ghanaian construction industry, particular with the absence of any implementation framework and any national quality award.

## **6.5 RECOMMENDATIONS**

Quality management begins with top management commitment (Zhang, 2000; Concao et al., 2004; Sila and Ebrahimpour, 2002; Seraph et al 1987), however, an appreciable percentage of firms top management are not committed to quality management program implementation and improvement. This can be achieved only if top management of these firms develop quality manual and see to its implementation, set objectives and provides requisite training for all of the employees in the firms.

Successful implementation of TQM in the real estate firms can be achieved through developing effective quality management system, persistence, and positive hands on leadership. Accomplishment in quality performance requires that top management should be dedicated to that ambition. In other words, those in top management must provide the initiative, direction commitment, resources for successful quality assurance practices and must support the quality programme in the organisation if such a programme is to be successful.

Finally, It is believed that attention to the eleven factors identified will minimize difficulties related to the implementation of Total quality management and will enhance best performance in companies implementing Total quality management.

### **6.5.1 Future Research**

Future research should look at performance of quality management practices of these firms in relation to customer satisfaction, employee satisfaction and product adequacy (quality and organisational efficiency in relation to cost and time).

And again, further studies should look at the relationship between the factors and with the performance of quality management practices.

And also, this study was concentrated on only the construction (products) aspect of these firms, however, further research can look at the combination of service delivery of this firms as well as the construction while using survey and case study approach.

## **6.6 LIMITATION OF THIS STUDY**

As this study contributes in a way of implementing TQM in a real estate firms, without doubt like any study or research it is also subject to some limitations. However, care was taken so that these limitations would not significantly affect its contribution to this research. The major limitation that was faced during the research process was limited access to organizational information.

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## **APPENDIX A**

### **QUESTIONNAIRE**

#### **TOPIC: FRAMEWORK FOR THE IMPLEMENTATION OF TQM IN REAL ESTATE FIRMS IN GHANA**

DEPARTMENT OF BUILDING TECHNOLOGY

### **INTRODUCTION**

Many construction companies in the US, Japan, Singapore, UK, and other European countries have been using Total Quality Management (TQM) successfully for a number of years now and reaping rich rewards in improved client, consultant, and supplier relations, reduced “cost of quality”, on time and within budget project completions, it is a dynamic process which promote never ending improvement in the effectiveness and efficiency of all elements of a business to result in an organisation doing the right thing, first time and all the time in order to ensure complete customer satisfaction.

### **OBJECTIVES**

This research plans:

- To investigate the current quality management practices of real estate firms in Ghana and ;
- To develop a Framework leading to adoption and implementation of TQM in the real estate firms.

Please take a look at the following questionnaire and try to answer correctly and accurately, as many questions as possible. All the information gathered here will be

kept strictly confidential and will be used only for research and analysis purposes without mentioning the person or company names.

For your information the questionnaire is designed with immense flexibility and simplicity and can be completed either **manually** or **electronically**.

If you require clarification and any further information, please do not hesitate to contact me.

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## Section A

**This section of the questionnaire is to identify the Quality Management Activities (QMS)**

Please complete the questionnaire by the following:

- 1- To complete this questionnaire electronically, first double left click on the appropriate box(s), then at the *Default value* click on "*Checked*" where applicable, "*Not checked*" if you want to reverse your decision and finally click on "*OK*" in both cases to register your response.
- 2- Where there are various options you can click as much as possible as its not limited to one answer
- 3- **Part-1: Personal Information**

**Nature of company** (Main contractor/sub-contractor):-----  
-----

**Size of the company (no. of persons):**

Up to 20 ☐                      21-40 ☐                      More than 40 ☐

**Age of the company:**

up to 5years ☐                      5-10 years ☐                      10-20 years ☐                      21 years  
and above ☐

***Annual volume of housing unit completed/handled***

- |   |  |
|---|--|
| <input type="checkbox"/> Up to 10 house-units | <input type="checkbox"/> 31-40 house-units   |
| <input type="checkbox"/> 10-20 house-units    | <input type="checkbox"/> 41-50 house-units   |
| <input type="checkbox"/> 21-30 house-units    | <input type="checkbox"/> Over 50 house-units |

**Experience  
management training**

**Qualifications**

**Position**

**Project**

**(Years)**

- |              |                          |     |                          |                        |                          |     |                          |
|--------------|--------------------------|-----|--------------------------|------------------------|--------------------------|-----|--------------------------|
| 0-2          | <input type="checkbox"/> | HND | <input type="checkbox"/> | Supervisor (Technical) | <input type="checkbox"/> | Yes | <input type="checkbox"/> |
| 2-5          | <input type="checkbox"/> | Bsc | <input type="checkbox"/> | Managers (Management)  | <input type="checkbox"/> |     |                          |
| 5-10         | <input type="checkbox"/> | Msc | <input type="checkbox"/> | Others:                | <input type="checkbox"/> | No  | <input type="checkbox"/> |
| More than 10 | <input type="checkbox"/> | Phd | <input type="checkbox"/> |                        |                          |     |                          |

*Would you like to be contacted again regarding this questionnaire, if your answer is*

*YES, please write down your name and contact details:* \_\_\_\_\_

**Perception of Quality**

**1 What is your organization's perception of quality?**

- ☐ Elimination of defects
- ☐ A tool to increase profits
- ☐ A competitive advantage
- ☐ Inspection and corrective actions
- ☐ Continuous improvement
- ☐ Customer satisfaction
- ☐ Increase productivity
- ☐ Others (please specify)-

## Data Acquisition

### 2. Do you collect data to measure the performance of operations?

☐ Yes

☐ No

### 3. How does your company measure performance?

☐ Fewer customer complaints

☐ Increase productivity

☐ Profit margins

☐ Timely completion of projects

☐ Other methods (please specify)\_\_\_\_\_

### 4. What data acquisition methodology do you follow within your organisation?

☐ Maintenance of data base

☐ Employee feedback forms

☐ Progress report

☐ Other methods (please specify)\_\_\_\_\_

### 5. How would you rate customer focus and satisfaction in your organisation?

☐ Very important

☐ Important

☐ Somewhat important

☐ Not important

### 6. Do you have a system for gathering customer suggestion?

☐ Yes

☐ No

**7. If Yes, how do you gather customers' suggestion(s)?**

- ☐ Customer feedback forms
- ☐ Questionnaire surveys
- ☐ Complaints forms
- ☐ Other methods (please specify)\_\_\_\_\_

**8. Do you have a system for gathering employees' suggestion(s)?**

- ☐ Yes
- ☐ No

**9. If Yes, how do you gather employee suggestion(s)?**

- ☐ Feedback forms
- ☐ Questionnaire surveys
- ☐ Open forum
- ☐ Other methods (please specify)\_\_\_\_\_

**Quality improvement in your Organization**

**10. Does your organization have a quality improvement program?**

- ☐ No (Please go to question 17)
- ☐ Such a plan is under consideration
- ☐ A quality improvement program has been implemented recently
- ☐ A quality improvement plan has been a part of corporate policy for some time now

**11. What type of quality improvement program do you have?**

- ☐ Total Quality Management
- ☐ Quality Assurance
- ☐ Quality Control

☐ Others (please specify)\_\_\_\_\_

–

**12. Your organization's quality improvement program can be described as:**

☐ There is no formal program

☐ Periodic short-range solutions or motivational program

☐ A formal program is underway with widespread employee awareness

☐ Others (please specify)\_\_\_\_\_

**13. Does your quality improvement plan have the full support of top management?**

☐ Yes

☐ No

**14. The major objectives of your quality programs are:**

☐ Increase productivity

☐ Cost reduction

☐ Involvement of employees in the quality building effort

☐ Compliance with statutory, environment and safety requirement

☐ Customer satisfaction

☐ Others (please specify)\_\_\_\_\_

**Review/ Audits**

**15 Do you have a well established internal quality Audit procedure?**

☐ Yes

☐ No

**16 If yes, how often do you ensure that internal quality audits are carried out effectively?**

- ☐ Once a month
- ☐ Quarterly
- ☐ Once a year
- ☐ Once every two years
- ☐ Other (please specify\_\_\_\_\_

**17. Do you check for design conformance to standards /regulations?**

- ☐ Yes
- ☐ No

**18. If yes, how often do you check for design conformance to standards /regulations?**

- ☐ After every design
- ☐ Before commencement of project
- ☐ During construction
- ☐ Other (please specify\_\_\_\_\_

**19. Do you carry out Peer review/project review after close out of every project?**

- ☐ Yes
- ☐ No

**Training**

**20. Is formal training in quality improvement given to employees?**

- ☐ No training is given (If No please go question to Q.29)
- ☐ Some training is available
- ☐ A formal training program is in effect
- ☐ Other (please specify)\_\_\_\_\_

**21. How do you train your employee for quality?**

- ☐ On-site/On the job training
  - ☐ Seminars /workshops on quality improvement
  - ☐ Short courses
  - ☐ Office library
  - ☐ Other (please specify)
- 

**22. How many times are training organised for employees?**

- ☐ Once a year
- ☐ Twice a year
- ☐ Once every two years
- ☐ Other (please specify)\_\_\_\_\_

**Teamwork**

**23 How does your organization solve problems?**

- ☐ Assign individual to solve
- ☐ Set up a multi-disciplinary team for each problem
- ☐ A permanent team is available
- ☐ Other (please specify)\_\_\_\_\_

**Tools and techniques**

**24 What are the tools used in measuring improvement?**

- ☐ Benchmarking
- ☐ Value engineering /reengineering
- ☐ Check sheets
- ☐ Other (please specify)\_\_\_\_\_

**QUALITY POLICY**

**25 Does the firm have quality manual or documents? (policy, Standards, etc)**

☐ Yes

☐ No

**26 what is the firm's mission statement in relation to quality?**

☐ Quality is captured in the mission statement

☐ There is a standalone policy for quality

☐ Mission statement does not capture quality

☐ Other (please specify)

---

**PROBLEMS AFFECTING QUALITY MANAGEMENT IMPLEMENTATION**

**27. In your view what are the problems affecting Quality Management (QM) implementation in your firm. Not limited to one answer**

☐ Changing behaviour and attitude

☐ Lack of communication in organisation

☐ Firms' emphasis on short-term objectives/gains

☐ Lack of education and training to drive the improvement process

☐ Too much documents are required (Lack of documentation ability)

☐ Lack of top-management commitment/understanding

☐ Lack of employees' commitment/understanding

☐ Lack of expertise/resources in QMS

**Below are a number of quality characteristics which can have an impact on quality management in your firm. Please indicate how significant each quality characteristic can influence quality management (Please mark just one appropriate box)**

**1**=Not Significant,  
Significant

**3**=Moderately Significant     **5**=Exceedingly

**2**=Slightly Significant

**4**=Very Significant

KNUST

Quality Characteristics	1	2	3	4	5
<b>TOP MANAGEMENT COMMITMENT AND LEADERSHIP</b>					
1. Management providing policies for promoting customer satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Management establishing clear and consistent communication of mission, vision and plan statements defining quality values expectations and focus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Management actively leading and directing quality management programs assuming responsibility for evaluating and improving Quality management system at pre defined intervals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Communication of Management Policies and Plans to employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.Reviewing quality issues in the top management meetings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Top management supporting long –term quality improvement process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Attachment of Importance to quality by top management in relation to cost and schedule objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>HUMAN RESOURCE MANAGEMENT</b>					
1 Human resource management policies aligned with site quality /operational and business performance plans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Safeguarding, occupational health and safety and security of employees at sites and offices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Organisation -wide training and development process, including carrier path planning for all employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Supervisors, unit heads and divisional managers assuming active roles as facilitators of continuous improvement, coaches of new methods and leaders of empowering employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Training organised for employees in problem identification and solving skills, quality improvement skills, teamwork and other technical skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Participation of managers and supervisors in specialist training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Management developing an environment helping towards on-the-job-training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Building quality awareness among employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Employees understanding the basic processes used in designing and construction works	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Availability/provision of resources for employee training in the company/division or firm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Training of management and employees in quality principles, tools and techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Providing technical and managerial training to subcontractors to enhance their projects management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>CUSTOMER FOCUS</b>					
1. Customers' requirements are used as the basis for quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Responding effectively to clients'/customers' enquiries and complaints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Employees knowing which attributes of the process in construction the organization's customers value	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Follow -ups with customer or client on products/service and transactions to receive prompt and actionable feedback	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Encouraging employees to satisfy customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Preventive and corrective actions undertaken to delight customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. The use of customer surveys and feedback process, and tracking of other key measures to assess customer satisfaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>PLANNING</b>					
1. Comprehensiveness of quality improvement plan within the organisation					
2. Development and implementation of strategies and plans based on data concerning customers' requirements and the firm's capabilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Management setting quality objectives for both managers and employees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Management communicating its strategy and objectives to the whole staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Well defined responsibilities of personnel who manages performs and verifies work that affects quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Evaluation of results by comparing them to planned results, in order to make improvements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Management involving the employees in the setting of its objectives and plans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Assessments of subcontractors for their ability to meet the subcontract requirement including commercial, statutory and technical aspect prior to selection and award of contract	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>PROCESS MANAGEMENT</b>					
1 Process flow chart and inspection and test plan for activities that directly affect quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Inspection and test plans, including checklist on completion of the construction project or a pre -determined stage of the work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Testing, reviewing and inspection of incoming products or work for specification compliance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Value engineering technique is employed before commencement of construction in order to highlight potential cost time saving proposals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Clarity of work or process instruction given to employees, artisans and site staff(these includes both employees of subcontractors & project staff)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. A system to ensure clarity, conciseness and uniformity of drawings and specification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>SUPPLIER MANAGEMENT</b>					
1. Reliance on reasonably few dependable suppliers who are evaluated and selected based on their capability and commitment to product and service quality, and value for money	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Offering closer and long term working relationship to	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

suppliers					
3 Management encouraging the usage of few suppliers, emphasizing quality rather than price or schedule	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Providing education(Technical Assistance) of suppliers by the organisation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Providing clear specifications to suppliers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Purchasing department assuming responsibility for the quality of incoming products / services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Suppliers having programs to assure quality of their products / services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>CONTINUOUS IMPROVEMENT</b>					
1. Tracking Cost of quality process (rework, waste, rejects) for continuous improvement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Ensuing that design and construction use quality tools(check sheet) for improvement activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Identification of areas for improvement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. The organization reinforcing continuous study and improvement of all its products, services and processes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Practising continual review on the construction safety, work plans and workplace environment with a view for improvement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Practising continual review on process completion time with a view of improvement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Practices to encourage project quality improvement discussions at subcontractor site meetings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Practising Bench marking process in order to improve activities in the firm with subsequent improvement to delight customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>TEAMWORK</b>					
1. Use of specific organizational structures (quality committee, work teams) to support quality improvement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Establishing peer review teams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 Effective coordination between various department of the firm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Activities to encourage frequent contact between parties involved in projects delivery and other functions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>INFORMATION ANALYSIS AND EVALUATION</b>					
1.Establishing internal Quality Audit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.Review of drawings and specification prior to authorization for construction works	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.Document procedures for reviewing disposition of non-conforming products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.Documenting procedure for implementing corrective and preventive actions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.Continual use of internal or external Audits to ensure delivery of quality products and service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.Documentation of project related documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you

## APENDIX B

**Table B.1 Detailed Item Analysis Results**

items	TP MGT	HRM	CF	PLNG	PRS MGT	SUP MGT	CONT. IMP	TMWK	INFOR
1	<b>.751</b>	-.094	.362	.013	.079	.045	.042	.064	.059
2	<b>.624</b>	.399	.319	.373	.549	.061	.384	.560	.302
3	<b>.562</b>	.175	.381	.141	.422	.147	.258	.410	.232
4	<b>.652</b>	.287	.593	-.149	.111	.146	.052	.106	-.132
5	<b>.620</b>	.267	.536	.025	.201	-.048	.162	.230	.132
6	<b>.595</b>	.244	.437	.109	.229	-.037	.020	.257	.151
1	.170	<b>.589</b>	.113	-.136	.088	.191	-.045	.053	.053
2	.176	<b>.581</b>	.055	-.103	.098	.113	-.017	.097	.059
3	.070	<b>.565</b>	-.014	.065	.239	-.034	.021	.242	.070
4	.124	.169	.033	.242	.172	-.057	-.009	.153	-.037
5	.138	<b>.570</b>	.040	-.137	.089	.094	.067	.109	.249
6	.228	<b>.655</b>	.039	.052	.131	.184	.098	.160	.192
7	.094	<b>.407</b>	-.108	.239	.114	.004	.053	.133	-.054
8	.386	<b>.574</b>	.148	.087	.224	.136	.147	.246	.327
9	.044	.161	-.155	.172	.075	-.010	.075	.144	-.163
10	.122	<b>.585</b>	.044	-.137	.090	-.033	-.098	.066	.082
11	.303	.269	-.003	.141	.304	.208	.454	.300	.262
12	.197	<b>.665</b>	-.002	.098	.205	.181	.067	.289	.289
1	.518	.013	<b>.742</b>	.037	.183	.124	.096	.139	-.054
2	.599	.017	<b>.698</b>	.055	.110	.186	.130	.105	.047
3	-.021	.091	.119	.013	.062	.244	.181	.099	.062
4	.493	.172	<b>.538</b>	.194	.294	.017	.139	.285	.204
5	.568	.079	<b>.690</b>	.011	.283	.111	.141	.239	.132
6	.597	.053	<b>.716</b>	.204	.122	.056	.094	.120	.116
7	.542	.030	<b>.718</b>	.069	.140	.158	.070	.117	.101
1	.125	.087	.021	<b>.597</b>	.370	.043	.029	.399	.152
2	.118	.139	.041	<b>.796</b>	.542	.201	.083	.607	.347
3	.090	.049	.019	<b>.832</b>	.390	.007	.119	.384	.168
4	.178	.070	.120	<b>.706</b>	.576	.123	.122	.637	.302
5	.171	.043	.067	<b>.617</b>	.552	.038	.237	.541	.268
6	.063	.089	.044	<b>.793</b>	.449	.016	.154	.475	.267
7	-.298	-.103	.332	.363	.116	.013	.044	.146	.130
8	.054	.144	.004	<b>.562</b>	.378	.009	.067	.340	.167

items	TP MGT	HRM	CF	PLNG	PRS MGT	SUP MGT	CONT. IMP	TMWK	INF
1	.347	.250	.186	.420	<b>.687</b>	-.007	.006	.602	.446
2	.525	.646	-.047	.482	<b>.721</b>	.073	.186	.620	.497
3	.352	.256	.156	.292	<b>.534</b>	.344	.337	.452	.301
4	.147	.165	.078	.606	<b>.714</b>	.075	.243	.506	.423
5	.362	.319	.256	.413	<b>.635</b>	.146	.162	.403	.415
6	.254	.138	.205	.551	<b>.768</b>	.013	.137	.611	.480
1	.076	.086	.069	.257	.019	<b>.784</b>	.365	-.038	.040
2	.118	.191	.132	.155	.260	<b>.754</b>	.375	.073	.003
3	.126	.109	.064	.054	.164	<b>.791</b>	.490	.117	.111
4	.058	.029	.047	.058	.057	.321	.156	.032	.055
5	.077	.113	.027	.105	.237	<b>.678</b>	.461	.214	.186
6	.113	.117	.075	.036	.252	<b>.778</b>	.416	.220	.093
7	-.142	-.009	.165	.142	.127	.170	.059	-.0184	-.044
1	.154	.066	.016	.158	.254	.404	<b>.886</b>	.282	.206
2	.187	-.220	.149	.066	.103	.457	.212	.073	.140
3	.177	.048	.101	.088	.220	.456	<b>.905</b>	.258	.173
4	.251	.290	.107	.153	.221	.394	<b>.859</b>	.286	.240
5	.065	.018	.009	.077	.164	.248	<b>.735</b>	.208	.066
6	.103	.100	-.082	.123	.085	.340	<b>.700</b>	.142	.001
7	.157	.050	.058	.114	.163	.440	<b>.871</b>	.171	.186
8	.229	.256	.062	.124	.232	.336	<b>.878</b>	.312	.275
1	.440	.357	.201	.299	.553	.221	.370	<b>.526</b>	.367
2	.165	.142	.069	.610	.691	-.029	.210	<b>.741</b>	.569
3	.348	.270	.174	.482	.411	-.013	.082	<b>.550</b>	.487
4	.098	.122	.062	.594	.595	.029	.196	<b>.724</b>	.441
1	.013	.131	-.084	.232	.413	.166	.164	.424	<b>.762</b>
2	.081	.219	-.134	.418	.565	-.047	.154	.529	<b>.590</b>
3	.073	.146	-.064	.245	.543	.004	.046	.553	<b>.733</b>
4	.270	.181	.121	.041	.298	.260	.296	.340	<b>.616</b>
5	.050	.049	.096	.298	.413	-.095	.067	.407	<b>.634</b>
6	.369	.129	.235	.108	.184	.243	.259	.230	<b>.533</b>

## APENDIX C

Constructs			Response Categories					
	Items	Imp Index	1	2	3	4	5	Total
<b>TOP Management Commitment &amp; Leadership</b>		<b>76.667</b>						
	1	77.419	0	1	19	29	13	62
	2	83.548	0	0	11	29	22	62
	3	76.452	0	4	20	21	17	62
	4	72.581	0	9	19	20	14	62
	5	77.097	0	3	17	28	14	62
	6	72.903	0	8	19	22	13	62
<b>Human Resources Management</b>		<b>76.452</b>						
	1	73.871	0	4	18	33	7	62
	2	74.516	0	3	17	36	6	62
	3	76.129	0	2	16	36	8	62
	5	77.419	0	1	13	41	7	62
	6	77.097	0	0	15	41	6	62
	8	78.387	0	2	11	39	10	62
	10	76.452	0	1	17	36	8	62
	12	77.742	1	1	9	44	7	62
<b>Customer Focus</b>		<b>76.828</b>						
	1	80.323	0	1	11	36	14	62
	2	77.097	0	1	18	32	11	62
	4	75.806	0	2	21	27	12	62
	5	76.452	0	2	21	25	14	62
	6	73.226	3	3	18	26	12	62
	7	78.065	0	4	15	26	17	62
<b>Planning</b>		<b>79.493</b>						
	1	80.323	0	1	9	40	12	62
	2	80	0	0	8	46	8	62
	3	79.355	0	0	11	42	9	62
	4	78.387	0	0	15	37	10	62
	5	78.387	0	1	12	40	9	62
	6	79.355	0	0	10	44	8	62

	8	80.355	0	1	9	39	13	62
<b>Constructs</b>	<b>Items</b>	<b>Imp Index</b>	<b>Response Categories</b>					<b>Total</b>
<b>Process management</b>		<b>76.935</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
	1	76.774	0	0	23	26	13	62
	2	78.065	0	1	13	39	9	62
	3	74.839	0	2	18	36	6	62
	4	78.065	0	2	12	38	10	62
	5	76.452	0	0	21	31	10	62
	6	77.419	0	2	13	38	9	62
<b>Supplier Management</b>		<b>78.387</b>						
	1	77.419	0	2	14	36	10	62
	2	78.71	0	1	12	39	10	62
	3	78.387	0	1	13	38	10	62
	5	79.032	0	1	13	36	12	62
	6	78.387	0	2	13	35	12	62
<b>Continuous Improvement</b>		<b>84.470</b>						
	1	84.194	0	0	8	33	21	62
	3	83.548	0	1	8	32	21	62
	4	85.484	0	0	8	29	25	62
	5	83.871	0	0	8	34	20	62
	6	84.516	0	0	5	38	19	62
	7	84.839	0	0	7	33	22	62
	8	84.839	0	0	8	31	23	62
<b>Team Work</b>		<b>77.177</b>						
	1	75.806	0	2	17	35	8	62
	2	79.355	0	1	11	39	11	62
	3	76.129	0	0	22	30	10	62
	4	77.419	0	1	14	39	8	62
<b>Information Analysis &amp; Evaluation</b>		<b>79.731</b>						
	1	79.355	0	1	10	41	10	62
	2	81.29	0	1	13	29	19	62
	3	79.677	0	1	14	32	15	62

4	79.355	0	0	9	46	7	62
5	79.065	0	1	17	31	13	62
6	80.645	0	0	10	40	12	62

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